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SITE-WIDE CHARACTERIZATION REPORT
VOLUME 5 OF 5 APPENDICES N-T
AUGUST 1992

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SITE-WIDE CHARACTERIZATION REPORT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

VOLUME 5 of 5
APPENDICES
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U.S. DEPARTMENT OF ENERGY
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FEMP-SWCR - 3

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APPENDIX N

CRITERION TO EXCLUDE UNUSUALLY HIGH SAMPLE QUANTITATION LIMITS FOR CHEMICAL CONSTITUENTS

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N.1.0 INTRODUCTION

When the concentration of a chemical constituent (ion, element, or compound) in an environmental medium (air, water, soil or sediment) can not be reliably measured in a sample that is analyzed, the concentration of the chemical is reported at the Sample Quantitation Limit (SQL) and is qualified with a U (hereafter referred to as a U-qualified datum). In other words, if data are U-qualified, this indicates that the amount of the constituent, if present at all in the sample, is below the SQL. Thus a value of 0.45 $\mu g/\ell$ (U) reported by the laboratory as the concentration of uranium in milk means that the uranium concentration was less than 0.45 $\mu g/\ell$, and the uranium concentration could actually have been any value from 0.00 to 0.44 $\mu g/\ell$.

The SQL is not the same for all chemical constituents. These variations exist because of differences in chemical and physical properties of the constituents in addition to differences in the capabilities of instruments available to measure these properties.

Also, the SQL is not always the same for a specific constituent in all samples of the same environmental medium. For example, the SQL for uranium in groundwater samples may vary for water samples from two different locations. This is due to variations in the kinds or amounts of other substances in the two samples that can interfere with the analysis.

In addition, the SQL for a constituent will not always be the same for identical samples that are from the same location, but that are analyzed at different times. Differences in SQLs can occur as a consequence of unavoidable minor fluctuations from time to time in the performance of analytical instrumentation used for sample analysis (WMCO 1991).

If a constituent is detected at least once in a given set of data, statistical analysis is performed on the data set for use in subsequent exposure and risk calculations. To obtain the mean, upper 95 percent confidence limit on the mean (UCL), or other statistical parameters, one-half the SQL is used to represent the concentration of the constituent in U-qualified samples. In some cases, however, an SQL may greatly exceed other measured values in a data set and this high value could therefore result in biased statistical parameters. This could lead to erroneous risk estimates even though the constituent may not be present. In this case it may be best to delete such a value (EPA 1989a). This appendix provides the criterion by which a high SQL is excluded from a data set (see Section N.2.0) to avoid using biased statistical parameters for a data set and to avoid arriving at misleading conclusions in the risk assessment.

This appendix does not address the problem of high detection limits for radiological analyses. Generally, results for radiological analyses do not exceed Fernald Environmental Management Project (FEMP)-specific detection limits. Instances where radioanalytical results are reported with high detection limits (e.g., certain analytes in Operable Unit 4 silo samples) are addressed on a case-by-case basis.

N.2.0 CRITERION TO EXCLUDE AN UNUSUALLY HIGH SQL

If the SQL of a U-qualified sample from an environmental medium exceeds both the Contract Required Quantitation Limit (CRQL) and the Risk-Based Quantitation Limit (RBQL), the datum is not considered suitable for quantitative use and is removed from the data set prior to statistical analysis.

The CRQL is a chemical-specific level that a Contract Laboratory Program (CLP) laboratory must be able to routinely and reliably detect and quantitate in specified sample matrices. The CRQL may or may not be equal to the reported quantitation limit for a given chemical in a given sample (EPA 1989b). The CRQL values for various chemicals in soil/sediment and water are specified by the EPA's CLP (EPA 1988) and are listed in Tables N.2-1 and N.2-2, respectively.

An RBQL is the concentration of a constituent in a given medium that would result in an incremental lifetime cancer risk (ILCR) of 1×10^{-6} for carcinogens or a hazard index of 1.0 for noncarcinogens under specified exposure scenarios. These scenarios are:

- Exposure Scenario for Soil
  - Carcinogens: a person ingests 100 mg/day of soil throughout a 70-year lifetime (EPA 1989b)
  - NonCarcinogens: a child ingests 200 mg/day of soil from age 0 to 6 (EPA 1989b)

- Exposure Scenario for Water
  - Carcinogens: a person ingests 2 ℓ/day of water throughout a 70-year lifetime (EPA 1989b)
  - Noncarcinogens: A person ingests 2 ℓ/day of water throughout a 70-year lifetime (EPA 1989b).

Calculation of RBQLs is described in Section N.3.0.

TABLE N.2-1

CRQL/RBQL VALUES FOR CHEMICALS IN SOIL/SEDIMENT

Chemical	CRQL	RBQL
1,1-Dichloroethane	0.01	8000.0
1,1-Dichloroethene	0.01	1.17
1,1,1-Trichloroethane	0.01	7200.0
1,2-Dibromo-3-chloropropane	--	0.0318
1,2-Dibromoethane	--	0.00824
1,2-Dichlorobenzene	0.33	7200.0
1,2-Dichloroethane	0.01	7.68
trans-1,2-Dichloroethene	0.01	1600
1,2-Dichloroethylene	0.01	800.0
1,2-Dichloropropane	0.01	10.3
1,1,2,-Tetrachloroethane	--	3.5
1,1,2,2-Tetrachloroethane	0.01	3.5
1,2,3-Trichloropropane	--	480
1,2,4-Trichlorobenzene	0.33	105
1,3-Dichlorobenzene	0.33	--
cis-1,3-Dichloropropene	0.01	3.89
trans-1,3-Dichloropropene	0.01	3.89
1,4-Dioxane	--	63.6
1,4-Dichlorobenzene	0.33	29.2
trans-1,4-Dichloro-2-butene	--	0.075
2-Butanone	0.01	4000.0
2-Chloro-1,3-butadiene	--	1600
2-Chlorophenol	0.33	400.0
2-Chloronaphthalene	0.33	--
2-Hexanone	0.01	--
2-Methylnaphthalene	0.33	--
2-Methylphenol	0.33	--

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TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
2-Nitroaniline	0.8	--
2-Nitrophenol	0.33	--
2,4-Dichlorophenol	0.33	240
2,4-Dinitrophenol	0.8	160
2,4-Dichlorophenoxyacetic acid	0.33	800.0
2,4-Dinitrotoluene	0.33	1.0
2,4,5-Trichlorophenol	0.8	8000
2,4,5-Trichlorophenoxyacetic	--	800
2,4,6-Trichlorophenol	0.33	63.6
2,6-Dinitrotoluene	0.33	1
3-Chloropropene	--	4000
3-Nitroaniline	0.8	--
3,3-Dichlorobenzidine	0.33	1.56
4-Chloro-3-methylphenol	0.33	--
4-Chloroaniline	0.33	320
4-Chlorophenylphenyl ether	0.33	--
4-Methyl-2-pentanone	0.01	--
4-Methylphenol	0.33	--
4-Nitroaniline	0.8	--
4-Nitrophenol	0.8	--
4,4'-DDD	0.0033	2.92
4,4'-DDE	0.0033	2.06
4,4'-DDT	0.0033	2.06
4,6-Dinitro-2-methylphenol	0.8	--
Acenaphthene	0.33	4800.0
Acenaphthylene	0.33	--
Acetone	0.01	8000.0
Acetonitrile	--	480

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TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
Acrolein	--	2.29
Acrylonitrile	--	1.3
Aldrin	0.0017	0.0412
Aluminum	20.0	--
Ammonia	--	77700.0
Anthracene	0.33	24000.0
Antimony	6.0	32
Aroclor	0.033	0.0909
Aroclor-1016	0.033	0.0909
Aroclor-1221	0.067	0.0909
Aroclor-1232	0.033	0.0909
Aroclor-1242	0.033	0.0909
Aroclor-1248	0.033	0.0909
Aroclor-1254	0.033	0.0909
Aroclor-1260	0.033	0.0909
Arsenic	1.0	0.014
alpha-BHC	0.0017	0.111
beta-BHC	0.0017	0.389
delta-BHC	0.0017	0.389
gamma-BHC (Lindane)	0.0017	0.53
Barium	20	4000.0
Benzene	0.01	24.1
Benzo(a)anthracene	0.33	--
Benzo(b)fluoranthene	0.33	--
Benzo(k)fluoranthene	0.33	--
Benzo(a)pyrene	0.33	0.0609
Benzo(g,h,i)perylene	0.33	--
Benzoic acid	--	320000

TABLE N.2-1
(Continued)

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Chemical	CRQL	RBQL
Benzyl alcohol	--	24000
Benzyl(b)fluoranthene	0.33	--
Benyl(k)fluoranthene	0.33	--
Beryllium	0.5	0.163
Bis(2-chloroethyl)ether	0.33	0.636
Bis(2-chloroethoxy)methane	0.33	--
Bis(2-chloroisopropyl)ether	--	3200
Bis(2-ethylhexyl)phthalate	0.33	50
Boron	--	7200
Bromodichloromethane	0.01	5.38
Bromoform	0.01	88.6
Bromomethane	0.01	112.0
Butylbenzylphthalate	0.33	16000
Cadmium	0.5	40.0
Calcium	500.0	--
Carbon disulfide	0.01	8000.0
Carbon tetrachloride	0.01	5.38
Chlordane	0.0017	0.538
alpha-Chlordane	0.0017	0.389
gamma-Chlordane	0.0017	0.538
Chlorobenzene	0.01	1600.0
Chlorobenzilate	--	1600
Chloroethane	0.01	251000.0
Chloroform	0.01	115.0
Chloromethane	0.01	53.8
Chromium	1.0	400.0
Chrysene	0.33	--
Cobalt	5.0	208.0

TABLE N.2-1
(Continued)

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Chemical	CRQL	RBQL
Copper	2.5	2970.0
Cyanide	--	1600.0
Di-n-butyl phthalate	0.33	8000.0
Di-n-octyl phthalate	0.33	1600.0
Dibenzo(a,h)anthracene	0.33	--
Dibenzofuran	0.33	800
Dibromochloromethane	0.01	1600.0
Dibromomethane	--	800.0
Dichlorodifluoromethane	--	16000
Dieldrin	0.0033	0.0438
Diethyl phthalate	0.33	64000
Dimethyl phthalate	--	80000
Dinoseb	--	700
Disulfoton	--	3.2
Endosulfan I	0.0017	4
Endosulfan II	0.0033	4
Endosulfan sulfate	0.0033	--
Endrin	0.0033	24
Endrin ketone	0.0033	--
Ethyl benzene	0.01	800.0
Ethyl methacrylate	--	7200
Fluoride	--	4800.0
Fluoranthene	0.33	3200
Fluorene	0.33	3200.0
Heptachlor	0.0017	0.156
Heptachlor epoxide	0.0017	0.0769
Hexachlorobenzene	0.33	0.44
Hexachlorobutadiene	0.33	8.97

TABLE N.2-1
(Continued)

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Chemical	CRQL	RBQL
Hexachlorocyclopentadiene	0.33	560
Hexachloroethane	0.33	50
Indeno(1,2,3-cd)pyrene	0.33	--
Iron	10.0	--
Isobutyl alcohol	--	24000
Isophorone	0.33	171.0
Lead	0.5	55.2
Magnesium	500	--
Malathion	--	1600
Manganese	1.5	8000.0
Mercury	0.02	24.0
Methacrylonitrile	--	8
Methyl parathion	--	20.0
Methylene chloride	0.01	93.3
Methyl methacrylate	--	6400
Methoxychlor	0.017	400
Molybdenum	--	320.0
Naphthalene	0.33	320.0
Nickel	4	1600
Nitrobenzene	0.33	40.0
N-nitroso-di-n-propylamine	0.33	0.1
N-nitrosodiphenylamine	0.33	143
Parathion methyl	--	20.0
Pentachlorophenol	0.8	5.83
Phenanthrene	0.33	--
Phenol	0.33	48000.0
Potassium	500	--
Pyrene	0.33	2400.0

TABLE N.2-1
(Continued)

Chemical	CRQL	RBQL
Pyridine	--	80
Selenium	0.5	400.0
Silver	1.0	240.0
Styrene	0.01	23.3
Tetrachlorethene	0.01	13.7
Tetraethyldithiopyrophosphate	--	40.0
Thallium	1.0	5.6
Tin	--	48000
Toluene	0.01	16000.0
Toxaphene	--	0.636
Trichloroethene	0.01	63.6
Trichlorofluoromethane	--	24000
Vanadium	5.0	560.0
Vinyl acetate	--	80000.0
Vinyl chloride	0.01	0.368
Total xylenes	0.01	160000.0
Zinc	2.0	16000.0

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TABLE N.2-2

CRQL/RBQL VALUES FOR CHEMICALS IN WATER

Chemical	CRQL	RBQL
1,1-Dichloroethane	0.01	3.5
1,1-Dichloroethene	0.01	0.0000583
1,1,1-Trichloroethane	0.01	3.15
1,2-Dichlorobenzene	0.01	3.15
1,2-Dichloroethane	0.01	0.000384
1,2-Dichloroethylene	0.01	0.35
1,2-Dichloropropane	0.01	0.000515
1,1,2-Trichloroethane	0.01	0.000614
1,1,2,2-Tetrachloroethane	0.01	0.000175
1,2,4-Trichlorobenzene	0.01	0.0459
1,3-Dichlorobenzene	0.01	--
cis-1,3-Dichloropropene	0.01	0.000194
trans-1,3-Dichloropropene	0.01	0.000194
1,4-Dichlorobenzene	0.01	0.00146
2-Butanone	0.01	1.75
2-Chlorophenol	0.01	0.175
2-Chloronaphthalene	0.01	--
2-Hexanone	0.01	--
2-Methylnaphthalene	0.01	--
2-Methylphenol	0.01	--
2-Nitroaniline	0.025	--
2-Nitrophenol	0.01	--
2,4-Dichlorophenol	0.01	0.105
2,4-Dinitrophenol	0.025	0.07
2,4-Dichlorophenoxyacetic acid	--	0.35
2,4-Dimethylphenol	0.01	0.7
2,4-Dinitrotoluene		

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TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
2,4,5-Trichlorophenol	0.025	3.5
2,4,6-Trichlorophenol	0.01	0.00318
2,6-Dinitrotoluene	0.01	0.0000515
3-Nitroaniline	0.025	--
3,3-Dichlorobenzidine	0.01	0.0000778
4-Bromophenyl phenyl ether	0.01	--
4-Chloro-3-methylphenol	0.01	--
4-Chloroaniline	0.01	0.14
4-Chlorophenylphenyl ether	0.01	--
4-Methyl-2-pentanone	0.01	--
4-Methylphenol		
4-Nitrophenol	0.025	--
4,4'-DDD	0.0001	0.000146
4,4'-DDE	0.0001	0.000103
4,4'-DDT	0.001	0.000103
4,6-Dinitro-2-methylphenol	0.025	--
Acenaphthene	0.01	2.1
Acenaphthylene	0.01	--
Acetone	0.01	3.5
Aldrin	0.00005	0.00000206
Aluminum	2	--
Ammonia	--	34.0
Anthracene	0.01	10.5
Antimony	0.06	0.14
Aroclor-1016	0.001	0.00000455
Aroclor-1221	0.002	0.00000455
Aroclor-1232	0.001	0.00000455
Aroclor-1242	0.001	0.00000455

TABLE N.2-2
(Continued)

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Chemical	CRQL	RBQL
Aroclor-1248	0.001	0.00000455
Aroclor-1254	0.001	0.00000455
Aroclor-1260	0.001	0.00000455
Arsenic	0.01	0.0000007
Arsenic, soluble	0.010	0.0000007
alpha-BHC	0.00005	0.00000556
beta-BHC	0.00005	0.0000194
delta-BHC	0.00005	--
gamma-BHC (Lindane)	0.00005	0.0000269
Barium	0.2	1.75
Benzene	0.01	0.0012
Benzo(a)anthracene	0.01	--
Benzo(b)fluoranthene	0.01	--
Benzo(k)fluoranthene	0.01	--
Benzo(a)pyrene	0.01	0.00000304
Benzo(g,h,i)perylene	0.01	--
Benzoic acid	--	140
Benzyl alcohol	--	10.5
Beryllium	0.005	0.00000814
Bis(2-chloroethyl)ether	0.01	0.0000318
Bis(2-chloroethoxy)methane	0.01	--
Bis(2-chloroisopropyl)ether	--	1.4
Bis(2-ethylhexyl)phthalate	0.01	0.0025
Boron	--	3.15
Bromodichloromethane	0.01	0.000269
Bromoform	0.01	0.00443
Bromomethane	0.01	0.049
Butylbenzylphthalate	0.01	7

TABLE N.2-2
(Continued)

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Chemical	CRQL	RBQL
Cadmium	0.005	0.0175
Calcium	5	--
Carbon disulfide	0.01	3.5
Carbon tetrachloride	0.01	0.000269
alpha-Chlordane	0.00005	0.0000269
gamma-Chlordane	0.00005	0.0000269
Chlorobenzene	0.01	0.7
Chloroethane	0.01	110.0
Chloroform	0.01	0.00574
Chloromethane	0.01	0.00269
Chromium	0.01	0.175
Chrysene	0.01	--
Cobalt	0.05	--
Copper	0.025	1.3
Cyanide	--	0.7
Diazinon	--	0.0315
Di-n-butyl phthalate	0.01	3.5
Di-n-octyl phthalate	0.01	0.7
Dibenzo(a,h)anthracene	0.01	--
Dibenzofuran	0.01	0.00714
Dibromochloromethane	0.01	0.7
Dieldrin	0.0001	0.00000219
Diethyl phthalate	0.01	28
Dimethyl phthalate	0.01	35
Disulfoton	--	0.0014
Endosulfan I	0.00005	0.00175
Endosulfan II	0.0001	0.00175
Endosulfan sulfate	0.0001	--

TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
Endrin	0.0001	0.00175
Endrin ketone	0.0001	--
Ethyl benzene	0.01	0.35
Fluoride	--	2.1
Fluoranthene	0.01	1.4
Fluorene	0.01	1.4
Heptachlor	0.00005	0.00000778
Heptachlor epoxide	0.00005	0.00000385
Hexachlorobenzene	0.01	0.0000219
Hexachlorobutadiene	0.01	0.000449
Hexachlorocyclopentadiene	0.01	0.245
Hexachloroethane	0.01	0.0025
Indeno(1,2,3-cd)pyrene	0.01	--
Iron	0.1	--
Isophorone	0.01	0.00854
Lead	0.005	0.0242
Magnesium	5	--
Malathion	--	0.7
Manganese	0.15	3.5
Mercury	0.0002	0.0105
Methylene chloride	0.01	0.00467
Methoxychlor	0.00005	0.175
Molybdenum	--	0.14
Naphthalene	0.01	0.14
Nickel	0.04	0.7
Nitrate nitrite	--	3.5
Nitrobenzene	0.01	0.00854
N-nitroso-di-n-propylamine	0.01	0.000005

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TABLE N.2-2
(Continued)

Chemical	CRQL	RBQL
N-nitrosodiphenylamine	0.01	0.00714
Parathion methyl	--	0.00875
Pentachlorophenol	0.025	0.000292
Phenanthrene	0.01	--
Phenol	0.01	21.0
Potassium	5.0	--
Pyrene	0.01	1.05
Pyridine	--	0.035
Selenium	0.005	0.175
Silver	0.010	0.105
Sodium	5.0	--
Styrene	0.01	0.00117
Tetrachlorethene	0.01	0.000684
Thallium	0.01	0.105
Toluene	0.01	7.0
Toxaphene	0.005	0.0000318
Trichloroethene	0.01	0.00318
Vanadium	0.05	0.245
Vinyl acetate	--	35.0
Vinyl chloride	0.01	0.0000184
Total xylenes	0.01	70.0
Zinc	0.02	7.0
Zinc (soluble)	0.02	7.0

N.3.0 CALCULATION OF RBQLs

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As noted in Section N.2.0, the RBQL is the concentrations of a constituent in a given medium that would result in an incremental lifetime cancer risk of 1×10^{-6} for carcinogens or a hazard index of 1.0 for non-carcinogens. Each RBQL is calculated for the specific exposure scenarios and parameters as follows:

$$RBQL_c = \frac{1 \times 10^{-6}}{[(SF_o)(IR)(EF)(ED)]/[(AT)(BW)]} \qquad \text{(N-3-1)}$$

$$RBQL_n = \frac{[(AT)(BW)(RFD_o)]}{[(IR)(EF)(ED)]} \qquad \text{(N-3-2)}$$

where

$RBQL_c$ = RBQL for carcinogens
$RBQL_n$ = RBQL for non-carcinogens
SF_o = Oral cancer slope factor (chemical-specific)
RFD_o = Oral reference dose (chemical-specific) (EPA 1991a)
IR = Ingestion rate of a given medium
- Soil
  - Carcinogens: IR = 0.0001 kg/day throughout life
  - Noncarcinogens: IR = 0.0002 kg/day for ages 0-6
- Water
  - Carcinogens: IR = 2 ℓ/day
  - Noncarcinogens: IR = 2 ℓ/day

EF = Exposure frequency (365 days/year)
ED = Exposure Duration
- Soil
  - Carcinogens: ED = 70 years
  - Noncarcinogens: ED = 6 years
- Water
  - Carcinogens: ED = 70 years
  - Noncarcinogens: ED = 70 years

AT = Averaging Time
- Carcinogens: AT = 70 years x 365 days/year
- Noncarcinogens: AT = 365 X ED

BW = Body weight
- Adult: BW = 70 kg
- Child (age 0-6): BW = 16 kg

The calculated RBQL values for various chemicals in soil/sediment and water are listed in Tables N.2-1 and N.2-2, respectively. It should be noted that RBQL values have been calculated assuming an exposure duration of 70 years for carcinogens in soil and water and for non-carcinogens in water. The exposure duration recommended by EPA in recent guidance (EPA 1991b) is 30 years. Similarly, an exposure frequency of 365 days per year has been used for calculation of RBQL values, instead of the 350 days per year recently recommended by EPA (EPA 1991b). Use of the new values for the exposure duration and exposure frequency yields RBQL values that are approximately 2.4 times the values given in Tables N.2-1 and N.2-2.

If an SQL exceeds both the CRQL and RBQL, that SQL is excluded from the data set.

There are other situations when the SQL for a U-qualified sample exceeds either the CRQL or the RBQL, or when CRQL and/or RBQL values are not available (e.g., CRQL values are not listed in CLP or RBQL values cannot be calculated because toxicity values are not available) Table N.3-1 presents rules that are followed in such cases to determine if SQL values are included or excluded from statistical analyses of data sets.

TABLE N.3-1

RULES FOR ACCEPTING U-QUALIFIED SAMPLE DATA IN STATISTICAL ANALYSES

Cases		Decision
SQL Below CRQL?	SQL Below RBQL?	Use in Statistical Analyses?
YES	YES	YES[a]
YES	NO	YES[a]
YES	RBQL Not Available	YES[a]
NO	YES	YES[a]
NO	NO	NO
NO	RBQL Not Available	IF ≤ 2 X CRQL, YES[a]. IF > 2 X CRQL, NO.
CRQL Not Available	YES	YES[a]
CRQL Not Available	NO	NO
CRQL Not Available	RBQL Not Available	YES[a]

[a] If the use of ½SQL to represent the concentration of a constituent for a sample in the statistical analysis causes the upper 95% confidence interval on the mean (UCL) to exceed the maximum detected sample concentration, the maximum detected concentration is substituted for the UCL (EPA 1989b), and this value is used in subsequent fate and transport modeling or exposure assessment.

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APPENDIX O

APPENDIX 0

GROUNDWATER FATE AND TRANSPORT MODELING

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O.1.0 INTRODUCTION

The objective of this report is to evaluate the fate and transport of constituents as they migrate from site-wide waste areas through the vadose zone and to the Great Miami Aquifer. The FEMP has been divided into five operable units based on site characteristics. Each operable unit was again sub-divided into separate waste areas. This allows individual waste areas to be modeled as realistically as possible. The following waste areas were considered for long-term analysis of contaminant migration in groundwater at the FEMP:

- Operable Unit One - Waste Pits 1 through 6, Burnpit, and Clearwell
- Operable Unit Two - Solid Waste Landfill, North and South Lime Sludge Ponds, Active and Inactive Flyash Piles, and South Field
- Operable Unit Three - Plant One Storage Pad, Buildings 60, 64, 65, 67 and 68
- Operable Unit Four - Silos 1 and 2, and Silo 3
- Operable Unit Five - Plant 2/3 Area soils, Plant 6 Area soils, Plant 9 Area soils, and Pilot Plant Area soils.

Groundwater fate and transport models were used to predict contaminant movement from source volumes (waste areas) to receptor locations through the groundwater media. Used in conjunction with monitoring data, these models provide contaminant concentrations at potential exposure locations when measured contaminant concentration data are not available, such as for off-property locations or for future exposure predictions.

This appendix presents a description of the technical approach used to model environmental transport by the groundwater pathway. This description includes the methods used to quantitatively predict contaminant concentrations for use in FEMP risk assessments, including discussions of the fate and transport models used and their required data and default parameter values. Figure O.1-1 is the conceptual groundwater fate and transport modeling flow diagram which shows the different steps that are involved in the overall groundwater modeling scenario.

The extent to which contaminants may migrate through the groundwater system depends both on site characteristics and the nature of the contaminants. Because of the variety of the contents of the waste areas and the heterogeneity in the vadose zone beneath the waste areas, a separate conceptual model was developed for each waste area. The development of these models involved the following steps:

1. Review of the available information on the specific waste area to establish the characteristics of the waste

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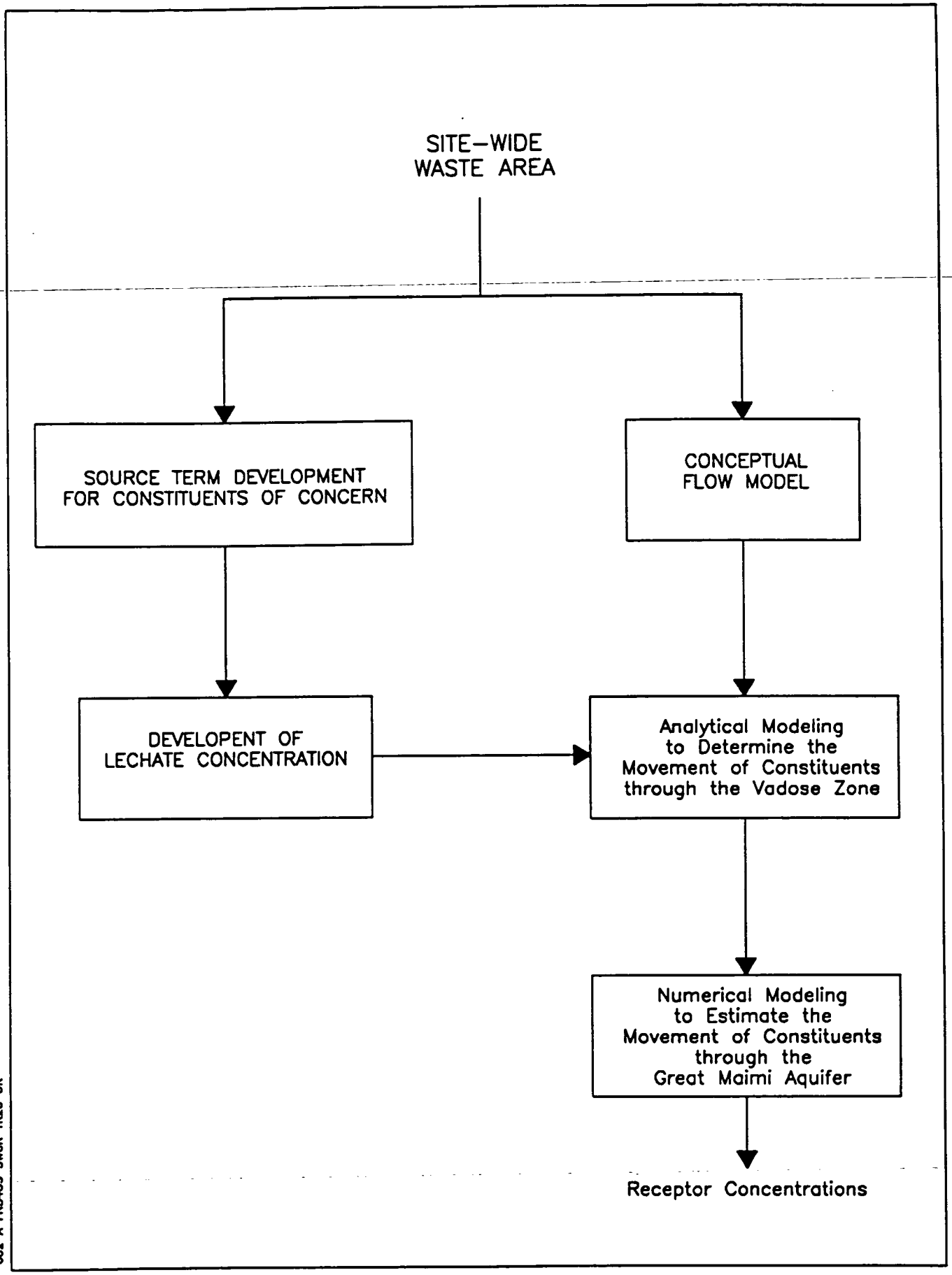

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FIGURE O.1–1. CONCEPTUAL TRANSPORT MODELING DIAGRAM

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2. Identification of constituents of concern by reviewing the production history and by analyzing site characterization data

3. Identification of the hydrologic processes governing the fate and transport of the constituents within each hydrostratigraphic unit

4. Development of a conceptual hydrogeologic model for each waste area, based on information about the contaminants present in that waste area and its location-specific geologic setting.

Once the conceptual model was developed, an existing computer code that allowed the creation of a proper mathematical representation of the conceptual model was selected. The mathematical representations used at the FEMP generally consider the rate at which the modeled processes occur, the interaction of different processes with each other, and the initial conditions of both the waste area and the surrounding geohydrological formations. Some of the major steps involved in constructing mathematical representations of the conceptual models used at the FEMP include:

- Quantification of the concentrations of constituents in the waste unit and the hydrologic processes previously identified;

- Use of measured data and geochemical modeling to determine the chemical speciation projected to result from the reactions of infiltrating water with the waste materials and the matrix of the glacial overburden.

- Estimation of the rate constants describing the cationic retardation of the predicted contaminants. These rate constants are based on partitioning coefficients selected during an extensive literature search.

- Estimation of the rate constants describing contaminant retardation attributable to interactions with organic carbon in the geological formation. These constants are based upon the grain-size distributions and organic carbon content of the glacial overburden matrix.

- Estimation of the rate constants describing the decay rates of the modeled contaminants. These first-order rate constants are based upon radioactive half-lives and biodegradation half-lives in groundwater for radionuclides and organic chemicals, respectively.

After existing computer codes and site-specific input parameters were selected, the codes were used to (1) calculate constituent loading rates to the aquifer beneath the selected waste area; and (2) perform flow and solute transport modeling to determine the effects of dispersion, retardation, and contaminant degradation or decay on the projected contaminant concentrations in the Great Miami Aquifer.

Estimates of future concentrations in the aquifer were the desired result of the modeling effort.

O.2.0 HYDROGEOLOGIC SETTING

The first step in developing the pathway analysis is to develop a conceptual understanding of the depositional history of the site and the general hydrogeologic characteristics of the deposits. This section describes the general geology and hydrogeology of the FEMP. For a detailed discussion, refer to the Fernald Groundwater Report (IT 1990a).

O.2.1 GEOLOGIC SETTING

The geology of the area is dominated by the glacial and glaciofluvial deposits formed during the most recent continental glaciation (approximately 70,000 years before present). Prior to the advancement of the glaciers, a large valley was eroded into the shale bedrock. This valley, which is approximately 200 feet below the existing surface, was filled with well-sorted sand and gravel glacial outwash during the retreat of early glaciers. Beneath the site, this outwash is divided by a till layer at a depth of 120 feet below the current surface. This till sheet was deposited by an ice sheet which advanced approximately to the southern edge of the FEMP. The ice sheet subsequently retreated and the remainder of the bedrock valley was filled with glaciofluvial outwash. Later glacial advances (Shelbyville) caused the displacement of the Dry Fork of the Whitewater River from its historic channel into its present channel. The Shelbyville ice deposited a moraine in the historic channel which formed a dam. The meltwater lake that formed behind the dam gave rise to the lacustrine deposits found in the area. This dam was breached at least two times, with the final breach draining the lake permanently. The lake basin is now occupied by Paddys Run.

In the Paddys Run floodway, recent deposits of silt (loess, fluvial, and lacustrine) form a terrace above the current stream elevation. Paddys Run has cut through this recent terrace and the glacial drift. The bed of Paddys Run from downstream to upstream is located on the well-sorted outwash material which fills the buried valley, on preglacial Whitewater River deposits, and in the uppermost sections, on glacial till.

Since the last retreat of the continental glaciers, the streams in the area have removed much of the till and lacustrine mantle left by the ice sheets. In the Great Miami River valley, the stream has eroded through the till and is now in direct contact with the glaciofluvial outwash deposits that contain the buried valley aquifer.

The term glacial overburden has been selected to describe the deposits located stratigraphically above the glaciofluvial material of the Great Miami Aquifer. The glacial overburden includes the following types of materials:

- Loess - Considered ubiquitous in the Fernald area, it generally forms the uppermost layer of the glacial overburden. Loess is generally a homogeneous fine-grained

blanket deposit, buff to light yellow or yellowish-brown in color. The deposit originated from windblown dust of Pleistocene age carried from the unconsolidated glacial and glaciofluvial deposits uncovered by glacial recession, but prior to the invasion of a vegetative cover.

- Lacustrine - Lacustrine deposits from the glacial lake consisting of well-sorted, stratified fine sands and clays formed in the Paddys Run valley. These varved clays can be interbedded with well-sorted beach deposits along the margins of the former lake basin.

- Till - Undifferentiated glacial till makes up the majority of the glacial overburden at the FEMP site. Because of its location at the ice margin, the till is likely to have been deposited by several modes including moraine deposits, ablation till, and subglacial till sheets arising from differing ice lobes. The primary feature of tills is that they are deposited directly by a glacier without fluvial sorting. The till at the site is a heterogeneous mixture of clays, silts, and pebbles.

- Glaciofluvial - Interbedded with the till are glaciofluvial beds that originated from meltwater streams that occurred along the margins of the ice sheets. These deposits of varying extent consist of highly-sorted sands and fine gravels.

While these deposits are related, each has a unique depositional environment. These depositional environments impart on the material hydrogeologic characteristics that are based primarily on the energy available for sorting when the deposit was formed. In these types of deposits, the higher the sorting energy, the more able the deposit is to transmit water. Secondary processes that occur after formation of the deposit will also affect the potential rates of flow. For example, in the Paddys Run glacial lake there was higher sorting energy along the beaches than in the deeper lake areas.

O.2.2 VADOSE ZONE

The unsaturated zone exists above the groundwater table or phreatic surface of the aquifer. In this zone, the interstices are occupied partially by water and partially by air. The partially filled soil water in the unsaturated zone is known as vadose water. For this, the zone with unsaturated soil above the phreatic surface is also known as vadose zone. Overlying the Great Miami Aquifer at the FEMP are approximately 15 to 35 feet (4.6 to 11 m) of unsaturated sand and gravel outwash deposits. These deposits are assumed to have the same hydraulic characteristics as the underlying saturated material since the deposits are essentially the same.

Dense, fine-grained glacial overburden overlie the unsaturated outwash deposits. These types of deposits have intergranular hydraulic conductivities that are very low, with values in the range of 10^{-7} to 10^{-5} ft/day (10^{-11} to 10^{-9} cm/s) (Heath 1983). Extensive deposits of clayey till can cause isolation from zones of near-surface groundwater flow.

In the Great Plains region and in parts of the Midwest, deposits of clayey or silty clay and glaciolacustrine clay have networks of predominantly vertical joints or fractures. This jointing pattern in the Wisconsin tills has also been noted in the area surrounding the FEMP (Brockman 1988). In the FEMP area, the joints which are commonly near vertical have a polygonal expression and are typically 18 to 25 inches (0.46 to 0.63 m) across. The joints are generally oxidized approximately two inches on either side of the joint. Within the FEMP, fractures have been noted in the till during the RI/FS drilling program and field reconnaissance. These fractures can impart an enhanced bulk hydraulic conductivity of up to 1,000 times greater than that of an unweathered till (Hendry 1988). As a result of increased lateral stresses caused by overburden loading, the hydraulic conductivity of fractured till and clay decreases with depth.

Recent investigations in similar geologic settings indicate that till deposits can be divided from a hydrogeologic standpoint into a brown weathered zone and a gray unweathered zone (Barari and Hedges 1985; Hendry 1988; Cravens and Ruedisili 1987). These studies indicate that infiltration is primarily limited to the weathered till. While precipitation enters this upper zone, it does not act as a significant source of recharge to deeper aquifer zones and the majority of the water lost from till deposits is from evapotranspiration. In addition to the losses due to evapotranspiration, some water may be discharged to small seeps or drainages.

Although the degree of fracturing within the brown tills at the FEMP has not been documented, sufficient observations have been made at the site and in the literature to indicate their presence is a characteristic physical property of these tills. Since fractures have been noted as a dominant feature in most brown tills, it is necessary to consider the effect that these fractures have on water and contaminant transport within the tills. As stated earlier, fractures have been reported to enhance the bulk hydraulic conductivity of till as much as 1,000 times with an expected increase of 1 to 3 times. It is reasonable to expect that contaminants will be transported by seepage more quickly through fractured till than unfractured till. At the FEMP, the till with its appreciable silt and clay content was regarded as providing the Great Miami Aquifer with protection from activities at the site (Dove and Norris 1951). This line of reasoning has justification because the low hydraulic conductivity produces very low velocities even if the hydraulic gradients are large. In addition, most contaminants being transported by seepage through the till matrix undergo attenuation and retardation.

If the till is fractured, these generalizations are not applicable because the velocities of water in the fractures are relatively large compared to the intergranular pore velocities in the unfractured matrix. It should be kept in mind that although the velocities are relatively large, the contaminant flux may be relatively small because the Darcy flux is small.

Fractures not only control velocity but they generally impart a lower capability for attenuation and retardation by adsorption of contaminants. The adsorption processes are capable of removing more contaminant mass from solution if the water is in contact with larger surface areas in the matrix. Contaminants transported by seepage through till fractures only have an opportunity to react with the mineral constituents present in a veneer layer on the exterior of the fracture. Therefore, when flow occurs in the fractures, there is less surface area available for chemical reactions that reduce the concentration of a contaminant or slow the movement of that contaminant. The exact nature of attenuation in fractured till is highly site specific and not well quantified. For example, if till fractures are coated with iron oxides, they may impart significant retardation on ionic solutions (Grisak et al. 1976).

Within the till deposits, there are numerous water-bearing zones that have limited interconnection. The majority of these zones are of glaciofluvial origin and consist of small beds of highly-sorted sands and gravels. These beds are probably the result of small meltwater streams that occurred along the ice margin and within the glacier itself. These intertill aquifers have the following general characteristics:

- High variability in areal extent, thickness, and volume
- Based upon hydrograph analysis, the interconnection between the intertill aquifers is limited
- Hydraulic conductivities are highly variable with an expected range of 2.8×10^{-5} to 280 ft/day (10^{-8} to 0.1 cm/s) (Freeze and Cherry 1979)
- Porosities range from 22.1 to 36.7, with a mean of 31 percent (Morris and Johnson 1967)

Generally these glaciofluvial interbeds are considered to be the major water-bearing units within the glacial overburden. However, movement of water and contaminants within these units will be limited due to limited extent and interconnection of these units. At the FEMP, a series of slug tests on these perched aquifers found hydraulic conductivities ranging from 0.0071 ft/day (2.5×10^{-5} cm/s) (Well 1025) to 14.7 ft/day (5.2×10^{-3} cm/s) (Well 1339).

Glaciolacustrine silt and clay were deposited in meltwater lakes during Pleistocene time. These deposits form some of the most extensive shallow aquitards in North America. However, at the site, the lacustrine deposits are near-surface and have been partially eroded. Due to weathering, these deposits are expected to have high secondary permeability.

O.2.3 GREAT MIAMI AQUIFER

The hydrogeology of the FEMP and the surrounding area is a textbook example of a glaciofluvial buried valley aquifer (Walton 1970; Fetter 1989; Freeze and Cherry 1979). The primary aquifer in the region is the Great Miami Aquifer, a well-sorted sand and gravel water table system consisting of glacial outwash deposits. Groundwater in the aquifer enters the FEMP area via buried channels on the west, north, and east. Under natural conditions, the primary flow would be across the site to the south. However, large pumping wells east of the FEMP in the Big Bend area of the GMR have created a pronounced cone of depression causing flow at the FEMP to have easterly, southeasterly, and southerly components.

The aquifer is divided by a clay aquitard 10 to 20 feet (3 to 6.1 m) thick at a depth of approximately 120 feet (37 m). Flow direction and magnitude of the Great Miami Aquifer were simulated using SWIFT III, a numerical groundwater flow and solute transport model. Subsequent text describes the modeling effort in more detail.

O.2.4 GENERAL CONTAMINANT CHARACTERISTICS AT THE FEMP

The depositional characteristics and the hydrostratigraphic units present at the FEMP impart general contaminant transport characteristics on solutes migrating from the individual waste areas to receptor locations. These characteristics include:

- Solute migration potential: Solutes have a high migration potential through the upper weathered tills due to the fractured nature of the layer. Solute migration can also occur through the unweathered till, however, at a much slower rate. Once the solute reaches the glacial outwash, the solute migration potential is high, based on the high hydraulic conductivity of the matrix.

- Aquifer intercommunication: The intercommunication between perched water-bearing zones is limited in the glacial environment. Communication between the upper water-bearing zones within the till and the Great Miami Aquifer is likely over an extended period of time. Communication between upper and lower zones within the Great Miami Aquifer will be controlled by transverse (vertical) dispersion and will therefore be extremely limited.

- Adsorption/attenuation characteristics: The layers found within the glacial overburden generally have sufficient organic carbon content to cause retardation of organic constituents. The clay mineralogy would result in significant cation retardation for inorganic constituents. Given the till matrix, it is also unlikely that all of the available sites for adsorption would be used by solutes. Therefore, it is unlikely that adsorption/attenuation breakthrough would occur. Adsorption/attenuation will occur at lower rates in the regional aquifer due to the lower organic carbon and clay content in the outwash.

APPENDIX O

GROUNDWATER FATE AND TRANSPORT MODELING

Based upon the general hydrogeologic and contaminant transport characteristics, there is a potential pathway from the waste units through the vadose zone to the regional aquifer. Given the high energy depositional characteristics of the glacial outwash, the pathway would extend from the aquifer-vadose interface to downgradient receptors.

O.3.0 DETAILED CONCEPTUAL FATE AND TRANSPORT MODEL

Water filters through the vadose zone and dissolves materials, forming an aqueous solution (leachate). This solution continues to percolate through the soil/waste matrix in the vadose zone as it moves toward the aquifer. The leachate often reacts with the soil/waste matrix through which it flows. These interactions determine what chemical species are present in the percolating water (leachate), and how fast they will move in the unsaturated zone. In this analysis the composition of the leachate and the speed at which individual constituents migrate will be treated individually.

The conceptual model of the geochemical interactions in the vadose zone traces the chemical reactions which occur when water migrates through, and equilibrates with, solids in compositionally-distinct horizons. This process is illustrated in Section 3.3.1 of Part I. For example, percolating rainwater reacts with waste to form leachate at the base of each waste area (Leachate A). This leachate migrates into the underlying glacial-overburden, where it reacts with the minerals in the overburden to form a modified leachate (Leachate B).

Contaminant transport in the vadose zone includes the bulk migration of water and dissolved materials from waste (source) areas at the FEMP to the Great Miami Aquifer. This occurs as surface water infiltrates from the surface and percolates through the source of contamination, and its surrounding soil, into the saturated zone. Downward movement of water, driven by the forces resulting from gravitational potential, capillary pressure, and other components of total fluid potential, mobilize the contaminants and carry them through the vadose zone. Vertical transport down through the vadose zone to the aquifer and the horizontal transport through the aquifer to the well of a potential human receptor is illustrated in Section 3.3.1 of Part I.

As stated above, the site was divided into smaller portions containing specific waste areas. These areas exhibit considerable diversity in their contents and in the physical and chemical characteristics of the vadose zone beneath them. Because of this diversity, the modeling of the contaminant migration through the vadose zone was considered imperative for the estimation of contaminant loading rates to the regional aquifer model. In order to model the transport of these contaminants, it was necessary to adapt the generic conceptual model presented in the Risk Assessment Work Plan (DOE 1992) to a series of specific conceptual models for each distinct waste area. These conceptual models considered the following:

- The contents of the waste area
- The presence of standing water in the waste area
- The presence or absence of a discrete cap
- The identifiable geologic strata beneath the waste area
- The thickness of each layer in the vadose zone
- The vertical permeability of the layers

- The interstitial fluid velocity through each layer based on saturation
- The dispersion coefficients of each layer.

O.3.1 DESCRIPTION OF OPERABLE UNIT WASTE AREAS

The following is a description of waste areas associated with the operable units at the FEMP. The description provides a brief explanation of the history and physical characteristics of each waste area.

O.3.1.1 Operable Unit 1

Operable Unit 1 is a waste disposal area consisting of six waste pits, a Clearwell, and a Burnpit which are located in the northwest portion of the FEMP. The six waste storage pits were constructed between 1952 and 1978 and were used to store process residues, filter cake materials, and various other wastes.

O.3.1.1.1 Waste Pit 1

Waste Pit 1 was constructed in 1952 and is located in the southern portion of the Operable Unit 1 study area. The disposal area was built by excavation into an existing clay layer followed by an additional liner of four feet of clay. In 1957, Waste Pit 1 was expanded by adding a berm to the western side. Currently, the surface area is estimated at 7685 m^2 and the volume is estimated at 25,750 m^3. Pit one received radioactive wastes consisting primarily of neutralized waste filter cakes, production plant sump cakes, depleted slag, scrap graphite, contaminated brick and sump liquid. The dry density and the mass of material in the waste pit are estimated at 1753 kg/m^3 and 45,140,000 kg, respectively. Waste Pit 1 was closed in 1959, backfilled and covered with a clean fill cap. The thickness of the cap is approximately 0.31 m.

O.3.1.1.2 Waste Pit 2

Waste Pit 2 was constructed in 1957 in the area of a small pond located to the northeast of Waste Pit 1. Waste Pit 2 was constructed into existing native clay and was operated from 1957 until mid-1964. The surface area is estimated at 4173 m^2 and the volume is estimated at 14,130 m^3. Waste Pit 2 received primarily dry, low-level radioactive wastes consisting of neutralized waste filter and sump cakes, sump liquid, depleted slag, scrap graphite, and contaminated brick. The dry density of the material is 1383 kg/m^3 and the mass is estimated at 19,540,000 kg. The waste pit was covered with clean fill and graded to drain surface runoff to the Clearwell for subsequent discharge to the GMR. The thickness of the cap is estimated to be 0.46 m.

O.3.1.1.3 Waste Pit 3

Construction on Waste Pit 3 was completed in 1959 by excavating into the underlying clay layer and was lined with an additional one foot of clay material. Waste Pit 3 is located in the west-central portion of Operable Unit 1 and is the largest of these waste pits. The surface area is estimated at 22,430 m^2 and the volume of material is estimated to be 181,200 m^3. Waste Pit 3 was operated as a settling basin from 1959 to 1968 and received liquid waste streams consisting of lime-neutralized waste solutions from the FEMP production plants. The waste pit was used to dispose of slag leach residue, filter cakes, flyash, and lime sludges. The dry density of the waste material is estimated at 1415 kg/m^3 and the mass is estimated at 256,400,000 kg. Waste Pit 3 was taken out of service in 1977, and clean fill was placed over the waste material and graded to divert surface runoff to the Clearwell. The thickness of the cap is approximately 2.74 m.

O.3.1.1.4 Waste Pit 4

Waste Pit 4 was constructed in 1960 using similar construction techniques as Waste Pit 3. It is estimated that the surface area is 7788 m^2 and the volume of waste is 41,060 m^3. The pit received radioactive wastes such as process residues, filter cakes, flyash, slurries, raffinates, graphite, waste sludges, and asbestos until May 1986. The dry density of the waste material is estimated to be 1933 kg/m^3 and a mass of 79,350,000 kg. Surface water runoff is diverted via surface grading to the Clearwell prior to discharge to the GMR. Groundwater monitoring wells are located upgradient and downgradient of Waste Pit 4. The pit is covered with an interim RCRA cover at the present time and is no longer in service. The thickness of the cap is estimated to be 1.83 m.

O.3.1.1.5 Waste Pit 5

Waste Pit 5 is a long-rectangular shaped waste unit located in the north-northwest corner of Operable Unit 1. The waste pit was constructed in 1968 using a 60-mm-thick Royal-Seal EPDM elastomeric membrane liner. The surface area of Waste Pit 5 is estimated at 14,970 m^2 and the volume of waste is 75,570 m^3. Liquid waste slurries from the Refinery and the Recovery Plant including materials similar to Waste Pit 3 such as neutralized raffinate, slag leach slurry, sump slurry and lime sludges, similar to Waste Pit 3 were disposed of in Waste Pit 5. The dry density of the waste material is estimated to be 1002 kg/m^3 and a mass of 75,680,000 kg. Although use of the pit as a disposal location for settling solids was halted in mid-1983, clear decant from process effluent continues to flow by gravity across the surface of the pit to the Clearwell from which it is monitored and discharged. There is no cap on Waste Pit 5.

O.3.1.1.6 Waste Pit 6

Waste Pit 6 was constructed in 1978 and 1979 and was used until early 1985. The waste pit is located adjacent to, and has a similar lining construction as, Waste Pit 5. The surface area of Waste Pit 6 is estimated at 3011 m^2 and the volume of waste is 8835 m^3. Wastes disposed in this pit include nonpyrophoric solid wastes, green salt, filter cakes, and process residues containing

elevated levels of uranium. The estimated material dry density is 1622 kg/m^3 and the mass is 14,330,000 kg. Until March 1987, rainfall that was collected in the pit was pumped to Waste Pit 5 for settling before discharge via the Clearwell. Since then, collected rainfall is pumped to the biodenitrification surge lagoon. There is no cap on Waste Pit 6.

O.3.1.1.7 Burnpit

The Burnpit is located in the central portion of Operable Unit 1 and was first used in 1957 as a source-site for clay to line Waste Pits 1 and 2. The resulting excavation was subsequently used to dispose of laboratory chemicals and to burn unknown quantities of combustible materials, including pyrophoric and reactive chemicals, oils, and other low-level mixed combustible materials. The volume of waste in the Burn Pit is estimated at 6937 m^3. The dry density of the material is 1301 kg/m^3 and the mass of the material in the Burn Pit is 9,025,000 kg. The lateral boundaries of the Burn Pit are no longer distinguishable because fill was graded to match surrounding topography, and a vegetative cover has been established over the filled area. The surface area of the Burn Pit is estimated at 2019 m^2 and the thickness of the cap is approximately 0.61 m.

O.3.1.1.8 Clearwell

The Clearwell is located in the southwestern portion of Operable Unit 1. The Clearwell was first used in 1959 and is essentially a settling pond used as a treatment facility for clear process effluents and surface runoff. The surface area of the Clearwell is estimated at 2737 m^2 and the volume is 3828 m^3. Effluent from the Clearwell is discharged to the GMR through the main effluent line. The dry density of material in the Clearwell is 1619 kg/m^3 and the mass of material is 6,197,000 kg. The Clearwell still receives decanted water from Waste Pit 5.

O.3.1.2 Operable Unit 2

Operable Unit 2 consists of five unlined waste disposal areas used for the disposal of flyash, spent lime, solid waste, and construction rubble from facility operations. The waste disposal areas include the Solid Waste Landfill, the North and South Lime Sludge Ponds, the Inactive Flyash Pile, the Active Flyash Pile, and the South Field. The primary characteristic of these units is that they involve large volumes of waste of which only small percentages are hazardous chemicals and/or radionuclides.

O.3.1.2.1 Solid Waste Landfill

The Solid Waste Landfill is located in the northeast corner of the waste storage area, adjacent to a drainageway and a railroad line. The landfill was started in 1954 and used for the disposal of cafeteria waste, rubbish, and other types of wastes from nonprocess areas. It is composed of five excavated cells and an evaporation pond. The five cells have been covered with on-site soils and the evaporation pond has been backfilled. The landfill has a surface area of 3931 m^2 and the volume is estimated at 14,980 m^3. An inventory of the waste types and quantity disposed of in the

cells was not recorded, however, the dry density of material is estimated at 1694 kg/m^3 and the mass of the material is estimated at 25,370,000 kg. The landfill has not been used since 1986.

O.3.1.2.2 North Lime Sludge Pond

The North Lime Sludge Pond is an unlined pond that has received spent lime sludges from FEMP water treatment plant operations and sludges from neutralization of the boiler plant blowdown and coal pile storm water runoff. The surface area is estimated at 2604 m^2 and the volume is estimated at 4166 m^3. The North Lime Sludge Pond is partially covered with water which varies in volume due to actual operating conditions and the amount of local precipitation. The dry density of the material is 757 kg/m^3 and the mass is estimated at 3,154,000 kg.

O.3.1.2.3 South Lime Sludge Pond

The South Lime Sludge Pond is a dry, unlined pond located directly south of the North Lime Sludge Pond. The pond is covered with vegetation with an estimated surface area of 2751 m^2. The pond does not have a cap. The South Lime Sludge Pond has a higher berms and a greater surface elevation and the volume of material is estimated at 9353 m^3, significantly greater than the North Lime Sludge Pond. The material dry density is 758 kg/m^3 and the mass of material is 7,071,000 kg. Spent lime sludges from FEMP water treatment plant operations as well as sludges from the neutralization of boiler plant blowdown and coal pile storm water runoff were pumped to this pond and allowed to settle. This pond has been inactive since the mid-1960s.

O.3.1.2.4 Active Flyash Pile

The Active Flyash Pile is located to the east of the running track/South Field, adjacent to an access road that runs between the waste areas. The pile is used for flyash disposal from a coal-fired boiler plant located in the main production facility. The surface area of the pile is estimated at 8714 m^2 and the flyash volume is estimated at 44,980 m^3. The dry density of material is 963 kg/m^3 and the mass is estimated at 43,350,000 kg. The Active Flyash Pile does not contain a cap.

O.3.1.2.5 Inactive Flyash Pile

The Inactive Flyash Pile is located in the southwestern portion of the FEMP, adjacent to the South Field. The northern portion of the disposal area is on top of an old drainage channel leading to Paddys Run. The surface area and waste volume are estimated at 12,150 m^2 and 59,980 m^3, respectively. The waste material in the disposal area contains predominately flyash in addition to small amounts of building rubble such as concrete, gravel, asphalt, masonry, and steel rebar. The dry density of the material is 802 kg/m^3 and the mass is 48,110,000 kg. The Inactive Flyash Pile has little soil and vegetation with no cap.

O.3.1.2.6 South Field

The South Field is the largest of the Operable Unit 2 waste areas that was used as a burial site for construction rubble from 1954 to 1957. The rubble includes debris from the razing of an old administration building. The surface area of the South Field is 22,500 m^2 and the volume is estimated at 83,310 m^3. There is no cap on the waste unit although vegetation covers the area. The dry density and the mass of material are 1551 kg/m^3 and 129,300,000 kg, respectively.

O.3.1.3 Operable Unit 3

The waste source areas considered for groundwater fate and transport analyses from Operable Unit 3 are the Plant One Storage Pad and the storage Buildings 60, 64, 65, 67 and 68. The principle purpose of these areas is to provide interim drum storage for thorium and uranium compounds. The thorium compounds were produced as a result of manufacturing operations between 1953 and 1986 and have been stored at these locations (DOE 1991)

O.3.1.3.1 Plant One Storage Pad

The Plant One Storage Pad is located in the southern portion of the northwest quadrant at the FEMP. The drum storage pad is located to the north and adjacent to Plant 1. The principle activities at these facilities include processing of slightly enriched uranium, uranium compound milling, materials sampling, analysis, and storage, and drum reconditioning. The Plant One Storage Pad contains 132,400 drums (55-gallon) with residues containing organic and radionuclide constituents. The surface area and volume of the storage pad is 9187 m^2 and 27,560 m^3, respectively. The total mass of the pad is 21,680,000 kg and the density is 786.7 kg/m^3.

O.3.1.3.2 Building 60

Building 60 is a storage facility located in the northern portion of the northwest quadrant. The facility has 1788 drums. The surface area of Building 60 is 186.1 m^2 and the pad and subgrade material (soil) volume is 372.3 m^3. The density is estimated to be 2180 kg/m^3.

O.3.1.3.3 Building 64

Building 64 and Building 65 are located adjacent to one another in the central portion of the northeast quadrant. Building 64 stores 420 drums containing residue materials at an estimated mass of 190,900 kg. The surface area of Building 64 is 43.7 m^2 and the volume of the pad and subgrade material is 87.4 m^3.

O.3.1.3.4 Building 65

Building 65 contains approximately 5600 drums with an estimated mass of 2,545,000 kg. The surface area of the building and the volume of the pad and subgrade material is 582.9 m^2 and 1166 m^3, respectively. The density of the pad and subgrade material is estimated to be 2180 kg/m^3.

O.3.1.3.5 Building 67

Building 67 is located in the southwest corner of the northwest quadrant, just west of Plant 1. The facility is used as a storage location for approximately 6000 drums. The total mass of material in the drums is 2,729,000 kg. Building 67 contains a surface area of 625 m^2 and a volume of pad and subgrade material of 1250 m^3.

O.3.1.3.6 Building 68

Located in the southwest corner of the FEMP is Building 68. This facility is used to store 1317 drums containing thorium residues. The total mass in the drums is 598,600 kg. The surface area of Building 68 is 136.1 m^2 and the volume of the pad and subgrade material is 272 m^3. The density of this material is 2180 kg/m^3.

O.3.1.4 Operable Unit 4

Operable Unit 4 includes the physical structures and waste contents of the K-65 silos (Silos 1 and 2), the metal oxide silo (Silo 3). These silos were built to receive wastes from the processing of pitchblende ore and concentrates and are located south of the waste pit area in the west-central portion of the FEMP.

O.3.1.4.1 Silos 1 and 2

Silos 1 and 2 were used for the storage of radium-bearing residues formed as by-products of processing the pitchblende ore and yellow cake. Silos 1 and 2 received waste from 1952 to 1958. Waste raffinates were pumped into the silos where the colloids would settle. The decant water was recovered for reuse in the process. Settling and decanting continued until the silos were filled to approximately four feet (1.2 m) below the top of the vertical wall. Each silo has a diameter of approximately 24.4 m; the total surface area of Silos 1 and 2 is 934 m^2. To ensure that the waste material was contained, investigations on the silo structural integrity were made and were followed by corrective measures. The volume in the Silos 1 and 2 is estimated at 5522 m^3. The dry density of the material in Silos 1 and 2 is 2050 kg/m^3 and the total mass of material is 11,320,000 kg.

O.3.1.4.2 Silo 3

Silo 3 was constructed in 1952 in a manner similar to Silos 1 and 2. Silo 3, also known as the metal oxide silo, contains waste from the processing of ores with low levels of radium. The surface area of Silo 3 is 467 m^2 and the volume is 3902 m^3. The contents are waste raffinate slurries from refinery operations that were dewatered in an evaporator and spray-calcined to produce a dry waste for storage. These wastes were blown in under pressure to fill Silo 3. The dry density of material is estimated at 2267 kg/m^3 and the mass of material is 8,847,000 kg.

O.3.1.5 Operable Unit 5

Operable Unit 5 is defined as groundwater, contaminated soils not included in the definitions of Operable Units 1, 2, 3, and 4, surface water, sediments, flora, and fauna. Of these, the waste source areas considered for fate and transport modeling are the contaminated soils and the perched groundwater in the former production area. The contaminated soils are in the Plant 2/3 area, Plant 6 area, Plant 9 area, and the Pilot Plant area.

O.3.1.5.1 Plant 2/3 Area Soils

Plant 2/3 is located adjacent to Second Street and the elevated water tower. The facility is a large-scale refinery operation in which a series of chemical processes produced uranium trioxide. Nitrogen oxides produced during the dissolution and denitrification steps were converted to nitric acid and reused in the process. The surface area of contaminated soils in the Plant 2/3 area is estimated at 26,040 m^2 and the volume of material is estimated at 123,000 m^3. The material dry density is 1462 kg/m^3 and the mass of material is 179,900,000 kg.

O.3.1.5.2 Plant 6 Area Soils

Plant 6 is a metals fabrication plant located in the southeast quadrant bounded by First and Second Street and abutted by F Street. Plant 6, the metals fabrication plant, heat-treated uranium metal billets to improve their strength and grain structure in preparation for extrusion into tubes at other sites. The surface area and volume of contaminated soils in the Plant 6 area are estimated to be 17,440 m^2 and 109,000 m^3 respectively. The dry density of material in Plant 6 is 1462 kg/m^3 and the mass of material is 159,300,000 kg.

O.3.1.5.3 Plant 9 Area Soils

Plant 9 is comprised of a decontamination and decommissioning facility, maintenance building, boiler plant, tank farm, and a metal scrap pile located in the northeast quadrant. The facility was used for special uranium products casting, uranium heat treating, machining and decladding, thorium processing, decontamination and decommissioning of equipment, equipment maintenance, chemical and metal scrap storage, and site production of steam, air, and water. The surface area and volume of contaminated soils in the Plant 9 area are estimated to be 5813 m^2 and 34,880 m^3, respectively. The dry density and mass of material in Plant 9 are estimated to be 1462 kg/m^3 and 50,990,000 kg, respectively.

O.3.1.5.4 Pilot Plant Area Soils

Located adjacent to First Street in the southwest quadrant is the Pilot Plant Area. The principal activities include various types of pilot-scale operations along with sample testing and analysis. The surface area and volume of contaminated soils in this area are estimated at 4650 m^2 and 27,900 m^3, respectively. The dry density of material for the Pilot Plant Area is 1463 kg/m^3 and the mass of material is 40,790,000 kg.

O.3.2 SOURCE TERMS

Analytical data for the site-wide waste areas were compiled and screened to identify those constituents that are of concern based upon the risk assessment criteria established in the Risk Assessment Work Plan Addendum (DOE 1992). Tables O.3-1 through O.3-5 list all the constituents of concern and their corresponding upper 95% confidence limit (UCL) on the concentrations in the source volumes (waste areas) for Operable Units 1 through 5 respectively. These tables also present the source terms, i.e., the initial concentrations of leachate (used as input source concentrations in the vadose zone transport model) that percolates through the soil/waste matrix in the vadose zone. However, field leachate results from the unsaturated media have not always been analyzed and therefore, alternative methods for estimating the best available site-specific data for leachate concentrations for the constituents of concern is necessary. The hierarchy decision method used to estimating leachate concentrations for radionuclides, inorganic and organic compounds is presented in the following text.

O.3.2.1 Leachate Concentrations for Radionuclides and Metals

Figure O.3-1 illustrates the approach for estimating the leachate concentrations for radionuclides and inorganic compounds to be used by vadose zone models. The logic behind using the decision hierarchy outlined in Figure O.3-1 rests with applying the best available site-specific data to estimating the leachate concentrations of the constituents of concern for the site-wide waste areas. Each successively lower step on this hierarchy represents a more conservative method for estimating the contaminant concentrations in leachate, with the potential to generate a greater uncertainty in the estimation. In applying this decision hierarchy to site-wide waste areas, waste leachate (Leachate A) may be estimated by using data from several levels. For instance, a particular waste area lacks data on insitu leachate and we are returned to the next level of the decision hierarchy to evaluate TCLP data. If the contaminant inventory in the source volume is depleted in less than 70 years using the TCLP values or the TCLP data is not available for a contaminant, we are left with estimating the waste leachate with mineral solubility calculations using geochemical modeling discussed in Section O.4.0. At this point of the decision hierarchy if contaminant solubility limits are not reached for any one of the remaining constituents of concern then we use EPA 70-year rule to calculate the waste leachate or Leachate A. After the estimation of Leachate A is finalized it (Leachate A) is reacted with the glacial overburden minerals using the EQ3/6 code and estimate of Leachate B is developed which is used as initial input concentrations into the vadose zone model. If the contaminant solubility limit is not reached, leachate A is used as input concentrations in the fate and transport modeling (Figure O.3-1).

TABLE O.3-1
SOURCE CHARACTERIZATION FOR OPERABLE UNIT ONE

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
RADIONUCLIDES				
WASTE PIT 1	Cs-137	1.270E-08	5.733E-01	9.960E-11
	Ra-226	6.590E-05	2.975E+03	1.030E-06
	Ru-106	2.929E-09	1.322E-01	3.050E-13
	Tc-99	2.943E-04	1.328E+04	8.740E-05
	Th-228	4.031E-08	1.820E+00	3.720E-19
	Th-230	1.362E-01	6.148E+06	1.260E-12
	Th-232	1.994E+02	9.001E+09	1.840E-09
	U-234	1.334E-01	6.022E+06	3.200E-08
	U-235	4.221E+01	1.905E+09	1.010E-05
	U-238	3.384E+03	1.528E+11	8.120E-04
WASTE PIT 2	Cs-137	2.808E-08	5.487E-01	9.960E-11
	Pu-238	5.603E-09	1.095E-01	1.260E-15
	Pu-239/240	3.820E-06	7.464E+01	8.590E-13
	Ra-226	4.350E-04	8.500E+03	1.030E-06
	Ru-106	6.560E-09	1.282E-01	3.050E-13
	Tc-99	7.984E-03	1.560E+05	8.740E-05
	Th-228	1.362E-07	2.661E+00	2.750E-19
	Th-230	1.644E-01	3.212E+06	3.320E-13
	Th-232	9.116E+02	1.781E+10	1.840E-09
	U-234	6.679E-01	1.305E+07	2.920E-08
	U-235	6.448E+02	1.260E+10	2.820E-05
	U-238	1.814E+04	3.545E+11	7.940E-04
WASTE PIT 3	Am-241	1.429E-05	3.664E+03	1.499E-05
	Cs-137	1.934E-08	4.959E+00	1.380E-10
	Np-237	6.435E-04	1.650E+05	4.000E-06
	Pu-238	1.413E-08	3.623E+00	7.043E-16

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TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 3	Pu-239/240	2.948E-05	7.559E+03	1.470E-12
	Ra-226	4.321E-04	1.108E+05	1.160E-09
	Sr-90	1.408E-08	3.610E+00	2.110E-11
	Tc-99	1.291E-01	3.310E+07	2.340E-04
	Th-228	9.997E-08	2.563E+01	8.279E-19
	Th-230	8.555E-01	2.194E+08	7.085E-12
	Th-232	2.177E+02	5.582E+10	1.803E-09
	U-234	5.677E-02	1.456E+07	3.278E-05
	U-235	3.459E+01	8.869E+09	1.997E-02
	U-238	7.205E+02	1.847E+11	4.160E-01
WASTE PIT 4	Np-237	5.245E-04	4.162E+04	2.850E-07
	Pu-238	2.918E-08	2.315E+00	7.380E-15
	Pu-239/240	5.899E-06	4.681E+02	1.490E-12
	Ra-226	3.165E-05	2.511E+03	2.436E-05
	Ru-106	5.798E-09	4.601E-01	4.463E-09
	Tc-99	1.326E-02	1.052E+06	1.110E-05
	Th-228	3.018E-07	2.395E+01	1.077E-18
	Th-230	2.802E-02	2.223E+06	1.000E-13
	Th-232	5.072E+02	4.025E+10	1.810E-09
	U-234	2.799E-01	2.221E+07	6.808E-06
	U-235	1.536E+02	1.219E+10	3.736E-03
	U-238	1.366E+04	1.084E+12	3.320E-01
WASTE PIT 5	Cs-137	2.697E-08	2.041E+00	1.040E-09
	Np-237	2.747E-02	2.079E+06	1.000E-06
	Pu-238	2.126E-07	1.609E+01	2.264E-12
	Pu-239/240	1.566E-04	1.185E+04	1.668E-09
	Ra-226	1.203E-04	9.104E+03	3.125E-05

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 5	Sr-90	7.200E-08	5.449E+00	3.330E-10
	Tc-99	1.083E-01	8.196E+06	1.880E-05
	Th-228	1.461E-07	1.106E+01	6.309E-19
	Th-230	7.412E-01	5.609E+07	3.201E-12
	Th-232	4.161E+02	3.149E+10	1.796E-09
	U-234	1.398E-01	1.058E+07	7.705E-05
	U-235	1.489E+01	1.127E+09	8.207E-03
	U-238	7.361E+02	5.571E+10	4.057E-01
WASTE PIT 6	Cs-137	8.905E-08	1.276E+00	1.720E-10
	Np-237	6.043E-03	8.660E+04	4.000E-06
	Pu-238	7.512E-08	1.076E+00	3.581E-16
	Pu-239/240	2.307E-04	3.306E+03	1.099E-12
	Ra-226	8.015E-06	1.149E+02	1.570E-10
	Sr-90	2.659E-08	3.810E-01	1.400E-11
	Tc-99	9.557E-03	1.370E+05	3.500E-05
	Th-228	2.338E-09	3.350E-02	2.185E-15
	Th-230	1.958E-03	2.806E+04	1.830E-09
	U-234	8.098E-01	1.160E+07	7.380E-07
	U-235	8.089E+02	1.159E+10	7.370E-04
	U-238	3.157E+04	4.524E+11	2.876E-02
BURNPIT	Np-237	6.393E-04	5.770E+03	2.850E-07
	Pu-238	1.208E-08	1.090E-01	5.988E-15
	Pu-239/240	3.014E-06	2.720E+01	1.494E-12
	Ra-226	2.635E-06	2.378E+01	7.960E-07
	Tc-99	4.192E-03	3.783E+04	1.110E-05
	Th-228	1.521E-08	1.373E-01	5.411E-19
BURNPIT	Th-230	4.406E-03	3.976E+04	1.567E-13

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
	Th-232	5.087E+01	4.591E+08	1.810E-09
	U-234	4.037E-02	3.643E+05	2.507E-05
	U-235	7.449E+00	6.723E+07	4.626E-03
	U-238	5.335E+02	4.815E+09	3.313E-01
CLEARWELL	Cs-137	4.687E-06	2.905E+01	1.380E-10
	Np-237	3.591E-03	2.225E+04	4.000E-06
	Pu-238	5.370E-09	3.328E-02	1.470E-12
	Ra-226	4.429E-04	2.745E+03	1.160E-09
	Sr-90	1.402E-07	8.688E-01	2.110E-11
	Tc-99	1.726E-02	1.070E+05	2.340E-04
	Th-228	6.181E-08	3.830E-01	3.302E-19
	Th-230	2.125E-01	1.317E+06	1.135E-12
	Th-232	3.386E+02	2.098E+09	1.809E-09
	U-234	5.833E-02	3.615E+05	1.263E-05
	U-235	2.232E+01	1.383E+08	4.833E-03
	U-238	1.991E+03	1.234E+10	4.312E-01
INORGANICS				
WASTE PIT 1	Cobalt	2.785E+01	1.257E+09	1.120E+00
	Copper	7.839E+01	3.539E+09	7.300E-04
	Lead	5.725E+01	2.584E+09	4.710E-01
	Manganese	2.367E+03	1.069E+11	6.080E-02
	Mercury	3.600E-01	1.625E+07	8.820E-11
	Nickel	5.995E+01	2.706E+09	1.520E+00
	Potassium	1.985E+03	8.958E+10	9.300E+00
	Silver	3.309E+01	1.494E+09	2.380E-04
WASTE PIT 2	Beryllium	8.920E+00	1.743E+08	5.700E-06
	Cobalt	3.412E+02	6.667E+09	1.120E+00

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 2	Copper	2.839E+02	5.547E+09	7.300E-04
	Lead	1.742E+02	3.404E+09	4.710E-01
	Mercury	7.000E-01	1.368E+07	8.820E-11
	Nickel	4.532E+02	8.856E+09	1.520E+00
	Selenium	1.019E+01	1.991E+08	2.530E-02
	Silver	2.316E+01	4.525E+08	2.380E-04
	Zinc	1.903E+03	3.718E+10	8.750E-02
WASTE PIT 3	Arsenic	2.011E+03	5.157E+11	4.520E-03
	Barium	7.368E+03	1.889E+12	2.710E-02
	Beryllium	1.738E+01	4.457E+09	5.700E-06
	Cadmium	9.309E+00	2.387E+09	9.763E+00
	Chromium	1.171E+02	3.002E+10	2.200E+00
	Copper	1.929E+03	4.947E+11	1.400E-02
	Lead	4.136E+02	1.060E+11	1.100E-03
	Manganese	3.625E+03	9.295E+11	3.110E-02
	Mercury	3.411E+00	8.746E+08	3.010E-04
	Nickel	2.289E+02	5.869E+10	2.410E-02
	Selenium	8.980E+01	2.302E+10	1.700E-03
	Uranium	9.690E+02	2.485E+11	4.360E-01
	Vanadium	5.325E+03	1.365E+12	3.150E-02
	Zinc	2.195E+02	5.628E+10	4.710E-02
WASTE PIT 4	Barium	5.868E+03	4.657E+11	1.390E-02
	Beryllium	1.330E+01	1.055E+09	5.700E-06
	Cadmium	2.872E+01	2.279E+09	2.211E+01
	Cobalt	8.406E+01	6.670E+09	7.920E-03
	Copper	1.633E+02	1.296E+10	4.600E-02
	Lead	6.168E+01	4.894E+09	1.100E-03

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 4	Manganese	3.596E+03	2.854E+11	5.100E-02
	Mercury	6.300E-01	4.999E+07	2.000E-04
	Nickel	4.973E+01	3.946E+09	3.828E+01
	Silver	4.437E+02	3.520E+10	4.610E-03
	Vanadium	2.354E+02	1.868E+10	5.900E-02
WASTE PIT 5	Antimony	2.800E+01	2.12E+09	2.400E-09
	Arsenic	1.459E+03	1.104E+11	2.130E-03
	Barium	2.866E+04	2.170E+12	1.090E-01
	Beryllium	1.339E+01	1.013E+09	5.700E-06
	Cadmium	1.700E+01	1.287E+09	4.417E+00
	Chromium	1.793E+02	1.358E+10	4.550E-03
	Cobalt	4.399E+01	3.330E+09	9.610E-03
	Copper	3.072E+03	2.325E+11	2.120E-02
	Lead	2.046E+02	1.549E+10	2.930E-03
	Manganese	3.246E+03	2.457E+11	3.630E-09
	Mercury	1.484E+00	1.123E+08	2.020E-04
	Nickel	2.020E+02	1.529E+10	2.330E-02
	Selenium	7.470E+00	5.655E+08	2.130E-03
	Silver	9.400E+00	7.116E+08	6.780E-03
	Vanadium	4.343E+03	3.288E+11	2.250E-02
	Zinc	2.044E+02	1.548E+10	9.400E-02
WASTE PIT 6	Beryllium	5.730E+00	8.211E+07	5.700E-06
	Cobalt	2.609E+01	3.739E+08	7.592E+00
	Copper	2.178E+02	3.121E+09	6.780E-03
	Lead	5.895E+01	8.447E+08	1.715E+01
	Nickel	4.596E+01	6.587E+08	1.337E+01
	Silver	1.581E+02	2.266E+09	6.710E-03

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
BURNPIT	Antimony	1.340E+01	1.209E+08	2.400E-09
	Barium	1.107E+03	9.993E+09	1.390E-02
	Beryllium	1.638E+01	1.478E+08	5.700E-06
	Boron	4.820E+01	4.350E+08	1.456E+01
	Cadmium	2.634E+01	2.377E+08	7.956E+00
	Cobalt	1.041E+02	9.396E+08	7.920E-03
	Copper	2.590E+02	2.337E+09	9.520E-03
	Lead	2.790E+02	2.518E+09	1.100E-03
	Manganese	1.717E+03	1.550E+10	1.860E-02
	Mercury	9.090E-01	8.204E+06	2.000E-04
	Molybdenum	1.930E+01	1.742E+08	5.830E+00
	Nickel	6.806E+01	6.143E+08	2.410E-02
	Silicon	1.210E+03	1.092E+10	2.310E+00
	Silver	5.061E+02	4.567E+09	4.610E-03
	Vanadium	1.345E+02	1.214E+09	3.150E-02
	Zinc	5.050E+02	4.558E+09	9.510E-02
CLEARWELL	Barium	6.913E+03	4.284E+10	2.710E-02
	Beryllium	9.100E+00	5.639E+07	5.700E-06
	Copper	1.119E+03	6.936E+09	3.000E-02
	Cyanide	9.180E+00	5.689E+07	8.700E-02
	Lead	8.300E+01	5.144E+08	1.100E-03
	Manganese	1.660E+03	1.029E+10	3.100E-02
	Mercury	4.380E+00	2.714E+07	7.200E-04
	Nickel	6.695E+01	4.149E+08	2.410E-02
	Selenium	3.720E+00	2.305E+07	1.700E-03
	Vanadium	2.596E+03	1.609E+10	3.150E-02
	Zinc	1.944E+02	1.204E+09	4.710E-02

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
ORGANICS				
WASTE PIT 1	1,1,1-Trichloroethane	1.110E-01	5.011E+06	1.965E-02
	2-Butanone	2.255E+00	1.018E+08	8.506E-01
	2-Methylnaphthalene	2.200E-01	9.931E+06	1.583E-03
	3,3-Dichlorobenzidine	1.300E-01	5.868E+06	2.097E-03
	4,4-DDT	1.600E+00	7.222E+07	5.387E-05
	Acetone	2.240E-01	1.011E+07	8.450E-02
	Anthracene	7.400E-02	3.340E+06	1.381E-04
	Aroclor-1248	3.500E+00	1.580E+08	3.241E-04
	Aroclor-1254	9.183E+00	4.145E+08	4.480E-04
	Aroclor-1260	7.000E+00	3.160E+08	2.834E-04
	Benzo(a)anthracene	1.800E-01	8.125E+06	2.350E-05
	Benzo(a)pyrene	1.400E-01	6.320E+06	7.650E-06
	Benzo(b)fluoranthene	3.000E-01	1.354E+07	4.219E-06
	Benzo(k)fluoranthene	1.400E-01	6.320E+06	1.061E-06
	Bis(2-ethylhexyl)phthalate	1.700E+00	7.674E+07	4.439E-04
	Carbon tetrachloride	2.000E-03	9.028E+04	1.942E-04
	Chloroform	2.030E-01	9.163E+06	7.657E-02
	Chrysene	4.720E-01	2.131E+07	6.162E-05
	Di-n-butyl phthalate	9.200E-02	4.153E+06	3.036E-05
	Di-n-octyl phthalate	7.320E-01	3.304E+07	2.416E-08
	Ethylbenzene	3.700E-02	1.670E+06	1.381E-03
	Fluoranthene	3.850E-01	1.738E+07	9.413E-05
	Methylene chloride	1.330E-01	6.004E+06	5.017E-02
	Napthalene	5.400E-02	2.438E+06	1.227E-03
	Phenanthrene	1.267E+00	5.719E+07	2.283E-03
	Pyrene	2.900E-01	1.309E+07	1.000E-04

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 1	Tetrachloroethene	2.100E-01	9.479E+06	3.236E-02
	Toluene	5.500E-02	2.483E+06	5.864E-03
	Total Xylenes	2.200E-02	9.931E+05	1.043E-03
	Trichloroethene	1.900E-02	8.577E+05	2.928E-03
WASTE PIT 2	1,1,1-Trichloroethane	1.500E-01	2.93E+06	2.65E-02
	2,4-dimethyl phenol	1.500E-01	2.93E+06	2.98E-02
	2-Butanone	2.700E+00	5.28E+07	8.12E-01
	2-Methylnaphthalene	8.000E+00	1.56E+08	5.76E-02
	4,4-DDT	1.400E+00	2.74E+07	4.71E-05
	4-Chlorophenyl-phenylether	6.200E+01	1.21E+09	2.70E-01
	4-Methylphenol	3.500E-01	6.84E+06	1.05E-01
	Acenaphthene	5.000E+01	9.77E+08	3.14E-01
	Acetone	5.400E-01	1.06E+07	1.62E-01
	Anthracene	1.200E+02	2.34E+09	2.24E-01
	Aroclor-1248	3.210E-01	6.27E+06	2.97E-05
	Aroclor-1254	3.230E-01	6.31E+06	1.58E-05
	Aroclor-1260	1.800E+00	3.52E+07	7.29E-05
	Benzo(a)anthracene	1.040E+02	2.03E+09	1.36E-02
	Benzo(a)pyrene	1.400E+02	2.74E+09	7.65E-03
	Benzo(b)fluoranthene	4.662E+01	9.11E+08	6.56E-04
	Benzo(g,h,i)perylene	5.200E+01	1.02E+09	1.60E-04
	Benzo(k)fluoranthene	1.184E+02	2.31E+09	8.97E-04
	Bis(2-ethylhexyl)phthalate	3.600E-01	7.03E+06	9.40E-05
	Chrysene	7.482E+01	1.46E+09	9.77E-03
	Di-n-butyl phthalate	3.800E-01	7.43E+06	1.25E-04
	Di-n-octyl phthalate	5.200E-01	1.02E+07	1.72E-08
	Dibenzo(a,h)anthracene	1.600E+01	3.13E+08	8.94E-04

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TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 2	Dibenzofuran	3.600E+01	7.03E+08	1.42E-01
	Ethylbenzene	4.800E-02	9.38E+05	1.79E-03
	Fluoranthene	1.929E+02	3.77E+09	4.72E-02
	Fluorene	6.200E+01	1.21E+09	2.16E-01
	Ideno(1,2,3-cd)pyrene	5.200E+01	1.02E+09	5.94E-05
	Methylene chloride	2.000E-01	3.91E+06	6.01E-02
	Naphthalene	1.600E+01	3.13E+08	3.64E-01
	Phenanthrene	1.544E+02	3.02E+09	2.78E-01
	Phenol	3.300E-01	6.45E+06	9.92E-02
	Pyrene	1.339E+02	2.62E+09	4.62E-02
	Total Xylenes	2.600E-01	5.08E+06	1.23E-02
	Vinyl chloride	6.700E-01	1.31E+07	2.01E-01
WASTE PIT 3	2-Butanone	3.600E+00	9.230E+08	3.775E+00
	Acetone	2.430E-01	6.231E+07	2.548E-01
	Aroclor-1254	2.500E-01	6.410E+07	1.220E-05
	Benzo(a)anthracene	6.000E-02	1.538E+07	7.833E-06
	Benzo(b)fluoranthene	1.100E-01	2.820E+07	1.547E-06
	Bis(2-ethylhexyl)phthalate	7.760E-01	1.990E+08	2.026E-04
	Chrysene	7.500E-02	1.923E+07	9.791E-06
	Di-n-butyl phthalate	8.400E-02	2.154E+07	2.772E-05
	Fluoranthene	2.300E-01	5.897E+07	5.623E-05
	Methylene chloride	4.200E-01	1.077E+08	4.405E-01
	N-nitrosodiphenylamine	1.300E-01	3.333E+07	5.019E-03
	Pentachlorophenol	1.300E+00	3.333E+08	6.667E-04
	Phenanthrene	1.200E-01	3.077E+07	2.162E-04
	Pyrene	1.900E-01	4.872E+07	6.552E-05

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 4	1,1,1-Trichloroethane	1.200E-01	9.522E+06	2.124E-02
	2-Butanone	7.900E+00	6.269E+08	6.081E+00
	Acenaphthene	1.700E-01	1.349E+07	1.069E-03
	Acetone	5.200E-01	4.126E+07	1.700E-02
	Anthracene	5.100E-01	4.047E+07	9.515E-04
	Aroclor-1242	1.034E+00	8.205E+07	4.186E-03
	Aroclor-1248	8.540E-01	6.776E+07	7.907E-05
	Aroclor-1254	1.008E+00	7.998E+07	4.917E-05
	Benzo(a)anthracene	7.500E-01	5.951E+07	9.791E-05
	Benzo(a)pyrene	5.500E-01	4.364E+07	3.005E-05
	Benzo(b)fluoranthene	5.100E-01	4.047E+07	7.173E-06
	Benzo(g,h,i)perylene	1.700E-01	1.349E+07	5.231E-07
	Benzo(k)fluoranthene	5.600E-01	4.444E+07	4.242E-06
	Bis(2-ethylhexyl)phthalate	2.700E-01	2.142E+07	4.000E-03
	Chloroform	1.300E+00	1.032E+08	7.263E-01
	Chrysene	7.600E-01	6.031E+07	9.922E-05
	Di-n-butyl phthalate	4.900E-01	3.888E+07	1.617E-04
	Di-n-octyl phthalate	1.700E-01	1.349E+07	5.611E-09
	Dibenzo(a,h)anthracene	1.700E-01	1.349E+07	9.497E-06
	Dibenzofuran	1.600E-01	1.270E+07	6.324E-04
	Ethyl parathion	8.600E-01	6.824E+07	7.818E-03
	Fluoranthene	2.200E+00	1.746E+08	5.379E-04
	Fluorene	3.100E-01	2.460E+07	1.080E-03
	Ideno(1,2,3-cd)pyrene	1.800E-01	1.428E+07	2.057E-07
	Malathion	6.700E-01	5.316E+07	5.158E-01
	Methyl parathion	2.100E+00	1.666E+08	9.953E-01
	Methylene chloride	2.300E-01	1.825E+07	4.000E-03

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE PIT 4	Naphthalene	1.100E-01	8.729E+06	2.500E-03
	Phenanthrene	2.100E+00	1.666E+08	3.784E-03
	Phenol	8.300E-01	6.586E+07	5.000E-03
	Pyrene	1.400E+00	1.111E+08	4.828E-04
	Tetrachloroethene	3.000E+01	2.381E+09	4.622E+00
	Toluene	6.700E-02	5.316E+06	7.143E-03
	Trans-1,2-dichloroethene	6.000E-02	4.761E+06	4.619E-02
	Trichloroethene	3.000E-01	2.381E+07	4.622E-02
WASTE PIT 5	Acetone	6.30E-01	4.77E+07	9.00E-03
	Aroclor-1248	5.50E-01	4.16E+07	5.09E-05
	Aroclor-1254	7.50E-01	5.68E+07	3.66E-05
	Bis(2-ethylhexyl)phthalate	1.24E+00	9.38E+07	3.24E-04
	Di-n-butyl phthalate	2.50E-01	1.89E+07	1.00E-03
	Methylene chloride	3.88E-01	2.94E+07	2.00E-03
	Phenol	2.00E-01	1.51E+07	5.19E-02
WASTE PIT 6	1,1,2,2-Tetrachloroethane	2.900E+01	4.156E+08	6.170E+00
	2-Butanone	1.400E+00	2.006E+07	4.074E-01
	Acetone	3.005E+00	4.306E+07	3.000E-03
	Aroclor-1254	8.100E-02	1.161E+06	3.951E-06
	Bis(2-ethylhexyl)phthalate	9.100E-01	1.304E+07	1.000E-02
	Methylene chloride	7.000E-01	1.003E+07	4.000E-03
	Toluene	4.400E-01	6.305E+06	2.000E-03
	Total Xylenes	7.500E-01	1.075E+07	3.571E-02
	Trichloroethene	1.700E-01	2398954	2.619E-02
BURNPIT	1,1,1-Trichloroethane	2.000E-03	1.805E+04	3.540E-04
	1,1-Dichloroethane	1.100E-01	9.928E+05	3.323E-02
	2-Butanone	6.700E-02	6.047E+05	2.024E-02

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
BURNPIT	2-Hexanone	2.000E-03	1.805E+04	6.041E-04
	2-Methylnaphthalene	5.000E-02	4.513E+05	3.597E-04
	4-Methyl-2-Pentanone	6.000E-03	5.415E+04	1.812E-03
	Acetone	2.390E-01	2.157E+06	7.220E-02
	Aroclor-1016	2.900E-01	2.617E+06	6.304E-04
	Aroclor-1242	2.900E-01	2.617E+06	1.174E-03
	Aroclor-1248	2.000E-01	1.805E+06	1.852E-05
	Aroclor-1254	2.700E+00	2.437E+07	1.317E-04
	Benzo(a)anthracene	1.530E-01	1.381E+06	1.997E-05
	Benzo(a)pyrene	1.600E-01	1.444E+06	8.743E-06
	Benzo(b)fluoranthene	1.560E-01	1.408E+06	2.194E-06
	Benzo(g,h,i)perylene	8.500E-02	7.671E+05	2.615E-07
	Bis(2-ethylhexyl)phthalate	1.913E+00	1.726E+07	4.995E-04
	Carbon disulfide	1.000E-03	9.025E+03	3.021E-04
	Chlorobenzene	2.000E-03	1.805E+04	1.504E-04
	Chrysene	8.300E-02	7.491E+05	1.084E-05
	Di-n-butyl phthalate	2.100E-01	1.895E+06	6.931E-05
	Di-n-octyl phthalate	1.220E-01	1.101E+06	4.026E-09
	Ethylbenzene	1.890E-01	1.706E+06	7.052E-03
	Fluoranthene	3.400E-01	3.069E+06	8.313E-05
	Ideno(1,2,3-cd)pyrene	7.800E-02	7.040E+05	8.914E-08
	Methylene chloride	1.140E-01	1.029E+06	3.444E-02
	Pentachlorophenol	2.600E+00	2.347E+07	1.333E-03
	Phenanthrene	2.260E-01	2.040E+06	4.072E-04
	Phenol	6.500E-01	5.866E+06	1.963E-01
	Pyrene	2.050E-01	1.850E+06	7.069E-05
	Tetrachloroethene	1.540E-01	1.390E+06	2.373E-02

TABLE O.3-1
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
BURNPIT	Toluene	4.200E-02	3.791E+05	4.478E-03
	Total Xylenes	7.380E-01	6.660E+06	3.498E-02
	Vinyl chloride	3.000E-03	2.708E+04	9.062E-04
CLEARWELL	Acetone	1.800E+00	1.115E+07	5.000E-03
	Aroclor-1248	3.080E-01	1.909E+06	2.852E-05
	Aroclor-1254	7.370E-01	4.567E+06	3.595E-05
	Benzo(a)anthracene	1.400E-01	8.676E+05	1.828E-05
	Bis(2-ethylhexyl)phthalate	2.700E-01	1.673E+06	4.000E-03
	Chrysene	1.500E-01	9.296E+05	1.958E-05
	Di-n-butyl phthalate	1.200E-01	7.436E+05	1.000E-03
	Methylene chloride	6.400E-01	3.966E+06	2.000E-03
	Phenanthrene	2.400E-01	1.487E+06	4.324E-04
	Pyrene	2.900E-01	1.797E+06	1.000E-04

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TABLE O.3-2
SOURCE CHARACTERIZATION FOR OPERABLE UNIT TWO

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
RADIONUCLIDES				
SOLID WASTE LANDFILL	Pu-238	5.848E-09	1.484E-01	2.107E-09
	Ra-226	9.682E-07	2.456E+01	3.488E-07
	Ra-228	8.842E-09	2.243E-01	3.186E-09
	Sr-90	8.122E-09	2.061E-01	2.926E-09
	Th-228	2.931E-09	7.436E-02	2.551E-19
	Th-230	2.007E-04	5.092E+03	1.747E-14
	Th-232	2.114E+01	5.363E+08	1.840E-09
	U-234	4.477E-03	1.136E+05	3.780E-07
	U-235	4.715E-01	1.196E+07	3.988E-05
	U-238	4.268E+01	1.083E+09	3.610E-03
NORTH LIME SLUDGE POND	Sr-90	1.583E-08	4.993E-02	1.474E-10
	Th-230	9.899E-04	3.122E+03	1.840E-09
	U-234	3.998E-04	1.261E+03	2.160E-07
	U-235	9.245E-02	2.916E+05	4.996E-05
	U-238	1.375E+01	4.337E+07	7.430E-03
SOUTH LIME SLUDGE POND	Cs-137	3.962E-09	2.802E-02	4.670E-10
	Th-230	3.465E-04	2.450E+03	1.840E-09
	U-234	4.957E-04	3.505E+03	2.950E-07
	U-235	1.387E-01	9.807E+05	8.261E-05
	U-238	1.242E+01	8.782E+07	7.397E-03
ACTIVE FLYASH PILE	Pb-210	5.226E-08	2.265E+00	1.669E-08
	Ra-226	2.468E-06	1.070E+02	7.881E-07
	Ra-228	1.208E-08	5.237E-01	3.858E-09
	Sr-90	1.442E-08	6.251E-01	4.605E-09
	Th-228	4.344E-09	1.883E-01	4.865E-19
	Th-230	1.978E-04	8.575E+03	2.215E-14

TABLE O.3-2
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
ACTIVE FLYASH PILE	Th-232	1.643E+01	7.122E+08	1.840E-09
	U-234	7.511E-04	3.256E+04	1.157E-13
	U-235	9.245E-02	4.008E+06	1.425E-11
	U-238	1.587E+01	6.880E+08	2.446E-09
INACTIVE FLYASH PILE	Pb-210	6.532E-08	3.143E+00	1.660E-08
	Ra-226	2.557E-06	1.230E+02	6.500E-07
	Ra-228	9.275E-09	4.462E-01	2.358E-09
	Sr-90	8.992E-09	4.326E-01	2.286E-09
	Th-228	3.366E-09	1.619E-01	3.232E-19
	Th-230	3.392E-04	1.632E+04	3.257E-14
	Th-232	1.916E+01	9.218E+08	1.840E-09
	U-234	4.396E-03	2.115E+05	3.098E-13
	U-235	5.593E-01	2.691E+07	3.942E-11
	U-238	3.434E+01	1.652E+09	2.420E-09
SOUTH FIELD	Pb-210	2.644E-07	3.419E+01	9.754E-08
	Ra-226	2.324E-06	3.005E+02	8.573E-07
	Ra-228	3.368E-08	4.355E+00	1.242E-08
	Ru-106	1.022E-09	1.321E-01	3.770E-10
	Th-228	4.633E-08	5.990E+00	2.042E-18
	Th-230	9.404E-04	1.216E+05	4.145E-14
	Th-232	4.174E+01	5.397E+09	1.839E-09
	U-234	2.399E-03	3.102E+05	3.247E-07
	U-235	3.698E-01	4.782E+07	5.004E-05
	U-238	3.192E+01	4.127E+09	4.320E-03

TABLE O.3-2
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
INORGANICS				
SOLID WASTE LANDFILL	Boron	2.660E+01	6.748E+08	9.583E+00
	Cyanide	7.900E-01	2.004E+07	2.846E-01
	Lead	6.193E+01	1.571E+09	2.231E+01
	Molybdenum	1.120E+01	2.841E+08	4.035E+00
	Nickel	3.177E+01	8.060E+08	1.145E+01
	Silicon	7.010E+02	1.778E+10	1.880E+00
	Silver	1.250E+01	3.171E+08	4.503E+00
	Thorium	1.662E+01	4.218E+08	1.840E-09
	Uranium	1.500E+02	3.806E+09	3.620E-03
	Zinc	9.858E+01	2.501E+09	1.600E+00
NORTH LIME SLUDGE POND	Mercury	3.000E-01	9.462E+05	2.990E-17
ACTIVE FLYASH PILE	Antimony	9.156E+00	3.969E+08	2.924E+00
	Arsenic	6.650E+01	2.883E+09	5.050E-01
	Beryllium	3.389E+00	1.469E+08	1.082E+00
	Copper	6.610E+01	2.865E+09	2.111E+01
	Cyanide	2.810E-01	1.218E+07	8.973E-02
	Lead	5.293E+01	2.294E+09	3.040E-01
	Mercury	1.950E-01	8.453E+06	1.240E-05
	Molybdenum	1.634E+01	7.083E+08	5.218E+00
	Nickel	3.186E+01	1.381E+09	1.018E+01
	Selenium	5.410E+00	2.345E+08	1.728E+00
	Silver	4.357E+00	1.889E+08	1.391E+00
	Thorium	4.580E+01	1.985E+09	1.840E-09
	Uranium	2.157E+01	9.350E+08	2.460E-09
	Zinc	8.304E+01	3.600E+09	2.652E+01

TABLE O.3-2
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
INACTIVE FLYASH PILE	Antimony	1.086E+01	5.224E+08	2.760E+00
	Arsenic	3.540E+01	1.703E+09	5.050E-01
	Beryllium	5.803E+00	2.792E+08	1.475E+00
	Cyanide	7.040E-01	3.387E+07	1.790E-01
	Lead	6.710E+01	3.228E+09	3.040E-01
	Mercury	1.820E-01	8.756E+06	1.240E-05
	Molybdenum	9.400E+00	4.522E+08	2.389E+00
	Selenium	2.548E+00	1.226E+08	6.477E-01
	Thorium	2.134E+01	1.026E+09	1.840E-09
	Uranium	5.865E+02	2.822E+10	2.460E-09
SOUTH FIELD	Cobalt	2.090E+01	2.702E+09	7.710E+00
	Manganese	8.238E+02	1.065E+11	7.020E-02
	Mercury	8.510E-01	1.100E+08	3.190E-08
	Nickel	3.373E+01	4.361E+09	1.244E+01
ORGANICS				
SOLID WASTE LANDFILL	1,1-Dichloroethane	1.300E-01	3.298E+06	4.684E-02
	2,4-Dimethyl phenol	2.400E-01	6.089E+06	4.762E-02
	2-Butanone	1.200E-01	3.044E+06	4.323E-02
	2-Methylnaphthalene	3.372E+00	8.555E+07	2.426E-02
	2-Methylphenol	9.600E-02	2.436E+06	3.459E-02
	4-Methylphenol	3.600E-01	9.133E+06	1.297E-01
	Acenaphthene	8.533E+00	2.165E+08	5.367E-02
	Acetone	1.910E-01	4.846E+06	6.881E-02
	Anthracene	2.385E+00	6.051E+07	4.450E-03
	Aroclor-1260	6.790E-01	1.723E+07	2.749E-05
	Aroclor-1248	5.650E-01	1.433E+07	5.231E-05

TABLE O.3-2
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
SOLID WASTE LANDFILL	Aroclor-1254	7.190E-01	1.824E+07	3.507E-05
	Benzo(a)anthracene	1.587E+00	4.026E+07	2.072E-04
	Benzo(a)pyrene	6.551E+00	1.662E+08	3.580E-04
	Benzo(b)fluoranthene	1.749E+00	4.437E+07	2.460E-05
	Benzo(g,h,i)perylene	2.730E+00	6.926E+07	8.400E-06
	Benzo(k)fluoranthene	1.963E+00	4.980E+07	1.487E-05
	Bis(2-Ethylhexyl)phthalate	1.500E-01	3.806E+06	3.916E-05
	Butyl benzyl phthalate	3.200E-01	8.118E+06	2.783E-04
	Chrysene	2.467E+00	6.259E+07	3.221E-04
	Di-n-butyl phthalate	2.790E-01	7.078E+06	9.208E-05
	Di-n-octyl phthalate	3.500E-01	8.880E+06	1.155E-08
	Dibenzo(a,h)anthracene	1.594E+00	4.044E+07	8.905E-05
	Dibenzofuran	1.711E+00	4.341E+07	6.763E-03
	Ethylbenzene	9.100E-02	2.309E+06	3.396E-03
	Fluoranthene	1.308E+00	3.318E+07	3.198E-04
	Fluorene	2.218E+00	5.627E+07	7.728E-03
	Ideno(1,2,3-cd)pyrene	2.712E+00	6.880E+07	3.099E-06
	Methylene Chloride	1.350E-01	3.425E+06	4.864E-02
	N-nitrosodiphenylamine	6.700E-02	1.700E+06	2.587E-03
	Naphthalene	1.622E+01	4.116E+08	3.687E-01
	Phenanthrene	1.291E+00	3.275E+07	2.326E-03
	Phenol	3.100E-01	7.865E+06	1.117E-01
	Pyrene	1.888E+00	4.790E+07	6.510E-04
	Tetrachloroethene	9.700E-02	2.461E+06	1.495E-02
	Toluene	1.800E-01	4.567E+06	1.919E-02
	Total Xylenes	3.200E-01	8.118E+06	1.517E-02

TABLE O.3-2
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
NORTH LIME SLUDGE POND	1,1,2-Trichloro-1,2,2-trifluorethane	8.100E-02	2.555E+05	7.543E-04
	1,1-Dichloroethane	3.000E-03	9.462E+03	2.794E-05
	Acetone	1.500E-01	4.731E+05	1.397E-03
	Aroclor-1248	1.200E+00	3.785E+06	1.111E-04
	Bis(2-ethylhexyl)phthalate	3.100E-01	9.777E+05	8.094E-05
	Butyl benzyl phthalate	2.800E+00	8.831E+06	2.435E-03
	Carbon disulfide	9.000E-03	2.839E+04	8.381E-05
	Chlordane	1.200E+00	3.785E+06	1.117E-02
	Di-n-butyl phthalate	1.200E-01	3.785E+05	3.960E-05
	Methylene chloride	2.600E-02	8.200E+04	2.421E-04
	Phenol	6.100E-01	1.924E+06	5.680E-03
	Toluene	2.000E-02	6.308E+04	1.862E-04
SOUTH LIME SLUDGE POND	2-Butanone	1.800E+00	1.273E+07	2.122E-01
	Acetone	1.400E-01	9.899E+05	1.650E-02
	Benzoic acid	1.600E-01	1.131E+06	1.886E-02
	Bis(2-ethylhexyl)phthalate	3.100E-01	2.192E+06	8.094E-05
	Di-n-butyl phthalate	7.300E-02	5.162E+05	2.409E-05
	Methylene chloride	2.400E-01	1.697E+06	2.829E-02
	Phenol	8.900E-02	6.293E+05	1.049E-02
ACTIVE FLYASH PILE	1,1,1-Trichloroethane	3.100E-02	1.344E+06	5.487E-03
	1,1-dichloroethene	2.000E-03	8.670E+04	6.387E-04
	2-Chlorophenol	4.800E-02	2.081E+06	1.533E-02
	2-Methylnaphthalene	1.600E-01	6.936E+06	1.151E-03
	4-Chloro-3-methylphenol	5.800E-02	2.514E+06	2.407E-03
	4-Nitrophenol	4.800E-02	2.081E+06	1.533E-02
	Acetone	6.100E-02	2.644E+06	1.948E-02

TABLE O.3-2
(Continued)

Location	Constituent	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
ACTIVE FLYASH PILE	Aroclor-1260	3.800E-02	1.647E+06	1.538E-06
	Benzoic acid	7.300E-02	3.165E+06	2.331E-02
	Bis(2-ethylhexyl)phthalate	5.750E-01	2.493E+07	1.501E-04
	Bromodichloromethane	2.000E-03	8.670E+04	6.387E-04
	Chloroform	6.000E-03	2.601E+05	1.916E-03
	Naphthalene	8.200E-02	3.555E+06	1.864E-03
	Phenanthrene	7.200E-02	3.121E+06	1.297E-04
	Phenol	5.800E-02	2.514E+06	1.852E-02
	Toluene	6.000E-03	2.601E+05	6.397E-04
INACTIVE FLYASH PILE	1,1,1-Trichloroethane	2.400E-02	1.155E+06	4.248E-03
	4-Methyl-2-pentanone	2.000E-03	9.622E+04	5.084E-04
	Acetone	4.100E-02	1.973E+06	1.042E-02
	Aroclor-1242	6.000E-03	2.887E+05	2.429E-05
	Aroclor-1254	2.900E-01	1.395E+07	1.415E-05
	Benzo(b)fluoranthene	9.300E-02	4.474E+06	1.308E-06
	Benzoic acid	1.500E-01	7.217E+06	3.813E-02
	Carbon disulfide	3.000E-03	1.443E+05	7.626E-04
	Phenol	3.100E-01	1.491E+07	7.880E-02
	Toluene	3.000E-03	1.443E+05	3.198E-04
SOUTH FIELD	Acetone	2.500E-01	3.233E+07	9.223E-02
	Aroclor-1242	9.300E-02	1.202E+07	3.765E-04
	Aroclor-1254	6.200E-01	8.017E+07	3.024E-05
	Aroclor-1260	4.200E-01	5.431E+07	1.700E-05
	Methylene chloride	1.100E-01	1.422E+07	4.058E-02

TABLE O.3-3
SOURCE CHARACTERIZATION FOR OPERABLE UNIT THREE

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
RADIONUCLIDES				
BUILDING 60	Th-230	1.218E-01	9.899E+04	1.052E-15
	Th-232	2.130E+05	1.731E+11	1.840E-09
BUILDING 64	Th-230	2.593E-01	4.950E+04	9.090E-16
	Th-232	5.249E+05	1.002E+11	1.840E-09
BUILDING 65	Th-230	5.835E-02	1.485E+05	8.569E-16
	Th-232	1.253E+05	3.189E+11	1.840E-09
BUILDING 67	Th-230	3.627E-02	9.898E+04	1.250E-15
	Th-232	5.341E+04	1.458E+11	1.840E-09
	U-233	7.597E-03	2.073E+04	2.028E-03
BUILDING 68	Th-230	3.307E-01	1.980E+05	1.111E-15
	Th-232	5.479E+05	3.280E+11	1.840E-09
	U-233	7.100E+00	4.250E+06	1.909E+00
PLANT 1 STORAGE PAD	U-234	6.979E+00	1.513E+08	1.026E-07
	U-235	8.815E+02	1.911E+10	1.296E-05
	U-238	1.215E+05	2.634E+12	1.787E-03
ORGANICS				
PLANT 1 STORAGE PAD	Tetrachloroethylene	N/A	3.483E+10	2.318E+02
	Methanol	N/A	1.259E+09	8.379E+00
	1,1,1-Trichloroethane	N/A	7.602E+10	5.059E+02
	Used Oil	N/A	4.502E+10	2.996E+02

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TABLE O.3-4
SOURCE CHARACTERIZATION FOR OPERABLE UNIT FOUR

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
RADIONUCLIDES				
SILOS 1 & 2	Pa-231	6.113E-03	6.920E+04	5.006E-03
	Pb-210	2.301E-03	2.605E+04	1.884E-03
	Ra-226	1.418E-01	1.605E+06	7.270E-04
	Th-228	4.332E-07	4.904E+00	2.012E-19
	Th-230	1.708E+00	1.933E+07	7.933E-13
	Th-232	3.960E+03	4.483E+10	1.839E-09
	U-234	1.493E-01	1.690E+06	4.050E-08
	U-235	2.271E+01	2.571E+08	6.155E-06
	U-238	2.538E+03	2.873E+10	6.878E-04
SILO 3	Ac-227	1.077E-05	9.528E+01	1.506E-05
	Pa-231	1.598E-02	1.414E+05	2.234E-02
	Pb-210	6.179E-05	5.467E+02	8.638E-05
	Ra-224	2.279E-09	2.016E-02	4.710E-10
	Ra-226	3.913E-03	3.462E+04	8.087E-04
	Ra-228	1.489E-06	1.317E+01	3.077E-07
	Th-228	9.106E-07	8.056E+00	1.911E-19
	Th-230	2.885E+00	2.552E+07	6.053E-13
	Th-232	8.767E+03	7.756E+10	1.839E-09
	U-234	2.761E-01	2.443E+06	4.412E-02
	U-235	5.422E+01	4.797E+08	8.665E+00
	U-238	5.277E+03	4.669E+10	8.433E+02
INORGANICS				
SILOS 1 & 2	Antimony	2.140E+01	2.422E+08	1.753E+01
	Arsenic	4.542E+02	5.141E+09	6.020E-01
	Barium	5.876E+03	6.651E+10	7.760E-03
	Beryllium	2.510E+00	2.841E+07	2.056E+00

TABLE O.3-4
(Continued)

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Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
SILOS 1 & 2	Boron	5.770E+01	6.532E+08	4.725E+01
	Cadmium	7.154E+00	8.098E+07	5.859E+00
	Chromium	8.145E+01	9.220E+08	6.750E-03
	Cobalt	1.041E+03	1.178E+10	8.180E+00
	Copper	5.370E+02	6.079E+09	1.620E-02
	Cyanide	4.664E+00	5.280E+07	3.820E+00
	Lead	5.252E+04	5.946E+11	4.250E+01
	Mercury	1.231E+00	1.393E+07	4.280E-07
	Molybdenum	4.490E+02	5.083E+09	3.677E+02
	Nickel	1.494E+03	1.691E+10	6.450E+02
	Nitrate	5.110E+03	5.785E+10	8.650E-01
	Selenium	1.481E+02	1.677E+09	1.590E+00
	Silicon	7.640E+02	8.648E+09	1.820E+00
	Silver	1.601E+01	1.812E+08	2.530E-02
	Sulfate	1.124E+04	1.272E+11	1.110E+03
	Uranium	2.561E+03	2.899E+10	6.940E-04
	Vanadium	1.931E+02	2.186E+09	2.360E-03
	Zinc	8.079E+01	9.146E+08	3.510E+01
SILO 3	Arsenic	3.072E+03	2.718E+10	3.090E+00
	Beryllium	2.914E+01	2.578E+08	4.073E+01
	Cadmium	9.139E+01	8.085E+08	1.278E+02
	Chromium	3.878E+02	3.431E+09	1.180E+01
	Cobalt	2.820E+03	2.495E+10	3.720E+02
	Copper	3.284E+03	2.905E+10	1.340E-03
	Lead	2.377E+03	2.103E+10	5.960E-01
	Manganese	5.164E+03	4.568E+10	1.370E-09
	Mercury	6.900E-01	6.104E+06	2.010E-03

TABLE O.3-4
(Continued)

3580

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
SILO 3	Nickel	4.159E+03	3.680E+10	2.400E+00
	Selenium	2.259E+02	1.999E+09	1.170E+01
	Silver	1.843E+01	1.630E+08	3.210E-02
	Thallium	5.020E+01	4.441E+08	7.017E+01
	Uranium	3.695E+03	3.269E+10	8.520E+02
	Vanadium	3.358E+03	2.971E+10	8.220E+00
	Zinc	5.347E+02	4.730E+09	6.130E-02
ORGANICS				
SILOS 1 & 2	1,4-Dioxane	7.800E-02	8.830E+05	6.388E-02
	2-Butanone	1.158E+01	1.311E+08	9.483E+00
	4-Methyl-2-pentanone	1.575E+00	1.783E+07	1.290E+00
	Acetone	2.175E+00	2.462E+07	1.781E+00
	Aroclor-1248	5.228E+00	5.918E+07	4.841E-04
	Aroclor-1254	7.619E+00	8.625E+07	3.717E-04
	Aroclor-1260	3.400E-01	3.849E+06	1.377E-05
	Bis(2-ethylhexyl)phthalate	1.670E+00	1.890E+07	4.360E-04
	Chloroform	1.500E+00	1.698E+07	8.380E-01
	Di-n-octyl phthalate	8.200E-01	9.282E+06	2.706E-08
	Fluoranthene	6.400E-02	7.245E+05	1.565E-05
	Methylene chloride	6.300E+00	7.132E+07	5.160E+00
	Pyrene	4.700E-02	5.320E+05	1.621E-05
	Pyridine	4.500E-02	5.094E+05	3.685E-02
	Styrene	1.890E-01	2.139E+06	6.823E-03
	Toluene	2.190E-01	2.479E+06	2.335E-02
	Total Xylenes	2.000E-01	2.264E+06	9.479E-03
	Trichloroethane	1.200E-01	1.358E+06	1.849E-02

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TABLE O.3-4
(Continued)

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
WASTE SILO 3	2-Butanone	1.564E+01	1.384E+08	2.186E+01
	Acetone	8.386E+00	7.419E+07	1.172E+01
	Bis(2-Ethylhexyl)phthalate	4.000E-02	3.539E+05	1.044E-05
	Chloroform	7.820E-01	6.918E+06	4.369E-01
	Chloromethane	1.400e-01	1.239E+06	1.957E-01
	Methylene chloride	2.349E+00	2.078E+07	3.283E+00
	Toluene	6.454E+00	5.710E+07	6.881E-01

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TABLE O.3-5
SOURCE CHARACTERIZATION FOR OPERABLE UNIT FIVE

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
RADIONUCLIDES				
PLANT 2/3 AREA	Cs-137	1.860E-09	3.346E-01	1.100E-09
	Np-237	9.866E-04	1.775E+05	5.834E-04
	Pu-238	2.066E-08	3.717E+00	2.925E-15
	Pu-239/240	6.302E-06	1.134E+03	8.922E-13
	Ra-226	4.646E-06	8.358E+02	2.747E-06
	Ra-228	5.028E-09	9.045E-01	2.973E-09
	Sr-90	8.100E-09	1.457E+00	4.790E-09
	Tc-99	6.854E-05	1.233E+04	4.053E-05
	Th-228	1.699E-09	3.057E-01	1.406E-12
	Th-230	1.520E-03	2.734E+05	1.063E-07
	Th-232	1.175E+01	2.114E+09	1.642E-02
	U-234	2.135E-01	3.841E+07	8.083E-03
	U-235	3.174E+01	5.710E+09	2.701E+00
	U-238	3.875E+03	6.971E+11	1.689E+02
PLANT 6 AREA	Pu-238	2.568E-08	4.091E+00	2.510E-08
	Pu-239/240	6.045E-06	9.630E+02	5.908E-06
	Ra-228	2.753E-09	4.386E-01	2.691E-09
	Sr-90	4.467E-09	7.116E-01	4.366E-09
	Tc-99	6.394E-05	1.019E+04	6.249E-05
	Th-228	2.402E-09	3.826E-01	2.096E-12
	Th-230	1.145E-04	1.824E+04	1.446E-07
	Th-232	8.491E+00	1.353E+09	2.340E-02
	U-234	1.781E-01	2.837E+07	4.060E-03
	U-235	1.015E+00	1.617E+08	9.920E-01
	U-238	3.890E+03	6.197E+11	2.406E+02

TABLE O.3-5
(Continued)

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Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
PLANT 9 AREA	Cs-137	1.560E-09	7.954E-02	8.785E-10
	Np-237	5.897E-04	3.007E+04	3.321E-04
	Ra-228	1.041E-08	5.308E-01	5.862E-09
	Sr-90	5.561E-09	2.836E-01	3.131E-09
	Tc-99	8.498E-05	4.333E+03	4.785E-05
	Th-228	1.936E-09	9.872E-02	4.960E-12
	Th-230	6.105E-04	3.113E+04	3.455E-07
	Th-232	1.120E+02	5.711E+09	2.851E-02
	U-234	1.360E-02	6.935E+05	7.658E-03
	U-235	1.673E+01	8.531E+08	3.464E+00
	U-238	2.266E+02	1.155E+10	1.276E+02
PILOT PLANT AREA	Cs-137	4.216E-09	1.660E-01	2.412E-09
	Pu-238	3.876E-08	1.526E+00	2.925E-15
	Pu-239/240	7.802E-06	3.072E+02	8.922E-13
	Ra-226	1.111E-05	4.374E+02	3.226E-06
	Ra-228	2.176E-07	8.567E+00	3.490E-09
	Sr-90	3.705E-09	1.459E-01	2.120E-09
	Tc-99	1.461E-04	5.752E+03	8.359E-05
	Th-228	6.079E-09	2.393E-01	6.058E-11
	Th-230	3.739E-04	1.472E+04	8.217E-07
	Th-232	2.548E+01	1.003E+09	3.710E-01
	U-234	2.189E-02	8.618E+05	6.924E-05
	U-235	7.997E+00	3.148E+08	1.928E-02
	U-238	8.024E+02	3.159E+10	1.275E+00

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TABLE O.3-5
(Continued)

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
INORGANICS				
PLANT 2/3 AREA	Arsenic	2.650E+01	4.767E+09	1.567E+01
	Beryllium	2.400E+00	4.318E+08	5.000E-03
	Lead	4.400E+02	7.916E+10	2.000E-03
	Mercury	1.300E+00	2.339E+08	1.000E-03
	Nickel	5.000E+01	8.995E+09	3.100E-02
	Silver	1.720E+01	3.094E+09	6.600E-02
	Thorium	9.691E+00	1.743E+09	1.500E-02
	Uranium	2.542E+02	4.572E+10	5.073E+01
	Zinc	2.470E+02	4.444E+10	1.500E-02
PLANT 6 AREA	Antimony	1.902E+01	3.031E+09	6.800E-02
	Cyanide	4.540E-01	7.232E+07	2.480E-01
	Thorium	9.587E+00	1.527E+09	9.370E+00
	Uranium	2.387E+03	3.802E+11	1.085E+02
PLANT 9 AREA	Antimony	1.920E+01	9.790E+08	3.100E-01
	Thorium	5.415E+01	2.761E+09	2.800E-02
	Uranium	9.869E+01	5.032E+09	5.557E+01
PILOT PLANT AREA	Antimony	9.296E+00	3.660E+08	5.319E+00
	Barium	3.610E+03	1.421E+11	1.640E-01
	Lead	4.443E+01	1.749E+09	2.000E-03
	Manganese	6.007E+02	2.365E+10	1.790E+00
	Mercury	8.450E-01	3.327E+07	6.340E-02
	Nickel	2.994E+01	1.179E+09	3.800E-02
	Silver	4.332E+00	1.706E+08	2.100E-02
	Thorium	2.576E+01	1.014E+09	3.680E-01
	Uranium	6.978E+02	2.747E+10	4.270E-01

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TABLE O.3-5
(Continued)

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
PILOT PLANT	Zinc	1.742E+02	6.857E+09	2.200E-02
PLANT 2/3 AREA	1,1,1-Trichloroethane	4.000E-03	7.196E+05	2.370E-03
	1,1-Dichloroethane	1.600E-02	2.878E+06	9.460E-03
	1,1-Dichloroethene	2.000E-03	3.598E+05	1.180E-03
	2-Butanone	5.600E-02	1.007E+07	5.000E-03
	4-Methyl-2-pentanone	2.000E-03	3.598E+05	1.180E-03
	Acetone	8.400E-02	1.511E+07	4.000E-03
	Aroclor-1254	3.600E-01	6.476E+07	1.756E-05
	Benzoic acid	8.800E-02	1.583E+07	5.200E-02
	Bis(2-ethylhexyl)phthalate	1.800E-01	3.238E+07	4.700E-05
	Ethylbenzene	3.000E-03	5.397E+05	1.119E-04
	Fluoranthene	8.100E-02	1.457E+07	1.980E-05
	Methylene chloride	3.700E-02	6.656E+06	1.000E-02
	N-Nitroso-di-propylamine	6.300E-01	1.133E+08	3.730E-01
	N-Nitrosodiphenylamine	1.300E-01	2.339E+07	5.019E-03
	Phenanthrene	8.800E-02	1.583E+07	1.586E-04
	Toluene	1.400E-02	2.519E+06	1.493E-03
	Total xylenes	1.200E-02	2.159E+06	5.687E-04
	Tributyl phosphate	1.200E+00	2.159E+08	4.500E-01
PLANT 6 AREA	1,1,1-Trichloroethane	2.000E-03	3.186E+05	1.955E-03
	1,1-Dichloroethene	9.000E-03	1.434E+06	8.796E-03
	1,2-Dichloroethylene	1.900E-02	3.027E+06	1.857E-02
	2-Butanone	1.400E-02	2.230E+06	1.368E-02
	2-Hexanone	3.000E-03	4.779E+05	2.932E-03
	4-Methyl-2-pentanone	3.000E-03	4.779E+05	2.932E-03

TABLE O.3-5
(Continued)

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
PLANT 6 AREA	Acetone	7.900E-02	1.258E+07	9.000E-03
	Aroclor-1221	8.300E-02	1.322E+07	8.112E-02
	beta-BHC	2.500E-01	3.983E+07	2.066E-03
	Bis(2-ethylhexyl)phthalate	2.450E-01	3.903E+07	6.397E-05
	Chloroform	3.000E-03	4.779E+05	2.932E-03
	Di-n-octyl phthalate	2.310E-01	3.680E+07	7.624E-09
	Ethylbenzene	2.000E-03	3.186E+05	7.463E-05
	Methylene chloride	1.700E-02	2.708E+06	1.661E-02
	Tetrachloroethene	3.000E-03	4.779E+05	2.932E-03
	Toluene	4.000E-03	6.372E+05	4.264E-04
	Vinyl chloride	3.000E-03	4.779E+05	2.932E-03
PLANT 9 AREA	1,1,1-Trichloroethane	1.000E-02	5.099E+05	5.631E-03
	1,1-Dichloroethene	4.000E-03	2.040E+05	2.252E-03
	1,2-Dichloroethylene	6.000E-03	3.059E+05	3.379E-03
	2-Butanone	7.000E-03	3.569E+05	3.942E-03
	2-Hexanone	1.000E-03	5.099E+04	5.631E-04
	4-Methyl-2-pentanone	7.000E-03	3.569E+05	3.942E-03
	Acetone	1.600E-02	8.158E+05	4.000E-03
	Bis(2-ethylhexyl)phthalate	3.200E-01	1.632E+07	8.355E-05
	Bromodichloromethane	4.000E-03	2.040E+05	2.252E-03
	Carbon disulfide	4.000E-03	2.040E+05	1.439E-03
	Chloroform	6.000E-03	3.059E+05	3.352E-03
	Methylene chloride	1.700E-02	8.668E+05	9.573E-03
	Tetrachloroethene	5.000E-03	2.550E+05	2.816E-03
	Toluene	2.000E-03	1.020E+05	1.000E-03
	Trichloroethene	1.100E-02	5.609E+05	6.194E-03

TABLE O.3-5
(Continued)

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Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
PILOT PLANT AREA	1,1,1-Trichloroethane	3.100E-02	1.220E+06	1.770E-02
	1,1,2,2-Tetrachloroethane	1.600E-02	6.299E+05	3.404E-03
	1,1,2-Trichloroethane	2.000E-03	7.874E+04	6.969E-04
	1,1-Dichloroethane	2.700E-02	1.063E+06	1.540E-02
	1,1-Dichloroethene	7.000E-03	2.756E+05	3.000E-03
	1,2-Dichloroethane	2.000E-03	7.874E+04	1.140E-03
	1,2-Dichloroethylene	2.000E-02	7.874E+05	1.140E-02
	2-Butanone	2.400E+00	9.449E+07	2.000E-03
	4-Methyl-2-pentanone	1.700E-02	6.693E+05	9.730E-03
	Acenaphthene	5.350E-01	2.106E+07	3.365E-03
	Acetone	6.100E-02	2.402E+06	3.000E-03
	Anthracene	3.870E-01	1.524E+07	7.220E-04
	Aroclor-1254	6.800E-01	2.677E+07	3.317E-05
	Aroclor-1260	9.560E-01	3.764E+07	3.870E-05
	Benzo(a)anthracene	6.180E-01	2.433E+07	8.068E-05
	Benzo(a)pyrene	3.487E+00	1.373E+08	1.905E-04
	Benzo(b)fluoranthene	4.400E-01	1.732E+07	6.188E-06
	Benzo(g,h,i)perylene	4.870E-01	1.917E+07	1.498E-06
	Benzo(k)fluoranthene	6.220E-01	2.449E+07	4.712E-06
	Benzoic acid	5.900E-02	2.323E+06	3.380E-02
	beta-BHC	2.300E-02	9.055E+05	1.901E-04
	Bis(2-ethylhexyl)phthalate	4.880E-01	1.921E+07	1.274E-04
	Carbon disulfide	4.000E-03	1.575E+05	1.439E-03
	Chlorobenzene	5.000E-03	1.969E+05	3.759E-04
	Chloroform	2.000E-03	7.874E+04	1.117E-03
	Chrysene	7.280E-01	2.866E+07	9.504E-05

TABLE O.3-5
(Continued)

3580

Location	Constituents	UCL (mg/kg)	Total Mass Available (mg)	Source Term (mg/ℓ)
PILOT PLANT AREA	Di-n-butyl phthalate	6.610E-01	2.602E+07	2.182E-04
	Dibenzo(a,h)anthracene	5.280E-01	2.079E+07	2.950E-05
	Dibenzofuran	3.160E-01	1.244E+07	1.249E-03
	Ethylbenzene	1.000E-03	3.937E+04	3.731E-05
	Fluoranthene	6.519E+00	2.567E+08	1.594E-03
	Fluorene	5.520E-01	2.173E+07	1.923E-03
	Ideno(1,2,3-cd)pyrene	9.030E-01	3.555E+07	1.032E-06
	Methylene chloride	1.909E+00	7.516E+07	4.000E-03
	Phenanthrene	7.180E-01	2.827E+07	1.294E-03
	Phenol	6.900E-02	2.717E+06	1.000E-03
	Pyrene	7.830E-01	3.083E+07	2.700E-04
	Tetrachloroethene	8.400E-02	3.307E+06	4.300E-02
	Toluene	1.000E-02	3.937E+05	1.000E-03
	Total xylenes	4.400E-02	1.732E+06	2.085E-03
	Trichloroethene	2.800E-02	1.102E+06	1.600E-02
	Vinyl chloride	6.000E-03	2.362E+05	3.430E-03

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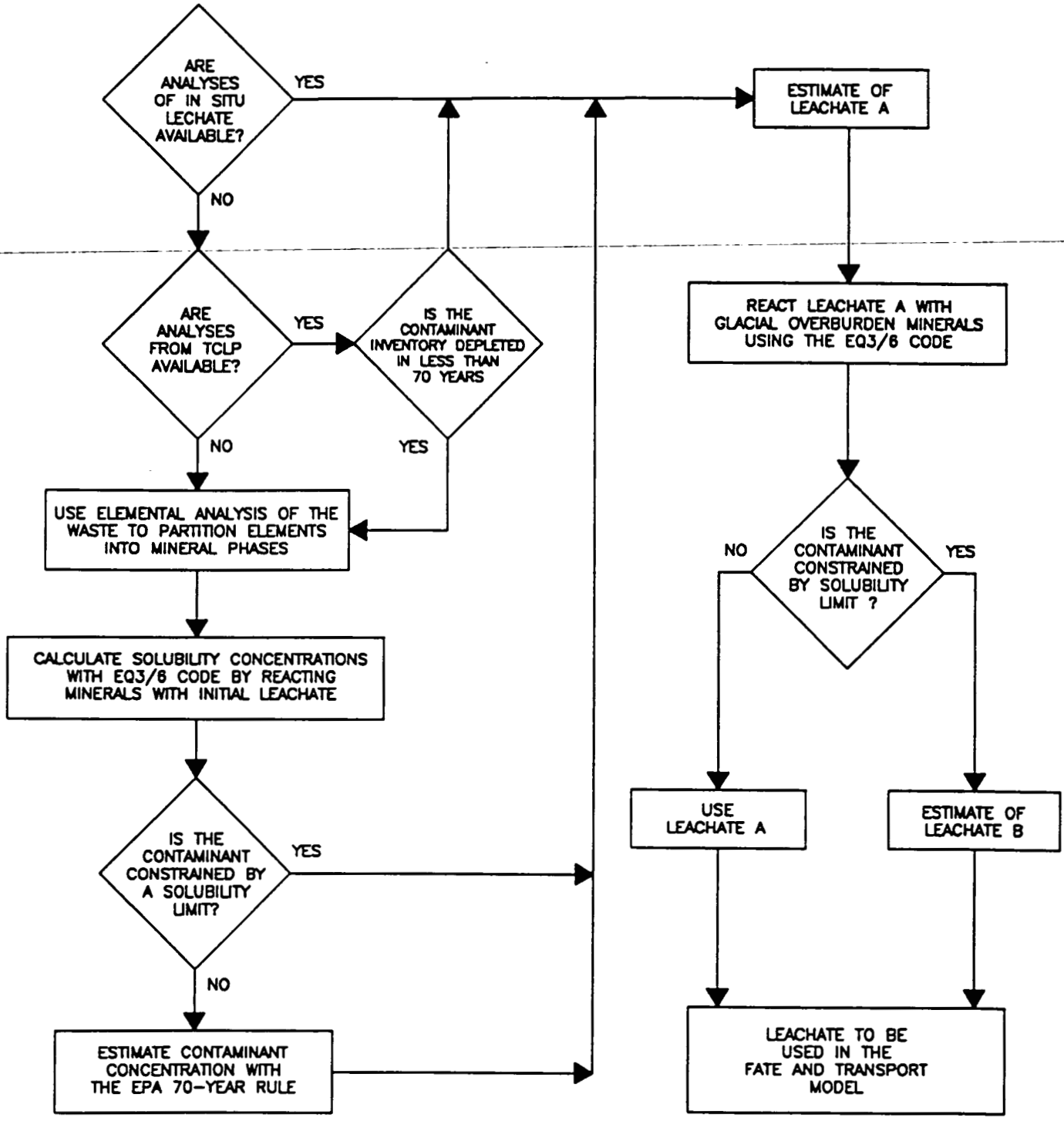

FIGURE O.3-1. ESTIMATING LEACHATE FOR RADIONUCLIDES AND INORGANICS

7/10/92 RO
A FN0435 SWCR TK20 OR

Geochemical Modeling

Geochemical modeling was conducted to estimate leachate concentrations that could develop at the base of each waste area defined in site-wide waste areas and within the glacial overburden. Leachate concentrations derived from the modeling were used as input data to the fate and transport model, which estimates the contaminant dose received at the human-receptor sites.

EQ3/6 Geochemical Computer Code

Geochemical modeling was conducted with the EQ3/6 geochemical code and was restricted to inorganic systems, because thermodynamic data were not available for the listed organic constituents of concern. EQ3/6 is an industry-standard geochemical code that performs solubility and speciation calculations and reaction-path modeling. Solubility and speciation calculations reveal the maximum concentration a contaminant can have in solution and the aqueous form(s) of that contaminant for a specific solid/liquid/ or gas system. Reaction-path modeling simulates reactions that occur when water (e.g., rainwater, groundwater, surface water, etc) migrates through, and equilibrates with, solids in compositionally-distinct horizons (e.g., rainwater reacts with waste to form leachate followed by leachate migration and reaction with underlying glacial-overburden minerals to form a modified leachate).

The EQ3/6 package was developed at Lawrence Livermore National Laboratory (Wolery 1983; Wolery and Daveler 1989) for predicting the behavior of metals, radionuclides, and other contaminants in the natural environment. The code accesses a data base containing the thermodynamic properties of 78 elements, 862 aqueous species, 886 minerals, and 76 gases. This data base includes 57 aqueous uranium species and 160 uranium-bearing minerals, constituting the most complete data base available for modeling the behavior of uranium in natural waters. EQ3/6 has been validated using standard geochemistry problems such as the speciation of sea water (Nordstrom 1979), basalt/sea water interactions (Bowers et al., 1985) and numerous comparisons with experimentally determined mineral solubilities (Jackson, 1988). Benchmark comparisons with the results of similar codes (e.g., PHREEQE) have been performed by INTERA (1983), Nordstrom (1979), Kincaid and Morey (1984) and Kerrisk (1981).

Geochemical Modeling of Leachate Concentrations

Geochemical modeling was conducted with the EQ3/6 geochemical code to estimate leachate concentrations at the base of each defined waste area within the FEMP site-wide (Leachate A), and within the glacial overburden (Leachate B). Leachate values within the glacial overburden were used as initial contaminant concentrations in the fate and transport model to estimate the contaminant dose received at human receptor sites.

Development of the Conceptual Model

The conceptual model shown in Figure 3-58 illustrates infiltration of rainwater into the waste unit and subsequent reaction with inorganic waste solids to form Leachate A. Subsequently, Leachate A migrates into the underlying glacial overburden and reacts with the naturally- occurring minerals to form Leachate B. The rainwater is assumed to equilibrate with the waste minerals instantaneously. This assumption is a requirement of the mathematical model because kinetic data on the waste minerals is not available to assess the equilibration period. As the initial solution equilibrates with the waste, waste minerals dissolve to increase the solute mass (i.e., TDS) and the solution acquires the characteristics of Leachate A.

Leachate A exits at the base of the waste unit and continues to migrate downward through the glacial overburden underlying the waste unit, where it is assumed to equilibrate instantaneously with the minerals in the glacial overburden. Again, this assumption is a requirement of the mathematical model because of the lack of kinetic data on minerals in the glacial overburden. Along this portion of the flow path, Leachate A is free to react with minerals in the glacial overburden to form Leachate B, and the concentration of contaminants may be lowered by precipitation of solids. Leachate B is used to estimate the initial contaminant concentrations required for the fate and transport model.

In accordance with the conceptual scenario stated above, solubility values reported for Leachate B may be lower than those for Leachate A if reactions between Leachate A and glacial-overburden minerals produce a pH in Leachate B that corresponds to a solubility minimum for the contaminant of concern. Conversely, contaminants in Leachate A that are controlled by the solubility of a waste phase or TCLP values cannot increase their concentration in Leachate B by reaction with glacial-overburden minerals. Therefore, contaminant concentrations in Leachate A are maximum values, and these values may only be lowered by reaction with glacial-overburden minerals.

Development of Leachate A

A decision support system for estimating Leachate A is given in Figure O.3-1. Each successively lower step in this hierarchy implies that more assumptions must be made concerning required data. This leads to a more conservative method for estimating the contaminant concentrations in Leachate A. In applying this decision hierarchy to site-wide waste areas, Leachate A was estimated by using data from several levels. For instance, TCLP data were available for arsenic, barium, cadmium, chromium, mercury, lead, selenium, silver, Radium, Strontium, thorium, and uranium. The TCLP data were used to constrain hazardous metal concentrations; antimony, beryllium, boron, cobalt, nickel, molybdenum, plutonium, concentrations were evaluated for constraint by solubility calculations. However, neither TCLP nor solubility constraints were

obtained for antimony, boron, molybdenum, thallium, vanadium, and (occasionally) cobalt, nickel and zinc. The EPA 70-year rule (EPA 1988) was applied to constrain these metal concentrations.

The solubility calculations were performed based on the assumed waste phases that were formed by combining metals and radionuclides with ligands (HCO_3^-, SO_4^{-2}, PO_4^{-3}, etc). For example, radium was combined with sulfate to form the mineral $RaSO_4$. Ligand data were generally not available and were estimated based on process knowledge.

After selection of the waste-bearing mineral phases, the minerals were added to rainwater solution at rates proportional to their molar abundance in the waste. This titration process was used to increase the concentrations of dissolved constituents in solution, and the molar abundance of the mineral in the waste was determined directly from the waste characterization data by converting the mass concentrations to molar concentrations. As element concentrations increased, solubility limits were reached and solid phases precipitated from the solution. The modeling was terminated when the contaminant inventory in four kilograms of waste had been added to the rainwater. The maximum amount of contaminant added to 1 kilogram of water (all calculations in EQ3/6 are carried out with respect to 1 kilogram of water) was based on moisture content measurements of about 20 weight percent (FEMP RI/FS database). Thus, it was estimated that 1 kilogram of water contacted about 4 kilograms of waste solids.

Contaminant concentrations in Leachate A that were not solubility- or TCLP-constrained were estimated using the EPA 70-year rule (EPA 1988). To apply the EPA 70-year rule, the concentration of a contaminant in leachate from a waste area was calculated by assuming that the total mass of the contaminant available for leaching (Tables O.3-1 through O.3-5) would be depleted in just 70 years (where 70 years is a time period approximately equal to the life of a human). This method is likely to be the most conservative (i.e., result in the greatest contaminant concentrations) for all but the most soluble elements (e.g., Cs).

Based on the methodology presented above, leachate compositions at the base of the site-wide waste areas (Leachate A) were constrained by TCLP, the EPA 70-year rule, or by solubility with respect to mineral phases.

Development of Leachate B

The procedure used to estimate the composition of Leachate B starts after the estimation of Leachate A is complete and is also shown in Figure O.3-1. The leachate composition at the base of the waste unit, Leachate A, is modified by reaction with the minerals identified in the glacial overburden. When the reactions achieve equilibrium within the glacial overburden, this modified leachate composition is referred to as Leachate B. The composition of Leachate A is modified by the dissolution of minerals in the glacial overburden and precipitation of both initial (i.e., glacial

overburden) and secondary mineral phases. The secondary mineral phases represent minerals that are stable in the presence of leachate and glacial overburden but are not present in the glacial overburden prior to the introduction of leachate.

Naturally-occurring minerals in the glacial overburden underlying the waste areas have been characterized (Solebello, 1991). These minerals were titrated into a rainwater solution at various rates to simulate the development of groundwater recovered from the glacial overburden. When results for major constituents in the modeled groundwater were within the range of values reported for groundwater recovered from the glacial overburden (FEMP RI/FS database), the corresponding mineral titration rates that produced the simulated groundwater were fixed for subsequent model runs involving Leachate A. Glacial-overburden minerals were titrated into Leachate A at these fixed rates. When the system reached equilibrium, the modified leachate composition was assumed to represent the Leachate B composition within the glacial overburden (Figure O.3-1). The fugacity (approximately equivalent to partial pressure) of carbon dioxide and oxygen was fixed during Leachate B modeling. The fugacity values were determined by the same procedure used to fix the glacial-overburden mineral titration rates.

Contaminant concentrations in Leachate B that were not solubility-constrained were estimated using Leachate A (Figure O.3-1). Therefore, the leachate composition within the glacial overburden was constrained by TCLP, the EPA 70-year rule, or by solubility with respect to the indicated mineral phases. The values were used as initial contaminant concentrations in the site-wide fate and transport model to estimate the contaminant dose received at human receptor sites.

EQ3/6 Limitations and Assumptions

The procedure used to develop the estimates of leachate concentrations has the following limitations and assumptions:

1. A limited number of organic constituents can be modeled, and this can lead to low estimates of leachate concentrations for some inorganic constituents if organic complexation occurs with constituents not present in the data base.

2. Mineral phases are assumed to represent the actual solid phases in the waste material.

3. Dissolution and precipitation kinetics are instantaneous, and this can lead to estimates of concentrations that are too high or too low.

4. Adsorption processes are not evaluated with the EQ3/6 model.

5. Modeled concentrations are site-specific solubility limits, and in most cases these concentrations are the highest concentrations that can exist in solution.

6. The waste to water mass ratio is approximately 4 to 1, i.e., four kilograms of waste contact about one kilogram of water.

Items 1 through 4 identify limitations and assumptions that introduce the greatest uncertainty in the calculated leachate concentration, and these merit further discussion. For example, a solution containing trace amounts of tributyl phosphate (an organic complex not present in the EQ3/6 thermodynamic data base) will contain a greater concentration of uranium than a solution with no tributyl phosphate. Therefore, if tributyl phosphate had been present in the uranium-bearing waste, the EQ3/6 code would not predict the uranium concentration in solution accurately. With respect to item 2, if a contaminant is present in a metastable, amorphous form rather than a crystalline solid (i.e., mineral), using a mineral phase for the solid will usually lead to low estimates of the contaminant concentration. This occurs because crystalline phases generally contain shorter and stronger element bonds relative to amorphous solids, and this leads to a lower solubility for the crystalline phase. In contrast to the statement of item 3, dissolution of crystalline solids is rarely instantaneous or complete in the natural environment (e.g., feldspar), except for some highly soluble salts (e.g., NaCl), and this can lead to high estimates of contaminant concentrations (i.e, a conservative error). Assuming instantaneous precipitation of mineral phases can lead to low estimates of element concentrations if the mineral is difficult to nucleate and crystallize in the natural environment (e.g., dolomite). Finally, the calculated solubility concentrations may be too high because adsorption reactions are not considered. Adsorption reactions can substantially lower some contaminant concentrations to below the calculated solubility limit (e.g., Cs^+).

O.3.2.2 Leachate Concentrations for Organic Compounds

Figure O.3-2 illustrates the approach for estimating the leachate concentrations for organic compounds to be used by vadose zone models. As stated earlier, the logic behind using the decision hierarchy outlined in Figures O.3-1 rests with applying the best available site-specific data to estimating the leachate concentrations of the constituents of concern for the site-wide waste areas. Each successively lower step on this hierarchy represents a more conservative method for estimating the contaminant concentrations in leachate, with the potential to generate a greater uncertainty in the estimation. Leachate values from in situ leachate analyses is the preferred leachate information. If in situ leachate analyses data is not available and if TCLP data is available these values were be used. TCLP data were not available for most of the organic compounds, a series of process evaluations (shown in Figure O.3-2) were used to derive at the leachate to be used in the vadose zone model.

3580

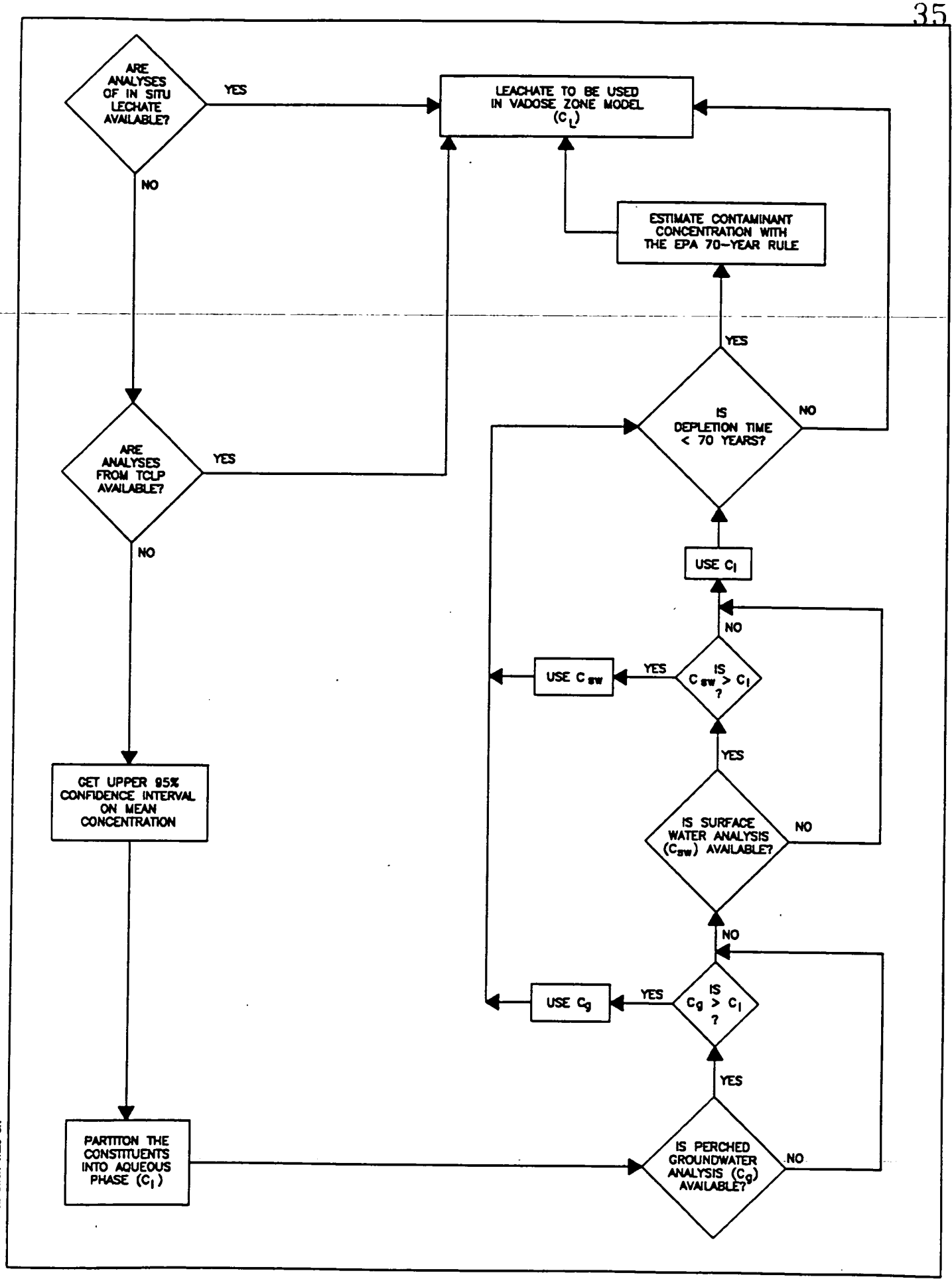

FIGURE 0.3-2. ESTIMATING LEACHATE FOR ORGANICS

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O.3.3 CONCEPTUAL FLOW MODEL

The flow and contaminant transport process in the subsurface is conceptualized from the hydrogeology of the site, saturated-unsaturated flow characteristics (such as hydraulic conductivity, thickness of the medium, Darcy and seepage velocity etc.), and constituent's chemical behavior in the media. As discussed previously, the geology of the FEMP site is dominated by glacial sediments. Well-sorted sand and gravel glacial outwash forms the regional Great Miami Aquifer. This aquifer is divided by a 3- to 6-m-thick (10- to 20-foot-thick) clay aquitard at an approximate depth of 36.6 m (120 ft). The receptor pathway considered for this analysis is the upper part of the Great Miami Aquifer, above the clay aquitard. The uppermost 4.6 to 10.7 m (15 to 35 ft) of the outwash deposits is unsaturated and forms model Layer 2 of the vadose zone conceptual flow model. Overlying the outwash deposits is a grey clay or unweathered till interbedded with sand and gravel glaciofluvial stringers. The thickness of this unit which makes up model Layer 1 ranges between 0 and 10.7 m (0 and 35 ft) for waste areas, as indicated in Tables O.3-6 through O.3-10. A layer of brown clay or weathered till overlies the gray clay. However, this layer is not included in the vadose zone modeling because of numerous fractures present within this zone. All layer thicknesses were estimated based on geologic boring logs from subsurface investigations conducted across the site. Flow in the Great Miami Aquifer and the conceptual flow model for the saturated zone is discussed in Section O.5.0.

Based on characteristics of the material underlying the FEMP waste areas, a conceptual flow model was developed for the pathway between the waste areas and receptor locations. Conceptually, constituent migration from waste areas at the FEMP is through three geologic units. Fluids and/or leachate entering from the waste areas migrate first through the unsaturated glacial overburden, then the unsaturated outwash deposits, and finally into the Great Miami Aquifer.

O.3.3.1 Operable Unit 1

The thickness of model Layer 1 under the waste pits, Clearwell and Burn Pit of Operable Unit 1 vary from 1 to 16 feet (0.3 to 4.9 m). The thickness of model Layer 2 (outwash materials) is estimated to be 23 feet (7.0 m) under all the Operable Unit 1 waste areas. The vertical hydraulic conductivity (K_v) for Layer 1 is 0.000355 feet per day (1.1×10^{-4} m/day) for Waste Pit 3, 0.00255 feet per day (7.8×10^{-4} m/day) for Waste Pit 5, and 0.00735 feet per day (2.2×10^{-4} m/day) for the Clearwell, Burn Pit, and Waste Pits 1, 2, 4, and 6. The vertical hydraulic conductivity is 45 feet per day (14 m/day) for Layer 2 for each of the Operable Unit 1 waste areas. Table O.3-6 presents the model layer thickness, vertical hydraulic conductivity, vertical seepage velocity, and longitudinal dispersion coefficient for each layer of the vadose model for all the waste areas in Operable Unit 1.

TABLE O.3-6
CONCEPTUAL MODEL AND FLOW PARAMETERS FOR THE VADOSE ZONE OPERABLE UNIT ONE

Waste Areas	Model Layer[a,b]	Model Layer Thickness m	(ft)	Vertical Hydraulic Conductivity K_v cm/s	(ft/day)	Vertical Seepage Velocity u_x cm/s	(ft/day)	Dispersion Coefficient D_x cm^2/s	(ft^2/day)
Waste Pit 1	1	1.52	(5)	2.593E-06	(0.00735)	2.191E-06	(0.00621)	1.226E-05	(0.00114)
	2	7.01	(23)	1.588E-02	(45)	4.459E-06	(0.01264)	1.871E-05	(0.00174)
Waste Pit 2	1	4.88	(16)	2.593E-06	(0.00735)	2.191E-06	(0.00621)	1.226E-05	(0.00114)
	2	7.01	(23)	1.588E-02	(45)	4.459E-06	(0.01264)	1.871E-05	(0.00174)
Waste Pit 3	1	0.30	(1)	1.252E-07	(0.000355)	2.082E-06	(0.0059)	7.310E-06	(0.00068)
	2	7.01	(23)	1.588E-02	(45)	3.210E-06	(0.0091)	1.516E-05	(0.00141)
Waste Pit 4	1	3.96	(13)	2.593E-06	(0.00735)	1.877E-06	(0.00532)	1.140E-05	(0.00106)
	2	7.01	(23)	1.588E-02	(45)	3.846E-06	(0.0109)	1.688E-05	(0.00157)
Waste Pit 5	1	3.66	(12)	9.014E-07	(0.002555)	2.597E-06	(0.00736)	1.344E-05	(0.00125)
	2	7.01	(23)	1.588E-02	(45)	5.468E-06	(0.0155)	2.172E-05	(0.00202)
Waste Pit 6	1	3.66	(12)	2.593E-06	(0.00735)	2.297E-06	(0.00651)	1.258E-05	(0.00117)
	2	7.01	(23)	1.588E-02	(45)	4.657E-06	(0.0132)	1.924E-05	(0.00179)
Clearwell	1	0.30	(1)	2.593E-06	(0.00735)	3.027E-06	(0.00858)	1.462E-05	(0.00136)
	2	7.01	(23)	1.588E-02	(45)	6.054E-06	(0.01716)	2.344E-05	(0.00218)
Burnpit	1	3.66	(12)	2.593E-06	(0.00735)	2.085E-06	(0.00591)	1.204E-05	(0.00112)
	2	7.01	(23)	1.588E-02	(45)	4.255E-06	(0.01206)	1.806E-05	(0.00168)

[a] Layer 1 consists of unweathered till interbedded with glaciofluvial sand and gravel stringers.
[b] Layer 2 consists of sand and gravel outwash deposits existing above the Great Miami Aquifer.

TABLE O.3-7
CONCEPTUAL MODEL AND FLOW PARAMETERS FOR THE VADOSE ZONE OPERABLE UNIT TWO

Waste Areas	Model Layer[a,b]	Model Layer Thickness m	(ft)	Vertical Hydraulic Conductivity K_v cm/s	(ft/day)	Vertical Seepage Velocity u_x cm/s	(ft/day)	Dispersion Coefficient D_x cm^2/s	(ft^2/day)
Solid Waste Landfill	1	6.10	(20)	1.252E-06	(0.00355)	2.431E-06	(0.00689)	1.295E-05	(0.001204)
	2	9.14	(30)	1.588E-02	(45)	5.062E-06	(0.01435)	2.054E-05	(0.00191)
North Lime Sludge Pond	1	6.71	(22)	5.468E-06	(0.00155)	9.807E-05	(0.278)	6.577E-03	(0.6117)
	2	4.57	(15)	1.588E-02	(45)	3.069E-05	(0.087)	1.073E-04	(0.00998)
South Lime Sludge Pond	1	6.71	(22)	5.468E-06	(0.000155)	3.122E-06	(0.00885)	1.484E-05	(0.00138)
	2	4.57	(15)	1.588E-02	(45)	6.068E-06	(0.0172)	2.344E-05	(0.00218)
Active Flyash Pile	1	0	(0)	-	(-)	-	(-)	-	(-)
	2	7.32	(24)	1.588E-02	(45)	4.459E-06	(0.01264)	1.871E-05	(0.00174)
Inactive Flyash Pile	1	1.52	(5)	3.404E-06	(0.00965)	2.215E-06	(0.00628)	1.237E-05	(0.00115)
	2	7.62	(25)	1.588E-02	(45)	4.459E-06	(0.01264)	1.871E-05	(0.00174)
South Field	1	0	(0)	-	(-)	-	(-)	-	(-)
	2	4.57	(15)	1.588E-02	(45)	4.459E-06	(0.01264)	1.871E-05	(0.00174)

[a] Layer 1 consists of a clay-rich till interbedded with glaciofluvial sand and gravel stringers.
[b] Layer 2 consists of well-sorted sand and gravel outwash deposits existing above the Great Miami Aquifer.

TABLE O.3-8
CONCEPTUAL MODEL AND FLOW PARAMETERS FOR THE VADOSE ZONE OPERABLE UNIT THREE

Waste Areas	Model Layer[a,b]	Model Layer Thickness m	(ft)	Vertical Hydraulic Conductivity K_v cm/s	(ft/day)	Vertical Seepage Velocity u_x cm/s	(ft/day)	Dispersion Coefficient D_x cm^2/s	(ft^2/day)
Plant 1 Storage Pad	1	8.84	(29)	1.104E-04	(0.313)	2.681E-06	(0.0076)	1.398E-05	(0.0013)
	2	9.75	(32)	1.588E-02	(45)	4.657E-06	(0.0132)	1.935E-05	(0.0018)
Building 60	1	5.18	(17)	3.352E-05	(0.095)	2.540E-06	(0.0072)	1.290E-05	(0.0012)
	2	10.67	(35)	1.588E-02	(45)	4.657E-06	(0.0132)	1.935E-05	(0.0018)
Building 64	1	5.18	(17)	3.352E-05	(0.095)	2.540E-06	(0.0072)	1.290E-05	(0.0012)
	2	10.67	(35)	1.588E-02	(45)	4.657E-06	(0.0132)	1.935E-05	(0.0018)
Building 65	1	5.18	(17)	3.352E-05	(0.095)	2.540E-06	(0.0072)	1.290E-05	(0.0012)
	2	10.67	(35)	1.588E-02	(45)	4.657E-06	(0.0132)	1.935E-05	(0.0018)
Building 67	1	5.18	(17)	3.352E-05	(0.095)	2.540E-06	(0.0072)	1.290E-05	(0.0012)
	2	10.67	(35)	1.588E-02	(45)	4.657E-06	(0.0132)	1.935E-05	(0.0018)
Building 68	1	5.18	(17)	3.352E-05	(0.095)	2.540E-06	(0.0072)	1.290E-05	(0.0012)
	2	10.67	(35)	1.588E-02	(45)	4.657E-06	(0.0132)	1.935E-05	(0.0018)

a Layer 1 consists of a clay-rich till interbedded with glaciofluvial sand and gravel stringers.
b Layer 2 consists of well-sorted sand and gravel outwash deposits existing above the Great Miami Aquifer.

TABLE O.3-9
CONCEPTUAL MODEL AND FLOW PARAMETERS FOR THE VADOSE ZONE OPERABLE UNIT FOUR

Waste Areas	Model Layer[a,b]	Model Layer Thickness		Vertical Hydraulic Conductivity K_v		Vertical Seepage Velocity u_x		Dispersion Coefficient D_x	
		m	(ft)	cm/s	(ft/day)	cm/s	(ft/day)	cm^2/s	(ft^2/day)
Silos 1 & 2	1	4.57	(15)	1.252E-06	(0.00355)	2.011E-06	(0.0057)	1.183E-05	(0.0011)
	2	7.62	(25)	1.588E-02	(45)	4.269E-06	(0.0121)	1.828E-05	(0.0017)
Silo 3	1	7.62	(25)	1.252E-06	(0.00355)	1.870E-06	(0.0053)	1.183E-05	(0.0011)
	2	6.10	(20)	1.588E-02	(45)	3.916E-06	(0.0111)	1.720E-05	(0.0016)

a Layer 1 consists of a clay-rich till interbedded with glaciofluvial sand and gravel stringers.
b Layer 2 consists of well-sorted sand and gravel outwash deposits existing above the Great Miami Aquifer.

TABLE O.3-10
CONCEPTUAL MODEL AND FLOW PARAMETERS FOR THE VADOSE ZONE
OPERABLE UNIT FIVE

Waste Areas	Model Layer[a,b]	Model Layer Thickness m	(ft)	Vertical Hydraulic Conductivity K_v cm/s	(ft/day)	Vertical Seepage Velocity u_x cm/s	(ft/day)	Dispersion Coefficient D_x cm^2/s	(ft^2/day)
Plant 2/3 Area	1	4.57	(15)	4.27E-05	(0.121)	1.87E-06	(0.0053)	1.18E-05	(0.0011)
	2	6.10	(20)	1.59E-02	(45)	3.42E-06	(0.0097)	1.61E-05	(0.0015)
Plant 6 Area	1	0	(0)	-	(-)	-	(-)	-	(-)
	2	6.10	(20)	1.59E-02	(45)	2.80E-06	(0.00794)	1.40E-05	(0.0013)
Plant 9 Area	1	7.62	(25)	4.27E-05	(0.121)	1.87E-06	(0.0053)	1.18E-05	(0.0011)
	2	11.59	(38)	1.59E-02	(45)	3.42E-06	(0.0097)	1.61E-05	(0.0015)
Pilot Plant Area	1	5.18	(17)	3.35E-05	(0.095)	2.32E-06	(0.0066)	1.290E-05	(0.0012)
	2	10.67	(35)	1.59E-02	(45)	4.26E-06	(0.0121)	1.828E-05	(0.0017)

[a] Layer 1 consists of a clay-rich till interbedded with glaciofluvial sand and gravel stringers.
[b] Layer 2 consists of well-sorted sand and gravel outwash deposits existing above the Great Miami Aquifer.

O.3.3.2 Operable Unit 2

Operable Unit 2 waste areas are located at three separate locations of the FEMP and, consequently, the geologic stratigraphy of the soils differ. Model Layer 1 is nonexistent under the Active Flyash Pile and the South Field. Layer 1 ranges from 5 to 22 feet (1.5 to 6.7 m) in thickness for the Inactive Flyash Pile and the Lime Sludge Ponds, respectively. The outwash deposit thicknesses vary from 15 to 30 feet (4.6 to 9.1 m) for the Operable Unit 2 waste areas. The vertical hydraulic conductivities for Layer 1 (glacial overburden layer) are 0.0155 feet per day (0.0078 m/day) for the lime sludge ponds, 0.00355 feet per day (0.0011 m/day) for the Solid Waste Landfill, and 0.00965 feet per day ((0.0029 m/day) for the Inactive Flyash Pile. The vertical hydraulic conductivity is 45 feet per day (14 m/day) for Layer 2 for each of the Operable Unit 2 waste areas. Table O.3-7 presents the model layer thickness, vertical hydraulic conductivity, vertical seepage velocity, and longitudinal dispersion coefficient for each layer of the vadose model for all the waste areas in Operable Unit 2.

O.3.3.3 Operable Unit 3

The Plant 1 Storage Pad and four buildings (60, 64, 65, 67, and 68) that make up Operable Unit 3 have similar hydrogeologic characteristics and thus modeling parameters. The glacial overburden thickness under the Plant 1 Storage Pad is 29 feet (8.8 m) and the thickness of Layer 2 is 32 feet (9.8 m). The soil material under the storage pad has a vertical hydraulic conductivity for Layer 1 of 0.313 feet per day (0.095 m/day). The vertical hydraulic conductivity is 45 feet per day (14 m/day) for Layer 2 for each of the Operable Unit 3 waste units. The storage pad seepage velocity and the dispersion coefficient of Layer 1 is 0.0076 feet per day (0.0023 m/day) and 0.0013 square feet per day (1.2×10^{-4} m^2/day), respectively. For Layer 2, the seepage velocity and dispersion coefficient are 0.0132 feet per day (0.004 m/day) and 0.0018 square feet per day(1.7×10^{-4} m^2/day), respectively. Table O.3-8 presents the model layer thickness, vertical hydraulic conductivity, vertical seepage velocity, and longitudinal dispersion coefficient for each layer of the vadose model for all the waste areas in Operable Unit 3.

O.3.3.4 Operable Unit 4

The lithology of the soils under Silos 1 and 2 are similar to Silo 3. Based on boring logs, Silo 1 and 2 soil thicknesses for Layer 1 and 2 are 15 feet (4.6 m) and 25 feet (7.6 m), respectively. Silo 3 is supported by a glacial overburden layer of 25 feet (7.6 m) and a outwash layer of 20 feet (6.1 m). For Layer 1, the vertical hydraulic conductivity for each waste unit is 0.00355 feet per day (0.0011 m/day). The vertical hydraulic conductivity is 45 feet per day (14 m/day) for Layer 2 for both of the Operable Unit 4 waste units. Table O.3-9 presents the model layer thickness, vertical hydraulic conductivity, vertical seepage velocity, and longitudinal dispersion coefficient for each layer of the vadose model for all the waste areas in Operable Unit 4.

O.3.3.5 Operable Unit 5

The glacial overburden layer thickness under the source volumes of Operable Unit 5 vary from 0 feet for Plant 6 Area soils to 25 feet (7.6 m) for Plant 9 Area soils. The thickness of the outwash materials is estimated at 20 feet (6.1 m) for Plant 2/3 area soils and Plant 6 area soils . Plant 9 area soils has an outwash layer of 38 feet (12 m) and for the Pilot Plant area soils, thickness of Layer 2 is 35 feet (11 m). The vertical hydraulic conductivity for Layer 1 is 0.121 feet per day (0.037 m/day) for Plant 2/3 area and 0.095 feet per day (0.029 m/day) for Pilot Plant area. No slug test results were available for Plant 9 area, therefore the vertical hydraulic conductivity of 0.121 feet per day (4.3×10^{-5} m/day) obtained from Plant 2/3 area was used in the calculations. The vertical hydraulic conductivity is 45 feet per day (14 m/day) for Layer 2 for each of the Operable Unit 5 waste areas. Table O.3-10 presents the model layer thickness, vertical hydraulic conductivity, vertical seepage velocity, and longitudinal dispersion coefficient for each layer of the vadose model for all the waste areas in Operable Unit 5.

O.3.4 PARAMETERS

The parameters used to perform the long-term migration analysis can be divided into flow parameters and contaminant transport parameters. Flow parameters affect the velocity of groundwater movement. Contaminant transport parameters affect the rate of migration and the fate of the contaminant. Wherever possible, site-specific values were used for the analyses. Certain parameters, however, were not available for all of the waste areas, and were estimated based on pertinent scientific literature search, geochemical investigations, and checks for consistency between model results and historical data. Conservative estimates of a reasonable worst-case scenario were used when a range of values was indicated or parameter values were not available. The formulations employed for the estimation of the parameters are described in the Addendum (DOE 1992). Uncertainty in the selection of model parameter values is addressed by performing sensitivity analyses. Sensitivity analyses were performed by varying parameters within reasonable ranges.

Parameters used in the conceptual models for all of the operable units are presented in Table O.3-6 through Table O.3-10. The vertical hydraulic conductivity values for Layer 1 were obtained by dividing the horizontal hydraulic conductivities (representing the results of slug tests conducted in 1000-series wells nearest to the waste area) by 20 (Djafari 1990). The vertical hydraulic conductivity for Layer 2 was obtained by dividing the horizontal hydraulic conductivity by 10. The estimates of the vertical seepage velocities used in the vadose zone transport model were based on the methods presented in the Addendum (DOE 1992). The longitudinal dispersion coefficients, a function of dispersivity, interstitial seepage velocity and molecular diffusion coefficient were estimated by the methods presented by Biggar and Nielson (1976), and Mills, et al. (1985). Site-wide media parameters for the vadose zone model are presented in Table O.3-11.

TABLE O.3-11

MEDIA PARAMETERS FOR VADOSE ZONE MODEL AT THE FEMP

Parameter	Vadose Zone	
	Layer 1[a]	Layer 2[b]
Porosity (%)	34	39
Specific Yield (%)	6	25
Bulk Density (g/cc)	1.78	1.60
Field Capacity (%)	28	14
Organic Content (%)	4	4
Fines Passing Less than 200 Mesh (%)	70	16

[a] Layer 1 consists of a clay-rich glacial overburden interbedded with glaciofluvial sand and gravel stringers.

[b] Layer 2 consists of well-sorted sand and gravel outwash deposits existing above the Great Miami Aquifer.

Flow and solute transport through the porous media are not only determined by the parameters listed in the conceptual model, they are also affected by retardation factors (R_f) and decay rates. These parameters are both chemical- and media-specific. Table O.3-12 through O.3-14 show the retardation factors for the vadose zone Layers 1 and 2 for all the constituents of concern at the FEMP. These tables also present the radioactive decay constants for radionuclides and the biodegradation coefficients for the organic constituents that were used in the transport model. The retardation factor is used to account for those reversible reactions that slow the arrival of a contaminant front, but do not act as a sink. The R_f can be expressed as the ratio between the rate of groundwater movement and the rate of contaminant movement. The R_f for each constituent in the vadose zone was calculated using the formula described by Walton (1984) and Mills, et al. (1985). The radioactive decay constants and biodegradation coefficients were estimated using the formulation presented in the Addendum (DOE 1992).

TABLE O.3-12

RETARDATION FACTORS AND DECAY CONSTANTS
FOR RADIONUCLIDES AT THE FEMP

Radionuclides	Retardation Factor Vadose Layer 1	Retardation Factor Vadose Layer 2	Radioactive Decay Constant (Day^{-1})
Ac-227	1.53E+04	5.14E+03	8.722E-05
Am-241	5.34E+04	2.17E+04	4.394E-06
Cs-137	1.15E+04	1.57E+04	6.294E-05
Np-237	3.51E+02	5.81E+01	8.874E-10
Pa-231	1.72E+04	6.29E+03	5.797E-08
Pb-210	1.91E+04	4.35E+02	8.531E-05
Pu-238	1.08E+04	1.14E+03	2.164E-05
Pu-239/240	1.08E+04	1.14E+03	7.870E-08
Ra-224	4.43E+03	1.21E+03	1.915E-01
Ra-226	4.43E+03	1.21E+03	1.187E-06
Ra-228	4.43E+03	1.21E+03	3.297E-04
Ru-106	5.09E+03	6.30E+02	1.890E-03
Sr-90	6.46E+01	2.96E+01	6.640E-05
Tc-99	1.75E+00	1.80E+00	8.916E-09
Th-228	3.69E+04	3.66E+04	9.926E-04
Th-230	3.69E+04	3.66E+04	2.466E-08
Th-232	3.69E+04	3.66E+04	1.360E-13
U-234	1.24E+01	1.79E+01	7.767E-09
U-235	1.24E+01	1.79E+01	2.698E-12
U-238	1.24E+01	1.79E+01	4.250E-13

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TABLE O.3-13

RETARDATION FACTORS FOR INORGANIC COMPOUNDS AT THE FEMP

Inorganics	Retardation Factor Vadose Layer 1	Retardation Factor Vadose Layer 2
Aluminum	9.54E+03	1.71E+04
Antimony	1.59E+03	5.15E+02
Arsenic	1.27E+03	2.29E+03
Barium	7.25E+03	2.30E+02
Beryllium	8.27E+03	2.86E+03
Boron	2.01E+01	3.53E+01
Cadmium	3.18E+03	1.38E+02
Calcium	3.19E+02	5.81E+01
Chromium	9.54E+03	8.01E+02
Cobalt	3.50E+03	6.87E+02
Copper	7.96E+02	4.01E+02
Iron	1.05E+03	2.52E+03
Lead	1.91E+04	4.35E+02
Magnesium	2.96E+01	5.24E+01
Manganese	1.15E+03	5.72E+02
Mercury	6.46E+01	1.15E+02
Molybdenum	5.73E+02	1.15E+02
Nickel	4.13E+03	4.57E+03
Potassium	4.78E+02	1.72E+02
Selenium	4.71E+03	1.72E+03
Silicon	1.15E+03	4.01E+02
Silver	1.15E+03	1.03E+03
Sodium	6.37E+02	1.14E+03
Thallium	9.54E+03	1.71E+04
Vanadium	6.36E+03	2.29E+03
Zinc	1.53E+04	2.29E+03

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TABLE O.3-14

RETARDATION FACTORS AND BIODEGRADATION COEFFICIENTS FOR ORGANIC COMPOUNDS AT THE FEMP

Organics	Retardation Factor Vadose Layer 1	Retardation Factor Vadose Layer 2	Organic Decay Constant (day^{-1})
1,1-Dichloroethane	8.51E+00	6.83E+00	1.13E-03
1,1-Dichloroethene	4.68E+00	3.85E+00	3.85E-03
1,1,2-Tricholoro-1,2,2-trifluorethane	1.90E+01	1.50E+01	4.70E-04
1,1,1-Trichloroethane	3.69E+01	2.89E+01	6.30E-04
1,1,2-Trichloroethane	1.93E+01	1.52E+01	4.70E-04
1,1,2,2-Tetrachloroethane	3.09E+01	2.42E+01	3.79E-03
1,2-Dichloroethane	4.43E+00	3.66E+00	9.50E-04
1,2-Dichloroethene	1.60E+01	1.26E+01	9.50E-04
1,4-Dioxane	1.05E+00	1.04E+00	9.50E-04
2-Butanone	1.22E+00	1.17E+00	2.48E-02
2-Chlorophenol	1.82E+01	1.43E+01	NA[a]
2-Hexanone	3.92E+00	3.27E+00	NA
2-Methylnaphthalene	8.82E+02	6.85E+02	NA
2-Methyl phenol	1.18E+01	9.42E+00	2.48E-02
2-Propanol	1.08E+00	1.07E+00	2.76E-02
2,4-Dimethyl phenol	3.30E+01	2.58E+01	2.48E-02
3,3-Dichlorobenzidine	3.95E+02	3.07E+02	9.50E-04
4-Chlorophenyl-phenylether	1.46E+03	1.14E+03	NA
4-Chloro-3-methylphenol	1.54E+02	1.20E+02	NA
4-Methyl-2-Pentanone	2.50E+00	2.16E+00	2.48E-02
4-Methyl phenol	1.07E+01	8.50E+00	2.48E-02
4-Nitrophenol	1.09E+01	8.68E+00	7.07E-02
Acenaphthene	1.01E+03	7.87E+02	1.70E-03
Acetone	1.07E+00	1.05E+00	2.48E-02
Anthracene	3.41E+03	2.65E+03	3.80E-04

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TABLE O.3-14
(Continued)

Organics	Retardation Factor Vadose Layer 1	Retardation Factor Vadose Layer 2	Organic Decay Constant (day^{-1})
Aroclor-1016	2.92E+03	2.27E+03	NA
Aroclor-1221	1.50E+03	1.16E+03	NA
Aroclor-1242	1.57E+03	1.22E+03	NA
Aroclor-1248	6.85E+04	5.31E+04	NA
Aroclor-1254	1.31E+05	1.01E+05	NA
Aroclor-1260	1.57E+05	1.22E+05	NA
Benzene	1.74E+01	1.38E+01	9.50E-04
Benzo(a)anthracene	4.87E+04	3.78E+04	2.50E-04
Benzo(a)pyrene	1.16E+05	9.02E+04	3.30E-04
Benzo(b)fluoranthene	4.52E+05	3.51E+05	2.80E-04
Benzo(g,h,i)perylene	2.07E+06	1.60E+06	2.70E-04
Benzo(k)fluoranthene	8.42E+05	6.54E+05	8.0E-05
Benzoic acid	1.00E+01	8.00E+00	NA
Beta-BHC	7.69E+02	5.97E+02	2.79E-03
Bis(2-Ethylhexy)phthalate	2.44E+04	1.89E+04	1.78E-03
Bromodichloromethane	1.02E+01	8.17E+00	NA
Butylbenzyl phthalate	7.34E+03	5.70E+03	3.79E-03
Carbon disulfide	1.87E+01	1.47E+01	NA
Carbon tetrachloride	6.64E+01	5.17E+01	1.90E-03
Chloroform	1.24E+01	9.81E+00	3.79E-03
Chlordane	7.44E+01	5.80E+01	5.00E-04
Chlorobenzene	8.53E+01	6.64E+01	1.16E-03
Chloromethane	1.99E+00	1.77E+00	6.2E-03
Chrysene	4.87E+04	3.78E+04	1.70E-04
cis-1,2-Dichloroethene	4.68E+00	3.85E+00	NA
Cyanide[b]	1.27E+00	1.21E+00	9.50E-04
DDT	1.89E+05	1.46E+05	1.20E-04
Dibenzofuran	1.61E+03	1.25E+03	6.19E-03

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TABLE O.3-14
(Continued)

Organics	Retardation Factor Vadose Layer 1	Retardation Factor Vadose Layer 2	Organic Decay Constant (day^{-1})
Dibenzo(a,h)anthracene	1.14E+05	8.81E+04	1.80E-04
Di-n-butyl phthalate	1.92E+04	1.49E+04	3.01E-02
Di-n-octyl phthalate	1.92E+08	1.49E+08	1.90E-03
Ethylbenzene	1.71E+02	1.33E+02	3.04E-03
Ethyl parathion	7.02E+02	5.45E+02	NA
Fluoranthene	2.60E+04	2.02E+04	3.90E-04
Fluorene	1.83E+03	1.42E+03	2.90E-03
Ideno(1,2,3-cd)pyrene	5.57E+06	4.32E+06	2.40E-04
Malathion	8.52E+01	6.64E+01	3.36E-03
Methanol	1.03E+00	1.02E+00	9.90E-02
Methyl parathion	1.44E+01	1.14E+01	1.90E-03
Methylene chloride	3.17E+00	2.68E+00	2.48E-02
Naphthalene	2.81E+02	2.18E+02	2.69E-03
N-Nitrosodiphenylamine	1.65E+02	1.29E+02	5.09E-03
N-Nitrosodipropylamine	3.49E+00	2.93E+00	9.50E-04
Pentachlorophenol	1.24E+04	9.64E+03	4.60E-04
Perchloroethylene	4.22E+01	3.30E+01	4.20E+04
Phenol	4.51E+00	3.72E+00	2.48E-02
Phenanthrene	3.53E+03	2.74E+03	8.70E-04
Pyrene	1.84E+04	1.43E+04	9.00E-05
Pyridine	1.54E+00	1.42E+00	2.76E-02
Styrene	1.77E+02	1.38E+02	3.30E-03
Tetrachloroethane	3.09E+01	2.42E+01	3.79E-03
Tetrachloroethene	4.22E+01	3.30E+01	4.20E-04
Toluene	6.07E+01	4.73E+01	3.30E-03
trans-1,2-Dichloroethene	4.68E+00	3.85E+00	NA
Tributyl phosphate	1.22E+03	9.46E+02	NA
Trichloroethane	3.69E+01	2.89E+01	4.70E-04

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TABLE O.3-14
(Continued)

Organics	Retardation Factor Vadose Layer 1	Retardation Factor Vadose Layer 2	Organic Decay Constant (day^{-1})
Trichloroethene	4.22E+01	3.30E+01	4.20E-04
Total xylenes	1.35E+02	1.05E+02	1.90E-03
Vinyl chloride	1.48E+00	1.38E+00	2.40E-04

[a] NA denotes not available
[b] Cyanide is an inorganic compound, but it has an organic decay constant.

O.4.0 VADOSE ZONE MODELING

Vadose zone modeling was performed to estimate contaminant loading rates to the Great Miami Aquifer from a given source as a function of time. The overburden may have great capacity for immobilization and retardation of contaminants due to adsorption, precipitation, biodegradation, and radioactive decay. This capacity to prevent or slow the movement of contaminants to the aquifer should be evaluated with respect to future risk.

Analytical models were selected for use, based upon the following factors:

- Analytical methods are the most efficient alternative when data necessary for the characterization of the system is sparse and uncertain.
- The method is consistent with approaches used for similar radionuclide assessment codes such as the flow portions of PRESTO (EPA 1987b) and other site studies.
- The basis of the solution is well documented and the code has been extensively verified.

The following criteria were used in selecting specific analytical models:

- Capability of treating adsorption, radioactive and organic decay, and longitudinal dispersion
- Capability of calculating concentrations at large times and distances
- Availability of code
- Degree of code documentation
- Degree of code verification

O.4.1 DESCRIPTION OF MODELS

The models selected to evaluate flow in the vadose zone are ST1D (IT 1990b), and ODAST (Javendel et al. 1984). ST1D, a one-dimensional analytical solution, was used for the initial screening of constituents for mobility. ODAST, also a one-dimensional analytical solution, was used for determining fate and transport of the remaining constituents in the unsaturated zone. These computer codes are based on the solution originally developed by Ogata and Banks (1961), and calculate the normalized concentrations of a given constituent in a uniform flow field from a source having a constant or varying concentration in the initial layer. ODAST evaluates the basic one-dimensional analytical solute transport equation as a function of seepage velocity, dispersion coefficient, source decay, retardation factor, depletion time, and source rate. ST1D and ODAST

have been extensively verified against STRIP1B (Batu 1989). The computer code ODAST was used to provide the final leachate concentrations.

Leachate infiltration rates through the waste areas were necessary for calculating the total time for source depletion. They were also necessary for calculating the vertical seepage velocities that were used in vadose zone models, as discussed above. Infiltration rates were estimated using the HELP model (EPA 1984) assuming steady state infiltration conditions. The HELP model is a deterministic quasi-two-dimensional model that predicts evapotranspiration using the modified Penman method (EPA 1984) by incorporating the effect of site-specific default values of temperature, solar radiation, and evaporation coefficients. The model computes surface runoff by the U.S Soil Conservation Service curve number method using site-specific default values of runoff curve numbers. The amount of precipitation, minus surface runoff and surface water evaporation, percolates through the soil layer producing soil moisture storage, vertical leakage, and lateral drainage flow. The hydrologic process in the HELP model is modeled by considering a water balance approach for the flow components active in the waste source.

O.4.2 MODEL APPLICATION

A two-stage evaluation for the simulation of contaminant transport through the glacial overburden was used. Initially, the one-dimensional analytical solute transport model ST1D (IT 1990b) was used to screen the list of constituents of concern to reject those that would not reach the Great Miami Aquifer within the time period of interest under conservative conditions. Each constituent was evaluated under the 1000-year scenario. For a given waste area, a range of retardation factors was evaluated using the seepage velocities and dispersion coefficients for each layer of vadose zone. The critical retardation factor, for which the contaminant would reach the Great Miami Aquifer, was identified by trial and error analysis. After eliminating the constituents having a retardation factor greater than the critical value, the remaining list of constituents was given a more detailed analysis.

For a multiple-layer hydrostratigraphic unit, the program ODAST was performed for each individual layer to calculate the normalized concentration at the bottom of each layer for each time step. In general, dispersion through the lower layer would not come into effect until the constituent reached the bottom of the upper adjacent layer. This can be seen by identifying the time step when the concentration at the base of the first layer first exceeds the critical minimum value. Consequently, the time steps in the lower layer are shifted, when the normalized concentration at the base of the upper layer exceeds critical minimum value.

For the 1000-year scenario, the projected concentration beneath the waste unit was calculated by multiplying the normalized concentration at the base of the lowest layer by the source term (initial contaminant concentration at the source). The loading rates were calculated by multiplying

the concentration beneath the waste units by the recharge rate from the source. The plots of loading rates versus time were then produced for the constituents which were projected to reach the aquifer within 1000 years. The peak values in these plots were considered as the maximum loading rates to be observed in the aquifer for the contaminants over 1000 years.

O.4.3 SENSITIVITY ANALYSIS

As part of the modeling process, a series of model runs was completed to determine the sensitivity of the solution to the estimated parameters. The analytical solution is a simplified representation of the physical system, and the transport is primarily regulated by the hydraulic conductivity under a given retardation factor. In addition to being a direct input into the seepage velocity calculation, it is also a controlling factor in determining whether seepage will occur under saturated or unsaturated conditions.

The sensitivity runs were completed by increasing and decreasing the hydraulic conductivity from the estimated value in a series of order-of-magnitude steps in the range of known site values. A second series of runs was also completed for values found during the literature search for field hydraulic conductivity measurements in similar settings. Analyses results indicate that the variation of conductivity and, as a result, the seepage velocity and dispersion coefficients lead to such contaminants as uranium being transported to the Great Miami Aquifer, with arrival times of within 60 to 300 years. In locations where constituents were not reaching the aquifer until about 1000 years, reducing the hydraulic conductivity resulted in a finding of no transport to the aquifer.

Contaminant transport in the subsurface is governed by the advective and dispersive properties of the medium. The advection process depends on the hydraulic properties, largely the hydraulic conductivity. Hydraulic conductivity is used to develop the seepage velocity. Seepage velocity increases as hydraulic conductivity increases. A low value for retardation factor and/or a high value for dispersion coefficient also accelerates the movement of contaminants through the vadose zone. The combined effects of seepage velocity, retardation (adsorption), dispersion, and duration of source loading govern peak concentration values and the time of their occurrence in the Great Miami Aquifer. Low seepage velocities, low dispersion coefficient, and/or high retardation factors delay the arrival of contaminants at the Great Miami Aquifer. Radioactive or organic decay reduce concentration of contaminants at the aquifer. Decay reduces the amount of contaminant reaching the aquifer. Decay prevents contamination of the aquifer if the rate of loss of mass due to decay increases to the point where it equals the mass entering the vadose zone before the contaminant reaches the aquifer.

When decay is combined with low seepage velocities and/or retardation due to adsorption, the contaminant concentration at the Great Miami Aquifer is significantly reduced. However, the difference between the peak concentrations reaching the aquifer for low and high seepage

velocities is sensitive to whether the contaminant concentration reached a steady state. For any contaminant, if the steady state condition was reached for both low and high seepage flow velocities, the peak concentrations differ less compared to other constituents that did not reach a steady state concentrations at the aquifer within the simulation period of 1000 years. The steady state concentration condition was achieved for uranium-238 at the North Lime Sludge Pond within the simulation period for both low- and high-end seepage velocities. The peak concentration in this case differed by one order of magnitude.

The movement of organic constituents to the Great Miami Aquifer is greatly impeded by high biodegradation rates. For low seepage velocities and dispersion coefficients, the transport process is delayed and more time is available for degradation of the organic chemicals. Thus for organic chemicals, the peak concentrations were several orders of magnitude lower (or zero) with low-end as compared to high-end seepage velocities and dispersion coefficients.

The range of hydraulic conductivities at a site is constrained by the geology. Nevertheless, the reasonable range of hydraulic conductivities at a site permits a high degree of variability in contaminant transport.

O.4.4 MODELING RESULTS

Loading rates to the Great Miami Aquifer were estimated for each contaminant of concern for each waste area using ODAST. Tables O.4-1 through O.4-5 provide a summary of the constituents of concern along with the peak loading rates that are projected to reach the Great Miami Aquifer within 1000 years from each waste area. The calculated loading rates were generally sensitive to changes in the leach rate of the waste, the thickness of the vadose zone, the dispersion coefficient, the interstitial water velocity, the retardation factor, the radioactive decay factor, the biodegradation, and the depletion time of the source. The loading rates were used as input data for SWIFT III to model the groundwater movement and solute transport in the Great Miami Aquifer. These tables also present the approximate number of years for the projected constituents from each of the waste areas to reach the Great Miami Aquifer and the maximum concentrations of the leachate that would be expected before being diluted in the aquifer.

Loading rates of a constituent to the aquifer from a given source vary over time. Loading rates versus time for the constituents that reach the aquifer have been plotted. Typically, loading rates experience a sharp increase during the initial time period. They can then stabilize or decrease depending upon the depletion time of the source. Figures O.4-1 through O.4-5 show the time variations in concentrations of the U-238 in the Great Miami Aquifer from Waste Pit 1 (Operable Unit 1), Solid Waste Landfill (Operable Unit 2), Plant 1 Storage Pad (Operable Unit 3), Silos 1

TABLE O.4-1

RESULTS OF VADOSE ZONE MODELING - OPERABLE UNIT ONE
SITE WIDE CHARACTERIZATION REPORT

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
WASTE PIT 1				
Radionuclides				
Tc-99	20	6.054E-05	9.252E-08	2.835E-01
U-234	80	3.199E-08	2.331E-09	1.498E-04
U-235	80	1.010E-05	7.234E-06	4.730E-02
U-238	80	8.120E-04	4.526E-05	3.803E+00
Inorganics				
Potassium	580	1.290E+00	NA[b]	6.042E+03
Organics				
1,1,1-Trichloroethane	110	0.0	6.580E-01	0.0
Tetrachloroethene	110	0.0	7.160E-06	0.0
Trichloroethene	110	0.0	3.320E-04	0.0
WASTE PIT 2				
Radionuclides				
Tc-99	40	8.569E-05	9.252E-08	2.179E-01
U-234	80	2.918E-08	2.331E-09	7.422E-05
U-235	80	2.820E-05	7.234E-06	7.172E-02
U-238	80	7.940E-04	4.526E-05	2.019E+00
Organics				
Vinyl chloride	10	3.932E-02	1.920E-06	1.000E+02

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TABLE O.4-1
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
WASTE PIT 3				
Radionuclides				
Np-237	200	3.801E-06	1.067E-08	3.637E-02
Sr-90	120	7.797E-14	4.449E-13	7.461E-10
Tc-99	20	2.338E-04	9.252E-08	2.238E+00
U-234	60	3.270E-05	2.331E-09	3.129E-01
U-235	60	1.993E-02	7.234E-06	1.907E+02
U-238	60	4.151E-01	4.526E-05	3.972E+03
Inorganics				
Barium	920	0.0	3.660E-01	0.0
Mercury	360	2.898E-04	2.200E-03	2.774E+00
WASTE PIT 4				
Radionuclides				
Np-237	840	1.984E-14	1.067E-08	8.006E-11
Tc-99	40	1.109E-05	9.252E-08	4.475E-02
U-234	100	6.804E-06	2.331E-09	2.745E-02
U-235	100	3.736E-03	7.234E-06	1.507E+01
U-238	100	3.320E-01	4.526E-05	1.339E+03
Inorganics				
Mercury	440	1.971E-04	2.200E-03	7.951E-01
Organics				
1,2-Dichloroethene	20	3.343E-02	NA	1.349E+02
Tetrachloroethene	240	0.0	7.160E-06	0.0
Trichloroethene	240	0.0	3.320E-04	0.0

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TABLE O.4-1
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
WASTE PIT 5				
Radionuclides				
Np-237	600	3.287E-09	1.067E-08	3.749E-05
Sr-90	160	2.586E-14	4.449E-13	2.949E-10
Tc-99	40	1.879E-05	9.252E-08	2.143E-01
U-234	60	7.672E-05	2.331E-09	8.749E-01
U-235	60	8.175E-03	7.234E-06	9.323E+01
U-238	60	4.041E-01	4.526E-05	4.609E+03
Inorganics				
Mercury	320	2.009E-04	2.200E-03	2.291E+00
WASTE PIT 6				
Radionuclides				
Np-237	660	1.472E-09	1.067E-08	2.837E-06
Sr-90	180	3.377E-16	4.449E-13	6.510E-13
Tc-99	40	3.473E-05	9.252E-08	6.694E-02
U-234	60	7.377E-07	2.331E-09	1.422E-03
U-235	60	7.370E-04	7.234E-06	1.421E+00
U-238	60	2.876E-02	4.526E-05	5.543E+01
Organics				
Trichloroethene	170	0.0	3.320E-04	0.0

TABLE O.4-1
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
BURNPIT				
Radionuclides				
Np-237	700	1.603E-11	1.067E-08	1.875E-08
Tc-99	40	1.104E-05	9.252E-08	1.291E-02
U-234	80	2.471E-05	2.331E-09	2.890E-02
U-235	80	4.562E-03	7.234E-06	5.335E+00
U-238	80	3.267E-01	4.526E-05	3.820E+02
Inorganics				
Boron	140	1.141E-01	NA	1.334E+02
Mercury	400	1.981E-04	2.200E-03	2.316E-01
Organics				
1,1-Dichloroethane	40	0.0	7.300E-01	0.0
2-Hexanone	20	4.599E-04	NA	5.378E-01
Carbon disulfide	70	1.361E-04	7.300E-01	1.591E-01
Tetrachloroethene	190	0.0	7.160E-06	0.0
Vinyl chloride	10	2.031E-04	1.920E-06	2.375E-01
CLEARWELL				
Radionuclides				
Np-237	120	3.750E-06	1.067E-08	8.761E-03
Sr-90	80	9.018E-13	4.449E-13	2.107E-09
Tc-99	20	2.201E-04	9.252E-08	5.143E-01
U-234	40	1.250E-05	2.331E-09	2.920E-02
U-235	40	4.784E-03	7.234E-06	1.118E+01
U-238	40	4.269E-01	4.526E-05	9.972E+02

TABLE O.4-1
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
CLEARWELL				
Inorganics				
Barium	520	8.648E-04	3.660E-01	2.020E+00
Copper	700	1.406E-06	NA	3.285E-03
Cyanide	20	1.525E-02	1.460E-01	3.563E+01
Mercury	220	7.073E-04	2.200E-03	1.652E+00

[a] The number of significant figures are provided for calculational purposes, and do not reflect the accuracy of the value.
[b] NA indicates screening level is not available.

TABLE O.4-2

RESULTS OF VADOSE ZONE MODELING - OPERABLE UNIT TWO
SITE WIDE CHARACTERIZATION REPORT

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
SOLID WASTE LANDFILL				
Radionuclides				
Sr-90	320	8.748E-17	4.449E-13	2.411E-13
U-234	100	3.776E-07	2.331E-09	1.041E-03
U-235	100	3.988E-05	7.234E-06	1.099E-01
U-238	100	3.607E-03	4.526E-05	9.942E+00
Inorganics				
Boron	180	3.896E-02	NA[b]	1.074E+02
Cyanide	10	7.482E-04	1.460E-01	2.062E+00
Organics				
1,1-Dichloroethane	60	0.0	7.300E-01	0.0
NORTH LIME SLUDGE POND				
Radionuclides				
Sr-90	40	4.653E-11	4.449E-13	6.168E-07
U-234	20	2.110E-07	2.331E-09	2.796E-03
U-235	20	4.879E-05	7.234E-06	6.468E-01
U-238	20	7.256E-03	4.526E-05	9.619E+01
Inorganics				
Mercury	60	2.990E-17	2.200E-03	3.964E-13

TABLE O.4-2
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
NORTH LIME SLUDGE POND				
Organics				
1,1-Dichloroethane	5	3.157E-06	7.300E-01	4.185E-02
1,1,2-Trichloro-1,2,2-Trifluoroethane	10	9.464E-05	2.200E+01	1.255E+00
Acetone	1	2.458E-06	7.300E-01	3.258E-02
Carbon disulfide	10	7.285E-05	7.300E-01	9.657E-01
Chlordane	40	2.674E-06	2.810E-06	3.544E-02
SOUTH LIME SLUDGE POND				
Radionuclides				
U-234	60	2.929E-07	2.331E-09	6.879E-04
U-235	60	8.206E-05	7.234E-06	1.927E-01
U-238	60	7.348E-03	4.526E-05	1.725E+01
Organics				
Benzoic Acid	40	9.292E-03	2.920E+01	2.182E+01
ACTIVE FLYASH PILE				
Radionuclides				
Sr-90	80	7.188E-11	4.449E-13	3.819E-07
U-234	60	1.157E-13	2.331E-09	6.145E-10
U-235	60	1.425E-11	7.234E-06	7.571E-08
U-238	60	2.446E-09	4.526E-05	1.300E-05

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TABLE O.4-2
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
ACTIVE FLYASH PILE				
Inorganics				
Cyanide	5	9.718E-03	1.460E-01	5.163E+01
Mercury	280	1.239E-05	2.200E-03	6.582E-02
Molybdenum	280	1.378E+00	2.920E-02	7.319E+03
Organics				
1,1-Dichloroethene	15	0.0	6.080E-06	0.0
2-Chlorophenol	40	1.183E-02	3.660E-02	6.284E+01
4-Chloro-3-methylphenol	300	1.827E-03	NA	9.709E+00
Benzoic Acid	20	1.974E-02	2.920E+01	1.049E+02
INACTIVE FLYASH PILE				
Radionuclides				
Sr-90	120	1.642E-13	4.449E-13	1.216E-09
U-234	80	3.097E-13	2.331E-09	2.294E-09
U-235	80	3.942E-11	7.234E-06	2.920E-07
U-238	80	2.420E-09	4.526E-05	1.793E-05
Inorganics				
Cyanide	5	6.122E-03	1.460E-01	4.535E+01
Mercury	340	1.235E-05	2.200E-03	9.147E-02
Molybdenum	520	3.553E-01	2.920E-02	2.632E+03
Organics				
1,1,1-Trichloroethane	140	0.0	6.580E-01	0.0
Benzoic Acid	30	1.856E-02	2.920E+01	1.375E+02
Carbon disulfide	50	2.283E-04	7.300E-01	1.691E+00

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TABLE O.4-2
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
SOUTH FIELD				
Radionuclides				
U-234	40	3.246E-07	2.331E-09	4.453E-03
U-235	40	5.003E-05	7.234E-06	6.863E-01
U-238	40	4.319E-03	4.526E-05	5.925E+01
Inorganics				
Manganese	700	1.064E-07	3.650E-03	1.460E-03
Mercury	140	3.190E-08	2.200E-03	4.376E-04
Organics				
Acetone	5	8.946E-13	7.300E-01	1.227E-08

[a] The number of significant figures are provided for calculational purposes, and do not reflect the accuracy of the value.
[b] NA indicates screening level is not available.

TABLE O.4-3

RESULTS OF VADOSE ZONE MODELING - OPERABLE UNIT THREE
SITE WIDE CHARACTERIZATION REPORT

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
PLANT 1 STORAGE PAD				
Radionuclides				
U-234	120	1.025E-07	2.331E-09	6.030E-04
U-235	120	1.296E-05	7.234E-06	7.620E-02
U-238	120	1.786E-03	4.526E-05	1.051E+01

[a] The number of significant figures are provided for calculational purposes, and do not reflect the accuracy of the value.

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TABLE O.4-4

RESULTS OF VADOSE ZONE MODELING - OPERABLE UNIT FOUR
SITE WIDE CHARACTERIZATION REPORT

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
SILOS 1 & 2				
Radionuclides				
U-234	100	4.048E-08	2.331E-09	2.190E-05
U-235	100	6.167E-06	7.234E-06	3.336E-03
U-238	100	6.878E-04	4.526E-05	3.721E-01
Inorganics				
Boron	160	4.918E-01	NA[b]	2.660E+02
Cyanide	10	1.351E-02	1.460E-01	7.308E+00
Mercury	460	4.247E-07	2.200E-03	2.298E-04
Organics				
1,4-Dioxane	10	5.140E-04	NA	2.781E-01
Trichloroethane	120	0.0	NA	0.0
SILO 3				
Radionuclides				
U-234	120	3.741E-02	2.331E-09	9.267E+00
U-235	120	7.353E+00	7.234E-06	1.821E+03
U-238	120	7.156E+02	4.526E-05	1.773E+05
Inorganics				
Mercury	580	1.648E-03	2.200E-03	4.081E-01

a The number of significant figures are provided for calculational purposes, and do not reflect the accuracy of the value.
b NA indicates screening level is not available.

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TABLE O.4-5

RESULTS OF VADOSE ZONE MODELING - OPERABLE UNIT FIVE
SITE WIDE CHARACTERIZATION REPORT

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
PLANT 2/3 AREA				
Radionuclides				
Sr-90	260	2.641E-16	4.449E-13	3.145E-12
Tc-99	40	2.427E-05	9.252E-08	2.890E-01
U-234	100	7.201E-03	2.331E-09	8.575E+01
U-235	100	2.098E+00	7.234E-06	2.498E+04
U-238	100	1.481E+02	4.526E-05	1.763E+06
Inorganics				
Mercury	420	9.691E-04	2.200E-03	1.154E+01
Organics				
1,1-Dichloroethane	45	0.0	7.300E-01	0.0
Benzoic acid	50	2.777E-02	2.920E+01	3.307E+02
N-Nitroso-di-propylamine	20	2.341E-07	7.450E-04	2.787E-03
PLANT 6 AREA				
Radionuclides				
Sr-90	100	1.980E-11	4.449E-13	1.263E-07
Tc-99	20	5.618E-05	9.252E-08	3.584E-01
U-234	60	3.978E-03	2.331E-09	2.538E+01
U-235	60	6.299E-01	7.234E-06	4.019E+03
U-238	60	2.285E+02	4.526E-05	1.458E+06
Inorganics				
Cyanide	5	1.359E-02	1.460E-01	8.669E+01

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TABLE O.4-5
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
PLANT 6 AREA				
Organics				
1,1-Dichloroethene	20	0.0	6.080E-06	0.0
1,2-Dichloroethene	50	0.0	NA[b]	0.0
2-Hexanone	10	2.609E-03	NA	1.665E+01
Tetrachloroethene	130	0.0	7.160E-06	0.0
Trichloroethene	130	0.0	3.320E-04	0.0
Vinyl chloride	5	1.175E-03	1.920E-06	7.497E+00
PLANT 9 AREA				
Radionuclides				
Sr-90	520	2.312E-20	4.449E-13	8.194E-17
Tc-99	40	3.485E-05	9.252E-08	1.235E-01
U-234	160	7.601E-04	2.331E-09	2.694E+00
U-235	160	1.757E+00	7.234E-06	6.226E+03
U-238	160	1.268E+01	4.526E-05	4.493E+04
Organics				
2-Hexanone	35	3.686E-04	NA	1.306E+00
Bromodichloromethane	100	1.257E-03	1.460E-01	4.456E+00
Carbon disulfide	170	5.561E-04	7.300E-01	1.971E+00

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TABLE O.4-5
(Continued)

Constituents	Time to Reach Aquifer (yrs)	Maximum Loading Conc. in Aquifer[a] (mg/ℓ)	Screening Levels[a] (mg/ℓ)	Maximum Loading Rates into the Aquifer[a] (mg/day)
PILOT PLANT AREA				
Radionuclides				
Sr-90	320	5.912E-17	4.449E-13	1.592E-13
Tc-99	40	5.210E-05	9.252E-08	1.403E-01
U-234	120	6.805E-05	2.331E-09	1.833E-01
U-235	120	1.904E-02	7.234E-06	5.127E+01
U-238	120	1.264E+00	4.526E-05	3.405E+03
Inorganics				
Mercury	640	1.930E-03	2.200E-03	5.199E+00
Organics				
1,1-Dichloroethane	60	0.0	7.300E-01	0.0
1,1,2-Trichloroethane	140	0.0	NA	0.0
1,2-Dichloroethane	35	2.222E-12	4.010E-05	5.985E-09
Carbon disulfide	110	7.282E-04	7.300E-01	1.961E+00
Vinyl chloride	15	4.330E-04	1.920E-06	1.166E+00

[a] The number of significant figures are provided for calculational purposes, and do not reflect the accuracy of the value.
[b] NA indicates screening level is not available.

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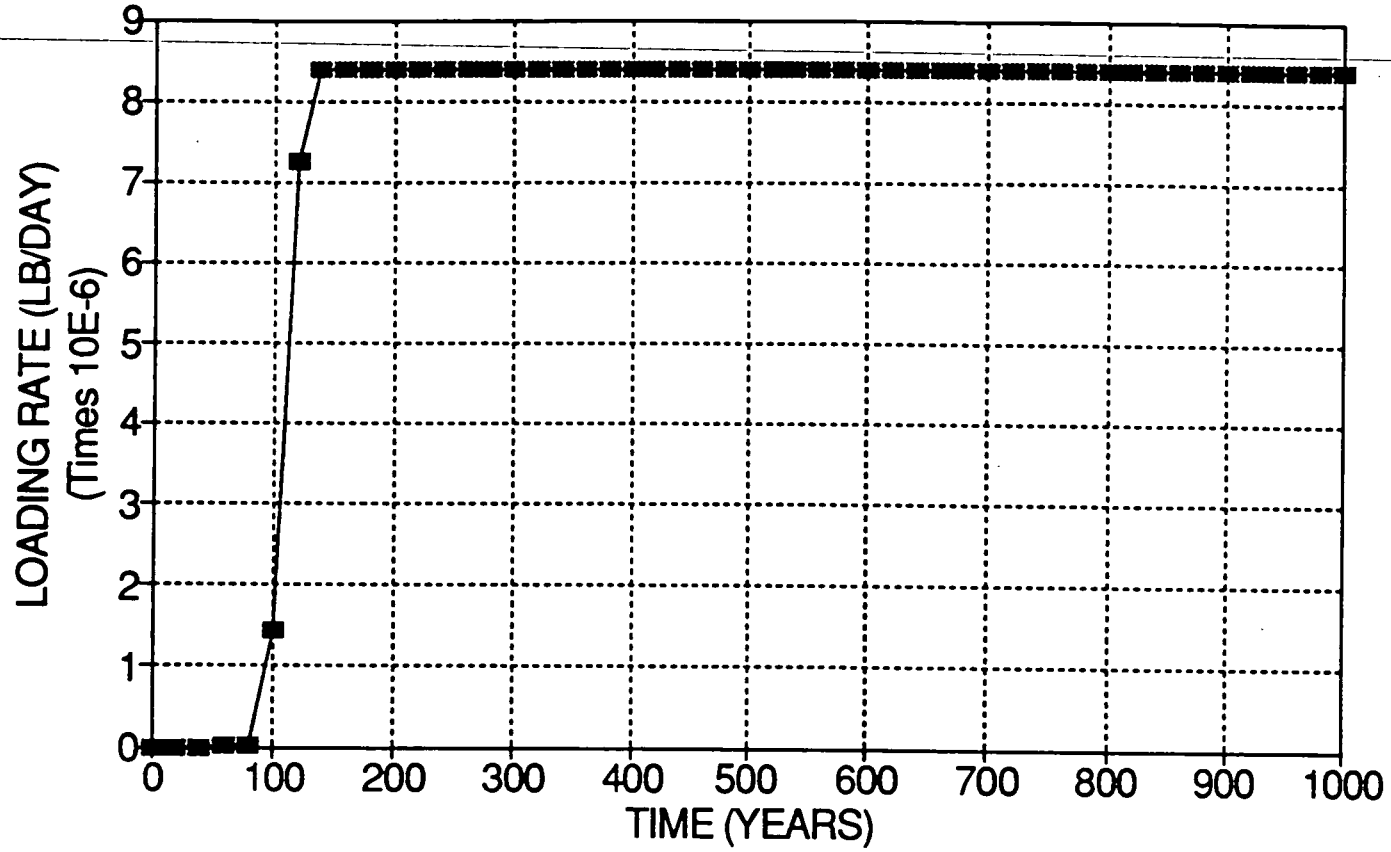

FIGURE O.4-1. MASS LOADING OF URANIUM-238 INTO THE GREAT MIAMI RIVER AQUIFER FROM WASTE PIT 1 (OPERABLE UNIT 1)

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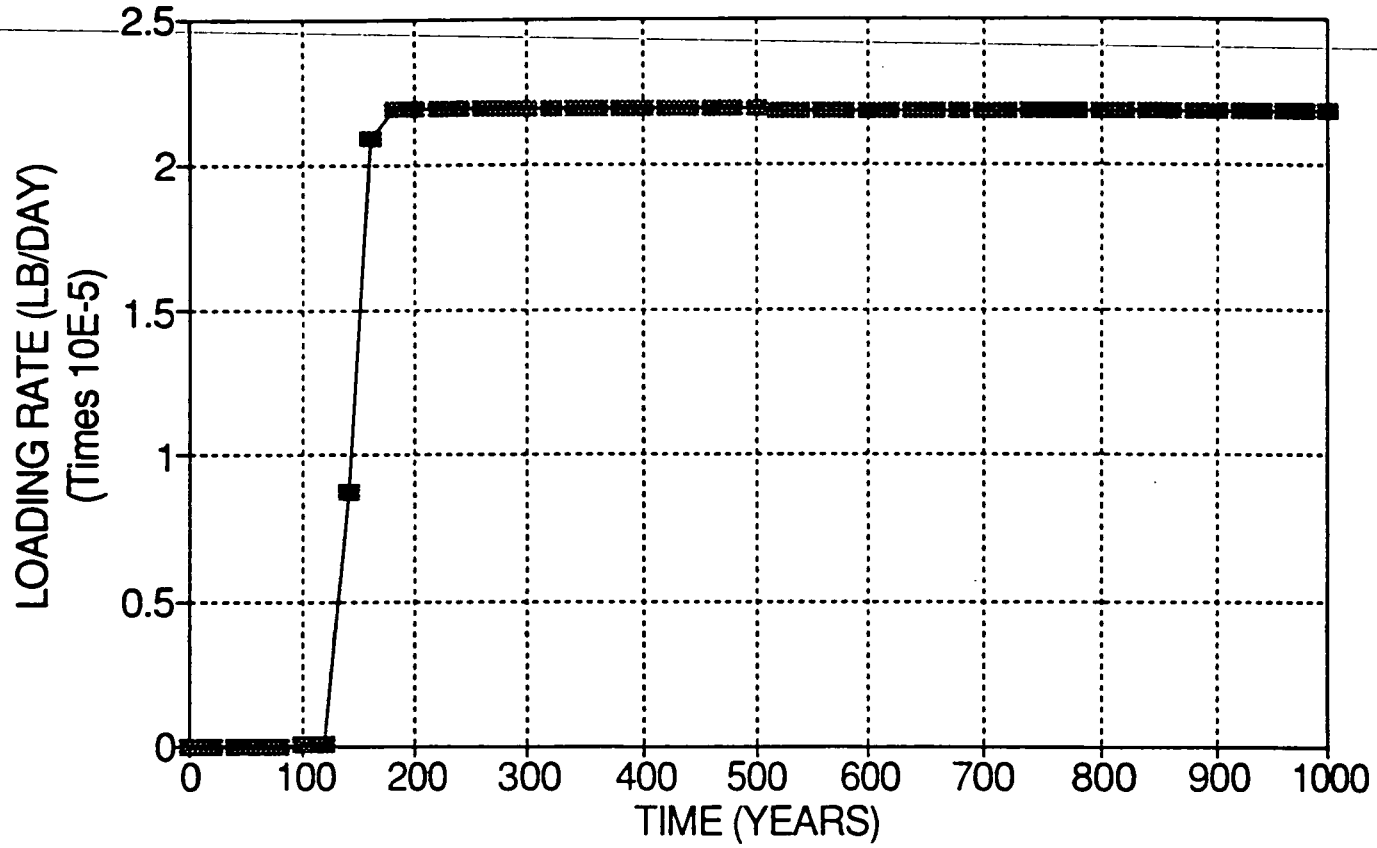

FIGURE O.4-2. MASS LOADING OF URANIUM-238 INTO THE GREAT MIAMI RIVER AQUIFER FROM SOLID WASTE LANDFILL (OPERABLE UNIT 2)

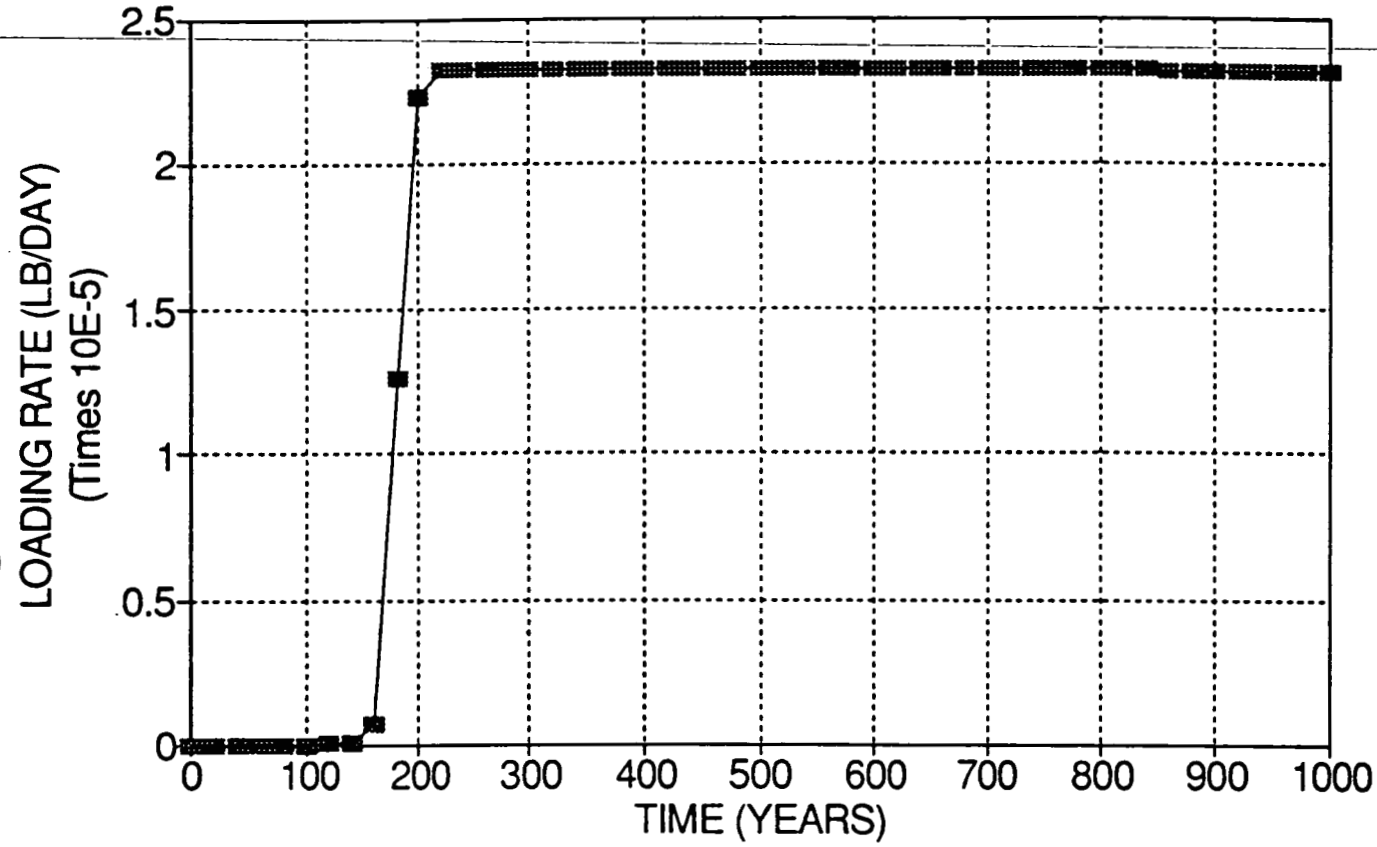

FIGURE O.4-3. MASS LOADING OF URANIUM-238 INTO THE GREAT MIAMI RIVER AQUIFER FROM PLANT 1 STORAGE PAD (OPERABLE UNIT 3)

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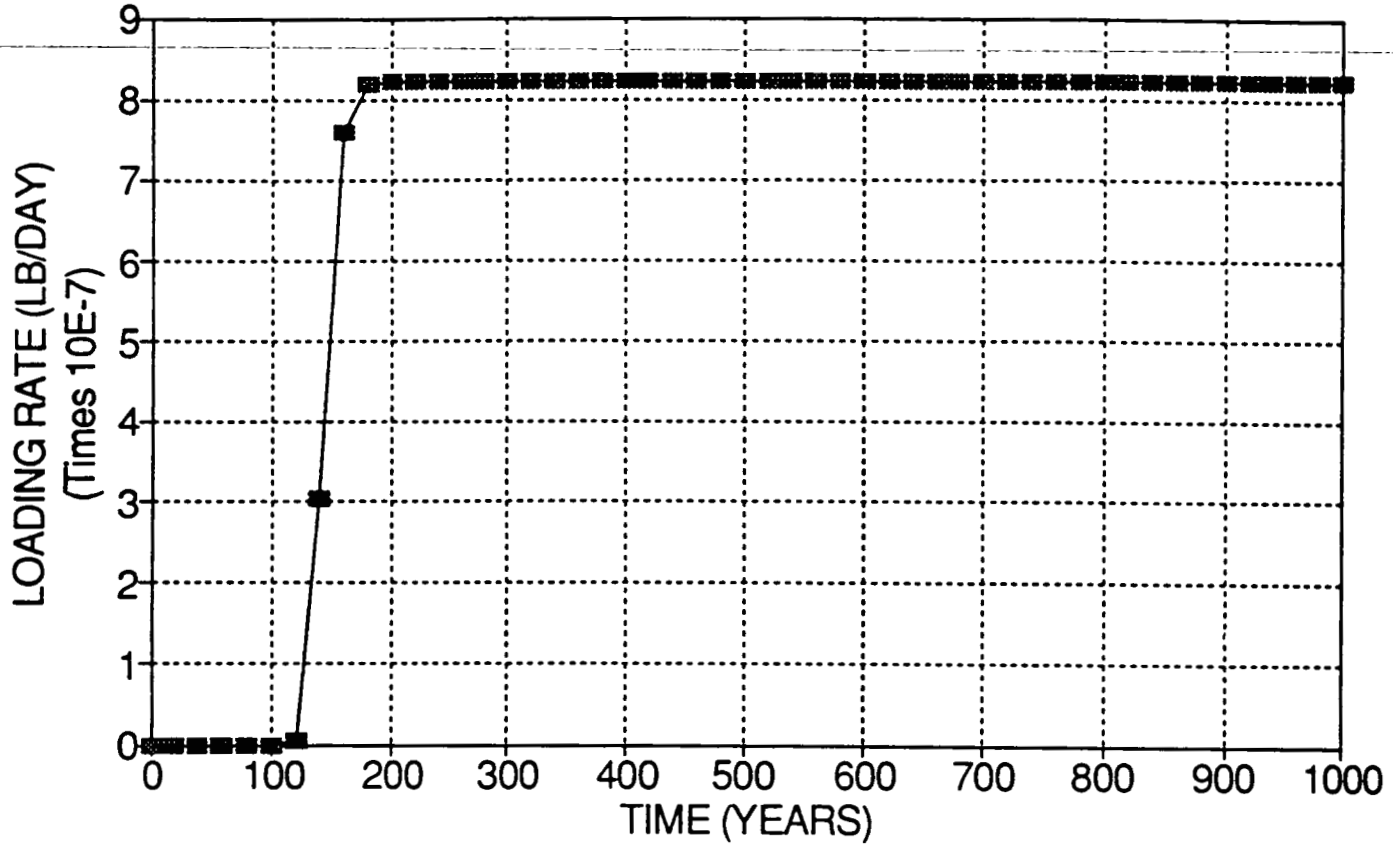

FIGURE O.4-4. MASS LOADING OF URANIUM-238 INTO THE GREAT MIAMI RIVER AQUIFER FROM SILOS 1&2 (OPERABLE UNIT 4)

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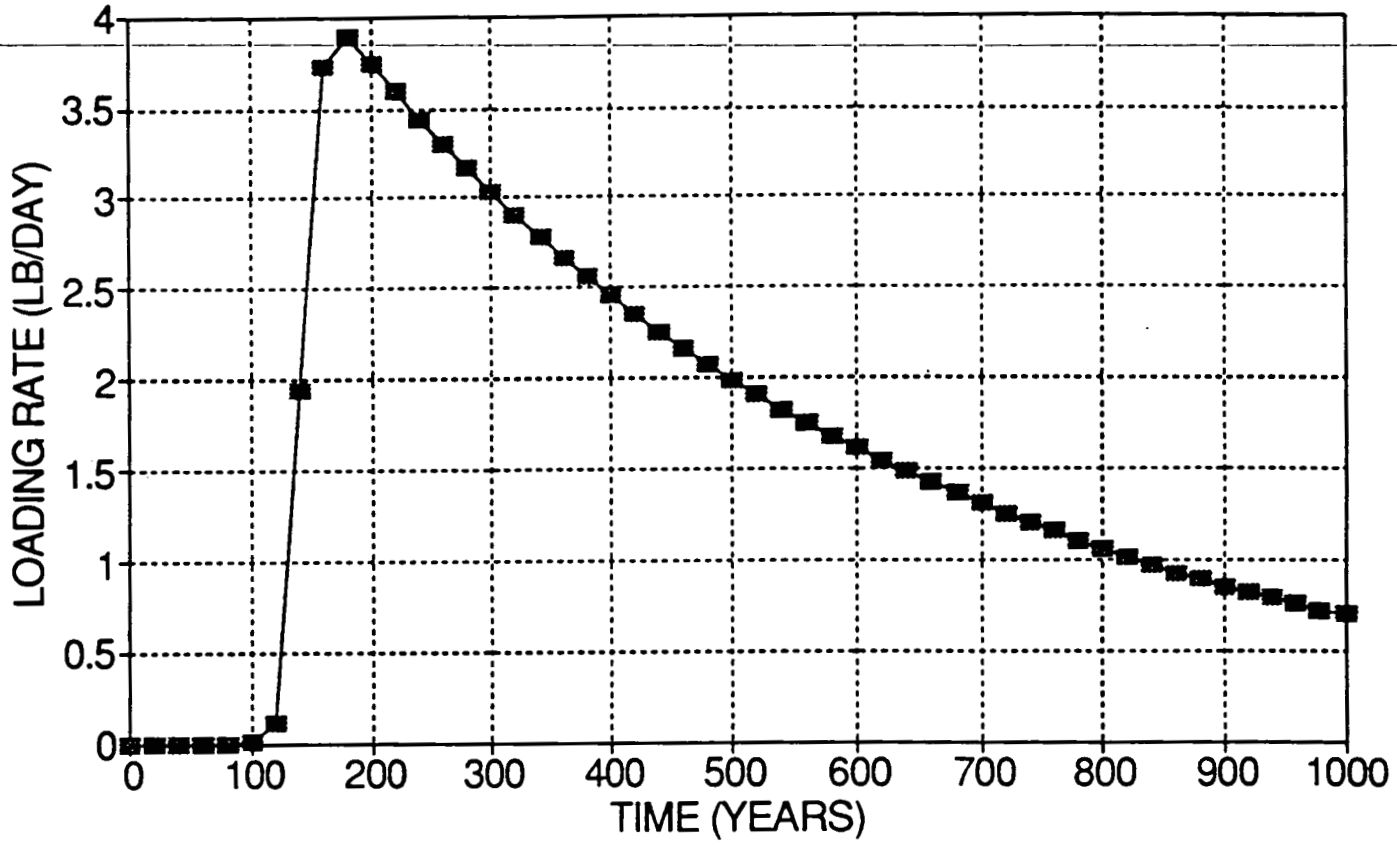

FIGURE O.4-5. MASS LOADING OF URANIUM-238 INTO THE GREAT MIAMI RIVER AQUIFER FROM PLANT 2/3 AREA (OPERABLE UNIT 5)

and 2 (Operable Unit 4), and Plant 2/3 Area (Operable Unit 5), respectively. For a long depletion time the source remains active for a longer period during the simulation. The depletion rate is low for long depletion times, this ensures a mild change in the source term with time and helps to approach a steady-state condition within the simulation time of 1000 years as shown in Figures O.4-1 through O.4-4. For short depletion time, the source term vanishes earlier during the simulation period. Also, for high depletion rate, the source term decreases faster during the simulation period. These factors cause an unsteady variation along with a sharp decline in the loading rates as shown in Figure 0.4-5.

The selected constituents to be modeled using SWIFT III were based on the risk associated with human health from the ingestion of water from the Great Miami Aquifer. The modeling of contaminant migration through the vadose zone to the Great Miami Aquifer, revealed that the peak concentrations of some constituents reaching the aquifer can be expected to be quite low. These concentrations would be further diluted in the aquifer. Consequently, the modeling of these contaminants in the aquifer was not considered justifiable for the human health risk assessment.

The decision to model a constituent in the aquifer was based on whether the concentration in the leachate exceeded a predetermined screening level. The concentration in the leachate (before dilution in the aquifer) capable of producing a 10^{-7} lifetime risk of cancer was selected to be an appropriate and conservative screening level. These screening levels are presented in Tables O.4-1 through O.4-5 to provide a basis for selection of the constituents to be used for aquifer modeling. The selection of this low concentration ensures that no chemical capable of contributing a significant risk to the site-wide RME was overlooked in the groundwater fate and transport portion of the risk assessment. If the predicted concentration of a given constituent at the vadose zone/aquifer interface equals or exceeds the respective screening level concentration, the constituent was selected for aquifer modeling. Table O.4-6 presents a summary of constituents which were considered for aquifer modeling.

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TABLE O.4-6

SUMMARY OF THE CONSTITUENTS OF CONCERN WHICH WILL ENTER THE AQUIFER IN 1000 YEARS AND THE CONSTITUENTS FOR SWIFT III MODELING

Constituents	Maximum Loading Concentration (mg/ℓ)	Screening Levels (mg/ℓ)	Is Constituent Used for the SWIFT III Modeling?
Radionuclides			
Np-237	3.80E-06	1.067E-08	Yes
Sr-90	7.19E-11	4.449E-13	Yes
Tc-99	2.34E-04	9.252E-08	Yes
U-234	3.74E-02	2.331E-09	Yes
U-235	7.35E+00	7.234E-06	Yes
U-238	7.16E+02	4.526E-05	Yes
Inorganics			
Barium	8.65E-04	3.66E-01	No
Boron	1.14E-01	NA[a]	Yes
Copper	1.41E-06[b]	NA	No
Manganese	1.06E-07	3.65E-03	No
Mercury	1.93E-03	2.20E-03	No
Molybdenum	1.38E+00	2.92E-02	Yes
Potassium	1.29E+00[b]	NA	No
Organics			
1,1-Dichloroethane	3.16E-06	7.30E-01	No
1,1-Dichloroethene	5.45E-11	6.08E-06	No
1,1,2-Trichloro-1,2,2-trifluorethane	9.46E-05	2.20E+01	No
1,1,1-Trichloroethane	6.90E-21	6.58E-01	No
1,1,2-Trichloroethane	4.00E-21	NA	No
1,2-Dichloroethane	2.22E-12	4.01E-05	No
1,2-Dichloroethene	1.03E-09[c]	NA	No
1,4-Dioxane	4.46E-04[d]	NA	No

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TABLE O.4-6
(Continued)

Constituents	Maximum Loading Concentration (mg/ℓ)	Screening Levels (mg/ℓ)	Is Constituent Used for the SWIFT III Modeling?
Organics			
2-Hexanone	2.61E-03[d]	NA	No
2-Chlorophenol	1.18E-02	3.66E-02	No
4-Chloro-3-methylphenol	1.83E-03	NA	Yes
Acetone	2.458E-06	7.30E-01	No
Benzoic acid	2.78E-02	2.92E+01	No
Bromodichloromethane	1.26E-03	1.46E-01	No
Carbon disulfide	7.28E-04	7.30E-01	No
Chlordane	2.674E-06	2.81E-06	No
Cyanide	1.53E-02	1.46E-01	No
N-Nitrosodipropylamine	2.34E-07	7.45E-04	No
Tetrachloroethene	4.79E-12	7.16E-06	No
trans-1,2-Dichloroethene	3.34E-02	1.46E-01	No
Trichloroethane	5.79E-17[c]	NA	No
Trichloroethene	1.28E-11	3.32E-04	No
Vinyl chloride	3.93E-02	1.92E-06	Yes

[a] NA indicates screening level is not available.
[b] Concentration is less than background concentrations, therefore, it was not included in the SWIFT III modeling.
[c] Concentration is below analytical testing methods and, therefore, it was not included in the SWIFT III modeling.
[d] The constituent of concern was eliminated from the aquifer modeling due to application complications.

O.5.0 AQUIFER MODELING

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O.5.1 MODEL BACKGROUND AND DEVELOPMENT

Groundwater modeling for the site-wide risk analysis was performed with the calibrated groundwater flow model for the FEMP. This model utilizes the SWIFT III code and was previously calibrated using groundwater elevations obtained during the April 1986 monitoring period. A brief summary of the calibration and the results of the calibration are presented in this section.

The groundwater modeling program was initiated to define groundwater transport in and around the FEMP. The selection, verification, calibration, and results of groundwater modeling are presented in two separate reports (IT 1990 and ASI/IT 1990). The groundwater model used in support of the site-wide risk analysis is a finite-difference computer model of groundwater flow and solute transport. The computer program used is SWIFT III, version 2.25. A detailed presentation of the model, its development, and the baseline input data was issued as a part of the overall modeling report prepared under the RI/FS (ASI/IT 1990). Only the most pertinent information is presented here. A comprehensive verification study of the SWIFT III code has also been completed and a report issued (IT 1990b).

Steps in the development of the model for application to the FEMP have included:

- Construction and calibration of a regional, two-dimensional, steady-state groundwater flow model
- Construction and calibration of a regional, three-dimensional, steady-state groundwater flow model
- Application of a local, two-dimensional, analytical solute transport model to help strategize the numerical solute transport model
- Construction of a local, two-dimensional, transient solute transport model
- Construction and calibration of a local, three-dimensional, transient solute transport model with uranium concentration data from the monitoring wells.

The regional model covers an area of 28.7 square miles (74.3 km^2), including the FEMP, the Southern Ohio Water Company (SOWC) collector wells, and a portion of the GMR. The regional model's grid spacing varies between 250 feet and 2000 feet (76 m and 610 m), and has the closest grid spacing in the area of the SOWC collector wells. It was calibrated against field data using a steady-state flow condition and calibration results were incorporated into the local area model.

The local model covers a smaller area than the regional model and uses a tighter grid spacing, with grid cells 125 feet (38 m) on a side. The smaller grid was established to include the area of the existing uranium plume, and extends from the northern part of the FEMP to approximately 1500 feet (460 m) north of the GMR (Figure O.5-1). The grid size was selected based on the need to simulate a uranium dispersivity of 100 feet (30 m) longitudinally, which was the preferred value based on literature review (IT 1990b). Using this dispersivity value, the grid size was selected to accommodate dispersivity values as low as 62.5 feet (19 m), or half the distance of the local grid area of 125 feet (38 m). The relationship between the local and regional models was established by imposing the steady-state flow field predicted by the regional model onto the local solute transport model.

The regional and local models each contain five layers. The uppermost two layers represent the upper and lower parts of the upper Great Miami Aquifer that underlies the area. The middle layer represents a clay interbed that is present in the immediate vicinity of the FEMP site, and the lowermost two layers represent the upper and lower parts of the Great Miami Aquifer. In regions where the clay interbed is not present, the middle layer has the same characteristics as the upper two layers. The layers extend laterally into bedrock to the edges of the buried valley that contains the aquifer. The number of aquifer cells in each layer was decreased with depth in the aquifer to simulate the narrowing bedrock valley. This was done using bedrock topography maps of the region and simulated the U-shaped buried valley which contains the Great Miami Aquifer.

Pumping wells are located in the area spanned by both the regional and local models. These include a FEMP production well and three industrial wells located south of the FEMP site in both models. Pumping from each of these wells was assigned to the proper cell and layer in the model. In addition, the regional model also simulates the presence of two large capacity collector wells owned by the SOWC located by the GMR. Although they are not directly included in the local model, they do influence its results by way of the boundary conditions brought in from the regional model.

The calibration of the groundwater flow model was performed by comparing hydraulic heads calculated by the model against heads measured in numerous monitoring wells throughout the FEMP and surrounding areas. This calibration was performed using the regional flow model. Reasonable estimates of hydraulic conductivity and recharge were initially input into the model and then varied within an acceptable range to adjust model-computed heads into agreement with observed monitoring well heads. The monitoring well heads used for calibration were measured in 1986 and are shown in Figure O.5-2. This period represents average groundwater conditions and water level elevations as indicated by time-series analysis.

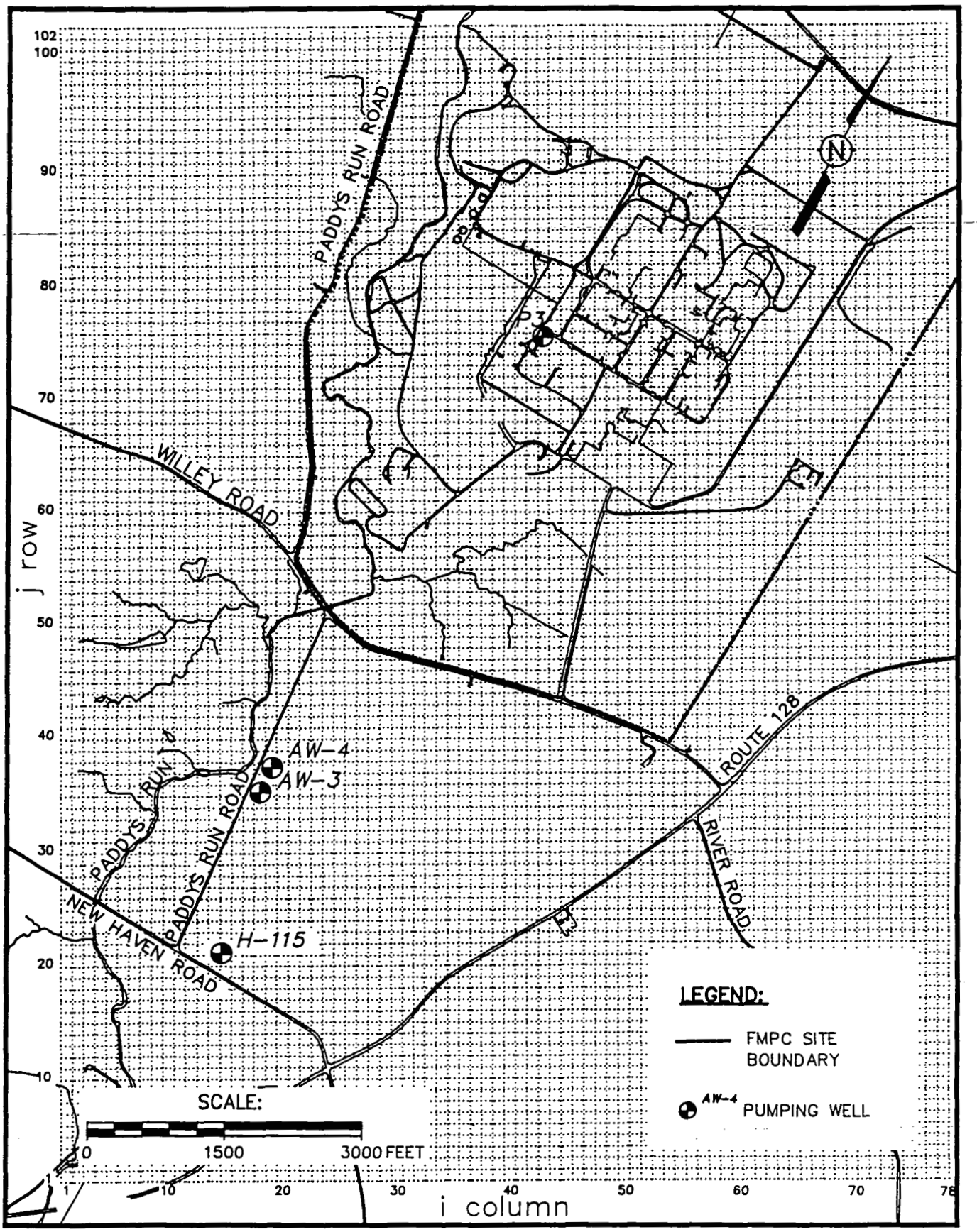

FIGURE 0.5-1
SWIFT III LOCAL AREA MODEL GRID

The model used varying hydraulic conductivity values for the five layers based on the results of the calibration. The uppermost and middle layers were assigned hydraulic conductivity values of 450 feet per day (140 m/day), and the lowermost layers used 600 feet per day (180 m/day). In addition, a portion of the middle layer which underlies the FEMP was assigned 0.0003 feet per day (9×10^{-5} m/day) as a hydraulic conductivity value to represent the clay interbed (as shown by geologic borings). This simulated the presence of a low permeability clay and created a semi-confining layer underneath part of the FEMP and its surrounding area.

Recharge rates set as a result of the regional model calibration were assigned to several different zones. In areas where the sand and gravel aquifer is overlain by glacial overburden, a recharge of 6 inches per year (0.15 m/yr) was used. Regions where the Great Miami Aquifer is exposed at the surface use 14 inches per year (0.36 m/yr), with Paddys Run channel being assigned a value of 32 inches per year (0.81 m/yr) in the local model to simulate its increased infiltration. An additional region, the area covered by the FEMP was also included as a consequence of the sensitivity analysis. This region was assigned a value of 2 inches per year (0.05 m/yr) to simulate the developed nature of the site and the effects of stormwater drainage into the storm sewer system.

Groundwater flow conditions simulated by the model were successful and reproduced the observed flow conditions throughout the study area. Based on water levels from 55 wells, the arithmetic mean residual (observed head minus calculated head at the monitoring well) for the calibrated flow model was 0.33 feet (0.1 m). The excellent match portrayed by this residual value is realized when compared to a total change in hydraulic head of approximately 20 feet (6.1 m) over the modeling area. The mean of the absolute values of the residuals was 1.08 feet (0.33 m), with a standard deviation of 1.36 feet (0.41 m). Water balances performed using the model showed total inflow and total outflow from the model to agree within 0.2 percent.

To maintain hydraulic similarity between the regional and local flow models, a computer program was used to check, cell by cell, the correspondence of heads in the local model with heads in the regional model. The program verified that the regional flow model calibration was preserved in the local model which was used for solute transport; thus, no new flow calibration was necessary. The local model used hydraulic parameters identical to those used in the calibrated regional model. Boundary conditions for the local model were set from corresponding cells in the regional model to maintain the hydraulic similarity. This resulting potentiometric surface is shown in Figure O.5-3.

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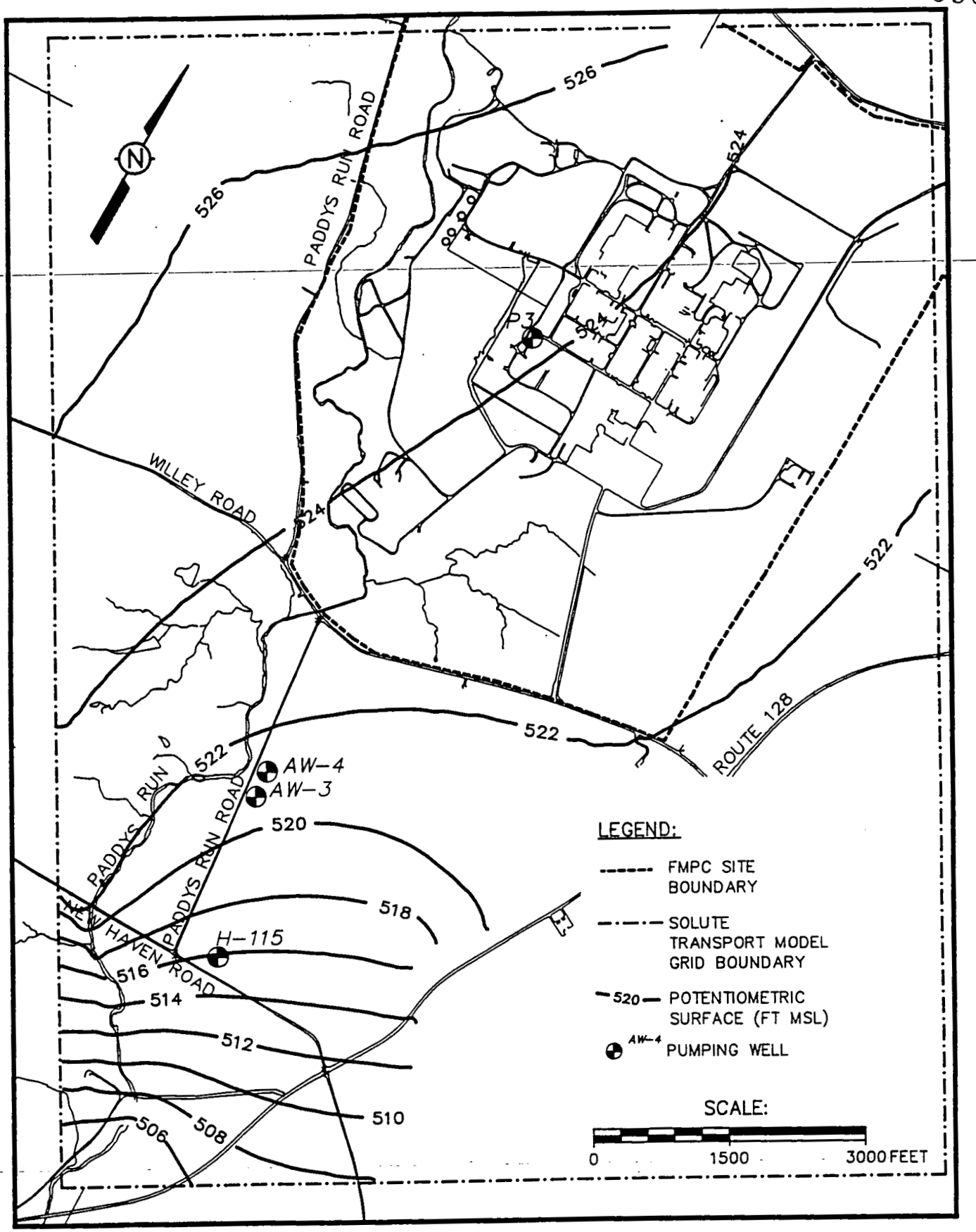

SITE WIDE BASELINE RISK ASSESSMENT
31332771/SWBRA/KNOX

FIGURE 0.5-3 SITEWIDE AQUIFER MODEL
SIMULATED POTENTIOMETRIC SURFACE

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O.5.2 CONCEPTUAL MODEL FOR SITE-WIDE RISK ASSESSMENT

The groundwater modeling performed for the site-wide risk analysis was done utilizing data obtained from the vadose zone modeling results. Compounds were initially simulated to determine their transport rates through the vadose zone. This modeling using one-dimensional seepage analysis (see Section O.5.0) derived loading rates and times for each of the 21 potential source areas within the five operable units. Each of these source areas, its associated operable unit, and the area it occupies is shown in Table O.5-1.

Using the results of the vadose zone modeling, the loading rates of each compound were used to calculate the expected maximum concentration which would occur in the Great Miami Aquifer. These expected maximum concentrations were then compared to risk-based screening concentrations to determine if a significant amount of risk would be developed from each compound. This resulted in 10 compounds to be modeled, that are already presented in Table O.4-6.

As stated previously, the calibrated groundwater flow model for the FEMP was used to simulate the solute transport of the compounds in the Great Miami Aquifer. Based on the aquifer loading rates derived from the vadose zone modeling, loading periods were defined for each compound to reduce the amount of data entry required. In general, loading periods ranged from 10 to 200 years in length and were defined in direct proportion to the changes in loading rates for each compound. Thus, compounds with steady loading rates had long loading periods, while compounds with variable loading rates used short loading periods. This allowed the simulation of short loading "spikes" while at the same time minimizing data input and runtimes.

Compounds were simulated for a total of 1000 years in the Great Miami Aquifer or until their concentrations reduced below 1 microgram per liter ($\mu g/\ell$). Below this level, numerical dispersion inherent in the model began to approach the same magnitude as the compound's concentration level. Results were output every 25 years for all compounds, to allow for calculation of risk levels in the aquifer at various times.

O.5.3 SATURATED FLOW MODELING FOR SITE-WIDE RISK ASSESSMENT

Saturated flow modeling for the site-wide risk analysis was initiated by dividing each of the loading curves generated by the vadose zone modeling into loading periods. As stated previously, the lengths of the loading periods were varied based upon the change in loading experienced by each compound. Loading rates for each period were calculated by averaging the results of the vadose zone modeling over the length of each period. In this way, total mass inflow into the aquifer was maintained.

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TABLE O.5-1

SOURCE AREAS FOR FEMP AQUIFER MODEL

Location	Area[a] m^2	(ft^2)	Number of Cells for Modeled Area
Operable Unit 1			
Waste Pit 1	7,682	(82,691)	5
Waste Pit 2	4,171	(44,901)	3
Waste Pit 3	22,422	(241,347)	15
Waste Pit 4	7,785	(83,799)	5
Waste Pit 5	14,965	(161,077)	10
Waste Pit 6	3,011	(32,410)	2
Clearwell	2,737	(29,461)	2
Burnpit	2,019	(21,732)	1
Operable Unit 2			
Solid Waste Landfill	3,931	(42,313)	3
North Lime Sludge Pond	2,604	(28,029)	2
South Lime Sludge Pond	2,751	(29,612)	2
Active Flyash Pile	8,715	(93,806)	6
Inactive Flyash Pile	12,150	(130,782)	8
South Field	22,501	(242,200)	16
Operable Unit 3			
Plant 1 Storage Pad	9,187	(98,888)	6
Operable Unit 4			
Silos 1 & 2	934	(10,054)	1
Silo 3	467	(5,027)	1
Operable Unit 5			
Plant 2/3 Area	26,040	(280,292)	18
Plant 6 Area	17,440	(187,723)	12
Plant 9 Area	5,813	(62,571)	4
Pilot Plant Area	4,650	(50,052)	3

[a] The number of significant figures are provided for calculational purposes and do not reflect the accuracy of the value.

Loading rates were assigned to each of the 21 potential source areas in the model and were adjusted to account for the varying surface area occupied by each source. Model source areas were calculated by dividing the area of the actual source by the area of a model grid cell, which is 125 feet (38 m) on a side (a total of 15,625 square feet [1450 m^2]). This defined the number of cells needed for each source area in the model as shown in Table O.5-1. Cells in the model were then assigned to each source area to correspond with the physical location of the source. These areas are shown in Figure O.5-4. The loading rate for each compound was then divided by the number of model cells in each source area to derive the adjusted loading rate for each cell in the source area.

In the case of U-234, U-235, and U-238, all three uranium isotopes were modeled as one compound to simplify the modeling and to allow the use of the previously calibrated total-uranium solute transport model. Because the previous model utilizes total-uranium and because the uranium at the FEMP is mostly U-238 (approximately 99 percent by mass), this approach was used.

Initial background concentrations of each compound in the aquifer were set at zero, with the exception of uranium, which used the results of the calibrated local solute transport model for uranium at the FEMP to set initial concentrations. The construction, calibration, and results of this model have been presented in a previous report (ASI/IT 1990), and will not be presented here. The uranium concentrations for model Layer 1 (the uppermost layer) from the calibrated solute transport model are shown in Figure O.5-5.

The model simulations for the compounds at the FEMP used dispersivity values of 100 feet (30 m) longitudinal and 10 feet (3 m) in the transverse direction. These values were determined during the solute transport calibration for uranium and are based on values taken from literature review (ASI/IT 1990 and Walton 1985). Retardation factors were compound-specific and are summarized in Table O.5-2. These values are based on literature reviews of the specific compounds in sands and gravels similar to the Great Miami Aquifer.

Model simulations were done using SWIFT III on a Prime EXL325 minicomputer. Simulation execution times varied between 60 and 170 hours and required extensive computing capacity. Output was written to a single file from which relevant data was extracted using data manipulation programs written for that purpose.

Contour plots were made for selected constituents at the simulation times of 10, 30, 100, 300, and 1000 years. Figures O.5-6 through O.5-10 illustrate the changing uranium concentrations in Layer 1 of the aquifer predicted by the model. Figures O.5-5 through O.5-8 depict a plume of uranium in groundwater along the southern boundary of the FEMP property. It appears that this plume

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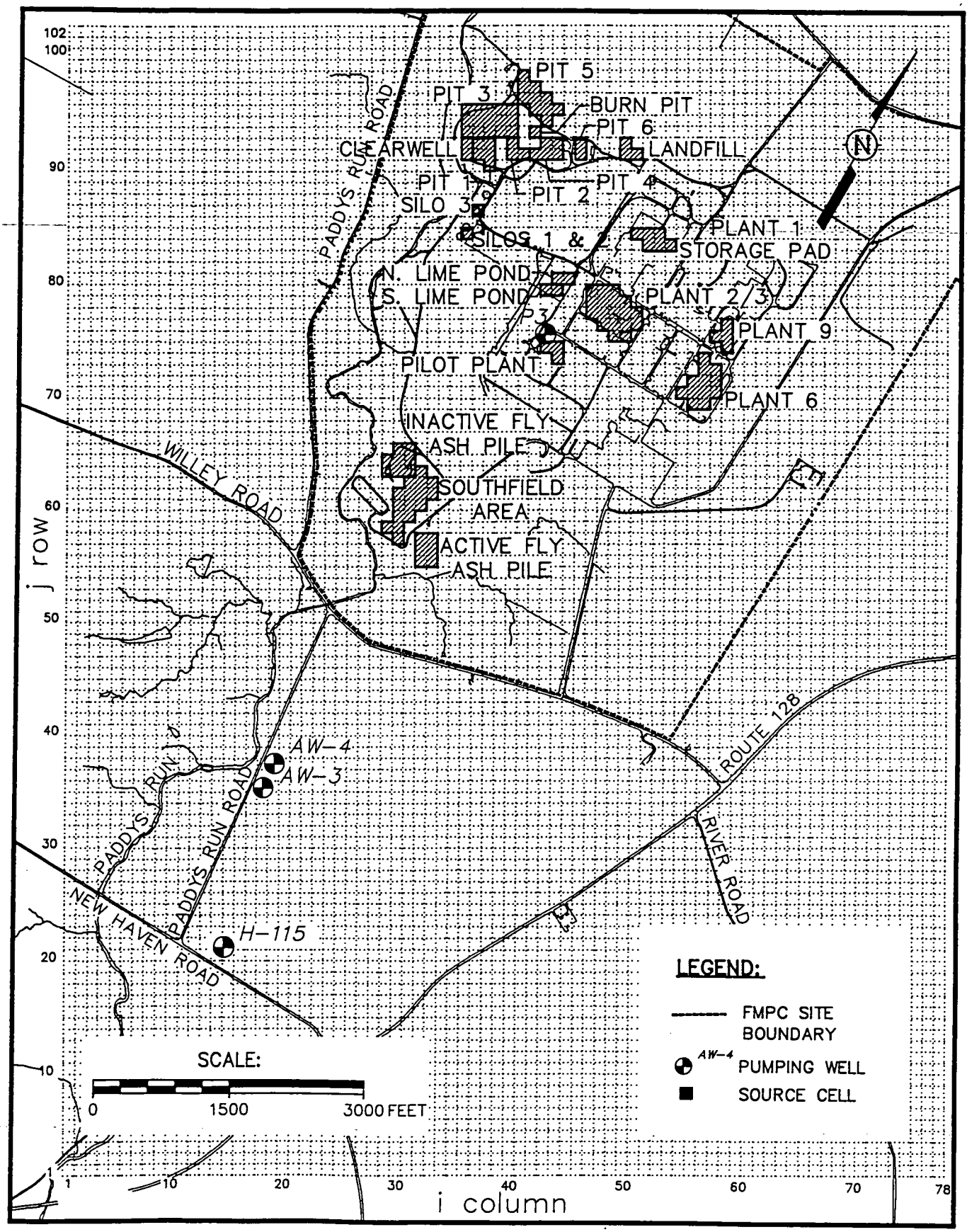

SITE: BASELINE RISK ASSESSMENT
31332770/SWBRA/KNOX

KNOX/SWCR/KW/3-5/SWCRAPPO.TXT/7-21-92

FIGURE 0.5-4
SWIFT III SOURCE LOADING LOCATIONS

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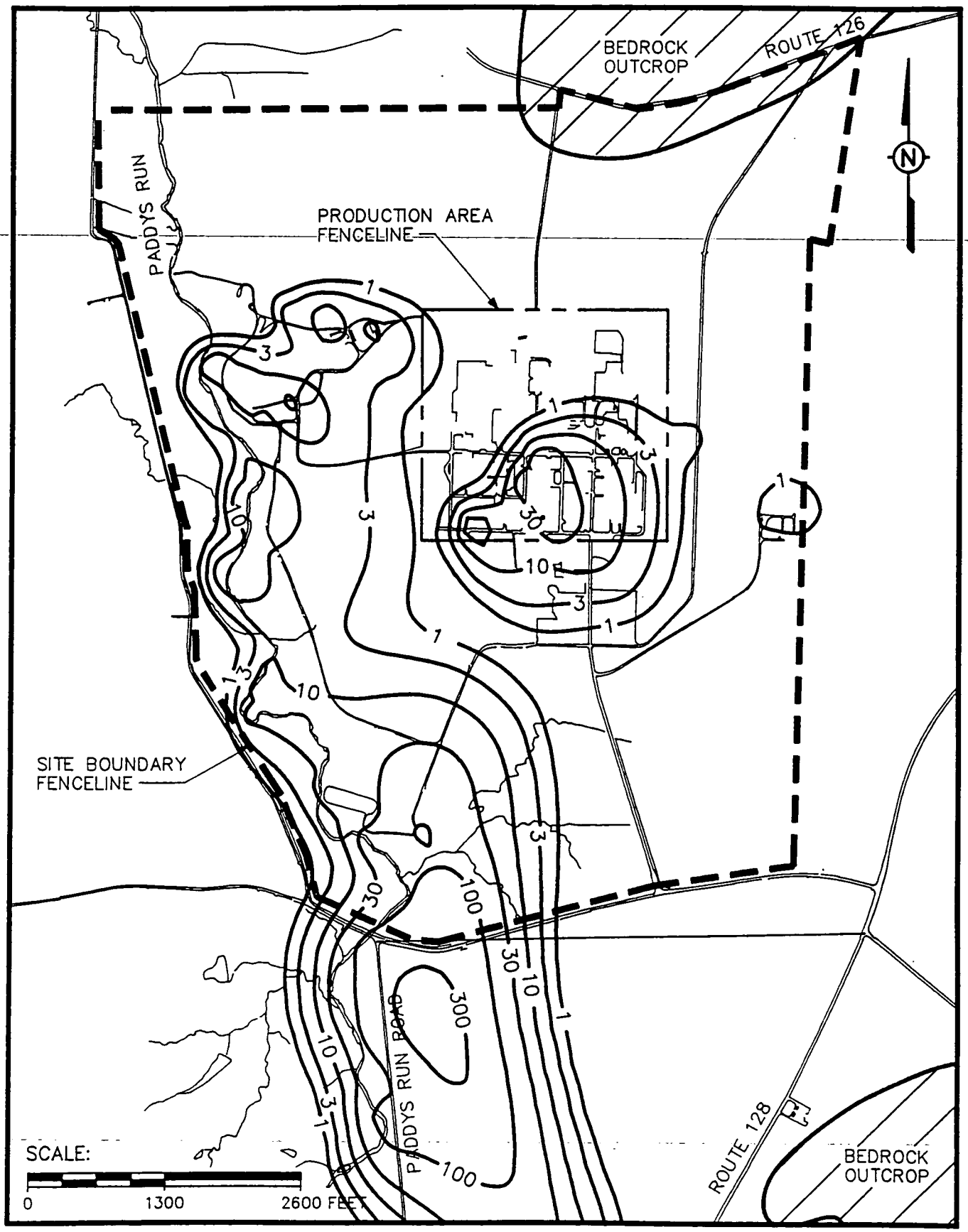

SITE WIDE BASELINE RISK ASSESSMENT
31332755/SWBRA/KNOX

FIGURE 0.5–5 INITIAL CONCENTRATION (ppb) OF URANIUM IN GROUNDWATER BENEATH THE FEMP

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TABLE O.5-2

RETARDATION FACTORS AND HALF-LIVES FOR COMPOUNDS MODELED BY SWIFT III

Compound	Retardation Factor	Half-life (yrs)
Radionuclides		
Np-237	40.8	2,140,000
Sr-90	20.9	28.6
Tc-99	1.56	213,000
U-233	12.0	1.6E+05
U-234	12.0	2.4E+05
U-235	12.0	7.0E+08
U-238	12.0	4.4E+09
Inorganics		
Boron	24.9	NA[a]
Molybdenum	80.6	NA
Organics		
4-chloro-3-methylphenol	83.8	NA
Vinyl chloride	1.26	NA

[a] NA indicates "not applicable"

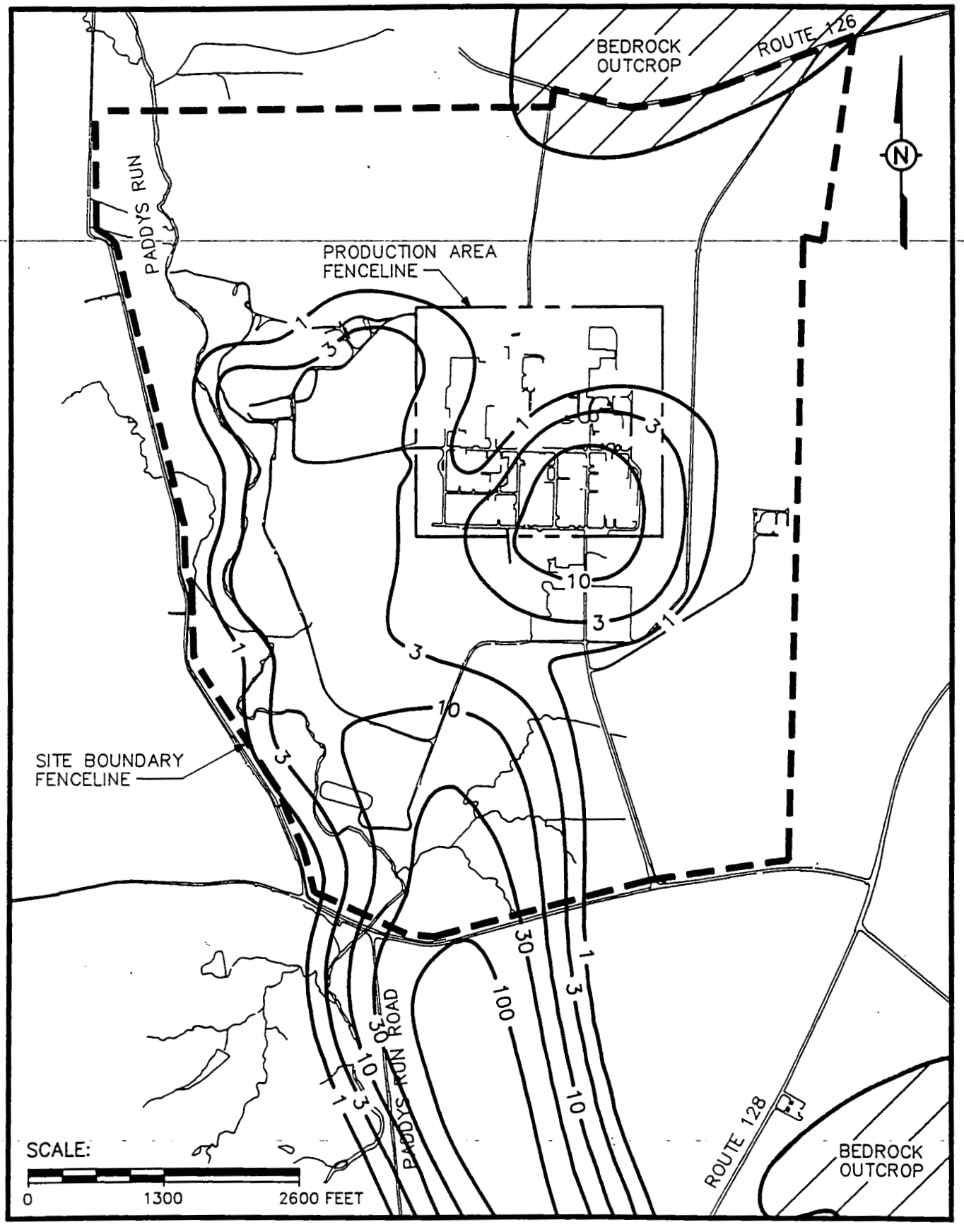

FIGURE 0.5–6 ESTIMATED CONCENTRATION (ppb) OF URANIUM IN GROUNDWATER BENEATH THE FEMP AFTER 10 YEARS

SITE WIDE BASELINE RISK ASSESSMENT
31332753/SWBRA/KNOX

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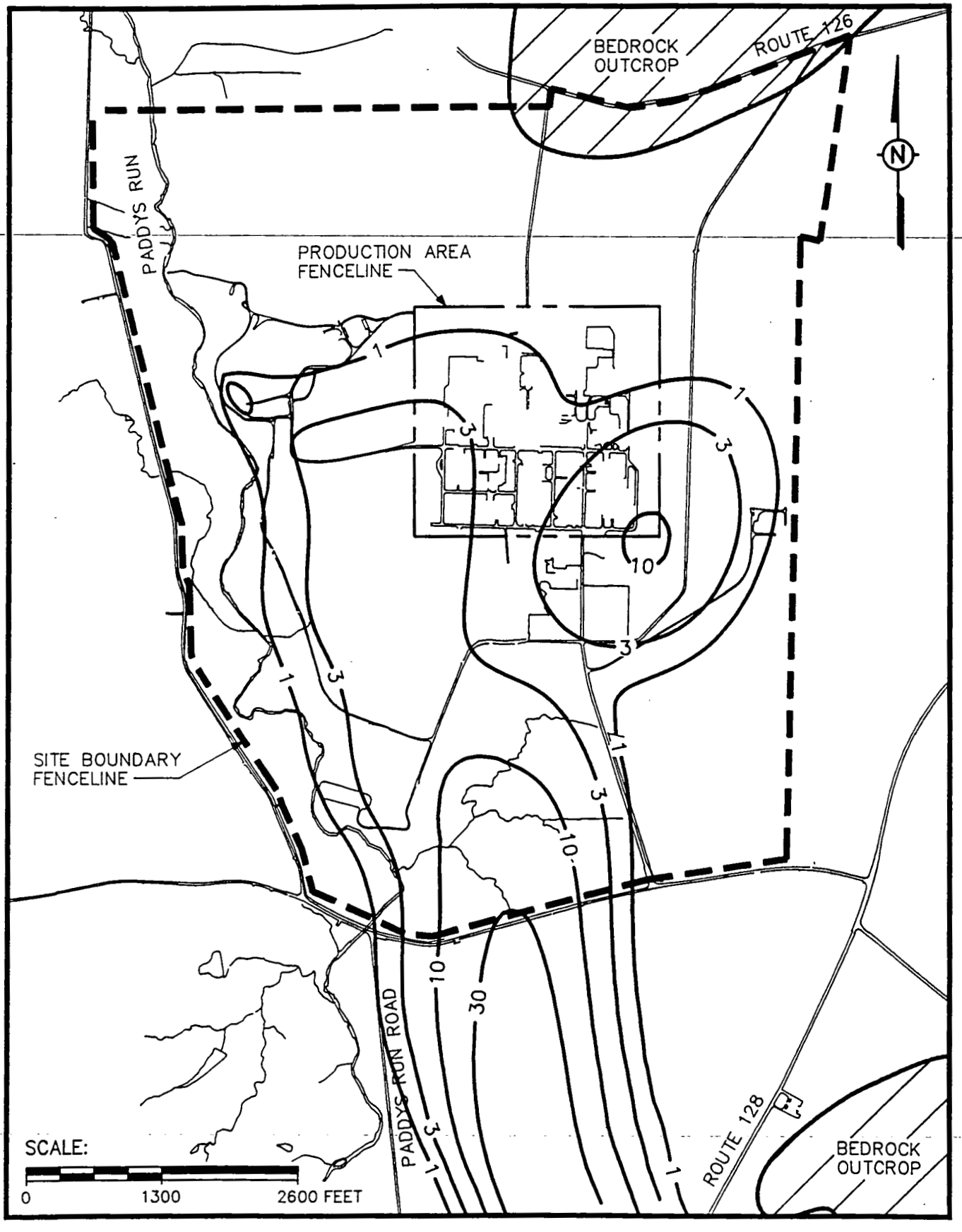

FIGURE 0.5–7 ESTIMATED CONCENTRATION (ppb) OF URANIUM IN GROUNDWATER BENEATH THE FEMP AFTER 30 YEARS

SITE WIDE BASELINE RISK ASSESSMENT
31332752/SWBRA/KNOX

147

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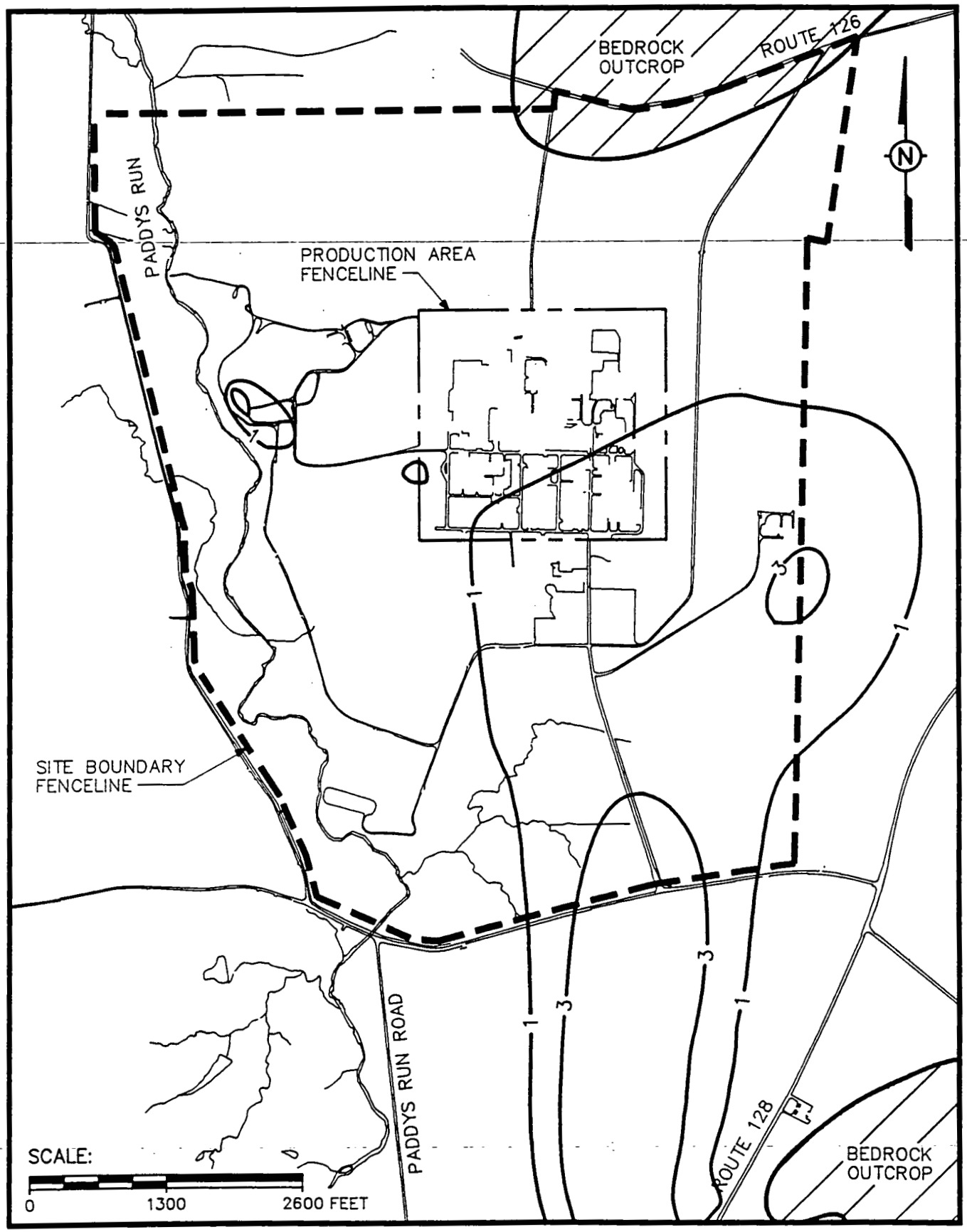

SITE WIDE BASELINE RISK ASSESSMENT
31332754/SWBRA/KNOX

FIGURE 0.5–8 ESTIMATED CONCENTRATIONS OF URANIUM (ppb) IN GROUNDWATER BENEATH THE FEMP AFTER 100 YEARS

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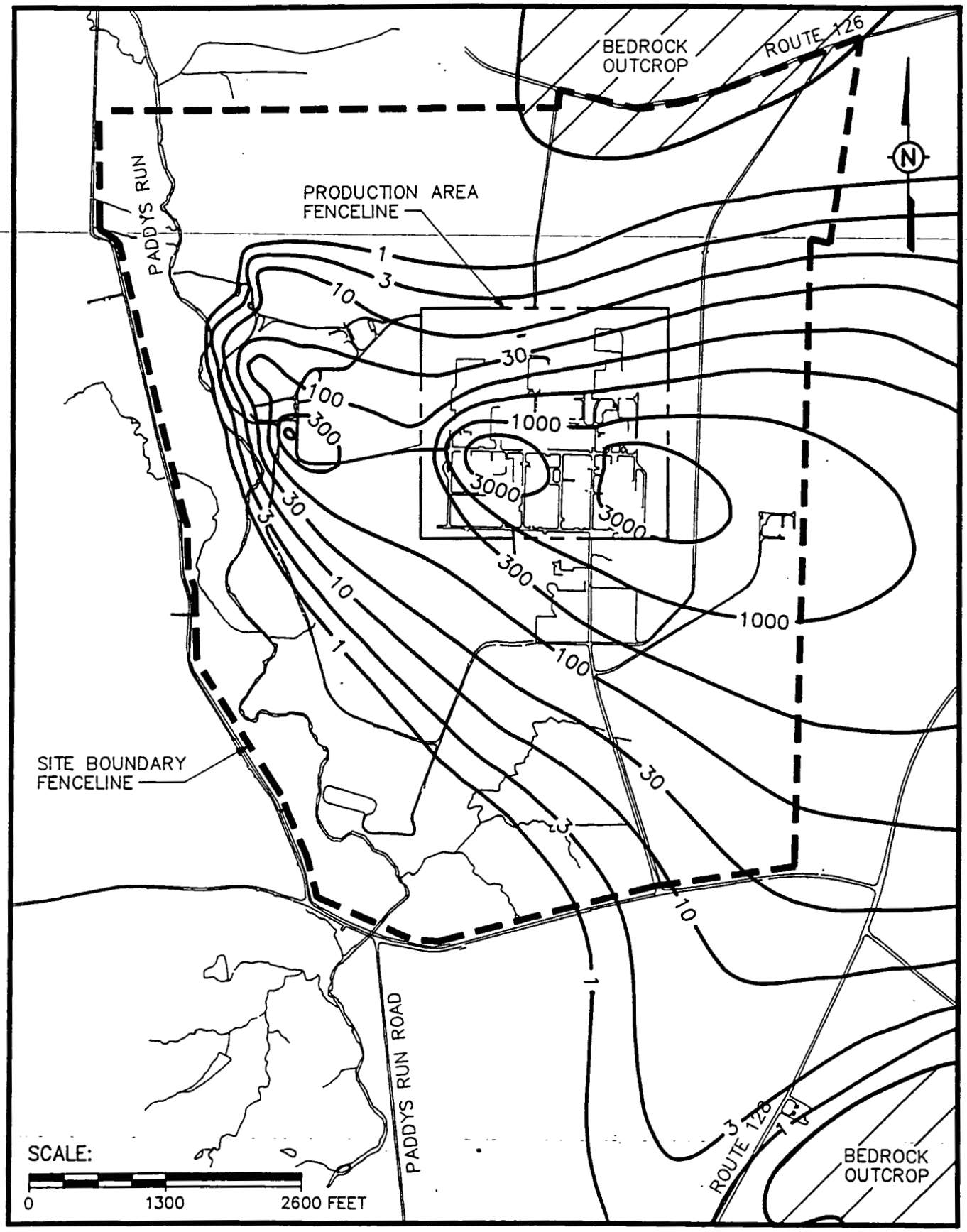

SITE WIDE BASELINE RISK ASSESSMENT
31332751/SWBRA/KNOX

FIGURE 0.5–9 ESTIMATED CONCENTRATION (ppb) OF URANIUM IN GROUNDWATER BENEATH THE FEMP AT 300 YEARS

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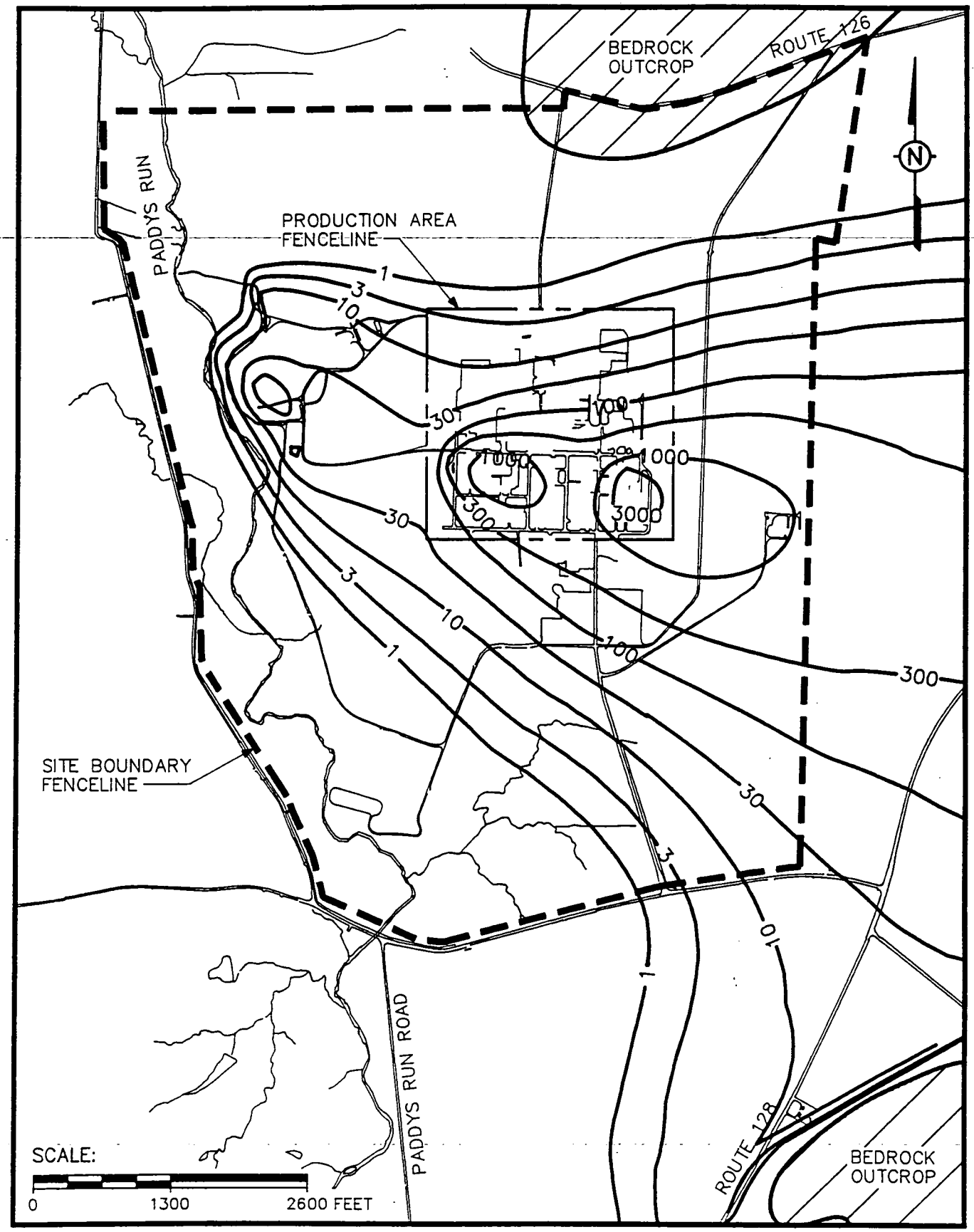

SITE WIDE BASELINE RISK ASSESSMENT
31332750/SWBRA/KNOX

FIGURE 0.5–10 ESTIMATED CONCENTRATION (ppb) OF URANIUM IN GROUNDWATER BENEATH THE FEMP AT 1000 YEARS

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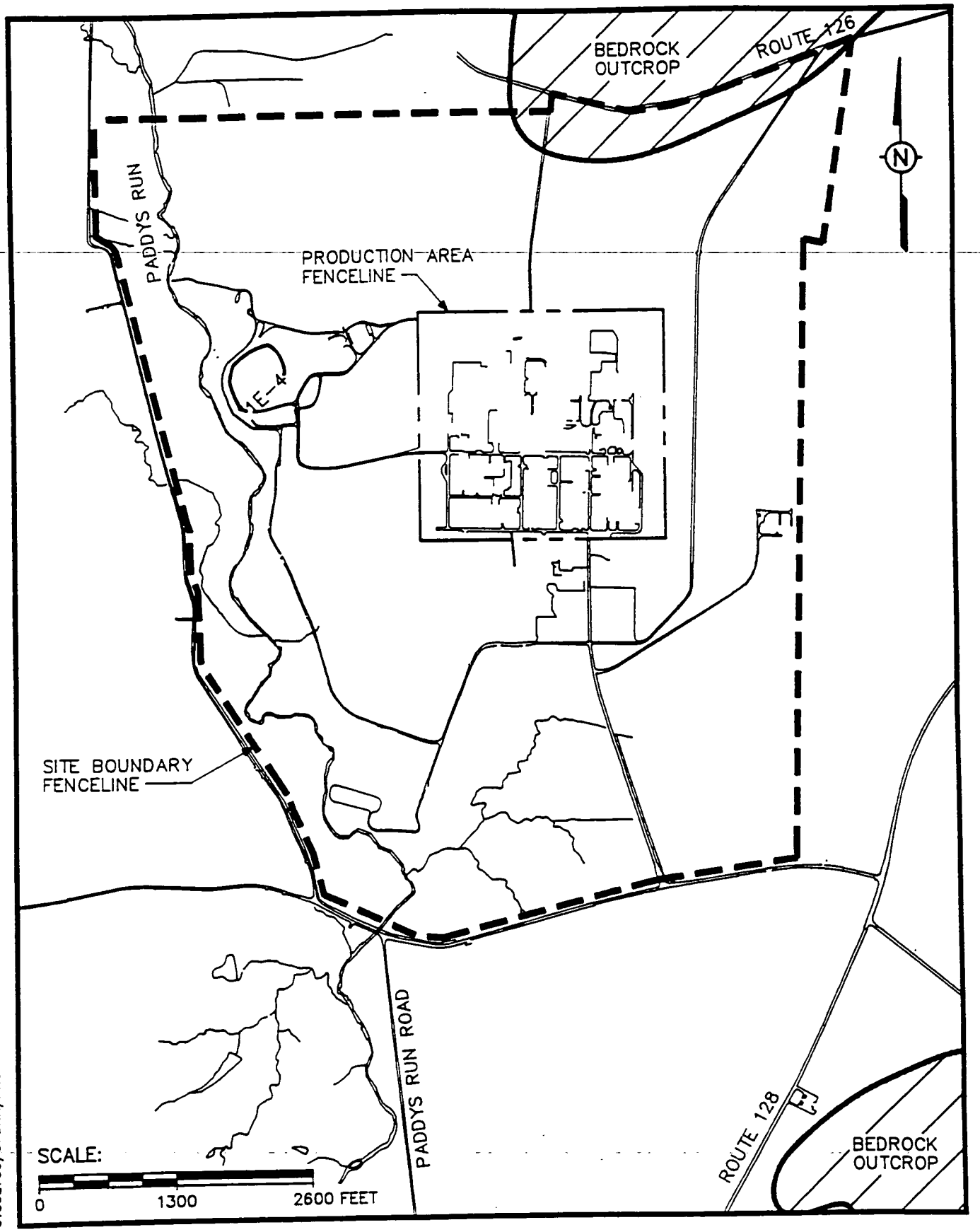
originated from direct charging of the aquifer by surface water contaminated by soluble forms of uranium through the stream bed of Paddys Run. Since drainage controls have been added and production has ceased, it has been assumed that this source of loading to the aquifer has also stopped.

Contributions from buried sources around the FEMP begin to appear in the aquifer around 100 years after the beginning of the simulation (Figure O.5-6). This loading peaks under the production area just before 300 years, and remains virtually unchanged over the next 700 years of the simulation.

Figures O.5-11 through O.5-20 portray model results for those constituents predicted to be present in the aquifer in significant concentrations. Note that all constituents modeled are not shown in these figures. This is because some constituents were diluted below detection limits before they spread very far downgradient.

Model results for each compound were examined to locate the time and location of the peak concentration of each constituent (Table O.5-3). The model predicts that the peak concentrations of these constituents of concern will occur before 300 years and be confined to the property. One of these constituents, Np-237, is predicted to peak about 700 years after the start of the modeling (Figure O.5-12).



SITE WIDE BASELINE RISK ASSESSMENT
31332756/SWBRA/KNOX

FIGURE 0.5–11 ESTIMATED CONCENTRATION (ppb) OF NEPTUNIUM IN GROUNDWATER BENEATH THE FEMP AFTER 1000 YEARS

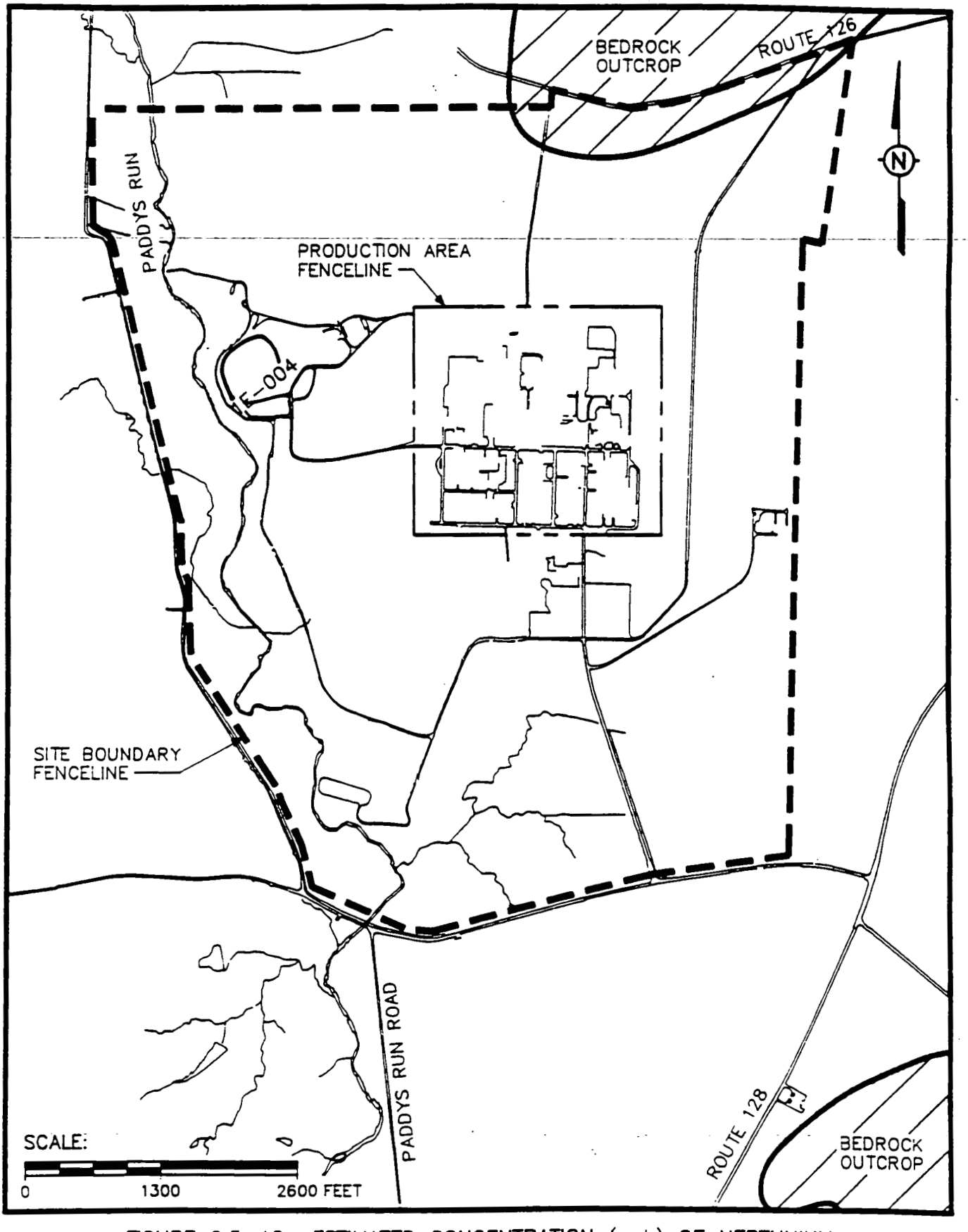
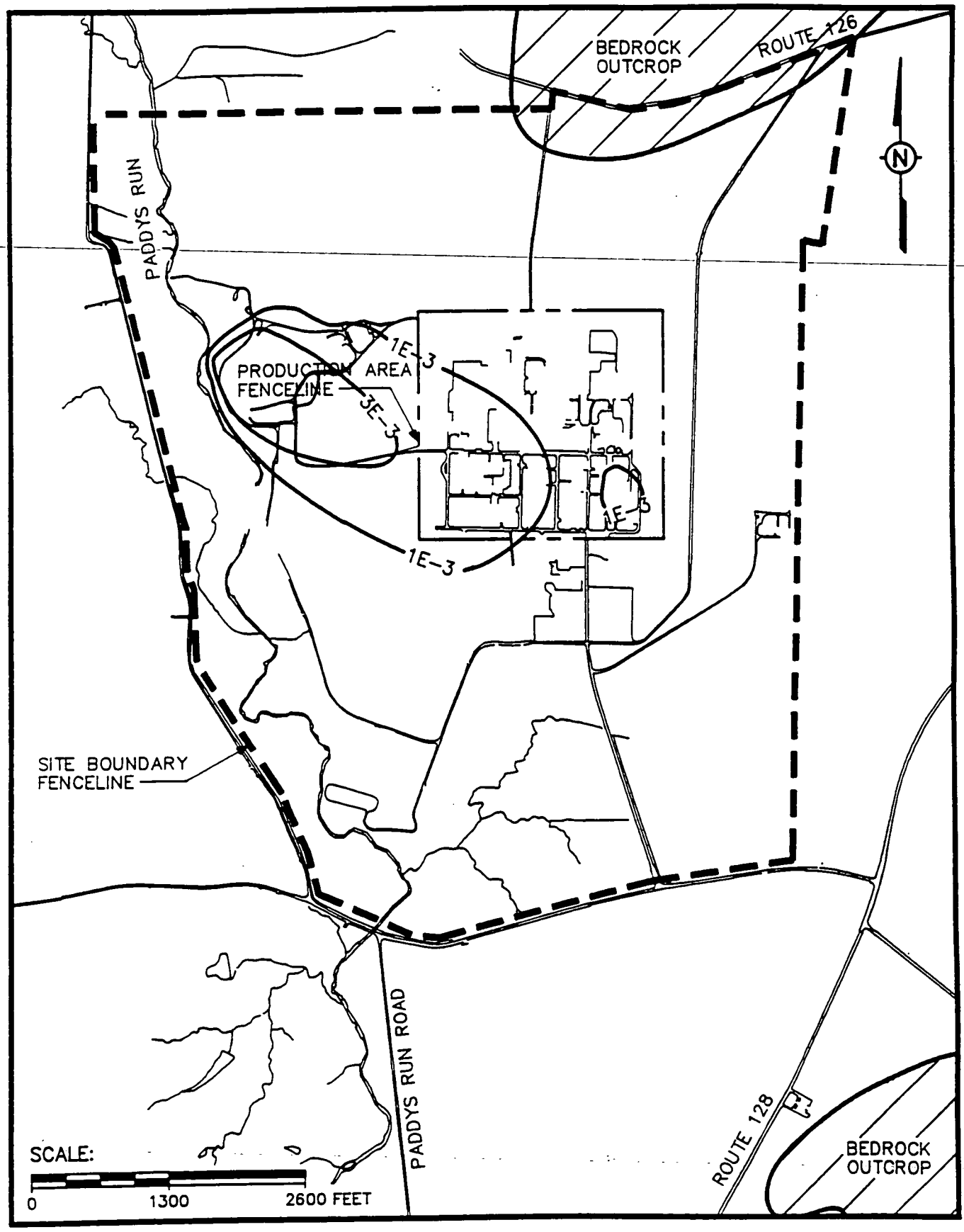


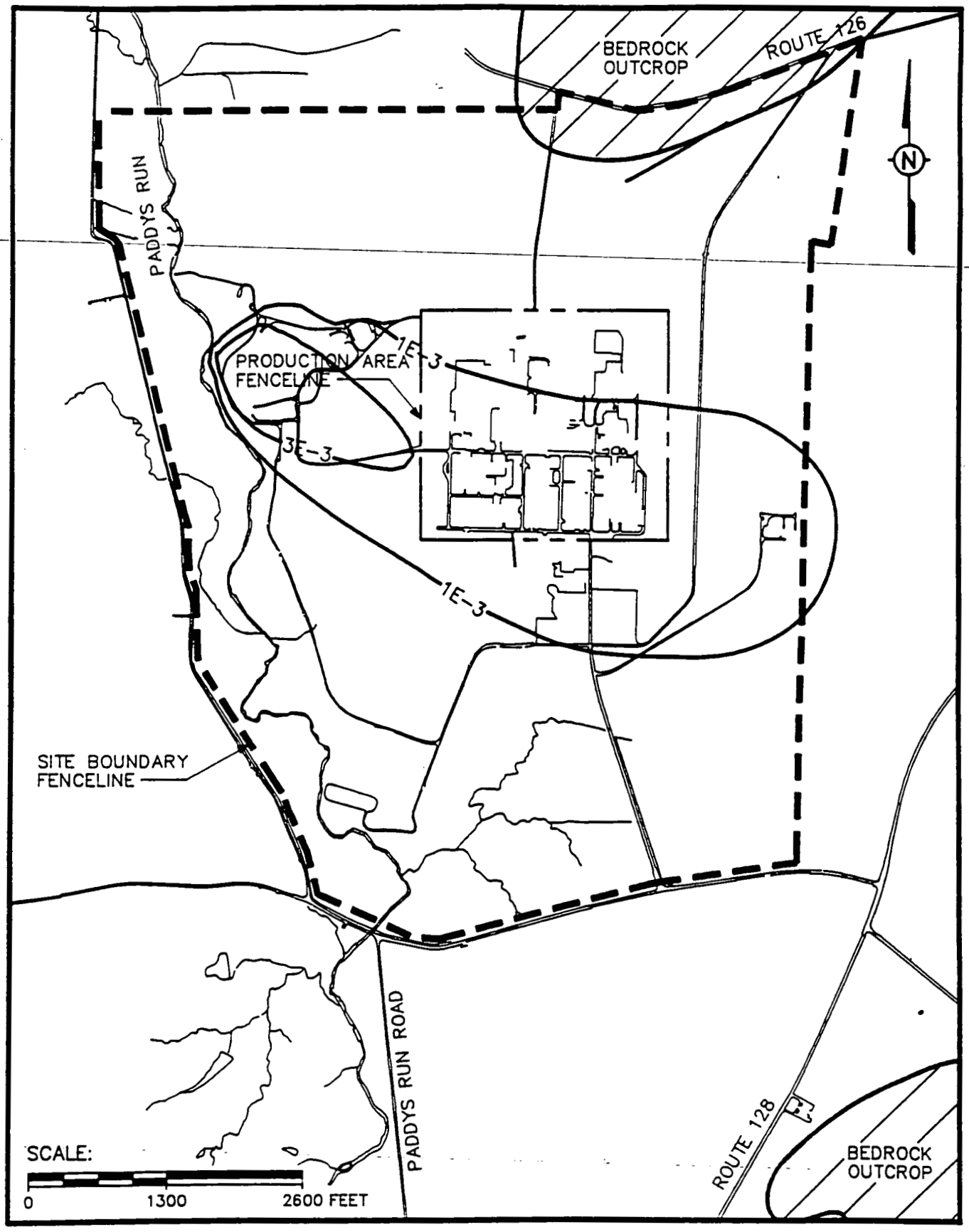
FIGURE 0.5-12 ESTIMATED CONCENTRATION (ppb) OF NEPTUNIUM IN GROUNDWATER BENEATH THE FEMP AFTER 700 YEARS

SITEWIDE BASELINE RISK ASSESSMENT
31332748/SWBRA/KNOX



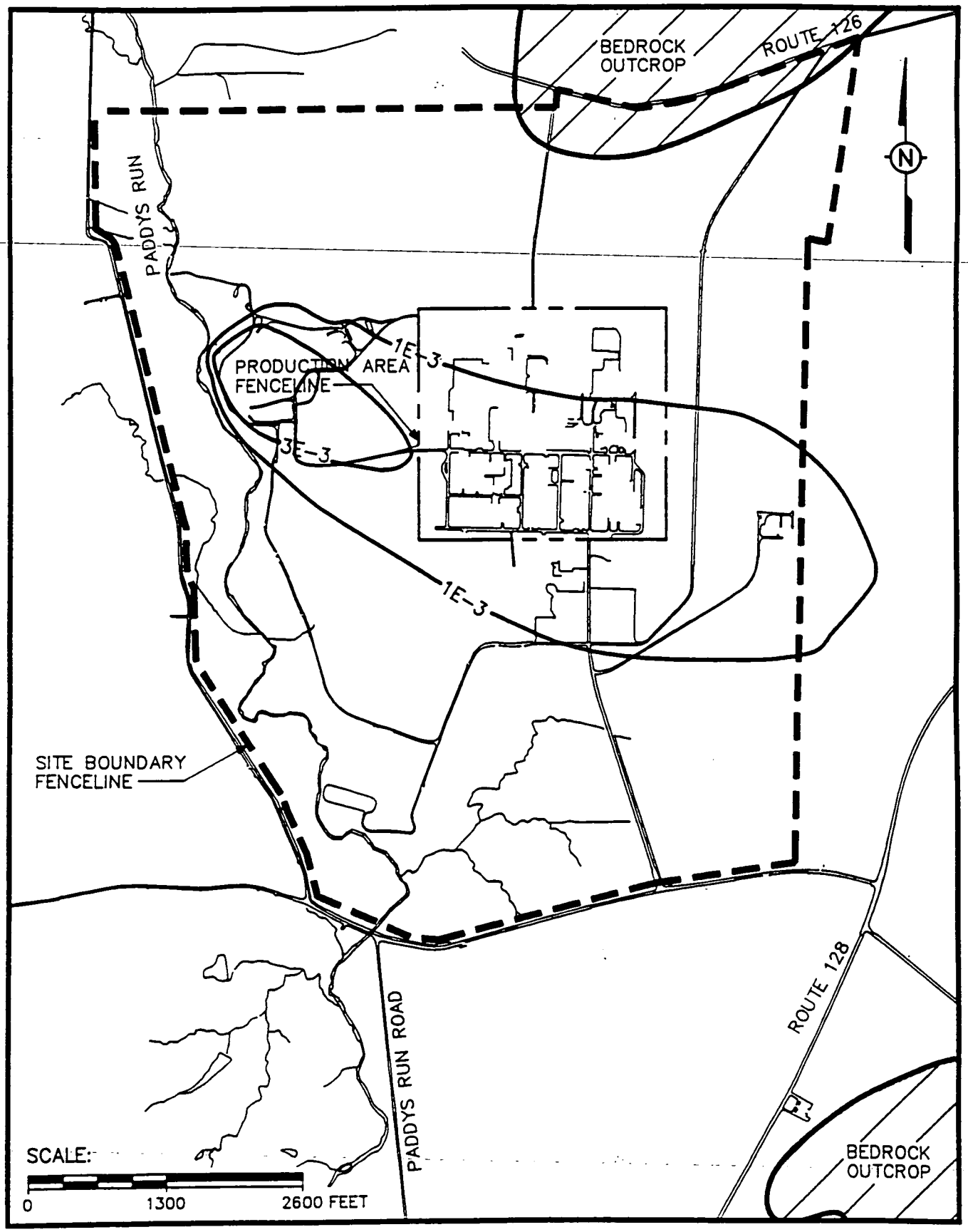
SITE WIDE BASELINE RISK ASSESSMENT
31332760/SWBRA/KNOX

FIGURE 0.5-13 ESTIMATED CONCENTRATION (ppb) OF TC-99 IN GROUNDWATER BENEATH THE FEMP AT 10 YEARS



SITE WIDE BASELINE RISK ASSESSMENT
31332744/SWBRA/KNOX

FIGURE 0.5-14 ESTIMATED CONCENTRATION (ppb) OF TC-99 IN GROUNDWATER BENEATH THE FEMP AFTER 30 YEARS



SITE WIDE BASELINE RISK ASSESSMENT
31332743/SWBRA/KNOX

FIGURE 0.5-15 ESTIMATED CONCENTRATION (ppb) OF TC-99 IN GROUNDWATER BENEATH THE FEMP AFTER 100 YEARS

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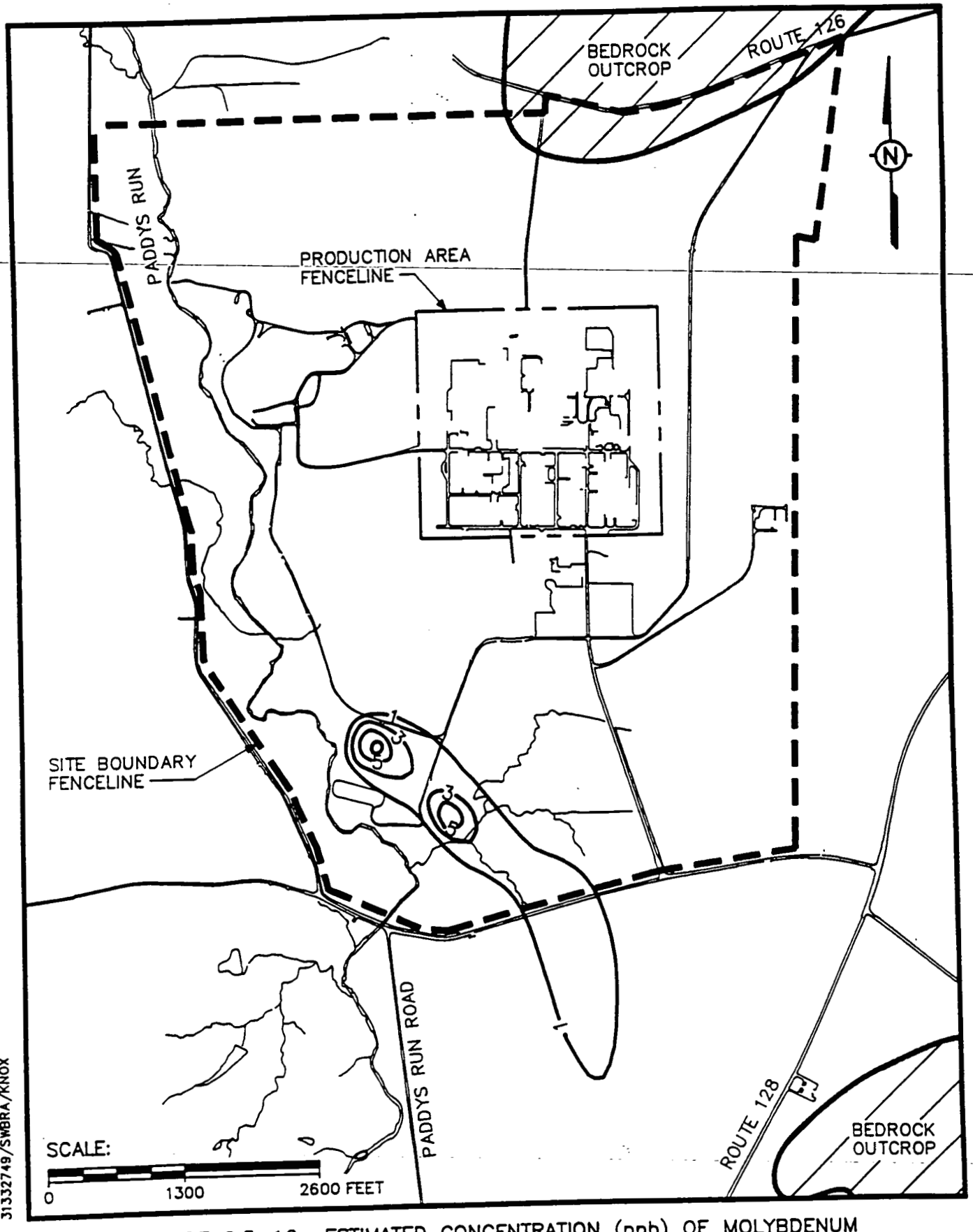
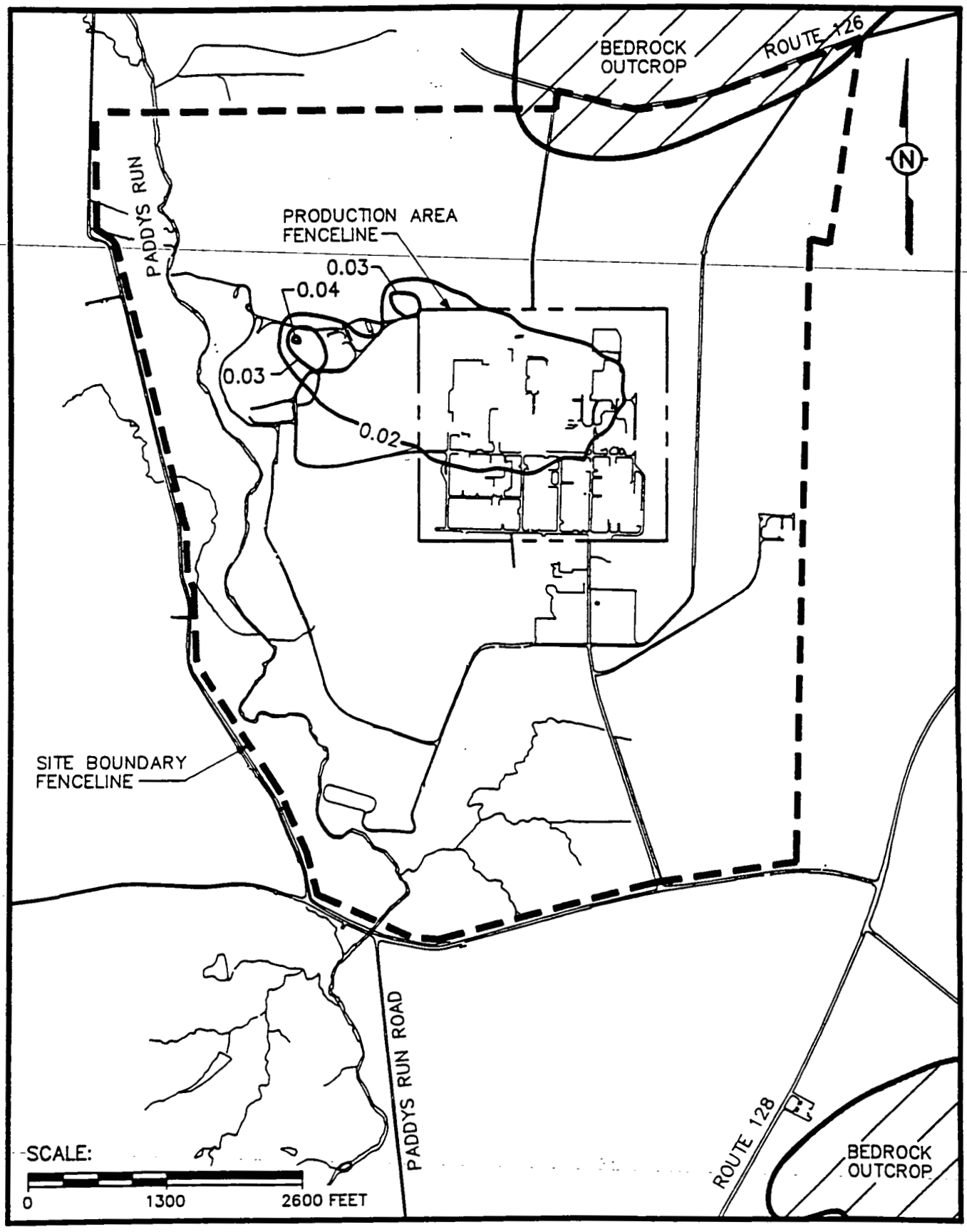


SITE WIDE BASELINE RISK ASSESSMENT
31332749/SWBRA/KNOX

FIGURE 0.5-16 ESTIMATED CONCENTRATION (ppb) OF MOLYBDENUM IN GROUNDWATER BENEATH THE FEMP AFTER 1000 YEARS



SITE WIDE BASELINE RISK ASSESSMENT
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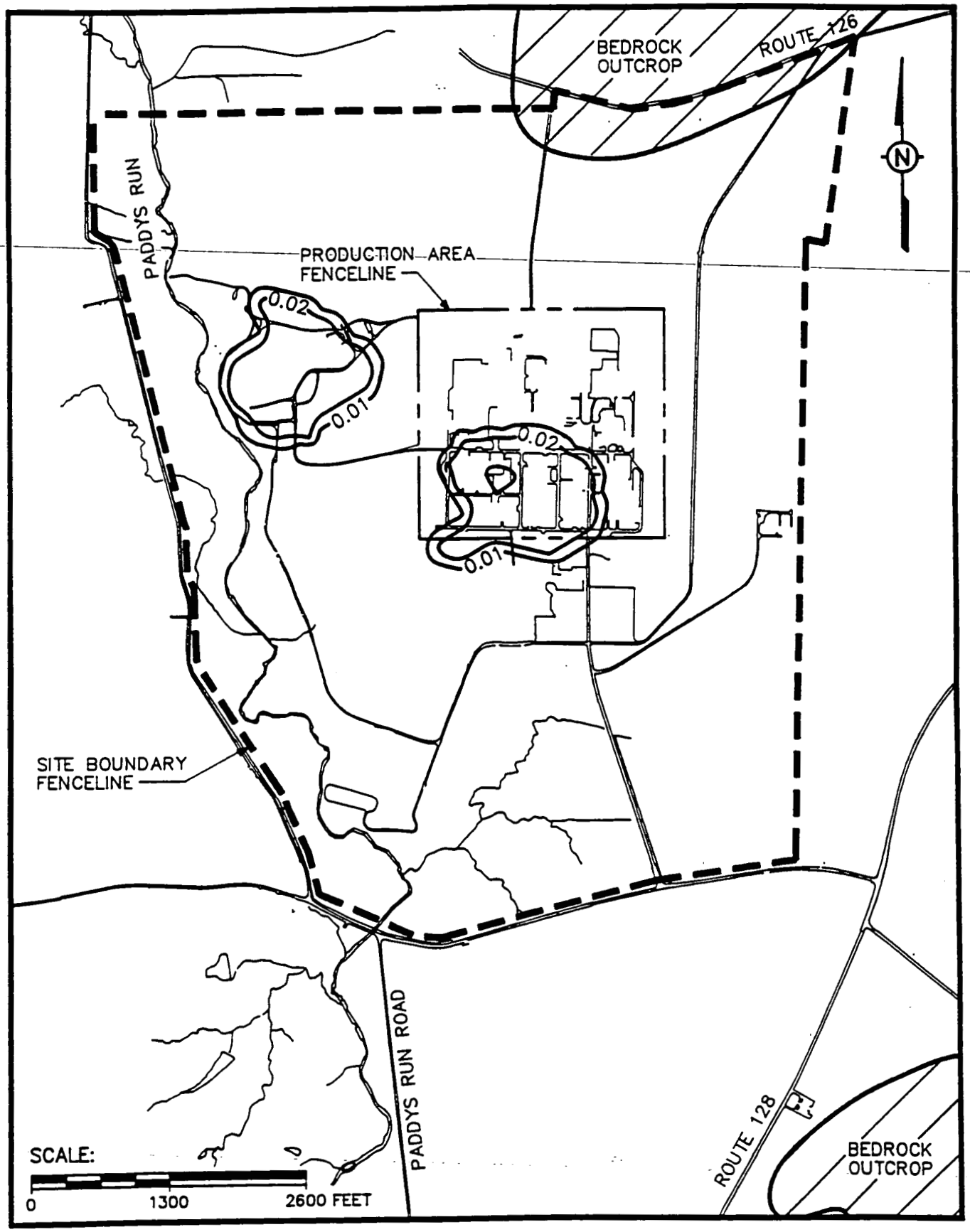
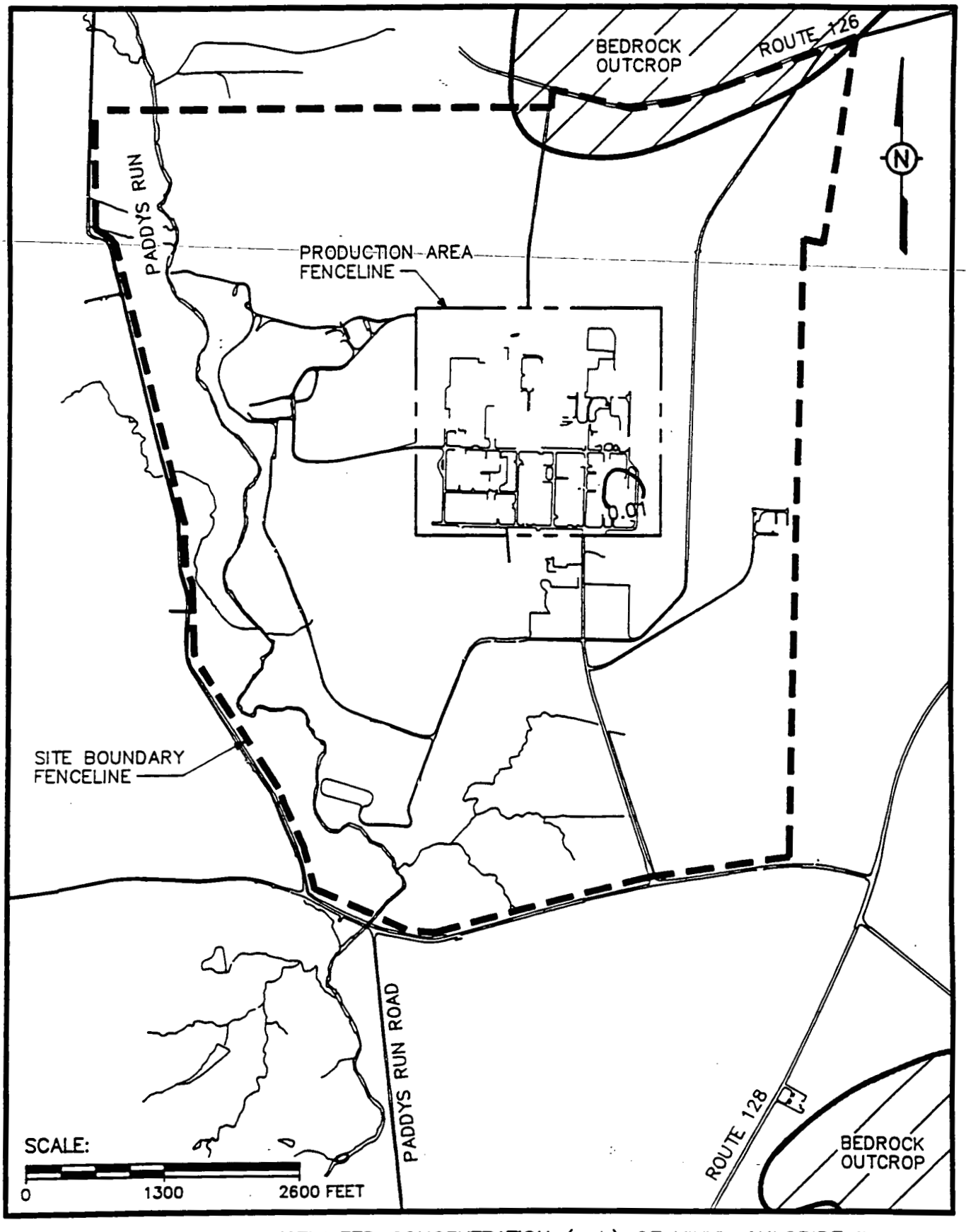
FIGURE 0.5–17 ESTIMATED CONCENTRATION (ppb) OF BORON IN GROUNDWATER BENEATH THE FEMP AT 300 YEARS



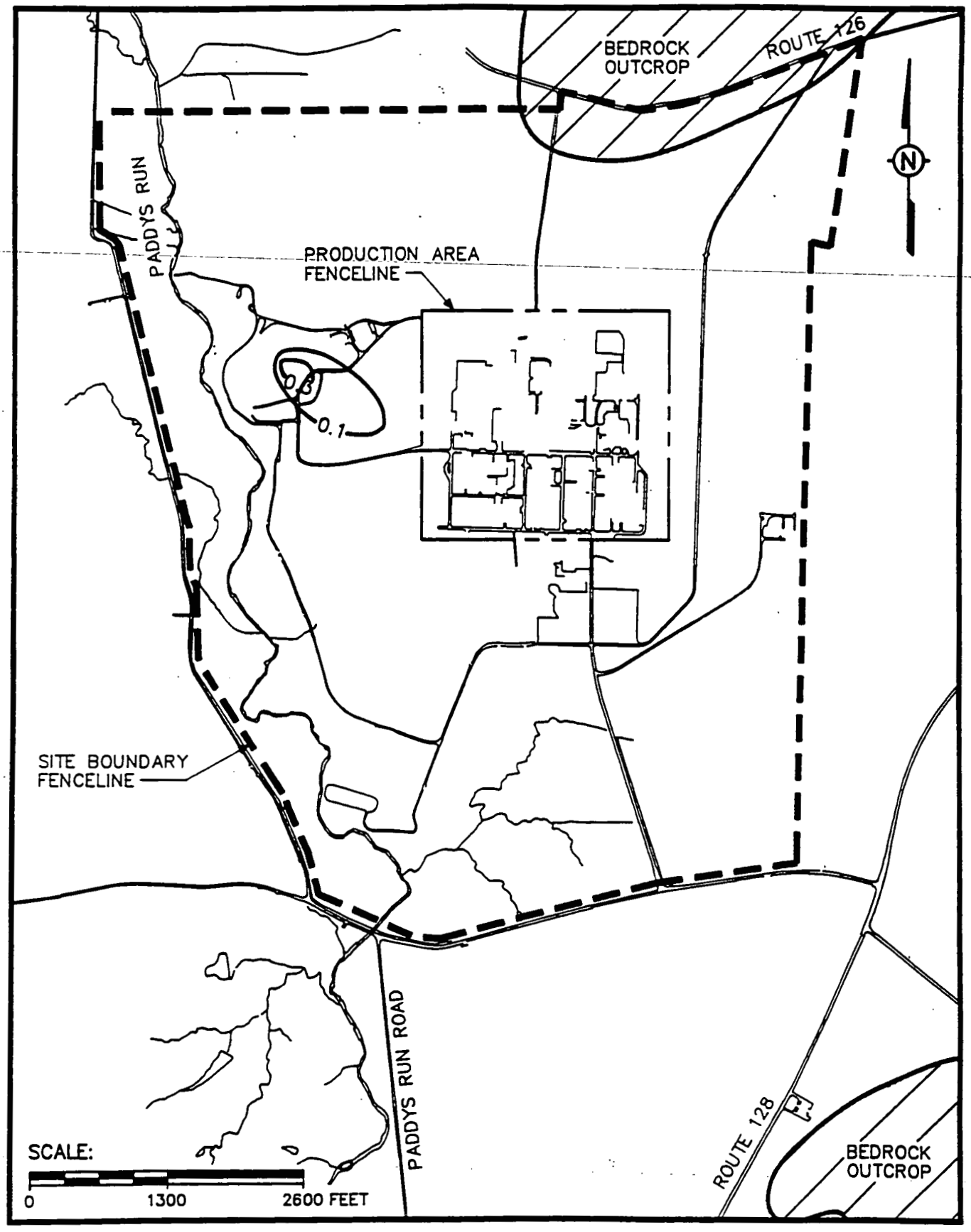
SITE WIDE BASELINE RISK ASSESSMENT
31332745 05/12/92 9:17am JAT

FIGURE 0.5–18 ESTIMATED CONCENTRATION (ppb) OF MERCURY IN GROUNDWATER BENEATH THE FEMP AFTER 1000 YEARS



SITE WIDE BASELINE RISK ASSESSMENT
31332746/SWBRA/KNOX

FIGURE 0.5–19 ESTIMATED CONCENTRATION (ppb) OF VINYL CHLORIDE IN GROUNDWATER BENEATH THE FEMP AFTER 10 YEARS



SITE WIDE BASELINE RISK ASSESSMENT
31332747/SWBRA/KNOX

FIGURE 0.5–20 ESTIMATED CONCENTRATION (ppb) OF VINYL CHLORIDE IN GROUNDWATER BENEATH THE FEMP AFTER 30 YEARS

O-5-28

KNOX/SWCR/KW/3-5/SWCRAPPO.TXT/7-21-92

TABLE O.5-3

MAXIMUM CONCENTRATIONS FOR COMPOUNDS
MODELED IN THE AQUIFER BENEATH THE FEMP BY SWIFT III

Compound	Maximum Concentration in the Aquifer (µg/ℓ)	Time of Maximum Concentration (yrs)
Radionuclides		
Np-237	1.472E-04	700
Sr-90	1.905E-09	100
Tc-99	8.919E-03	100
Inorganics		
Boron	4.090E-01	100
Molybdenum	3.237E+01	700
Uranium	8.497E+03	300
Organics		
4-chloro-3-methylphenol	5.884E-02	800
Vinyl chloride	7.162E-01	20

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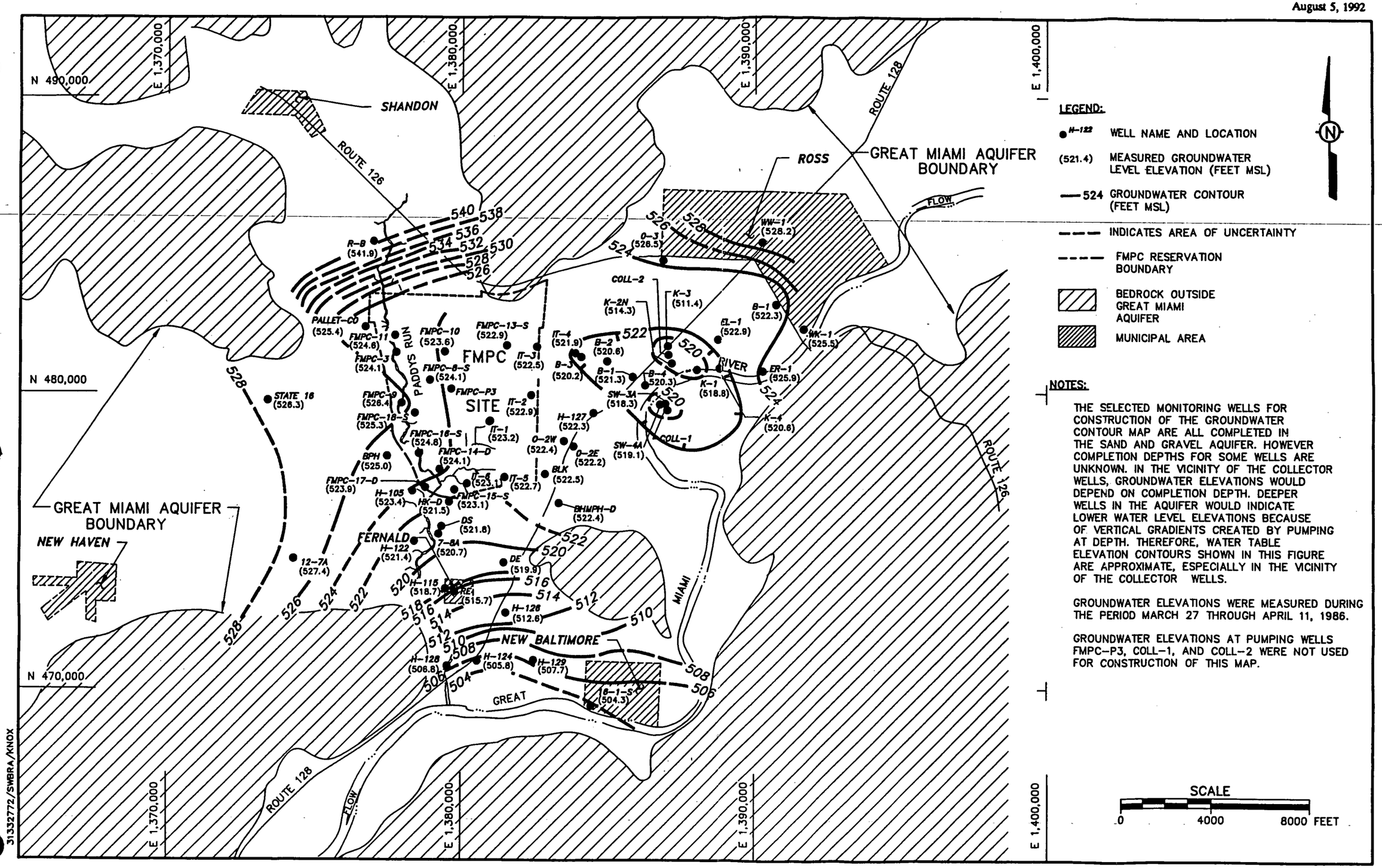

FIGURE 0.5-2

APRIL 1986 GROUNDWATER ELEVATIONS USED FOR CALIBRATION OF SWIFT III

31332772/SWBRA/KNOX

APPENDIX P

APPENDIX P

SURFACE WATER RUNOFF MODELING

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P.1.0 INTRODUCTION

The modeling approach used to estimate contaminant concentrations in surface water and sediment resulting from transport by surface water runoff is described in this appendix. Modeling the contaminant transport by runoff requires characterization of the contaminants in the initial soil or waste source term. Once a runoff scenario is selected, one of two models will be used to quantify the migration of contaminants to stream sediment and surface water from erosion by runoff effluent.

P.2.0 MODEL DESCRIPTION

P.2.1 CALCULATION OF SOIL LOSS FROM RUNOFF

The two soil loss models, obtained from the EPA Superfund Exposure Assessment Manual (EPA 1988), are the Universal Soil Loss Equation (USLE) and the Modified Universal Soil Loss Equation (MUSLE). These models calculate the total mass of soil transported annually (USLE) by surface water runoff or by a single rainfall event (MUSLE). The USLE model takes the same form as MUSLE, except that USLE considers erosion potential from average annual rainfall to determine runoff, while MUSLE employs event-specific runoff volume, storm duration, and flow rate variables.

Annual soil loss is estimated using the USLE:

$$Y(s)a = [(Rr)(A)(Sd)](K)(LS)(C)(P) \qquad \text{(P-2-1)}$$

Soil loss is estimated using the MUSLE:

$$Y(s)e = (CF)[(Vr)(qp)]^{0.56}(K)(LS)(C)(P) \qquad \text{(P-2-2)}$$

where

Y(s)a	=	Annual soil loss in runoff (metric tons/yr)
Y(s)e	=	Soil loss in runoff (metric tons per event)
CF	=	Conversion factor (11.8 for metric units)
Rr	=	Rainfall and runoff erosion potential factor (unitless)
K	=	Soil erodability factor (metric tons/ha/unit R_r)
LS	=	Product of slope length factor and slope steepness factor (unitless)
C	=	Cover factor (unitless)
P	=	Erosion control practice factor (unitless)
A	=	Contaminated area (hectares)
Sd	=	Sediment delivery ratio (unitless)
Vr	=	Volume of runoff (m^3)
qp	=	Peak runoff flow rate (m^3/sec)

Intermediate parameters Vr and qp are calculated by:

$$Vr = (100)(A)(Qr) \qquad \text{(P-2-3)}$$

and

$$Qr = (Rt-0.2Sw)^2/(Rt+0.8Sw) \qquad \text{(P-2-4)}$$

and

$$Sw = (2.54)[(1000/CN)-10] \qquad \text{(P-2-5)}$$

and

$$qp = (0.028)(A)(Rt)(Qr)/(Tr)(Rt-0.2Sw) \qquad \text{(P-2-6)}$$

where

Qr = Depth of runoff (cm)
Rt = Depth of rainfall (cm)
Sw = Soil water retention factor (cm)
CN = SCS runoff curve number (unitless)
Tr = Rainfall duration (hours)

P.2.2 CALCULATION OF CONTAMINANT PARTITIONING AND LOADING

Additional models are used to describe contaminant partitioning between soil and water in the receiving water body. These partitioning models provide an estimate of the contaminant concentration in surface water runoff and in the soil that is carried with the runoff and deposited in the sediments of receiving surface water bodies (Haith 1980, Mills et al. 1982). The portion of contaminant from the eroded soil that remains with the sediment or is dissolved in the water is estimated using the following equations, respectively:

$$Ss = [1/(1+Oc/(Kd \bullet \rho))]\ (Ci)(\rho)(A)(d)(CF) \qquad \text{(P-2-7)}$$

and

$$Ms = [1/(1+(Kd \bullet \rho)/Oc)]\ (Ci)(\rho)(A)(d)(CF) \qquad \text{(P-2-8)}$$

where

Ss = Available quantity of adsorbed contaminant (portion to sediment) (g)
Ms = Available quantity of dissolved contaminant (portion to water) (g)
Oc = Available water capacity in top cm of soil (unitless)
Kd = Sorption partition coefficient (cm^3/g)
ρ = Bulk soil density (g/cm^3)
Ci = Concentration of contaminant in soil (mg/kg)
d = Depth of soil affected by rainfall (assumed = 1 cm)
CF = Conversion factor, 100 ($kg/mg \bullet cm^2/ha$)

A = Contaminated volume (hr-cm)

The mass of adsorbed contaminant in the source area is:

$$PXi = [(Y(s)e/100\rho A]Ss \qquad \text{(P-2-9)}$$

where

PXi = Sorbed substance available per event (g)

The contaminant concentration in sediment of the receiving water body is:

$$Cs = PXi/Y(s)e \qquad \text{(P-2-10)}$$

where

Cs = Sediment concentration (g/metric ton or mg/kg)

The mass of dissolved contaminant from the source area is:

$$PQi = (Qr/Rt)Ms \qquad \text{(P-2-11)}$$

where

PQi = Dissolved substance available per event (g)

The contaminant concentration in the runoff effluent is:

$$Ce = PQi/Vr \qquad \text{(P-2-12)}$$

where

Ce = Concentration of contaminant in runoff (g/m^3)
Vr = Volume of runoff (m^3)

The average effluent flow rate is:

$$Qe = Vr/Tr \qquad \text{(P-2-13)}$$

The contaminant concentration in the receiving water body downstream is:

$$Cw = (Ce)(Qe)/(Qt + Qe) \qquad \text{(P-2-14)}$$

where

Cw = Concentration of contaminant in surface water downstream (mg/ℓ)
Qe = Runoff flow rate (m^3/sec)
Qt = Flow rate of receiving water body downstream (m^3/hr)

P.2.3 EXAMPLE CALCULATION OF U-238 LOADING TO STREAMS FROM SURFACE RUNOFF MODEL

For the southwest quadrant of the former production area:

Ci = 4.3×10^4 mg/kg
Area = 5.9 ha
K = 0.37 tons/unit R
LS = 0.27
C = 0.042
P = 1
Rt = 6.35 cm
CN = 71
Tr = 24 hrs
Kd = 1.8 mℓ/g
Oc = 0.6
ρ = 1.48 g/cm^3

1. Calculate Y(s)e from MUSLE:

$$Y(s)e = (CF)[(Vr)(Qp)]^{0.56}(K)(LS)(C)(P)$$
$$= (11.8)[(Vr)(Qp)]^{0.56}(0.37)(0.27)(0.042)(1)$$
$$= 0.0495[(Vr)(Qp)]^{0.56}$$

$$Vr = (CF)(A)(Qr)$$
$$= (100)(5.9)Qr = 590Qr$$
$$Qr = (Rt - 0.2\,Sw)^2 / (Rt + 0.8\,Sw)$$
$$= (6.35 - 0.2\,Sw)^2 / 6.35 + 0.8\,Sw)$$
$$Sw = CF\,[(1000/CN) - 10]$$
$$= 2.54\,[(1000/71) - 10]$$

$= 10.375$

$Qr = [6.35 - (0.2)(10.375)]^2 / (6.35 + 0.8\ (10.375)]$

$Qr = 1.247$

$Vr = (590)(1.247) = 735.75\ m^3$

$Qp = (CF)(A)(Rt)(Qr) / Tr\ (Rt\text{-}0.2\ Sw)$

$= (0.028)(6.35)(1.247)(5.9) / (24)(4.275)$

$= 0.0127$

$Y(s)e = 0.0495[(735.73)(0.0127)]^{0.56}$

$= 0.173$ metric tons (391 pounds)

2. Calculate Ss:

$Ss = [1/(1+Oc/(Kd\ .\ \rho))]\ (Ci)(A)(\rho)(d)(CF)$

$= [1/(1 + 0.6/(1.8)(1.48)](4.3 \times 10^4)(5.9)(1.48)(1)(100)$

$= 3.065 \times 10^7$ g (67,500 pounds)

3. Calculate Ms:

$Ms = [1/(1 + (Kd)(\rho)\ /Oc)]\ (Ci)(\rho)(A)(d)(CF)$

$= [1/(1+(1.8)(1.48)/(0.6)](4.3 \times 10^4)(5.9)(1.48)(1)(100)$

$= 6.903 \times 10^6$ g (15,200 pounds)

4. Calculate PXi:

$PXi = [Y(s)e / (100)(\rho)(A)](Ss)$

$= (0.173 / (100)(1.48)(5.9)]\ (3.065 \times 10^7)$

$= 6.072 \times 10^3$ g (13.4 pounds)

5. Calculate PQi:

$PQi = (Qr/Rt)(Ms)$

$= [(1.247)/(6.35)](6.903 \times 10^6)$

$= 1.36 \times 10^6$ g (3,000 pounds)

6. Calculate Cs:

$$Cs = PXi/Y(s)e = (6.072 \times 10^3)/(0.173)$$
$$= 3.51 \times 10^4 \text{ mg/kg}$$

7. Calculate Cw:

$$Cw = (Ce)(Qe)/(Qt + Qe)$$

$$Ce = (PQi)/(Vr) = (1.36 \times 10^6)/(735.73)$$
$$= 1.849 \times 10^3 \text{ g/m}^3 \text{ or mg/}\ell$$

$$Qe = (Vr)/(Tr) = (735.73)/(24)$$
$$= 30.66 \text{ m}^3\text{/hr}$$

$$Qt = 410 \text{ m}^3\text{/hr(high flow)}$$

$$Cw = (1.849 \times 10^3)(30.66)/(410+30.66)$$

$$= 1.286 \times 10^2 \text{ g/m}^3 \text{ or mg/}\ell$$

The numerical parameter values used to model the transport of soil and surface water by runoff were obtained from appropriate EPA guidance documents, climatological databases for the FEMP area, and site-specific data. Numerical parameter values and references are presented in Table P.3-1.

P.2.4 CALCULATION OF TOTAL LOADINGS

The effect of runoff from several areas entering the surface water simultaneously (as would be expected in a rainfall event) was estimated by summing the constituent loadings from each area for both Paddys Run and the SSOD. The receiving stream for each area is discussed below.

Water column (dissolved constituent) concentrations were estimated by:

$$Cw = (\sum PQi)/(Tr)/[Qt + (\sum Vr)/(Tr)] \qquad \text{(P-2-15)}$$

Where PQi and Vr are summed for all sites contributing to either Paddys Run or the SSOD.

Sediment concentrations (sorbed constituents) were estimated by:

$$Cs = \sum Pxi / \sum Y(s)e \qquad \text{(P-2-16)}$$

This equation assumes that the sediment loading from all contributing areas are combined to yield an average sediment concentration.

Remaining areas (those not in any defined source term) were included in the calculation of total loadings and overall concentrations to account for the expected runoff from the entire site.

P.2.5 MODEL ASSUMPTIONS

These models make the following assumptions:

- Constituents adsorbed to soils in runoff remain adsorbed in the stream sediments
- Constituents dissolved in runoff water remain in the water column in the receiving stream
- Inputs from individual source areas can be summed to obtain site-wide inputs to receiving streams

P.3.0 SOURCE TERMS AND MODEL PARAMETERS

Ten areas were selected as source terms for the model. These sites are:

- Northeast quadrant of the former production area
- Northwest quadrant of the former production area
- Southeast quadrant of the former production area
- Southwest quadrant of the former production area
- Incinerator Area
- Silo area
- Waste Storage Area
- Flyash - South Field
- Remainder of the site expected to runoff into Paddys Run
- Remainder of the site expected to runoff into the SSOD

Model parameters and references for these source term areas are presented in Table P.3-1.

Paddys Run is an intermittent stream that begins north of the site and flows southward along the western edge. Natural drainage from the site flows primarily to Paddys Run. Paddys Run flows into the Great Miami River 2.4 km south of the site. Some surface water drainage has been diverted away from Paddys Run into a retention basin (WMCO 1991). The SSOD flows from the retention basis into Paddys Run in the south end of the site.

Runoff from all quadrants in the former Production Area plus the Incinerator Area was assumed to flow into the SSOD. The silo area, Waste Storage Area, and Flyash - South Field runoff was assumed to enter Paddys Run. The remainder of the site was divided into two areas to account for runoff into either Paddys Run or the SSOD that is not associated with any of the eight defined source areas. As shown in Table P.3-1, these remainder areas are approximately 20 to 80 times larger than the size of any one source area.

Surface water and sediment concentrations were modeled on an event-specific basis using MUSLE. Because Paddys Run and the SSOD are intermittent streams, event-specific concentrations should yield more realistic results of episodal contamination than an average calculated for one or several years. Low and high flow values for Paddys Run were used in the model to represent flows in Paddys Run and the SSOD. (Flow rates were not available for the SSOD as of December 1, 1991.) Paddys Run flows primarily between January and May, with estimated flows from 0.2 to 4.0 cubic feet per second. Peak flows have not been gaged (ASI/IT 1990). Surface water concentrations were estimated based on both high and low flow rates in the receiving stream.

TABLE P.3-1
SITE PARAMETERS USED IN THE USLE AND MUSLE MODELS

Parameter	Units	Northeast quadrant of Production Area	Northwest quadrant of Production Area	Southeast quadrant of Production Area	Southwest quadrant of Production Area	Incinerator Area	Silo Area	Waste Storage Area	Flyash-South Field Area	Remainder to Paddys Run	Remainder to Storm Sewer Outfall Ditch
LS, slope length and steepness factor[a]	unitless	0.32	0.32	0.27	0.27	0.31	0.18	0.25	0.85	0.25	0.26
C, cover factor[b]	unitless	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
A, contaminated area[c]	ha	7.9	6.3	7.6	5.9	3.4	2.2	10.6	7.2	149	161
CN, SCS runoff curve no.[d]	unitless	71	71	71	71	71	71	71	71	71	71
Oc, available water capacity[e]	unitless	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
ρ, soil bulk density[c]	g/cm^3	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.37	1.5	1.5
Rr, rainfall & runoff factor[f]	unitless	180	180	180	180	180	180	180	180	180	180
K, soil erodibility factor[g]	ton/ha	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Rt, total storm rainfall[h]	cm	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35
Tr, storm duration[h]	hrs	24	24	24	24	24	24	24	24	24	24
Dd, overland distance from site to surface water[c]	ft	2657	2657	1444	1444	2461	328	951	722	1004	1135

[a] EPA, 1988 fig 2-6
[b] AES, 1988 exhibit 7-5, 60% grass cover assumed based on examination of aerial photographs of the FEMP.
[c] calculated from site-specific information. Areas for the former production area quadrants account only for exposed soil area, approximately 50%, based on examination of aerial photographs of the FEMP.
[d] assumed for the site
[e] RA Work Plan Addendum (DOE 1992)
[f] AES, 1988; exhibit 7-11; Mills et al., 1982
[g] average for Butler Co. (SCS 1980)
[h] 1-year, 24-hr storm event (Hershfield, 1961)

P.4.0 MODEL RESULTS

Preliminary model runs yielded two items worth noting. First, MUSLE was run using the site parameters shown in Table P.3-1, with average rainfall data from the National Climate Database (NCDB 1992). With an average storm duration of 10.6 hours, and average precipitation amount of 0.6 inch (for the Cincinnati area), the model indicated that all of the precipitation was retained by the soil with no net runoff predicted. This indicates that an average rainfall at the site yields negligible amounts of runoff. Therefore, a more extreme rainfall event was used in the model in order to yield any runoff. A one-year, 24-hour storm event (2.5 inches precipitation) was used to represent a more intense rainfall. This is comparable with measured rainfall at the site for July 1988 of 6.9 inches, attributed primarily to two storm events (WMCO 1989).

A second preliminary result to note came from the USLE model. USLE was used to model annual runoff amounts from each source area. Based on combining the mass of soil expected to runoff [Y(s)a] with source surface area (A) and soil bulk density (ρ), the annual depth of soil loss was estimated. These calculations indicated that up to 0.004 cm per year is expected to be lost to soil erosion, or no more than 0.2 inches in 100 years. In general, soil erosion is not a major transport factor at the site.

Results were calculated on a source term-specific basis and in terms of total loadings from the site. Source term specific surface water and sediment concentrations for the constituents of concern are presented in Tables P.4-1 through P.4-10. Total loadings are presented in Table P.4-11. With the exception of uranium, concentrations in the receiving streams are generally very low.

TABLE P.4-1

SURFACE WATER RUNOFF MODEL RESULTS FOR THE NORTHEAST QUADRANT OF THE FORMER PRODUCTION AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Organics							
1,1,1-Trichloroethane	5.00×10^{-03}	1.33×10^{-03}	7.69×10^{-02}	7.80×10^{-05}	5.25×10^{-05}	7.10×10^{-06}	4.67×10^{-03}
1,2-Dichloroethene	1.00×10^{-03}	2.43×10^{-04}	3.37×10^{-02}	3.42×10^{-05}	2.30×10^{-05}	3.11×10^{-06}	8.53×10^{-04}
2-Butanone	1.60×10^{-02}	3.59×10^{-04}	$3.39 \times 10^{+00}$	3.44×10^{-03}	2.31×10^{-03}	3.13×10^{-04}	1.26×10^{-03}
2-Methylnaphthalene	5.59×10^{-01}	1.59×10^{-01}	3.74×10^{-01}	3.80×10^{-04}	2.55×10^{-04}	3.46×10^{-05}	5.57×10^{-01}
4-Methyl-2-pentanone	3.00×10^{-03}	3.14×10^{-04}	4.36×10^{-01}	4.42×10^{-04}	2.97×10^{-04}	4.03×10^{-05}	1.10×10^{-03}
Acenaphthene	$2.60 \times 10^{+00}$	7.40×10^{-01}	$1.52 \times 10^{+00}$	1.54×10^{-03}	1.04×10^{-03}	1.40×10^{-04}	$2.60 \times 10^{+00}$
Acetone	1.60×10^{-02}	1.20×10^{-04}	$3.58 \times 10^{+00}$	3.63×10^{-03}	2.44×10^{-03}	3.31×10^{-04}	4.20×10^{-04}
Anthracene	$3.26 \times 10^{+00}$	9.30×10^{-01}	5.66×10^{-01}	5.75×10^{-04}	3.86×10^{-04}	5.23×10^{-05}	$3.26 \times 10^{+00}$
Aroclor-1254	$1.20 \times 10^{+00}$	3.42×10^{-01}	5.44×10^{-03}	5.52×10^{-06}	3.71×10^{-06}	5.03×10^{-07}	$1.20 \times 10^{+00}$
Aroclor-1260	$2.80 \times 10^{+00}$	7.99×10^{-01}	1.06×10^{-02}	1.07×10^{-05}	7.20×10^{-06}	9.75×10^{-07}	$2.80 \times 10^{+00}$
Benzo(a)anthracene	$1.61 \times 10^{+01}$	$4.59 \times 10^{+00}$	1.96×10^{-01}	1.99×10^{-04}	1.34×10^{-04}	1.81×10^{-05}	$1.61 \times 10^{+01}$
Benzo(a)pyrene	$2.40 \times 10^{+01}$	$6.84 \times 10^{+00}$	1.22×10^{-01}	1.24×10^{-04}	8.34×10^{-05}	1.13×10^{-05}	$2.40 \times 10^{+01}$
Benzo(b)fluoranthene	$3.29 \times 10^{+01}$	$9.37 \times 10^{+00}$	4.30×10^{-02}	4.36×10^{-05}	2.93×10^{-05}	3.97×10^{-06}	$3.29 \times 10^{+01}$
Benzo(g,h,i)perylene	$1.03 \times 10^{+01}$	$2.92 \times 10^{+00}$	2.94×10^{-03}	2.98×10^{-06}	2.00×10^{-06}	2.71×10^{-07}	$1.03 \times 10^{+01}$
Benzo(k)fluoranthene	$2.60 \times 10^{+00}$	7.41×10^{-01}	1.83×10^{-03}	1.85×10^{-06}	1.25×10^{-06}	1.69×10^{-07}	$2.60 \times 10^{+00}$
Benzoic acid	2.50×10^{-01}	5.55×10^{-02}	$1.28 \times 10^{+01}$	1.29×10^{-02}	8.70×10^{-03}	1.18×10^{-03}	1.94×10^{-01}
Beta-BHC	1.00×10^{-01}	2.84×10^{-02}	7.68×10^{-02}	7.79×10^{-05}	5.24×10^{-05}	7.09×10^{-06}	9.97×10^{-02}
Bis(2-ethylhexyl)phthalate	7.80×10^{-01}	2.22×10^{-01}	1.90×10^{-02}	1.92×10^{-05}	1.29×10^{-05}	1.75×10^{-06}	7.80×10^{-01}
Carbondisulfide	3.00×10^{-03}	7.47×10^{-04}	8.78×10^{-02}	8.91×10^{-05}	5.99×10^{-05}	8.11×10^{-06}	2.62×10^{-03}
Chloroform	1.00×10^{-02}	2.32×10^{-03}	4.25×10^{-01}	4.31×10^{-04}	2.90×10^{-04}	3.92×10^{-05}	8.15×10^{-03}
Cholorobenzene	1.00×10^{-03}	2.77×10^{-04}	6.82×10^{-03}	6.92×10^{-06}	4.65×10^{-06}	6.30×10^{-07}	9.70×10^{-04}
Chrysene	$1.53 \times 10^{+01}$	$4.35 \times 10^{+00}$	1.85×10^{-01}	1.88×10^{-04}	1.27×10^{-04}	1.71×10^{-05}	$1.53 \times 10^{+01}$

TABLE P.4-1
(Continued)

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Dibenzofuran	$1.19 \times 10^{+00}$	3.38×10^{-01}	4.36×10^{-01}	4.43×10^{-04}	2.98×10^{-04}	4.03×10^{-05}	$1.18 \times 10^{+00}$
Dibenzo(a,h) anthracene	$5.85 \times 10^{+00}$	$1.67 \times 10^{+00}$	3.05×10^{-02}	3.09×10^{-05}	2.08×10^{-05}	2.81×10^{-06}	$5.84 \times 10^{+00}$
Fluoranthene	$1.71 \times 10^{+01}$	$4.88 \times 10^{+00}$	3.89×10^{-01}	3.95×10^{-04}	2.66×10^{-04}	3.60×10^{-05}	$1.71 \times 10^{+01}$
Fluorene	$1.85 \times 10^{+00}$	5.28×10^{-01}	6.00×10^{-01}	6.09×10^{-04}	4.09×10^{-04}	5.54×10^{-05}	$1.85 \times 10^{+00}$
Ideno(1,2,3-cd)pyrene	$1.11 \times 10^{+01}$	$3.15 \times 10^{+00}$	1.18×10^{-03}	1.19×10^{-06}	8.03×10^{-07}	1.09×10^{-07}	$1.11 \times 10^{+01}$
Methylene chloride	2.60×10^{-02}	3.39×10^{-03}	$3.24 \times 10^{+00}$	3.29×10^{-03}	2.21×10^{-03}	3.00×10^{-04}	1.19×10^{-02}
Naphthalene	8.51×10^{-01}	2.40×10^{-01}	$1.78 \times 10^{+00}$	1.81×10^{-03}	1.22×10^{-03}	1.65×10^{-04}	8.43×10^{-01}
N-nitrosodiphenyl amine	2.00×10^{-01}	5.62×10^{-02}	7.09×10^{-01}	7.20×10^{-04}	4.84×10^{-04}	6.55×10^{-05}	1.97×10^{-01}
Phenanthrene	$1.13 \times 10^{+01}$	$3.21 \times 10^{+00}$	$1.89 \times 10^{+00}$	1.92×10^{-03}	1.29×10^{-03}	1.74×10^{-04}	$1.13 \times 10^{+01}$
Pyrene	$1.17 \times 10^{+01}$	$3.34 \times 10^{+00}$	3.77×10^{-01}	3.82×10^{-04}	2.57×10^{-04}	3.48×10^{-05}	$1.17 \times 10^{+01}$
Tetrachloroethene	7.00×10^{-03}	1.88×10^{-03}	9.46×10^{-02}	9.59×10^{-05}	6.45×10^{-05}	8.73×10^{-06}	6.59×10^{-03}
Toluene	3.00×10^{-03}	8.20×10^{-04}	2.85×10^{-02}	2.90×10^{-05}	1.95×10^{-05}	2.64×10^{-06}	2.88×10^{-03}
Trichloroethene	1.10×10^{-02}	2.95×10^{-03}	1.49×10^{-01}	1.51×10^{-04}	1.01×10^{-04}	1.37×10^{-05}	1.04×10^{-02}
Inorganics							
Aluminum	$9.98 \times 10^{+03}$	$2.85 \times 10^{+03}$	$6.19 \times 10^{+02}$	6.28×10^{-01}	4.23×10^{-01}	5.72×10^{-02}	$9.98 \times 10^{+03}$
Antimony	$6.44 \times 10^{+00}$	$1.83 \times 10^{+00}$	$2.40 \times 10^{+00}$	2.43×10^{-03}	1.63×10^{-03}	2.21×10^{-04}	$6.43 \times 10^{+00}$
Arsenic	$1.46 \times 10^{+01}$	$4.14 \times 10^{+00}$	$6.76 \times 10^{+00}$	6.86×10^{-03}	4.62×10^{-03}	6.25×10^{-04}	$1.45 \times 10^{+01}$
Barium	$4.11 \times 10^{+02}$	$1.17 \times 10^{+02}$	$3.35 \times 10^{+01}$	3.40×10^{-02}	2.29×10^{-02}	3.10×10^{-03}	$4.10 \times 10^{+02}$
Beryllium	$1.60 \times 10^{+00}$	4.57×10^{-01}	1.15×10^{-01}	1.16×10^{-04}	7.83×10^{-05}	1.06×10^{-05}	$1.60 \times 10^{+00}$
Cadmium	$6.90 \times 10^{+00}$	$1.96 \times 10^{+00}$	$1.28 \times 10^{+00}$	1.30×10^{-03}	8.76×10^{-04}	1.19×10^{-04}	$6.89 \times 10^{+00}$
Copper	$4.40 \times 10^{+01}$	$1.25 \times 10^{+01}$	$3.26 \times 10^{+01}$	3.31×10^{-02}	2.23×10^{-02}	3.02×10^{-03}	$4.38 \times 10^{+01}$
Cyanide	$1.44 \times 10^{+01}$	3.92×10^{-01}	$2.99 \times 10^{+03}$	$3.03 \times 10^{+00}$	$2.04 \times 10^{+00}$	2.76×10^{-01}	$1.38 \times 10^{+00}$
Lead	$1.24 \times 10^{+02}$	$3.53 \times 10^{+01}$	$3.84 \times 10^{+00}$	3.90×10^{-03}	2.62×10^{-03}	3.55×10^{-04}	$1.24 \times 10^{+02}$

TABLE P.4-1
(Continued)

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Mercury	4.05×10^{-01}	1.11×10^{-01}	$3.62 \times 10^{+00}$	3.68×10^{-03}	2.47×10^{-03}	3.35×10^{-04}	3.89×10^{-01}
Nickel	$5.89 \times 10^{+01}$	$1.68 \times 10^{+01}$	$8.43 \times 10^{+00}$	8.55×10^{-03}	5.75×10^{-03}	7.79×10^{-04}	$5.88 \times 10^{+01}$
Zinc	$3.35 \times 10^{+02}$	$9.56 \times 10^{+01}$	$1.30 \times 10^{+01}$	1.32×10^{-02}	8.87×10^{-03}	1.20×10^{-03}	$3.35 \times 10^{+02}$
Radionuclides							
Cs-137	5.90×10^{-09}	1.68×10^{-09}	3.03×10^{-10}	3.08×10^{-13}	2.07×10^{-13}	2.80×10^{-14}	5.90×10^{-09}
Ra-226	2.40×10^{-06}	6.84×10^{-07}	3.21×10^{-07}	3.26×10^{-10}	2.19×10^{-10}	2.96×10^{-11}	2.40×10^{-06}
Ra-228	2.20×10^{-07}	6.27×10^{-08}	2.94×10^{-08}	2.98×10^{-11}	2.01×10^{-11}	2.72×10^{-12}	2.20×10^{-07}
Sr-90	4.60×10^{-09}	1.26×10^{-09}	4.12×10^{-08}	4.18×10^{-11}	2.81×10^{-11}	3.80×10^{-12}	4.42×10^{-09}
Tc-99	6.60×10^{-05}	4.24×10^{-06}	1.17×10^{-02}	1.19×10^{-05}	8.01×10^{-06}	1.08×10^{-06}	1.49×10^{-05}
Th-228	4.60×10^{-09}	1.31×10^{-09}	7.39×10^{-11}	7.49×10^{-14}	5.04×10^{-14}	6.82×10^{-15}	4.60×10^{-09}
Th-230	4.10×10^{-02}	1.17×10^{-02}	6.58×10^{-04}	6.68×10^{-07}	4.49×10^{-07}	6.08×10^{-08}	4.10×10^{-02}
Th-232	$2.50 \times 10^{+02}$	$7.13 \times 10^{+01}$	$4.01 \times 10^{+00}$	4.07×10^{-03}	2.74×10^{-03}	3.71×10^{-04}	$2.50 \times 10^{+02}$
U-234	2.30×10^{-02}	5.35×10^{-03}	9.71×10^{-01}	9.85×10^{-04}	6.63×10^{-04}	8.97×10^{-05}	1.88×10^{-02}
U-235/236	$2.30 \times 10^{+00}$	5.35×10^{-01}	$9.71 \times 10^{+01}$	9.85×10^{-02}	6.63×10^{-02}	8.97×10^{-03}	$1.88 \times 10^{+00}$
U-238	$2.30 \times 10^{+03}$	$5.35 \times 10^{+02}$	$9.71 \times 10^{+04}$	$9.85 \times 10^{+01}$	$6.63 \times 10^{+01}$	$8.97 \times 10^{+00}$	$1.88 \times 10^{+03}$

[a]Organics and inorganics in mg/l, radionuclides in pci/l
[b]Organics and inorganics in mg/kg, radionuclides in pci/g

TABLE P.4-2

SURFACE WATER RUNOFF MODEL RESULTS FOR THE NORTHWEST QUADRANT OF THE PRODUCTION AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Organics							
Aroclor-1254	$1.50 \times 10^{+00}$	3.32×10^{-01}	5.43×10^{-03}	6.90×10^{-06}	4.29×10^{-06}	5.11×10^{-07}	$1.50 \times 10^{+00}$
Inorganics							
Antimony	$3.11 \times 10^{+01}$	$6.88 \times 10^{+00}$	$9.23 \times 10^{+00}$	1.17×10^{-02}	7.29×10^{-03}	8.69×10^{-04}	$3.11 \times 10^{+01}$
Barium	$4.07 \times 10^{+02}$	$9.01 \times 10^{+01}$	$2.65 \times 10^{+01}$	3.37×10^{-02}	2.09×10^{-02}	2.49×10^{-03}	$4.07 \times 10^{+02}$
Cobalt	$2.09 \times 10^{+01}$	$4.62 \times 10^{+00}$	$2.82 \times 10^{+00}$	3.58×10^{-03}	2.22×10^{-03}	2.65×10^{-04}	$2.09 \times 10^{+01}$
Copper	$1.28 \times 10^{+02}$	$2.82 \times 10^{+01}$	$7.58 \times 10^{+01}$	9.64×10^{-02}	5.99×10^{-02}	7.13×10^{-03}	$1.28 \times 10^{+02}$
Cyanide	2.18×10^{-01}	4.62×10^{-03}	$3.61 \times 10^{+01}$	4.59×10^{-02}	2.85×10^{-02}	3.40×10^{-03}	2.09×10^{-02}
Lead	$5.65 \times 10^{+01}$	$1.25 \times 10^{+01}$	$1.40 \times 10^{+00}$	1.78×10^{-03}	1.11×10^{-03}	1.32×10^{-04}	$5.65 \times 10^{+01}$
Nickel	$3.82 \times 10^{+01}$	$8.44 \times 10^{+00}$	$4.36 \times 10^{+00}$	5.54×10^{-03}	3.44×10^{-03}	4.10×10^{-04}	$3.81 \times 10^{+01}$
Silver	$8.87 \times 10^{+00}$	$1.96 \times 10^{+00}$	$3.65 \times 10^{+00}$	4.65×10^{-03}	2.88×10^{-03}	3.44×10^{-04}	$8.85 \times 10^{+00}$
Zinc	$9.97 \times 10^{+01}$	$2.21 \times 10^{+01}$	$3.08 \times 10^{+00}$	3.92×10^{-03}	2.44×10^{-03}	2.90×10^{-04}	$9.97 \times 10^{+01}$
Radionuclides							
Cs-137	8.00×10^{-09}	1.77×10^{-09}	3.28×10^{-10}	4.18×10^{-13}	2.59×10^{-13}	3.09×10^{-14}	8.00×10^{-09}
Ra-226	5.10×10^{-04}	1.13×10^{-04}	5.44×10^{-05}	6.92×10^{-08}	4.30×10^{-08}	5.12×10^{-09}	5.10×10^{-04}
Ra-228	1.60×10^{-07}	3.54×10^{-08}	1.71×10^{-08}	2.17×10^{-11}	1.35×10^{-11}	1.61×10^{-12}	1.60×10^{-07}
Sr-90	4.40×10^{-09}	9.36×10^{-10}	3.14×10^{-08}	4.00×10^{-11}	2.48×10^{-11}	2.96×10^{-12}	4.23×10^{-09}
Tc-99	4.90×10^{-05}	2.45×10^{-06}	6.95×10^{-03}	8.85×10^{-06}	5.49×10^{-06}	6.54×10^{-07}	1.10×10^{-05}
Th-228	1.90×10^{-08}	4.21×10^{-09}	2.43×10^{-10}	3.10×10^{-13}	1.92×10^{-13}	2.29×10^{-14}	1.90×10^{-08}
Th-230	2.60×10^{-02}	5.75×10^{-03}	3.33×10^{-04}	4.24×10^{-07}	2.63×10^{-07}	3.13×10^{-08}	2.60×10^{-02}
Th-232	$2.90 \times 10^{+02}$	$6.42 \times 10^{+01}$	$3.71 \times 10^{+00}$	4.72×10^{-03}	2.93×10^{-03}	3.49×10^{-04}	$2.90 \times 10^{+02}$
U-234	2.70×10^{-01}	4.88×10^{-02}	$9.09 \times 10^{+00}$	1.16×10^{-02}	7.18×10^{-03}	8.56×10^{-04}	2.20×10^{-01}
U-235/236	$4.80 \times 10^{+01}$	$8.67 \times 10^{+00}$	$1.62 \times 10^{+03}$	$2.06 \times 10^{+00}$	$1.28 \times 10^{+00}$	1.52×10^{-01}	$3.92 \times 10^{+01}$

TABLE P.4-2
(Continued)

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
U-238	$5.70 \times 10^{+03}$	$1.03 \times 10^{+03}$	$1.92 \times 10^{+05}$	$2.44 \times 10^{+02}$	$1.52 \times 10^{+02}$	$1.81 \times 10^{+01}$	$4.65 \times 10^{+03}$

[a]Organics and inorganics in mg/l, radionuclides in pci/l
[b]Organics and inorganics in mg/kg, radionuclides in pci/g

TABLE P.4-3

SURFACE WATER RUNOFF MODEL RESULTS FOR THE SOUTHEAST QUADRANT OF THE PRODUCTION AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration (pci/l)	Surface Water Concentration (pci/l)		Sediment Concentration (pci/g)
					Low Flow	High Flow	
Radionuclides							
Cs-137	3.30×10^{-08}	7.60×10^{-09}	1.63×10^{-09}	1.72×10^{-12}	1.14×10^{-12}	1.51×10^{-13}	3.30×10^{-08}
Pu-239/240	7.20×10^{-06}	1.66×10^{-06}	3.79×10^{-07}	4.00×10^{-10}	2.66×10^{-10}	3.52×10^{-11}	7.20×10^{-06}
Ra-226	1.80×10^{-06}	4.15×10^{-07}	2.32×10^{-07}	2.44×10^{-10}	1.62×10^{-10}	2.15×10^{-11}	1.80×10^{-06}
Ra-228	8.70×10^{-09}	2.00×10^{-09}	1.12×10^{-09}	1.18×10^{-12}	7.84×10^{-13}	1.04×10^{-13}	8.69×10^{-09}
Sr-90	5.20×10^{-09}	1.15×10^{-09}	4.48×10^{-08}	4.72×10^{-11}	3.13×10^{-11}	4.15×10^{-12}	5.00×10^{-09}
Tc-99	6.00×10^{-05}	3.12×10^{-06}	1.03×10^{-02}	1.08×10^{-05}	7.19×10^{-06}	9.52×10^{-07}	1.35×10^{-05}
Th-228	3.60×10^{-09}	8.29×10^{-10}	5.56×10^{-11}	5.86×10^{-14}	3.89×10^{-14}	5.15×10^{-15}	3.60×10^{-09}
Th-230	8.90×10^{-04}	2.05×10^{-04}	1.37×10^{-05}	1.45×10^{-08}	9.63×10^{-09}	1.27×10^{-09}	8.90×10^{-04}
Th-232	$3.20 \times 10^{+01}$	$7.37 \times 10^{+00}$	4.94×10^{-01}	5.21×10^{-04}	3.46×10^{-04}	4.58×10^{-05}	$3.20 \times 10^{+01}$
U-234	9.50×10^{-02}	1.79×10^{-02}	$3.86 \times 10^{+00}$	4.07×10^{-03}	2.70×10^{-03}	3.58×10^{-04}	7.75×10^{-02}
U-235/236	$1.60 \times 10^{+01}$	$3.01 \times 10^{+00}$	$6.50 \times 10^{+02}$	6.86×10^{-01}	4.55×10^{-01}	6.02×10^{-02}	$1.31 \times 10^{+01}$
U-238	$2.10 \times 10^{+03}$	$3.95 \times 10^{+02}$	$8.53 \times 10^{+04}$	$9.00 \times 10^{+01}$	$5.97 \times 10^{+01}$	$7.91 \times 10^{+00}$	$1.71 \times 10^{+03}$

TABLE P.4-4

SURFACE WATER RUNOFF MODEL RESULTS FOR THE SOUTHWEST QUADRANT OF THE PRODUCTION AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Organics							
2-Butanone	9.00×10^{-03}	1.23×10^{-04}	$1.42 \times 10^{+00}$	1.93×10^{-03}	1.17×10^{-03}	1.34×10^{-04}	7.09×10^{-04}
Acenaphthene	$1.09 \times 10^{+00}$	1.89×10^{-01}	4.76×10^{-01}	6.47×10^{-04}	3.91×10^{-04}	4.50×10^{-05}	$1.09 \times 10^{+00}$
Acetone	2.10×10^{-02}	9.55×10^{-05}	$3.51 \times 10^{+00}$	4.77×10^{-03}	2.88×10^{-03}	3.32×10^{-04}	5.51×10^{-04}
Anthracene	$1.85 \times 10^{+00}$	3.20×10^{-01}	2.39×10^{-01}	3.25×10^{-04}	1.97×10^{-04}	2.26×10^{-05}	$1.84 \times 10^{+00}$
Aroclor-1254	8.90×10^{-01}	1.54×10^{-01}	3.01×10^{-03}	4.10×10^{-06}	2.48×10^{-06}	2.85×10^{-07}	8.90×10^{-01}
Aroclor-1260	$1.00 \times 10^{+00}$	1.74×10^{-01}	2.81×10^{-03}	3.82×10^{-06}	2.31×10^{-06}	2.66×10^{-07}	$1.00 \times 10^{+00}$
Benzo(a)anthracene	$4.59 \times 10^{+00}$	7.97×10^{-01}	4.17×10^{-02}	5.66×10^{-05}	3.43×10^{-05}	3.94×10^{-06}	$4.59 \times 10^{+00}$
Benzo(a)pyrene	$5.10 \times 10^{+00}$	8.85×10^{-01}	1.94×10^{-02}	2.63×10^{-05}	1.59×10^{-05}	1.83×10^{-06}	$5.10 \times 10^{+00}$
Benzo(b)fluoranthene	$3.97 \times 10^{+00}$	6.89×10^{-01}	3.88×10^{-03}	5.27×10^{-06}	3.19×10^{-06}	3.67×10^{-07}	$3.97 \times 10^{+00}$
Benzo(g,h,i)perylene	$3.15 \times 10^{+00}$	5.46×10^{-01}	6.73×10^{-04}	9.15×10^{-07}	5.54×10^{-07}	6.37×10^{-08}	$3.15 \times 10^{+00}$
Benzo(k)fluoranthene	$4.27 \times 10^{+00}$	7.40×10^{-01}	2.24×10^{-03}	3.04×10^{-06}	1.84×10^{-06}	2.12×10^{-07}	$4.27 \times 10^{+00}$
Beta-BHC	1.46×10^{-01}	2.52×10^{-02}	8.37×10^{-02}	1.14×10^{-04}	6.89×10^{-05}	7.92×10^{-06}	1.46×10^{-01}
Bis(2-Ethylhexyl)phthalate	1.80×10^{-01}	3.12×10^{-02}	3.27×10^{-03}	4.44×10^{-06}	2.69×10^{-06}	3.09×10^{-07}	1.80×10^{-01}
Chrysene	$6.12 \times 10^{+00}$	$1.06 \times 10^{+00}$	5.55×10^{-02}	7.55×10^{-05}	4.57×10^{-05}	5.25×10^{-06}	$6.12 \times 10^{+00}$
Dibenzofuran	5.08×10^{-01}	8.80×10^{-02}	1.40×10^{-01}	1.90×10^{-04}	1.15×10^{-04}	1.32×10^{-05}	5.07×10^{-01}
Dibenzo(a,h) anthracene	$1.29 \times 10^{+00}$	2.24×10^{-01}	5.02×10^{-03}	6.83×10^{-06}	4.13×10^{-06}	4.75×10^{-07}	$1.29 \times 10^{+00}$
Fluoranthene	$6.50 \times 10^{+00}$	$1.13 \times 10^{+00}$	1.10×10^{-01}	1.50×10^{-04}	9.08×10^{-05}	1.04×10^{-05}	$6.50 \times 10^{+00}$
Fluorene	$1.16 \times 10^{+00}$	2.00×10^{-01}	2.79×10^{-01}	3.80×10^{-04}	2.30×10^{-04}	2.64×10^{-05}	$1.15 \times 10^{+00}$
Ideno(1,2,3-cd)pyrene	$2.47 \times 10^{+00}$	4.28×10^{-01}	1.96×10^{-04}	2.66×10^{-07}	1.61×10^{-07}	1.85×10^{-08}	$2.47 \times 10^{+00}$
Methylene chloride	2.10×10^{-02}	1.66×10^{-03}	$1.96 \times 10^{+00}$	2.66×10^{-03}	1.61×10^{-03}	1.85×10^{-04}	9.59×10^{-03}
N-Nitrosodiphenyl amine	1.00×10^{-01}	1.71×10^{-02}	2.65×10^{-01}	3.60×10^{-04}	2.18×10^{-04}	2.50×10^{-05}	9.85×10^{-02}
Phenanthrene	$7.47 \times 10^{+00}$	$1.29 \times 10^{+00}$	9.34×10^{-01}	1.27×10^{-03}	7.68×10^{-04}	8.83×10^{-05}	$7.46 \times 10^{+00}$

TABLE P.4-4
(Continued)

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Pyrene	$6.49 \times 10^{+00}$	$1.13 \times 10^{+00}$	1.56×10^{-01}	2.12×10^{-04}	1.28×10^{-04}	1.47×10^{-05}	$6.49 \times 10^{+00}$
Tetrachloroethene	2.00×10^{-03}	3.27×10^{-04}	2.02×10^{-02}	2.74×10^{-05}	1.66×10^{-05}	1.91×10^{-06}	1.88×10^{-03}
Toluene	2.00×10^{-03}	3.33×10^{-04}	1.42×10^{-02}	1.93×10^{-05}	1.17×10^{-05}	1.34×10^{-06}	1.92×10^{-03}
Tributyl phosphate	$1.20 \times 10^{+00}$	2.08×10^{-01}	4.35×10^{-01}	5.91×10^{-04}	3.58×10^{-04}	4.11×10^{-05}	$1.20 \times 10^{+00}$
Trichloroethene	4.00×10^{-03}	6.53×10^{-04}	4.04×10^{-02}	5.48×10^{-05}	3.32×10^{-05}	3.82×10^{-06}	3.76×10^{-03}
Inorganics							
Beryllium	$2.01 \times 10^{+00}$	3.48×10^{-01}	1.07×10^{-01}	1.46×10^{-04}	8.84×10^{-05}	1.02×10^{-05}	$2.01 \times 10^{+00}$
Cyanide	3.79×10^{-01}	6.29×10^{-03}	$5.88 \times 10^{+01}$	7.99×10^{-02}	4.84×10^{-02}	5.56×10^{-03}	3.63×10^{-02}
Lead	$2.98 \times 10^{+02}$	$5.17 \times 10^{+01}$	$6.90 \times 10^{+00}$	9.38×10^{-03}	5.68×10^{-03}	6.53×10^{-04}	$2.98 \times 10^{+02}$
Mercury	9.70×10^{-01}	1.62×10^{-01}	$6.48 \times 10^{+00}$	8.81×10^{-03}	5.33×10^{-03}	6.13×10^{-04}	9.32×10^{-01}
Nickel	$5.00 \times 10^{+01}$	$8.67 \times 10^{+00}$	$5.35 \times 10^{+00}$	7.26×10^{-03}	4.40×10^{-03}	5.06×10^{-04}	$5.00 \times 10^{+01}$
Silver	$1.11 \times 10^{+01}$	$1.92 \times 10^{+00}$	$4.28 \times 10^{+00}$	5.81×10^{-03}	3.52×10^{-03}	4.04×10^{-04}	$1.11 \times 10^{+01}$
Zinc	$3.16 \times 10^{+02}$	$5.48 \times 10^{+01}$	$9.16 \times 10^{+00}$	1.24×10^{-02}	7.53×10^{-03}	8.66×10^{-04}	$3.16 \times 10^{+02}$
Radionuclides							
Cs-137	1.30×10^{-08}	2.26×10^{-09}	4.99×10^{-10}	6.78×10^{-13}	4.11×10^{-13}	4.72×10^{-14}	1.30×10^{-08}
Pu-238	1.70×10^{-07}	2.95×10^{-08}	6.95×10^{-09}	9.45×10^{-12}	5.72×10^{-12}	6.57×10^{-13}	1.70×10^{-07}
Pu-239/240	1.80×10^{-05}	3.12×10^{-06}	7.36×10^{-07}	1.00×10^{-09}	6.05×10^{-10}	6.96×10^{-11}	1.80×10^{-05}
Ra-226	1.60×10^{-06}	2.77×10^{-07}	1.60×10^{-07}	2.17×10^{-10}	1.31×10^{-10}	1.51×10^{-11}	1.60×10^{-06}
Ra-228	5.80×10^{-07}	1.01×10^{-07}	5.79×10^{-08}	7.87×10^{-11}	4.76×10^{-11}	5.48×10^{-12}	5.80×10^{-07}
Sr-90	7.40×10^{-09}	1.23×10^{-09}	4.95×10^{-08}	6.72×10^{-11}	4.07×10^{-11}	4.68×10^{-12}	7.11×10^{-09}
Tc-99	2.20×10^{-03}	8.61×10^{-05}	2.92×10^{-01}	3.97×10^{-04}	2.40×10^{-04}	2.76×10^{-05}	4.96×10^{-04}
Th-228	3.80×10^{-07}	6.59×10^{-08}	4.56×10^{-09}	6.19×10^{-12}	3.75×10^{-12}	4.31×10^{-13}	3.80×10^{-07}
Th-230	1.40×10^{-02}	2.43×10^{-03}	1.68×10^{-04}	2.28×10^{-07}	1.38×10^{-07}	1.59×10^{-08}	1.40×10^{-02}

TABLE P.4-4
(Continued)

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Th-232	$2.60 \times 10^{+03}$	$4.51 \times 10^{+02}$	$3.12 \times 10^{+01}$	4.24×10^{-02}	2.56×10^{-02}	2.95×10^{-03}	$2.60 \times 10^{+03}$
U-234	$2.10 \times 10^{+00}$	2.97×10^{-01}	$6.62 \times 10^{+01}$	9.00×10^{-02}	5.45×10^{-02}	6.26×10^{-03}	$1.71 \times 10^{+00}$
U-235/236	$2.20 \times 10^{+02}$	$3.12 \times 10^{+01}$	$6.94 \times 10^{+03}$	$9.43 \times 10^{+00}$	$5.71 \times 10^{+00}$	6.56×10^{-01}	$1.80 \times 10^{+02}$
U-238	$4.30 \times 10^{+04}$	$6.09 \times 10^{+03}$	$1.36 \times 10^{+06}$	$1.84 \times 10^{+03}$	$1.12 \times 10^{+03}$	$1.28 \times 10^{+02}$	$3.51 \times 10^{+04}$

[a]Organics and inorganics in mg/l, radionuclides in pci/l
[b]Organics and inorganics in mg/kg, radionuclides in pci/g

TABLE P.4-5

SURFACE WATER RUNOFF MODEL RESULTS FOR THE INCINERATOR AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration (pci/l)	Surface Water Concentration (pci/l)		Sediment Concentration (pci/g)
					Low Flow	High Flow	
Radionuclides							
Cs-137	7.20×10^{-09}	7.74×10^{-10}	1.59×10^{-10}	3.76×10^{-13}	1.76×10^{-13}	1.55×10^{-14}	7.20×10^{-09}
Pu-238	2.70×10^{-08}	2.90×10^{-09}	6.36×10^{-10}	1.50×10^{-12}	7.04×10^{-13}	6.20×10^{-14}	2.70×10^{-08}
Pu-239/240	7.10×10^{-06}	7.63×10^{-07}	1.67×10^{-07}	3.95×10^{-10}	1.85×10^{-10}	1.63×10^{-11}	7.10×10^{-06}
Ra-226	2.20×10^{-05}	2.36×10^{-06}	1.27×10^{-06}	2.98×10^{-09}	1.40×10^{-09}	1.23×10^{-10}	2.20×10^{-05}
Ra-228	1.60×10^{-08}	1.72×10^{-09}	9.21×10^{-10}	2.17×10^{-12}	1.02×10^{-12}	8.97×10^{-14}	1.60×10^{-08}
Sr-90	1.30×10^{-08}	1.34×10^{-09}	5.01×10^{-08}	1.18×10^{-10}	5.54×10^{-11}	4.88×10^{-12}	1.25×10^{-08}
Tc-99	1.50×10^{-04}	3.63×10^{-06}	1.15×10^{-02}	2.71×10^{-05}	1.27×10^{-05}	1.12×10^{-06}	3.38×10^{-05}
Th-228	5.70×10^{-09}	6.12×10^{-10}	3.94×10^{-11}	9.29×10^{-14}	4.36×10^{-14}	3.84×10^{-15}	5.70×10^{-09}
Th-230	7.70×10^{-03}	8.27×10^{-04}	5.32×10^{-05}	1.25×10^{-07}	5.88×10^{-08}	5.18×10^{-09}	7.70×10^{-03}
Th-232	$5.70 \times 10^{+01}$	$6.12 \times 10^{+00}$	3.94×10^{-01}	9.29×10^{-04}	4.36×10^{-04}	3.84×10^{-05}	$5.70 \times 10^{+01}$
U-234	$1.30 \times 10^{+00}$	1.14×10^{-01}	$2.36 \times 10^{+01}$	5.57×10^{-02}	2.61×10^{-02}	2.30×10^{-03}	$1.06 \times 10^{+00}$
U-235/236	$3.40 \times 10^{+02}$	$2.98 \times 10^{+01}$	$6.18 \times 10^{+03}$	$1.46 \times 10^{+01}$	$6.83 \times 10^{+00}$	6.02×10^{-01}	$2.78 \times 10^{+02}$
U-238	$3.10 \times 10^{+04}$	$2.72 \times 10^{+03}$	$5.63 \times 10^{+05}$	$1.33 \times 10^{+03}$	$6.23 \times 10^{+02}$	$5.49 \times 10^{+01}$	$2.53 \times 10^{+04}$

TABLE P.4-6

SURFACE WATER RUNOFF MODEL RESULTS FOR THE SILO AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Organics							
Aroclor-1254	3.00×10^{-02}	1.15×10^{-03}	3.79×10^{-05}	1.38×10^{-07}	5.02×10^{-08}	3.75×10^{-09}	3.00×10^{-02}
Inorganics							
Antimony	$2.97 \times 10^{+01}$	$1.14 \times 10^{+00}$	$3.08 \times 10^{+00}$	1.12×10^{-02}	4.08×10^{-03}	3.04×10^{-04}	$2.97 \times 10^{+01}$
Silver	$8.40 \times 10^{+00}$	3.21×10^{-01}	$1.21 \times 10^{+00}$	4.40×10^{-03}	1.60×10^{-03}	1.19×10^{-04}	$8.38 \times 10^{+00}$
Radionuclides							
Ra-226	3.00×10^{-06}	1.15×10^{-07}	1.12×10^{-07}	4.07×10^{-10}	1.48×10^{-10}	1.10×10^{-11}	3.00×10^{-06}
Ra-228	5.50×10^{-09}	2.11×10^{-10}	2.05×10^{-10}	7.46×10^{-13}	2.71×10^{-13}	2.02×10^{-14}	5.50×10^{-09}
Sr-90	1.20×10^{-08}	4.42×10^{-10}	2.99×10^{-08}	1.09×10^{-10}	3.96×10^{-11}	2.96×10^{-12}	1.15×10^{-08}
Tc-99	4.60×10^{-05}	3.97×10^{-07}	2.28×10^{-03}	8.30×10^{-06}	3.02×10^{-06}	2.25×10^{-07}	1.04×10^{-05}
Th-228	1.50×10^{-09}	5.75×10^{-11}	6.71×10^{-12}	2.44×10^{-14}	8.89×10^{-15}	6.63×10^{-16}	1.50×10^{-09}
Th-230	1.80×10^{-04}	6.90×10^{-06}	8.05×10^{-07}	2.93×10^{-09}	1.07×10^{-09}	7.96×10^{-11}	1.80×10^{-04}
Th-232	$1.30 \times 10^{+01}$	4.98×10^{-01}	5.81×10^{-02}	2.12×10^{-04}	7.70×10^{-05}	5.75×10^{-06}	$1.30 \times 10^{+01}$
U-234	1.10×10^{-03}	3.44×10^{-05}	1.29×10^{-02}	4.71×10^{-05}	1.71×10^{-05}	1.28×10^{-06}	8.98×10^{-04}
U-238	$5.60 \times 10^{+01}$	$1.75 \times 10^{+00}$	$6.59 \times 10^{+02}$	$2.40 \times 10^{+00}$	8.73×10^{-01}	6.51×10^{-02}	$4.57 \times 10^{+01}$

[a]Organics and inorganics in mg/l, radionuclides in pci/l
[b]Organics and inorganics in mg/kg, radionuclides in pci/g

TABLE P.4-7

SURFACE WATER RUNOFF MODEL RESULTS FOR THE WASTE STORAGE AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Organics							
Aroclor-1254	7.20×10^{-01}	2.23×10^{-01}	4.38×10^{-03}	3.31×10^{-06}	2.43×10^{-06}	3.93×10^{-07}	7.20×10^{-01}
Aroclor-1260	3.70×10^{-02}	1.15×10^{-02}	1.87×10^{-04}	1.42×10^{-07}	1.04×10^{-07}	1.68×10^{-08}	3.70×10^{-02}
Inorganics							
Antimony	$2.72 \times 10^{+01}$	$8.40 \times 10^{+00}$	$1.36 \times 10^{+01}$	1.03×10^{-02}	7.53×10^{-03}	1.22×10^{-03}	$2.71 \times 10^{+01}$
Cyanide	1.55×10^{-01}	4.59×10^{-03}	$4.32 \times 10^{+01}$	3.27×10^{-02}	2.40×10^{-02}	3.87×10^{-03}	1.48×10^{-02}
Nickel	$2.92 \times 10^{+01}$	$9.02 \times 10^{+00}$	$5.60 \times 10^{+00}$	4.24×10^{-03}	3.11×10^{-03}	5.02×10^{-04}	$2.91 \times 10^{+01}$
Silver	$8.90 \times 10^{+00}$	$2.75 \times 10^{+00}$	$6.16 \times 10^{+00}$	4.66×10^{-03}	3.42×10^{-03}	5.52×10^{-04}	$8.88 \times 10^{+00}$
Radionuclides							
Cs-137	5.00×10^{-09}	1.55×10^{-09}	3.45×10^{-10}	2.61×10^{-13}	1.91×10^{-13}	3.09×10^{-14}	5.00×10^{-09}
Np-237	2.00×10^{-04}	6.15×10^{-05}	4.51×10^{-04}	3.41×10^{-07}	2.50×10^{-07}	4.04×10^{-08}	1.99×10^{-04}
Pu-238	1.20×10^{-08}	3.72×10^{-09}	8.82×10^{-10}	6.67×10^{-13}	4.89×10^{-13}	7.90×10^{-14}	1.20×10^{-08}
Pu-239/240	3.40×10^{-06}	1.05×10^{-06}	2.50×10^{-07}	1.89×10^{-10}	1.39×10^{-10}	2.24×10^{-11}	3.40×10^{-06}
Ra-226	2.40×10^{-06}	7.43×10^{-07}	4.31×10^{-07}	3.26×10^{-10}	2.39×10^{-10}	3.86×10^{-11}	2.40×10^{-06}
Ra-228	1.20×10^{-07}	3.71×10^{-08}	2.15×10^{-08}	1.63×10^{-11}	1.19×10^{-11}	1.93×10^{-12}	1.20×10^{-07}
Ru-106	9.00×10^{-10}	2.79×10^{-10}	1.40×10^{-10}	1.06×10^{-13}	7.80×10^{-14}	1.26×10^{-14}	9.00×10^{-10}
Sr-90	2.40×10^{-09}	7.14×10^{-10}	2.88×10^{-08}	2.18×10^{-11}	1.60×10^{-11}	2.58×10^{-12}	2.31×10^{-09}
Tc-99	1.40×10^{-04}	9.77×10^{-06}	3.34×10^{-02}	2.53×10^{-05}	1.85×10^{-05}	2.99×10^{-06}	3.16×10^{-05}
Th-228	1.30×10^{-08}	4.03×10^{-09}	2.80×10^{-10}	2.12×10^{-13}	1.55×10^{-13}	2.51×10^{-14}	1.30×10^{-08}
Th-230	7.80×10^{-02}	2.42×10^{-02}	1.68×10^{-03}	1.27×10^{-06}	9.32×10^{-07}	1.51×10^{-07}	7.80×10^{-02}
Th-232	$2.60 \times 10^{+01}$	$8.05 \times 10^{+00}$	5.60×10^{-01}	4.24×10^{-04}	3.11×10^{-04}	5.02×10^{-05}	$2.60 \times 10^{+01}$
U-234	3.30×10^{-02}	8.34×10^{-03}	$1.87 \times 10^{+00}$	1.41×10^{-03}	1.04×10^{-03}	1.67×10^{-04}	2.69×10^{-02}
U-235/236	$1.10 \times 10^{+01}$	$2.78 \times 10^{+00}$	$6.23 \times 10^{+02}$	4.71×10^{-01}	3.46×10^{-01}	5.58×10^{-02}	$8.98 \times 10^{+00}$

TABLE P.4-7
(Continued)

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
U-238	$7.90 \times 10^{+02}$	$2.00 \times 10^{+02}$	$4.48 \times 10^{+04}$	$3.38 \times 10^{+01}$	$2.48 \times 10^{+01}$	$4.01 \times 10^{+00}$	$6.45 \times 10^{+02}$

[a]Organics and inorganics in mg/l, radionuclides in pci/l
[b]Organics and inorganics in mg/kg, radionuclides in pci/g

TABLE P.4-8

SURFACE WATER RUNOFF MODEL RESULTS FOR THE FLYASH - SOUTH FIELD AREA

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration (pci/l)	Surface Water Concentration (pci/l)		Sediment Concentration (pci/g)
					Low Flow	High Flow	
Radionuclides							
Cs-137	8.10×10^{-09}	5.53×10^{-09}	3.80×10^{-10}	4.23×10^{-13}	2.76×10^{-13}	3.54×10^{-14}	8.10×10^{-09}
Ra-226	4.90×10^{-05}	3.34×10^{-05}	5.97×10^{-06}	6.65×10^{-09}	4.33×10^{-09}	5.56×10^{-10}	4.90×10^{-05}
Th-228	2.50×10^{-08}	1.71×10^{-08}	3.66×10^{-10}	4.07×10^{-13}	2.65×10^{-13}	3.41×10^{-14}	2.50×10^{-08}
Th-230	6.30×10^{-03}	4.30×10^{-03}	9.22×10^{-05}	1.03×10^{-07}	6.69×10^{-08}	8.58×10^{-09}	6.30×10^{-03}
Th-232	$1.70 \times 10^{+01}$	$1.16 \times 10^{+01}$	2.49×10^{-01}	2.77×10^{-04}	1.80×10^{-04}	2.32×10^{-05}	$1.70 \times 10^{+01}$
U-234	8.30×10^{-02}	4.56×10^{-02}	$3.15 \times 10^{+00}$	3.50×10^{-03}	2.28×10^{-03}	2.93×10^{-04}	6.68×10^{-02}
U-235/236	$6.60 \times 10^{+00}$	$3.62 \times 10^{+00}$	$2.50 \times 10^{+02}$	2.79×10^{-01}	1.82×10^{-01}	2.33×10^{-02}	$5.31 \times 10^{+00}$
U-238	$1.10 \times 10^{+02}$	$6.04 \times 10^{+01}$	$4.17 \times 10^{+03}$	$4.64 \times 10^{+00}$	$3.03 \times 10^{+00}$	3.88×10^{-01}	$8.85 \times 10^{+01}$

TABLE P.4-9

SURFACE WATER RUNOFF MODEL RESULTS FOR REMAINDER OF THE SITE TO PADDYS RUN

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Organics							
Acetone	1.50×10^{-02}	2.38×10^{-03}	$6.41 \times 10^{+01}$	3.45×10^{-03}	3.36×10^{-03}	2.26×10^{-03}	3.98×10^{-04}
Aroclor-1254	1.06×10^{-01}	6.34×10^{-01}	9.07×10^{-03}	4.88×10^{-07}	4.76×10^{-07}	3.19×10^{-07}	1.06×10^{-01}
Methylene chloride	2.50×10^{-02}	6.88×10^{-02}	$5.93 \times 10^{+01}$	3.19×10^{-03}	3.11×10^{-03}	2.08×10^{-03}	1.15×10^{-02}
Inorganics							
Antimony	$2.73 \times 10^{+01}$	$1.63 \times 10^{+02}$	$1.92 \times 10^{+02}$	1.03×10^{-02}	1.00×10^{-02}	6.74×10^{-03}	$2.73 \times 10^{+01}$
Arsenic	$9.44 \times 10^{+00}$	$5.63 \times 10^{+01}$	$8.27 \times 10^{+01}$	4.45×10^{-03}	4.34×10^{-03}	2.91×10^{-03}	$9.42 \times 10^{+00}$
Cyanide	1.06×10^{-01}	6.14×10^{-02}	$4.20 \times 10^{+02}$	2.26×10^{-02}	2.20×10^{-02}	1.48×10^{-02}	1.03×10^{-02}
Nickel	$2.92 \times 10^{+01}$	$1.74 \times 10^{+02}$	$7.88 \times 10^{+01}$	4.24×10^{-03}	4.13×10^{-03}	2.77×10^{-03}	$2.92 \times 10^{+01}$
Silver	$9.20 \times 10^{+00}$	$5.49 \times 10^{+01}$	$8.95 \times 10^{+01}$	4.82×10^{-03}	4.70×10^{-03}	3.15×10^{-03}	$9.18 \times 10^{+00}$
Radionuclides							
Cs-137	7.10×10^{-09}	4.24×10^{-08}	6.89×10^{-09}	3.71×10^{-13}	3.61×10^{-13}	2.42×10^{-13}	7.10×10^{-09}
Pu-238	1.90×10^{-08}	1.14×10^{-07}	1.96×10^{-08}	1.06×10^{-12}	1.03×10^{-12}	6.90×10^{-13}	1.90×10^{-08}
Pu-239/240	5.50×10^{-06}	3.29×10^{-05}	5.68×10^{-06}	3.06×10^{-10}	2.98×10^{-10}	2.00×10^{-10}	5.50×10^{-06}
Ra-226	3.70×10^{-05}	2.21×10^{-04}	9.33×10^{-05}	5.02×10^{-09}	4.89×10^{-09}	3.28×10^{-09}	3.70×10^{-05}
Ra-228	7.20×10^{-09}	4.30×10^{-08}	1.82×10^{-08}	9.77×10^{-13}	9.52×10^{-13}	6.39×10^{-13}	7.20×10^{-09}
Sr-90	6.50×10^{-09}	3.74×10^{-08}	1.10×10^{-06}	5.91×10^{-11}	5.76×10^{-11}	3.86×10^{-11}	6.25×10^{-09}
Tc-99	3.80×10^{-05}	5.17×10^{-05}	1.29×10^{-01}	6.93×10^{-06}	6.76×10^{-06}	4.53×10^{-06}	8.66×10^{-06}
Th-228	2.40×10^{-09}	1.43×10^{-08}	7.27×10^{-10}	3.91×10^{-14}	3.81×10^{-14}	2.56×10^{-14}	2.40×10^{-09}
Th-230	8.10×10^{-04}	4.84×10^{-03}	2.45×10^{-04}	1.32×10^{-08}	1.29×10^{-08}	8.63×10^{-09}	8.10×10^{-04}
Th-232	$1.20 \times 10^{+01}$	$7.17 \times 10^{+01}$	$3.63 \times 10^{+00}$	1.95×10^{-04}	1.91×10^{-04}	1.28×10^{-04}	$1.20 \times 10^{+01}$
U-234	2.20×10^{-03}	1.08×10^{-02}	$1.76 \times 10^{+00}$	9.45×10^{-05}	9.21×10^{-05}	6.18×10^{-05}	1.80×10^{-03}
U-235/236	2.60×10^{-01}	$1.27 \times 10^{+00}$	$2.08 \times 10^{+02}$	1.12×10^{-02}	1.09×10^{-02}	7.30×10^{-03}	2.13×10^{-01}

TABLE P.4-9
(Continued)

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
U-238	$5.60 \times 10^{+01}$	$2.74 \times 10^{+02}$	$4.47 \times 10^{+04}$	$2.41 \times 10^{+00}$	$2.34 \times 10^{+00}$	$1.57 \times 10^{+00}$	$4.58 \times 10^{+01}$

[a]Organics and inorganics in mg/ℓ, radionuclides in pCi/ℓ
[b]Organics and inorganics in mg/kg, radionuclides in pCi/g

TABLE P.4-10

SURFACE WATER RUNOFF MODEL RESULTS FOR REMAINDER OF THE SITE TO THE STORM SEWER OUTFALL DITCH

Chemical	Concentration in Site Source (mg/kg)	Sorbed Substance Loading (g)	Dissolved Substance Loading (g)	Effluent Concentration[a] (mg/l, pci/l)	Surface Water Concentration[a] (mg/l, pci/l)		Sediment Concentration[b] (mg/kg, pci/g)
					Low Flow	High Flow	
Organics							
Acetone	1.50×10^{-02}	2.70×10^{-03}	$6.93 \times 10^{+01}$	3.45×10^{-03}	3.37×10^{-03}	2.32×10^{-03}	3.98×10^{-04}
Aroclor-1254	1.06×10^{-01}	7.19×10^{-01}	9.80×10^{-03}	4.88×10^{-07}	4.76×10^{-07}	3.27×10^{-07}	1.06×10^{-01}
Methylene chloride	2.50×10^{-02}	7.80×10^{-02}	$6.40 \times 10^{+01}$	3.19×10^{-03}	3.11×10^{-03}	2.14×10^{-03}	1.15×10^{-02}
Inorganics							
Antimony	$2.73 \times 10^{+01}$	$1.85 \times 10^{+02}$	$2.07 \times 10^{+02}$	1.03×10^{-02}	1.01×10^{-02}	6.92×10^{-03}	$2.73 \times 10^{+01}$
Arsenic	$9.44 \times 10^{+00}$	$6.39 \times 10^{+01}$	$8.94 \times 10^{+01}$	4.45×10^{-03}	4.35×10^{-03}	2.99×10^{-03}	$9.42 \times 10^{+00}$
Cyanide	1.06×10^{-01}	6.96×10^{-02}	$4.54 \times 10^{+02}$	2.26×10^{-02}	2.21×10^{-02}	1.52×10^{-02}	1.03×10^{-02}
Nickel	$2.92 \times 10^{+01}$	$1.98 \times 10^{+02}$	$8.52 \times 10^{+01}$	4.24×10^{-03}	4.14×10^{-03}	2.85×10^{-03}	$2.92 \times 10^{+01}$
Silver	$9.20 \times 10^{+00}$	$6.22 \times 10^{+01}$	$9.68 \times 10^{+01}$	4.82×10^{-03}	4.70×10^{-03}	3.23×10^{-03}	$9.18 \times 10^{+00}$
Radionuclides							
Cs-137	7.10×10^{-09}	4.81×10^{-08}	7.44×10^{-09}	3.71×10^{-13}	3.62×10^{-13}	2.49×10^{-13}	7.10×10^{-09}
Pu-238	1.90×10^{-08}	1.29×10^{-07}	2.12×10^{-08}	1.06×10^{-12}	1.03×10^{-12}	7.09×10^{-13}	1.90×10^{-08}
Pu-239/240	5.50×10^{-06}	3.73×10^{-05}	6.14×10^{-06}	3.06×10^{-10}	2.98×10^{-10}	2.05×10^{-10}	5.50×10^{-06}
Ra-226	3.70×10^{-05}	2.51×10^{-04}	1.01×10^{-04}	5.02×10^{-09}	4.90×10^{-09}	3.37×10^{-09}	3.70×10^{-05}
Ra-228	7.20×10^{-09}	4.88×10^{-08}	1.96×10^{-08}	9.77×10^{-13}	9.54×10^{-13}	6.56×10^{-13}	7.20×10^{-09}
Sr-90	6.50×10^{-09}	4.24×10^{-08}	1.19×10^{-06}	5.91×10^{-11}	5.77×10^{-11}	3.96×10^{-11}	6.25×10^{-09}
Tc-99	3.80×10^{-05}	5.87×10^{-05}	1.39×10^{-01}	6.93×10^{-06}	6.77×10^{-06}	4.65×10^{-06}	8.66×10^{-06}
Th-230	8.10×10^{-04}	5.49×10^{-03}	2.65×10^{-04}	1.32×10^{-08}	1.29×10^{-08}	8.86×10^{-09}	8.10×10^{-04}
Th-232	$1.20 \times 10^{+01}$	$8.14 \times 10^{+01}$	$3.93 \times 10^{+00}$	1.95×10^{-04}	1.91×10^{-04}	1.31×10^{-04}	$1.20 \times 10^{+01}$
U-234	2.20×10^{-03}	1.22×10^{-02}	$1.90 \times 10^{+00}$	9.45×10^{-05}	9.23×10^{-05}	6.34×10^{-05}	1.80×10^{-03}
U-235/236	2.60×10^{-01}	$1.44 \times 10^{+00}$	$2.24 \times 10^{+02}$	1.12×10^{-02}	1.09×10^{-02}	7.49×10^{-03}	2.13×10^{-01}
U-238	$5.60 \times 10^{+01}$	$3.11 \times 10^{+02}$	$4.83 \times 10^{+04}$	$2.41 \times 10^{+00}$	$2.35 \times 10^{+00}$	$1.61 \times 10^{+00}$	$4.58 \times 10^{+01}$

TABLE P.4-10
(Continued)

[a]Organics and inorganics in mg/ℓ, radionuclides in pCi/ℓ
[b]Organics and inorganics in mg/kg, radionuclides in pCi/g

TABLE P.4-11

SURFACE WATER RUNOFF MODEL RESULTS FOR TOTAL LOADINGS FROM ALL SITES

Chemical	Storm Sewer Outfall Ditch[a]			Paddys Run[b]			Great Miami River	
	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Surface Water Concentration from Storm Sewer Outfall Ditch, Paddys Run[c] (mg/l, pci/l)	
	high flow	low flow		high flow	low flow		high flow	low flow
Organics								
1,1,1-Trichloroethane	2.27×10^{-06}	3.15×10^{-06}	1.71×10^{-04}	ND[e]	ND	ND	2.72×10^{-09}	1.84×10^{-10}
1,2-Dichloroethene	9.97×10^{-07}	1.38×10^{-06}	3.12×10^{-05}	ND	ND	ND	1.19×10^{-09}	8.07×10^{-11}
2-Butanone	1.42×10^{-04}	1.97×10^{-04}	6.19×10^{-05}	ND	ND	ND	1.70×10^{-07}	1.15×10^{-08}
2-Methylnaphthalene	1.11×10^{-05}	1.53×10^{-05}	2.04×10^{-02}	ND	ND	ND	1.32×10^{-08}	8.96×10^{-10}
4-Methyl-2-Pentanone	1.29×10^{-05}	1.78×10^{-05}	4.03×10^{-05}	ND	ND	ND	1.54×10^{-08}	1.04×10^{-09}
Acenaphthene	5.90×10^{-05}	8.15×10^{-05}	1.19×10^{-01}	ND	ND	ND	7.05×10^{-08}	4.77×10^{-09}
Acetone	2.10×10^{-04}	2.90×10^{-04}	3.74×10^{-04}	7.70×10^{-08}	1.10×10^{-07}	3.40×10^{-04}	2.51×10^{-07}	1.70×10^{-08}
Anthracene	2.38×10^{-05}	3.29×10^{-05}	1.60×10^{-01}	ND	ND	ND	2.85×10^{-08}	1.93×10^{-09}
Aroclor-1254	2.17×10^{-05}	3.00×10^{-05}	1.98×10^{-01}	2.06×10^{-05}	2.96×10^{-05}	1.22×10^{-01}	5.06×10^{-08}	3.48×10^{-09}
Aroclor-1260	3.95×10^{-07}	5.47×10^{-07}	1.25×10^{-01}	6.05×10^{-09}	8.68×10^{-09}	1.63×10^{-03}	4.80×10^{-10}	3.25×10^{-11}
Benzo(a)anthracene	7.02×10^{-06}	9.71×10^{-06}	6.91×10^{-01}	ND	ND	ND	8.40×10^{-09}	5.68×10^{-10}
Benzo(a)pyrene	4.19×10^{-06}	5.79×10^{-06}	9.91×10^{-01}	ND	ND	ND	5.01×10^{-09}	3.39×10^{-10}
Benzo(b)fluoranthene	1.39×10^{-06}	1.92×10^{-06}	$1.29 \times 10^{+00}$	ND	ND	ND	1.66×10^{-09}	1.12×10^{-10}
Benzo(g,h,i)perylene	1.07×10^{-07}	1.48×10^{-07}	4.45×10^{-01}	ND	ND	ND	1.28×10^{-10}	8.64×10^{-12}
Benzo(k)fluoranthene	1.20×10^{-07}	1.66×10^{-07}	1.90×10^{-01}	ND	ND	ND	1.44×10^{-10}	9.73×10^{-12}
Benzoic acid	3.77×10^{-04}	5.22×10^{-04}	7.11×10^{-03}	ND	ND	ND	4.51×10^{-07}	3.05×10^{-08}
Beta-BHC	4.75×10^{-06}	6.57×10^{-06}	6.88×10^{-03}	ND	ND	ND	5.68×10^{-09}	3.84×10^{-10}
Bis(2-Ethylhexyl)phthalate	6.58×10^{-07}	9.09×10^{-07}	3.25×10^{-02}	ND	ND	ND	7.87×10^{-10}	5.32×10^{-11}
Carbon disulfide	2.60×10^{-06}	3.59×10^{-06}	9.57×10^{-05}	ND	ND	ND	3.11×10^{-09}	2.10×10^{-10}
Chloroform	1.26×10^{-05}	1.74×10^{-05}	2.98×10^{-04}	ND	ND	ND	1.50×10^{-08}	1.02×10^{-09}

TABLE P.4-11
(Continued)

Chemical	Storm Sewer Outfall Ditch[a]			Paddys Run[b]			Great Miami River	
	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Surface Water Concentration from Storm Sewer Outfall Ditch, Paddys Run[c] (mg/l, pci/l)	
	high flow	low flow		high flow	low flow		high flow	low flow
Chlorobenzene	2.02×10^{-07}	2.79×10^{-07}	3.55×10^{-05}	ND	ND	ND	2.41×10^{-10}	1.63×10^{-11}
Chrysene	7.13×10^{-06}	9.86×10^{-06}	6.94×10^{-01}	ND	ND	ND	8.53×10^{-09}	5.77×10^{-10}
Dibenzofuran	1.70×10^{-05}	2.36×10^{-05}	5.46×10^{-02}	ND	ND	ND	2.04×10^{-08}	1.38×10^{-09}
Dibenzo(a,h) anthracene	1.05×10^{-06}	1.45×10^{-06}	2.42×10^{-01}	ND	ND	ND	1.26×10^{-09}	8.49×10^{-11}
Fluoranthene	1.48×10^{-05}	2.04×10^{-05}	7.71×10^{-01}	ND	ND	ND	1.77×10^{-08}	1.20×10^{-09}
Fluorene	2.60×10^{-05}	3.60×10^{-05}	9.34×10^{-02}	ND	ND	ND	3.11×10^{-08}	2.10×10^{-09}
Ideno(1,2,3-cd)pyrene	4.06×10^{-08}	5.61×10^{-08}	4.59×10^{-01}	ND	ND	ND	4.86×10^{-11}	3.28×10^{-12}
Methylene chloride	1.56×10^{-04}	2.16×10^{-04}	1.06×10^{-02}	2.22×10^{-06}	3.19×10^{-06}	9.81×10^{-03}	1.89×10^{-07}	1.28×10^{-08}
Naphthalene	5.27×10^{-05}	7.29×10^{-05}	3.08×10^{-02}	ND	ND	ND	6.31×10^{-08}	4.27×10^{-09}
N-Nitrosodiphenyl amine	2.88×10^{-05}	3.98×10^{-05}	9.39×10^{-03}	ND	ND	ND	3.45×10^{-08}	2.33×10^{-09}
Phenanthrene	8.35×10^{-05}	1.15×10^{-04}	5.78×10^{-01}	ND	ND	ND	9.99×10^{-08}	6.75×10^{-09}
Pyrene	1.57×10^{-05}	2.18×10^{-05}	5.73×10^{-01}	ND	ND	ND	1.88×10^{-08}	1.27×10^{-09}
Tetrachloroethene	3.39×10^{-06}	4.69×10^{-06}	2.83×10^{-04}	ND	ND	ND	4.06×10^{-09}	2.75×10^{-10}
Toluene	1.26×10^{-06}	1.75×10^{-06}	1.48×10^{-04}	ND	ND	ND	1.51×10^{-09}	1.02×10^{-10}
Tributyl phosphate	1.29×10^{-05}	1.78×10^{-05}	2.66×10^{-02}	ND	ND	ND	1.54×10^{-08}	1.04×10^{-09}
Trichloroethene	5.59×10^{-06}	7.73×10^{-06}	4.62×10^{-04}	ND	ND	ND	6.69×10^{-09}	4.52×10^{-10}
Inorganics								
Aluminum	$1.96 \times 10^{+00}$	$2.71 \times 10^{+00}$	$9.23 \times 10^{+03}$	$1.86 \times 10^{+00}$	$2.67 \times 10^{+00}$	$8.50 \times 10^{+03}$	4.58×10^{-03}	3.15×10^{-04}
Antimony	5.81×10^{-03}	8.04×10^{-03}	$2.48 \times 10^{+01}$	5.81×10^{-03}	8.33×10^{-03}	$2.46 \times 10^{+01}$	1.39×10^{-05}	9.57×10^{-07}
Arsenic	2.25×10^{-03}	3.12×10^{-03}	$9.11 \times 10^{+00}$	1.96×10^{-03}	2.81×10^{-03}	$8.30 \times 10^{+00}$	5.04×10^{-06}	3.46×10^{-07}
Barium	1.71×10^{-02}	2.36×10^{-02}	$1.00 \times 10^{+02}$	1.42×10^{-02}	2.03×10^{-02}	$6.45 \times 10^{+01}$	3.74×10^{-05}	2.57×10^{-06}

TABLE P.4-11
(Continued)

Chemical	Storm Sewer Outfall Ditch[a]			Paddys Run[b]			Great Miami River
	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Surface Water Concentration from Storm Sewer Outfall Ditch, Paddys Run[c] (mg/l, pci/l)
	high flow	low flow		high flow	low flow		high flow	low flow
Beryllium	1.68×10^{-04}	2.33×10^{-04}	8.26×10^{-01}	1.57×10^{-04}	2.26×10^{-04}	7.20×10^{-01}	3.90×10^{-07}	2.68×10^{-08}
Cadmium	1.11×10^{-03}	1.54×10^{-03}	$4.99 \times 10^{+00}$	1.04×10^{-03}	1.49×10^{-03}	$4.64 \times 10^{+00}$	2.58×10^{-06}	1.77×10^{-07}
Calcium	$3.31 \times 10^{+01}$	$4.57 \times 10^{+01}$	$7.50 \times 10^{+04}$	$2.57 \times 10^{+01}$	$3.69 \times 10^{+01}$	$6.83 \times 10^{+04}$	7.04×10^{-02}	4.83×10^{-03}
Chromium	3.78×10^{-03}	5.22×10^{-03}	$1.90 \times 10^{+01}$	3.51×10^{-03}	5.04×10^{-03}	$1.60 \times 10^{+01}$	8.72×10^{-06}	6.00×10^{-07}
Cobalt	2.39×10^{-03}	3.31×10^{-03}	$1.09 \times 10^{+01}$	2.19×10^{-03}	3.14×10^{-03}	$9.77 \times 10^{+00}$	5.48×10^{-06}	3.77×10^{-07}
Copper	7.80×10^{-03}	1.08×10^{-02}	$2.34 \times 10^{+01}$	4.58×10^{-03}	6.57×10^{-03}	$1.80 \times 10^{+01}$	1.48×10^{-05}	1.01×10^{-06}
Cyanide	9.11×10^{-02}	1.26×10^{-01}	6.06×10^{-02}	1.40×10^{-03}	2.01×10^{-03}	9.41×10^{-03}	1.11×10^{-04}	7.49×10^{-06}
Iron	$4.99 \times 10^{+00}$	$6.90 \times 10^{+00}$	$1.92 \times 10^{+04}$	$4.34 \times 10^{+00}$	$6.22 \times 10^{+00}$	$1.76 \times 10^{+04}$	1.12×10^{-02}	7.67×10^{-04}
Lead	6.32×10^{-03}	8.73×10^{-03}	$3.86 \times 10^{+01}$	5.77×10^{-03}	8.27×10^{-03}	$2.61 \times 10^{+01}$	1.45×10^{-05}	9.95×10^{-07}
Magnesium	$5.03 \times 10^{+01}$	$6.95 \times 10^{+01}$	$1.87 \times 10^{+04}$	$2.79 \times 10^{+01}$	$4.00 \times 10^{+01}$	$1.69 \times 10^{+04}$	9.35×10^{-02}	6.40×10^{-03}
Manganese	1.25×10^{-01}	1.73×10^{-01}	$4.93 \times 10^{+02}$	1.17×10^{-01}	1.68×10^{-01}	$4.66 \times 10^{+02}$	2.89×10^{-04}	1.99×10^{-05}
Mercury	3.20×10^{-04}	4.42×10^{-04}	3.77×10^{-02}	ND	ND	ND	3.83×10^{-07}	2.59×10^{-08}
Molybdenum	1.14×10^{-03}	1.58×10^{-03}	$4.07 \times 10^{+00}$	1.07×10^{-03}	1.54×10^{-03}	$3.89 \times 10^{+00}$	2.65×10^{-06}	1.82×10^{-07}
Nickel	6.39×10^{-03}	8.83×10^{-03}	$2.97 \times 10^{+01}$	5.87×10^{-03}	8.42×10^{-03}	$2.64 \times 10^{+01}$	1.47×10^{-05}	1.01×10^{-06}
Potassium	3.43×10^{-01}	4.75×10^{-01}	$9.71 \times 10^{+02}$	2.50×10^{-01}	3.59×10^{-01}	$8.64 \times 10^{+02}$	7.10×10^{-04}	4.87×10^{-05}
Selenium	ND	ND	ND	2.40×10^{-06}	3.44×10^{-06}	1.74×10^{-02}	2.87×10^{-09}	2.01×10^{-10}
Silver	2.13×10^{-03}	2.95×10^{-03}	$8.62 \times 10^{+00}$	2.01×10^{-03}	2.89×10^{-03}	$8.27 \times 10^{+00}$	4.96×10^{-06}	3.41×10^{-07}
Sodium	1.12×10^{-01}	1.55×10^{-01}	$2.05 \times 10^{+02}$	2.83×10^{-02}	4.05×10^{-02}	$1.02 \times 10^{+02}$	1.68×10^{-04}	1.14×10^{-05}
Thallium	5.83×10^{-05}	8.07×10^{-05}	2.82×10^{-01}	5.51×10^{-05}	7.91×10^{-05}	2.53×10^{-01}	1.36×10^{-07}	9.34×10^{-09}
Vanadium	5.09×10^{-03}	7.04×10^{-03}	$2.37 \times 10^{+01}$	4.82×10^{-03}	6.91×10^{-03}	$2.18 \times 10^{+01}$	1.19×10^{-05}	8.16×10^{-07}
Zinc	1.14×10^{-02}	1.57×10^{-02}	$6.81 \times 10^{+01}$	1.03×10^{-02}	1.48×10^{-02}	$4.76 \times 10^{+01}$	2.60×10^{-05}	1.79×10^{-06}

TABLE P.4-11
(Continued)

Chemical	Storm Sewer Outfall Ditch[a]			Paddys Run[b]			Great Miami River	
	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Overall Surface Water Concentration[c] (mg/l, pci/l)		Overall Sediment Concentration[d] (mg/kg, pci/g)	Surface Water Concentration from Storm Sewer Outfall Ditch, Paddys Run[c] (mg/l, pci/l)	
	high flow	low flow		high flow	low flow		high flow	low flow
Radionuclides								
Cs-137	1.31×10^{-01}	1.81×10^{-01}	6.91×10^{-01}	1.21×10^{-01}	1.73×10^{-01}	6.12×10^{-01}	3.01×10^{-04}	2.07×10^{-05}
Np-237	ND	ND	ND	1.03×10^{-02}	1.48×10^{-02}	6.19×10^{-03}	1.23×10^{-05}	8.63×10^{-07}
Pu-238	6.91×10^{-02}	9.56×10^{-02}	3.54×10^{-01}	6.34×10^{-02}	9.09×10^{-02}	2.87×10^{-01}	1.59×10^{-04}	1.09×10^{-05}
Pu-239/240	7.08×10^{-02}	9.79×10^{-02}	3.41×10^{-01}	6.64×10^{-02}	9.53×10^{-02}	3.00×10^{-01}	1.64×10^{-04}	1.13×10^{-05}
Ra-226	$8.99 \times 10^{+00}$	$1.24 \times 10^{+01}$	$4.66 \times 10^{+01}$	$7.28 \times 10^{+00}$	$1.04 \times 10^{+01}$	$3.61 \times 10^{+01}$	1.95×10^{-02}	1.34×10^{-03}
Ra-228	$1.25 \times 10^{+00}$	$1.73 \times 10^{+00}$	$8.77 \times 10^{+00}$	5.70×10^{-01}	8.18×10^{-01}	$3.12 \times 10^{+00}$	2.18×10^{-03}	1.49×10^{-04}
Ru-106	ND	ND	ND	1.52×10^{-02}	2.18×10^{-02}	1.33×10^{-01}	1.82×10^{-05}	1.28×10^{-06}
Sr-90	$1.07 \times 10^{+00}$	$1.47 \times 10^{+00}$	8.61×10^{-01}	4.32×10^{-01}	6.19×10^{-01}	7.64×10^{-01}	1.79×10^{-03}	1.22×10^{-04}
Tc-99	$1.67 \times 10^{+02}$	$2.31 \times 10^{+02}$	3.44×10^{-01}	$1.96 \times 10^{+01}$	$2.81 \times 10^{+01}$	1.50×10^{-01}	2.23×10^{-01}	1.52×10^{-02}
Th-228	5.15×10^{-01}	7.13×10^{-01}	$9.38 \times 10^{+00}$	3.98×10^{-01}	5.70×10^{-01}	$4.15 \times 10^{+00}$	1.09×10^{-03}	7.51×10^{-05}
Th-230	$4.01 \times 10^{+00}$	$5.55 \times 10^{+00}$	$6.84 \times 10^{+01}$	$4.32 \times 10^{+00}$	$6.20 \times 10^{+00}$	$9.60 \times 10^{+01}$	9.97×10^{-03}	6.87×10^{-04}
Th-232	3.93×10^{-01}	5.44×10^{-01}	$9.59 \times 10^{+00}$	2.58×10^{-01}	3.70×10^{-01}	$1.44 \times 10^{+00}$	7.79×10^{-04}	5.35×10^{-05}
U-234	$1.92 \times 10^{+04}$	$2.66 \times 10^{+04}$	$3.97 \times 10^{+02}$	$1.02 \times 10^{+03}$	$1.46 \times 10^{+03}$	$5.77 \times 10^{+01}$	$2.42 \times 10^{+01}$	$1.64 \times 10^{+00}$
U-235/236	$9.91 \times 10^{+02}$	$1.37 \times 10^{+03}$	$2.07 \times 10^{+01}$	$6.12 \times 10^{+01}$	$8.77 \times 10^{+01}$	$2.37 \times 10^{+00}$	$1.26 \times 10^{+00}$	8.53×10^{-02}
U-238	$2.28 \times 10^{+04}$	$3.16 \times 10^{+04}$	$4.78 \times 10^{+02}$	$5.43 \times 10^{+02}$	$7.78 \times 10^{+02}$	$2.57 \times 10^{+01}$	$2.80 \times 10^{+01}$	$1.89 \times 10^{+00}$

[a]Includes the four former Production Area quandrants, the Incinerator Area, and the site remainder expected to drain to the storm sewer outfall ditch.
[b]Includes the Silo Area, Waste Storage Area, Flyash-South Field Area, and the site remainder expected to drain to Paddys Run.
[c]Organics and inorganics in mg/ℓ, radionuclides in pCi/ℓ.
[d]Organics and inorganics in mg/kg, radionuclides in pCi/g

TABLE P.4-11
(Continued)

[e]ND = not detected in any areas contributing to receiving stream.

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APPENDIX Q

APPENDIX Q

AIR MODELING

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Q.1.0 INTRODUCTION

During periods of turbulent wind conditions, particles of surface materials (e.g., contaminated soil) can become suspended in ambient air and thus become subject to inhalation. The quantity of particulates resuspended depends on wind speed and other site conditions such as soil moisture, particle size range, and the extent of vegetative cover. Once resuspended, particles travel in whatever direction the wind happens to be blowing at the time, dispersing as they migrate downwind and eventually resettling to the ground. Downwind concentrations of the contaminated particles can vary widely, depending on atmospheric conditions. In this section, the methodology for estimating annual average concentrations of resuspended contaminants is described. Tables of estimated concentrations of airborne radionuclides and inorganic contaminants are presented. These concentrations form the basis for assessment of human exposure by the inhalation pathway, as described in Part II, Preliminary Baseline Risk Assessment, Section 3.3.

Q.2.0 DESCRIPTION OF THE DISPERSION MODEL

The Industrial Source Complex (ISC) model is an EPA guideline model (EPA 1987b). The long-term version, ISCLT, calculates annual average concentrations of an airborne pollutant at user-selected locations of interest, called receptor locations. It is a steady-state, Gaussian plume model that is applicable in flat or gently rolling terrain. It is well suited to this application, for it permits emission rates to vary with wind speeds. Data required for input to the model include emission rates of the sources, the locations and other physical information about the sources, meteorological information that is representative of actual site conditions, and physical locations of receptors.

In this application, on-property meteorological data for 1989 was used. A windrose generated from this data is shown in Figure Q.2-1. A statistical summary of the data is presented in Table Q.2-1. The model was programmed to allow resuspension to occur only during the time that wind speed one foot (0.3 m) above the ground exceeded 12 mph (19 km/hr).

Receptors were located in rows 100 meters apart, as shown by the grid in Figure Q.2-2. In addition to these 575 receptors, "discrete receptors" were located at each of the seven perimeter air monitoring sites (AMS-1 through AMS-7, shown in Part I, Figure 3.4) and at the two nearest "sensitive receptor sites", Elda School in Ross, Ohio, and Township School, located between Fernald and New Haven.

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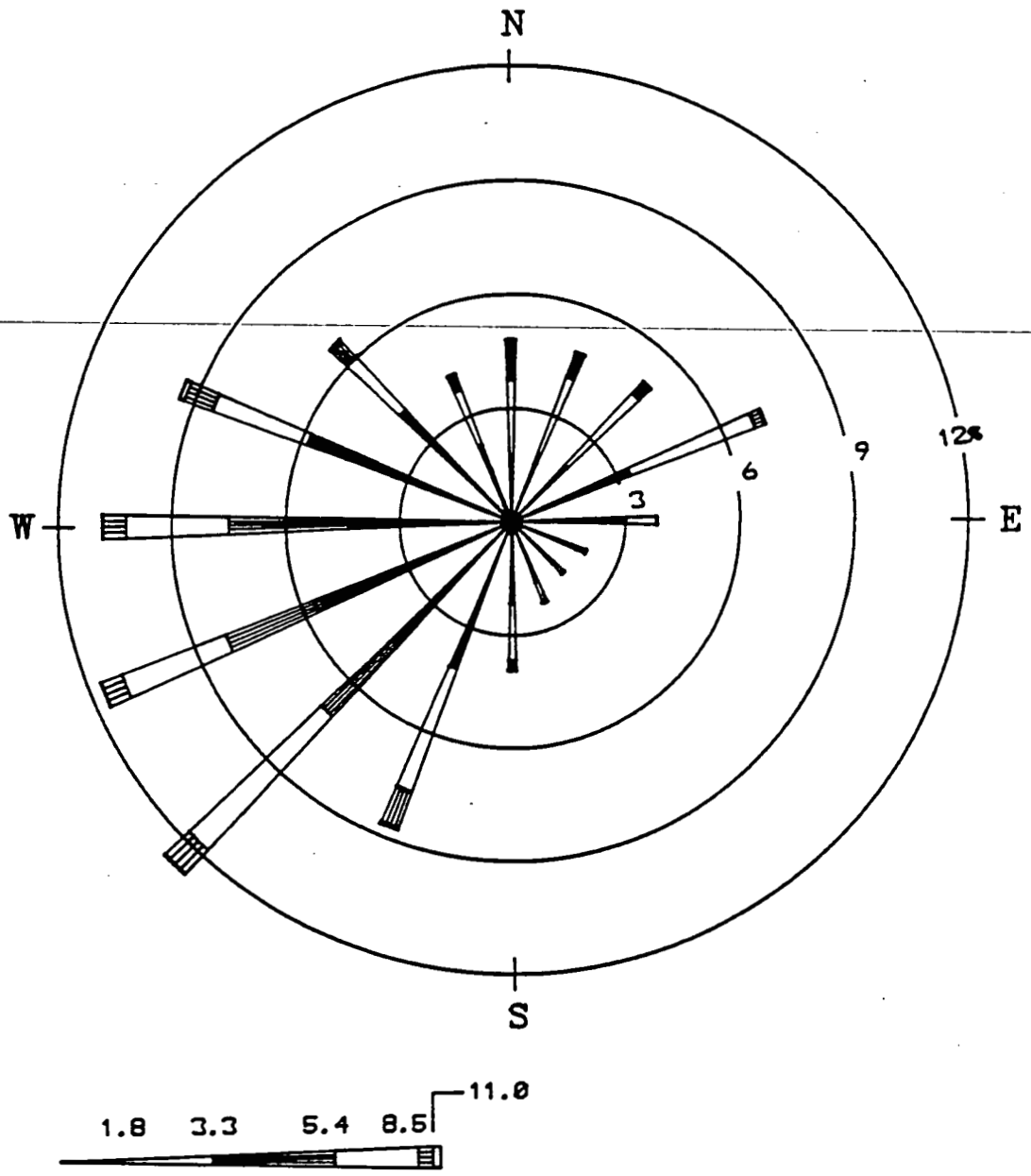

WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

10-METER LEVEL
94.6 PERCENT DATA RECOVERY

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 4.8 PERCENT OF THE TIME.

FIGURE Q.2-1 FEMP WINDROSE, 1989

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TABLE Q.2-1

FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION AT THE FEMP, 1989

Direction (Degrees)	Wind-Speed Classes (meters per second) Class 1 (0-2)	Class 2 (2-4)	Class 3 (4-6)	Class 4 (6-8)	Class 5 (8-10)	Class 6 (>10)	TOTAL
0	0.01303	0.02437	0.00941	0.00121	0.00000	0.00000	0.04802
22.5	0.01653	0.02425	0.00640	0.00048	0.00000	0.00000	0.04766
45.0	0.02039	0.02582	0.00422	0.00000	0.00000	0.00000	0.05043
67.5	0.03342	0.03499	0.00302	0.00000	0.00000	0.00000	0.07143
90.0	0.02980	0.00808	0.00024	0.00000	0.00000	0.00000	0.03813
112.5	0.01858	0.00241	0.00000	0.00000	0.00000	0.00000	0.02100
135.0	0.01544	0.00362	0.00000	0.00000	0.00000	0.00000	0.01906
157.5	0.01689	0.00567	0.00036	0.00000	0.00000	0.00000	0.02293
180.0	0.02160	0.01508	0.00253	0.00024	0.00000	0.00000	0.03946
202.5	0.04151	0.03475	0.01014	0.00060	0.00000	0.00000	0.08699
225.0	0.07022	0.04790	0.00857	0.00036	0.00000	0.00000	0.12705
247.5	0.08144	0.02920	0.00591	0.000012	0.00000	0.00000	0.11667
270.0	0.07517	0.02691	0.00615	0.00024	0.00000	0.00000	0.10847
292.5	0.05840	0.02630	0.00821	0.00121	0.00000	0.00000	0.09411
315.0	0.04102	0.01931	0.00591	0.00036	0.00000	0.00000	0.06660
337.5	0.02172	0.01569	0.00434	0.00022	0.00000	0.00000	0.04197
TOTAL	0.57518	0.34436	0.07542	0.00504	0.00000	0.00000	1.00000

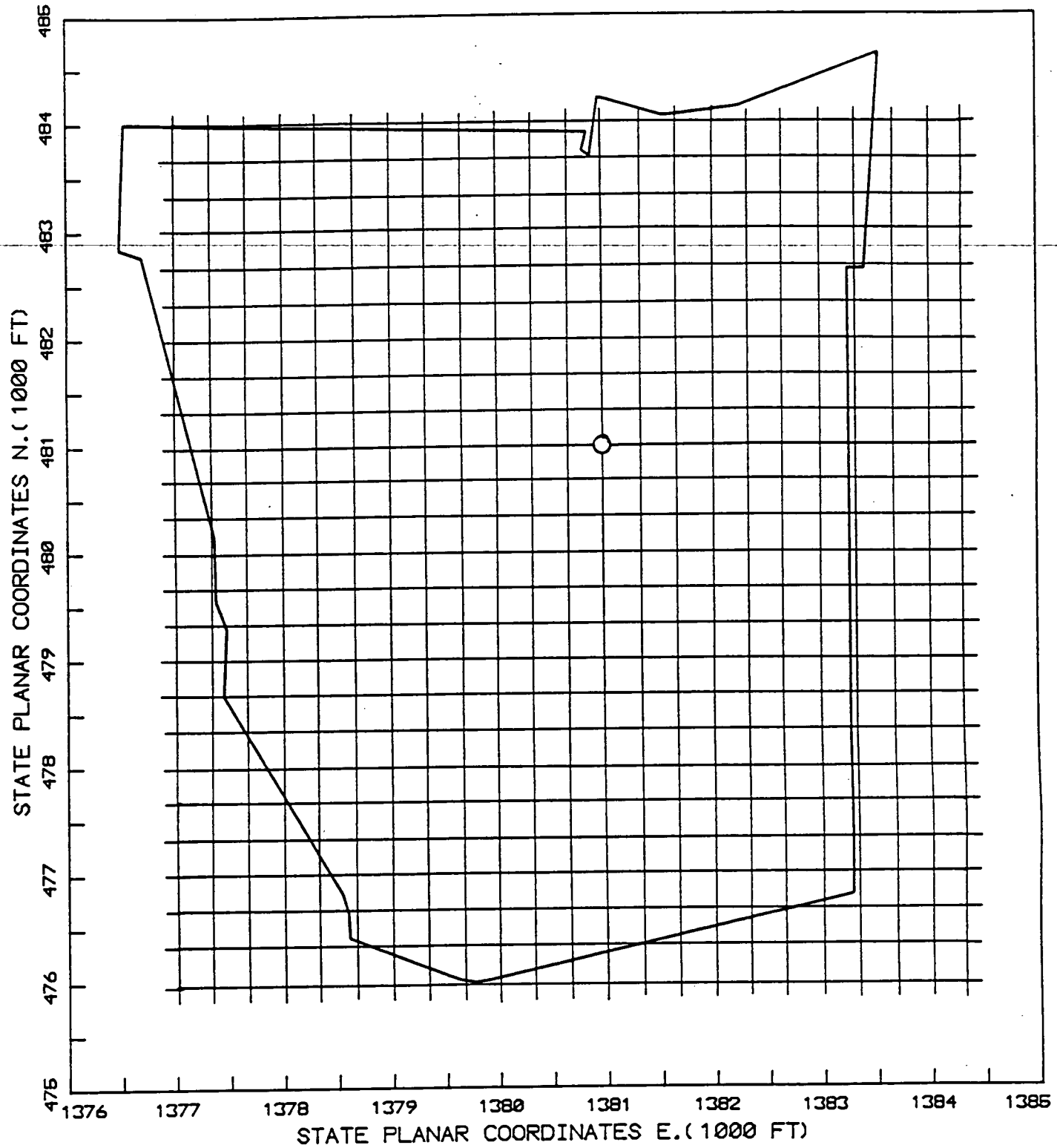

FIGURE Q.2-2 RECEPTOR GRID LAYOUT

Q.3.0 ASSUMPTIONS FOR DISPERSION MODELING

A knowledge of past operational practices at the FEMP is supplemented with environmental sampling to determine the sizes, locations, and contents of areas which might contribute to airborne contamination. Figure Q-3.1 indicates the areas selected for investigation. Currently, there are ten areas which have the potential to contribute contaminated dust and gases to the air on the FEMP property. The upper 95 percent confidence limit of the mean concentration of constituents for these areas (presented in Appendix R) are used as the ISCLT source terms to estimate the current exposures expected in air around the FEMP (Table Q.3-1).

It is conceivable that erosion of soil at the FEMP could uncover waste which is presently buried beneath protective caps. In addition, containers could fail, spilling their contents onto the soil surface. In both of these cases, additional sources of aerial emissions could be added to those sources already present. Since it is difficult to predict the extent of erosion or container failure over the next 1000 years, a scenario was constructed in which all caps are eroded, and all containers lose their integrity. These extremely conservative assumptions will provide an upper bound on the potential future exposures associated with contaminated dust and gases from the FEMP. During construction of this "cap failure" scenario, 27 areas of subsurface soils and wastes were identified (Figure Q.3-1). The upper 95 percent confidence limit on the mean concentration for constituents for these areas (presented in Appendix R) are used as the ISCLT source terms to estimate potential exposures in air around the FEMP (Table Q.3-2). The constituent concentrations in these subsoils are used as if they were surface soils (i.e., no caps).

Except for the surface of Waste Pit 6, all contaminated surfaces on the FEMP tract were assumed to be normally dry and subject to resuspension. To facilitate modeling, it was assumed that resuspension rates could be reasonably estimated by the methodology presented in EPA guidance for fugitive emissions. (EPA 1987a), using representative wind-speed data and other typical site data, namely:

- Silt content of surface materials = approximately 10 percent
- Number of dry days per year (rainfall <0.01 inches) = 240.

The equation also requires the percentage of time that wind speed one foot (0.3 m) above the ground surface exceeds 12 mph (19 km/hr). This was calculated from on-property meteorological data, using a wind power law (EPA 1987b) to adjust the observed speeds at 10-meter height to corresponding speeds at one foot (0.3 m).

An estimated resuspension rate of contaminated particles was calculated using the EPA methodology (EPA 1987a). The concentration of a specific contaminant in the particles was

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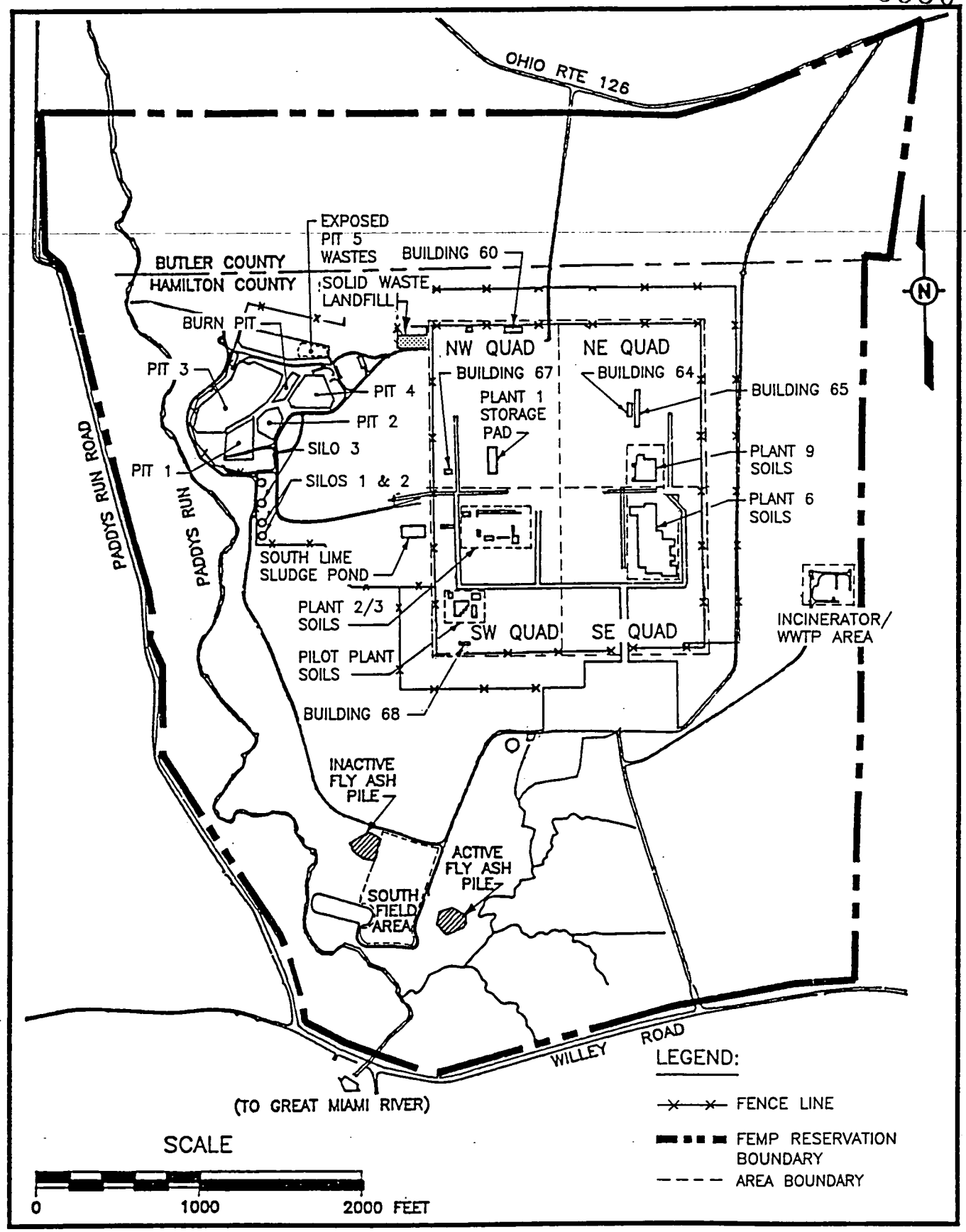

FIGURE Q.3-1 SOURCE TERMS USED TO MODEL THE POTENTIAL FOR AERIAL TRANSPORT OF CONTAMINANTS AT THE FEMP

SITE WIDE BASELINE RISK ASSESSMENT
313327-A-106/KNOX

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TABLE Q.3-1

CURRENT RADIOLOGICAL SOURCE TERM FOR FEMP AIR MODELING

Radionuclide	Waste Pit Area (pCi/g)	Pit 5 (pCi/g)	Active Flyash Pile (pCi/g)	Inactive Flyash Pile (pCi/g)	South Field (pCi/g)	Surface Soil in Production Area: NW Quad (pCi/g)	Surface Soil in Production Area: NE Quad (pCi/g)	Surface Soil in Production Area: SW Quad (pCi/g)	Surface Soil in Production Area: SE Quad (pCi/g)	Incin/ W. Water Area (pCi/g)
Cs-137	4.33E-01	2.34E+00	NA[b]	7.00E-01	4.66E-01	6.96E-01	5.11E-01	1.13E+00	2.86E+00	6.25E-01
Np-237	1.40E-01	1.94E+01	NA	NA	NA	NA	NA	NA	NA	NA
Pa-231	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pu-238	2.10E-01	3.64E+00	NA	NA	NA	NA	NA	2.95E+00	4.57E-01	NA
Pu-239/240	2.13E-01	9.72E+00	NA	NA	NA	NA	NA	1.12E+00	4.47E-01	4.38E-01
Ra-226	2.35E+00	1.19E+02	7.00E-01	3.49E+01	2.80E+01	5.07E+02	2.33E+00	1.63E+00	1.82E+00	2.23E+01
Ru-106	3.03E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sr-90	3.30E-01	1.00E+01	NA	NA	NA	6.16E-01	6.36E-01	1.03E+00	7.22E-01	1.76E+00
Tc-99	2.38E+00	1.84E+03	NA	NA	NA	8.27E-01	1.12E+00	3.80E+01	1.03E+00	2.61E+00
Th-230	1.58E+03	1.50E+04	NA	5.90E+01	1.28E+02	5.30E+02	8.36E+02	2.80E+02	1.80E+01	1.55E+02
Th-232[a]	2.86E+00	4.57E+01	1.05E+00	2.30E+00	1.89E+00	3.14E+01	2.70E+01	2.83E+02	3.52E+00	6.31E+00
U-234	2.09E+02	8.75E+02	NA	8.20E+01	5.19E+02	1.69E+03	1.46E+02	1.33E+04	5.96E+02	7.88E+03
U-235	2.43E+01	3.22E+01	NA	1.90E+00	3.43E+01	1.04E+02	4.95E+00	4.87E+02	3.53E+01	7.27E+02
U-238	2.67E+02	2.48E+02	2.80E+00	2.16E+01	1.38E+01	1.93E+03	7.78E+02	1.43E+04	7.04E+02	1.05E+04

[a] All Th-232 decay products assumed to be in equilibrium with Th-232
[b] NA indicates not applicable

TABLE Q.3-2

RADIOLOGICAL SOURCE TERM FOR FEMP AIR MODELING, ASSUMING ALL CAPS AND CONTAINERS FAIL

Radionuclide	Burn Pit (pCi/g)	Pit 1 (pCi/g)	Pit 2 (pCi/g)	Pit 3 (pCi/g)	Pit 4 (pCi/g)	Pit 5 (pCi/g)	Active Flyash Pile (pCi/g)	Inactive Flyash Pile (pCi/g)	So. Lime Sludge Pond (pCi/g)	South Field (pCi/g)	Solid Waste Landfill (pCi/g)
Am-241	NA[a]	NA	NA	4.91E+01	NA	NA	NA	NA	NA	NA	NA
Cs-137	NA	1.10E+00	2.43E+00	1.67E+00	NA	2.34E+00	NA	NA	3.43E-01	NA	NA
Np-237	4.50E-01	NA	NA	4.54E-01	3.70E-01	1.94E+01	NA	NA	NA	NA	NA
Pa-231	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pu-238	2.07E-01	NA	9.60E-02	2.42E-01	5.00E-01	3.64E+00	NA	NA	NA	NA	1.00E-01
Pu-239/240	1.87E-01	NA	2.37E-01	1.83E+00	3.66E-01	9.72E+00	NA	NA	NA	NA	NA
Ra-226	2.61E+00	6.52E+01	4.30E+02	4.28E+02	3.13E+01	1.19E+02	2.44E+00	2.53E+00	NA	2.30E+00	9.58E-01
Ru-106	NA	9.80E+00	2.19E+01	NA	1.94+01	NA	NA	NA	NA	3.42E+00	NA
Sr-90	NA	NA	NA	1.96E+00	NA	100E+01	2.00E+00	1.25E+00	NA	NA	1.13E+00
Tc-99	7.11E+01	4.99E+00	1.35E+02	2.19E+03	2.25E+02	1.84E+03	NA	NA	NA	NA	NA
Th-230	8.90E+01	2.75E+03	3.32E+03	1.73E+04	5.66E+02	1.50E+04	4.00E+00	6.85E+00	7.00E+00	1.90E+01	4.06E+00
Th-232	5.58E+00	2.19E+01	1.00E+02	2.39E+01	5.57E+01	4.57E+01	1.80E+00	2.10E+00	NA	4.58E+00	2.32E+00
U-233	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
U-234	2.52E+02	8.34E+02	4.18E+03	3.55E+02	1.75E+03	8.75E+02	4.70E+00	2.75E+01	3.10E+00	1.50E+01	2.80E+01
U-235	1.61E+01	9.13E+01	1.39E+03	7.48E+01	3.32E+02	3.22E+01	2.00E-01	1.21E+00	3.00E-01	8.00E-01	1.02E+00
U-238	1.80E+02	1.14E+03	6.10E+03	2.42E+02	4.60E+03	2.48E+02	5.34E+00	1.16E+01	4.18E+00	1.07E+01	1.44E+01

TABLE Q.3-2
(Continued)

Radionuclide	Silo 1 & 2 (pCi/g)	Silo 3 (pCi/g)	NW Quad (pCi/g)	NE Quad (pCi/g)	SW Quad (pCi/g)	SE Quad (pCi/g)	Pilot Plant (pCi/g)	Plant 6 (pCi/g)	Plant 9 (pCi/g)	Plant 2/3 (pCi/g)
Am-241	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cs-137	NA	NA	6.96E-01	5.11E-01	1.13E+00	2.86E+00	3.65E-01	NA	1.35E-01	1.61E-01
Np-237	NA	NA	NA	NA	NA	NA	NA	NA	4.16E-01	6.96E-01
Pa-231	2.89E+02	7.56E+02	NA	NA	NA	NA	NA	NA	NA	NA
Pu-238	NA	NA	NA	NA	2.95E+00	NA	6.64E-01	4.40E-01	NA	3.54E-01
Pu-239/240	NA	NA	NA	NA	1.12E+00	4.47E-01	4.84E-01	3.75E-01	NA	3.91E-01
Ra-226	1.40E+05	3.87E+03	5.07E+02	2.33E+00	1.63E+00	1.82E+00	1.10E+01	NA	NA	4.60E+00
Ru-106	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sr-90	NA	NA	6.16E-01	6.36E-01	1.03E+00	7.22E-01	5.15E-01	6.21E-01	7.73E-01	1.13E+00
Tc-99	NA	NA	8.27E-01	1.12E+00	3.80E+01	1.03E+00	2.48E+00	1.09E+00	1.44E+00	1.16E+00
Th-230	3.45E+04	5.38E+04	5.30E+02	8.36E+02	2.80E+02	1.80E+01	7.56E+00	2.31E+00	1.23E+01	3.07E+01
Th-232	4.35E+02	9.62E+02	3.14E+01	2.70E+01	2.83E+02	3.52E+00	2.80E+00	9.32E-01	1.23E+01	1.29E+00
U-233	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
U-234	9.34E+02	1.73E+03	1.69E+03	1.46E+02	1.33E+04	5.96E+02	1.37E+02	1.11E+03	8.50E+01	1.34E+03
U-235	4.91E+01	1.17E+02	1.04E+02	4.95E+00	4.87E+02	3.53E+01	1.73E+01	2.20E+00	3.62E+01	6.87E+01
U-238	8.54E+02	1.78E+03	1.93E+03	7.78E+02	1.43E+04	7.04E+02	2.70E+02	1.31E+03	7.63E+01	1.30E+03

TABLE Q.3-2
(Continued)

Radionuclide	Building 60 (pCi/g)	Building 64 (pCi/g)	Building 65 (pCi/g)	Building 67 (pCi/g)	Building 68 (pCi/g)	Plant 1 Pad (pCi/g)
Am-241	NA	NA	NA	NA	NA	NA
Cs-137	NA	NA	NA	NA	NA	NA
Np-237	NA	NA	NA	NA	NA	NA
Pa-231	NA	NA	NA	NA	NA	NA
Pu-238	NA	NA	NA	NA	NA	NA
Pu-239/240	NA	NA	NA	NA	NA	NA
Ra-226 + Pb-210	NA	NA	NA	NA	NA	NA
Ru-106	NA	NA	NA	NA	NA	NA
Sr-90	NA	NA	NA	NA	NA	NA
Tc-99	NA	NA	NA	NA	NA	NA
Th-230	2.46E+03	5.24E+03	1.18E+03	7.33E+02	6.68E+03	NA
Th-232	2.34E+04	5.76E+04	1.38E+04	5.86E+03	6.01E+04	NA
U-233	NA	NA	NA	7.33E+01	6.85E+04	NA
U-234	NA	NA	NA	NA	NA	4.36E+04
U-235	NA	NA	NA	NA	NA	1.91E+03
U-238	NA	NA	NA	NA	NA	4.09E+04

[a] NA indicates "Not Applicable".

assumed to be the same as its measured concentration in undisturbed surface layers of the contaminated area. Thus, emission rates of the contaminant were calculated for input into the ISCLT model. Since radon is not a resuspended contaminant it is not dependant upon a threshold wind speed. Radon emission rates for input into the ISCLT model were based on information from prior investigations. The estimated emission rates, shown in Table Q.3-3, were assumed to be constant.

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TABLE Q.3-3

ESTIMATED RADON EMISSION RATES
(picocuries per second)

Source	Cap Failure Scenario[a]	Current Scenario
Silo 1	1.7E+07[b]	4.4E+05[c]
Silo 2	1.7E+07[c]	4.4E+05[c]
Silo 3	4.8E+05[d]	1.2E+05[d]
Waste Pit 1	6.8E+04[e]	6.8E+04[e]
Waste Pit 2	2.6E+04[e]	2.6E+04[e]
Waste Pit 3	5.8E+04[e]	5.8E+04[e]

a Silo Caps Fail

b Reference: Assessment of Radiation Dose and Cancer Risk for Emissions from 1951 through 1984, page F-9 (IT 1989).

c The emission rate multiplied by the after/before ratio of "all four" monitored concentrations, minus background, appearing in Part I, Table 4.2.1-1.
Example: [(17.2E+06)*(1.22-0.63)]/(23.85-0.86) = 441,000 pCi/sec.

d Based on ratio of radium-226 in Silo 3 to radium-226 in Silos 1 and 2 (WMCO 1991), multiplied by the emission rate of Silos 1 and 2.
Example: (3.87E+03/1.40E+05)*17.2E+06 = 47.5E+04.

e Radon flux calculations and measurements performed by the FEMP.

Q.4.0 MODELING RESULTS

Under favorable wind conditions, resuspension can occur simultaneously from several contaminated areas on the FEMP tract. For example, 10 different areas are contaminated with known concentrations of Th-230. The amount of thorium resuspended from each area during the year depends on wind speed, area size, and the concentration of thorium in the surface layers. Using the procedures and assumptions described above, the annual average concentration of thorium at each of the 584 receptor locations was projected by the ISCLT model. Attachment Q-1 presents the model printout for current land-use conditions for Th-230. The receptor locations and concentrations are tabulated on pages 8 through 10 of the model printout. A plot of Th-230 concentration isopleths generated by these data is presented in Figure Q.4-1.

Additional runs of the ISCLT model generated concentrations of other resuspended contaminants of concern including radionuclide particles, radon gas, and inorganic compounds. In the printout of each run of the model, four concentrations of special interest were noted:

- Highest on-property concentration
- Highest off-property concentration
- Concentrations at the two nearest "sensitive receptor" sites:
  -Elda School in Ross, Ohio
  -Township School, located between Fernald and New Haven.

These concentrations are summarized in Tables Q.4-1 and Q.4-2, which represent present-day conditions. Concentrations representing cap failure conditions appear in Tables Q.4-3 and Q.4-4. In addition, Figures Q.4-2, Q.4-3, and Q.4-4 display the contaminant concentration isopleths under the current land-use scenario for U-234, U-238, and radon, respectively. Plots of predicted contaminant concentrations for the cap failure scenario have been generated including two thorium isotopes (Th-230 and Th-232), three uranium isotopes (U-233, U-234, and U238), and radon. They are presented in Figures Q.4-5 through Q.4-10.

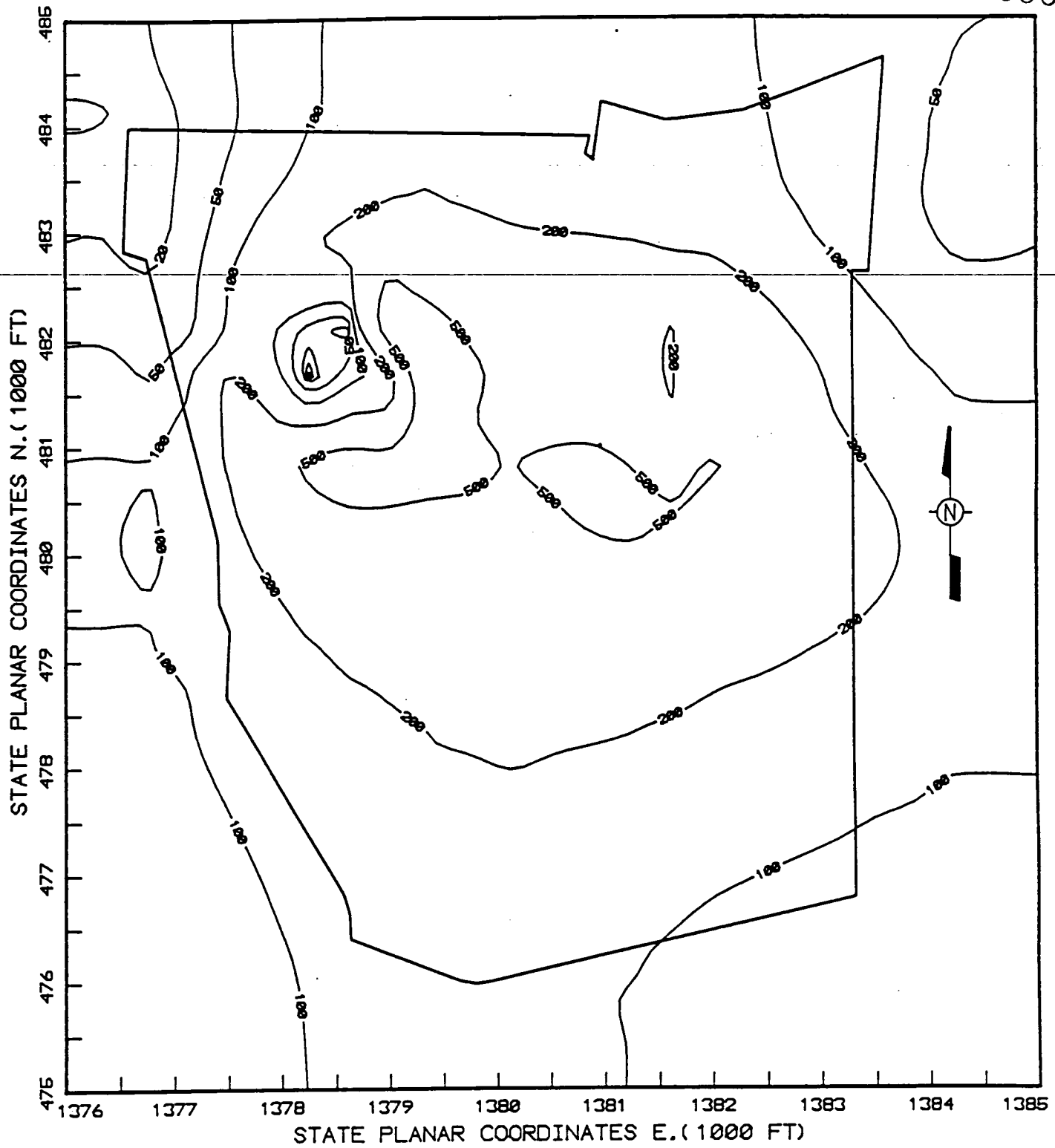

FIGURE Q.4-1 CURRENT CONCENTRATIONS OF TH-230
(ATTOCURIES PER CUBIC METER)

TABLE Q.4-1

ANNUAL AVERAGE CONCENTRATIONS OF AIRBORNE RADIONUCLIDES (CURRENT SCENARIO)

Radionuclide[a]	Maximum On-property			Maximum Off-property			Elda School[c]	Township School[d]
	Concentration (attocuries/m^3)[b]	Location		Concentration (attocuries/m^3)	Location		Concentration (attocuries/m^3)	Concentration (attocuries/m^3)
		W-E (m)	S-N (m)		W-E (m)	S-N (m)		
Th-230	8.3E+02	1379.4	481.7	2.0E+02	1383.3	480.9	4.6E+00	1.2E+01
Th-232	1.5E+02	1380.7	479.7	1.2E+01	1380.9	483.9	3.7E-01	5.8E-01
Ra-226	2.5E+02	1380.7	481.0	2.9E+01	1380.9	483.9	6.0E-01	1.2E+00
U-234	7.0E+03	1380.7	479.7	1.1E+03	1383.3	480.9	2.0E+01	2.7E+01
U-235	3.6E+02	1383.3	480.0	8.5E+01	1383.3	480.9	9.8E-01	1.2E+00
U-238	7.6E+03	1380.7	479.7	1.5E+03	1383.3	480.9	2.3E+01	3.0E+01
Radon	6.3E+08	1378.7	480.3	1.6E+07	1377.3	480.6	7.3E+05	3.6E+05

a Short-lived daughters (half-life ≤30 years) are assumed to be in equilibrium.
b 1×10^6 attocuries/m^3 = 1 pCi/m^3
c W-E (m) = 1394.2 and S-N (m) = 488.0
d W-E (m) = 1372.6 and S-N (m) = 472.2

TABLE Q.4-2

ANNUAL AVERAGE CONCENTRATIONS OF RESUSPENDED AIRBORNE INORGANICS (CURRENT SCENARIO)

Inorganic Contaminant	Maximum On-property			Maximum Off-property			Elda School[b]	Township School[c]
	Concentration (picograms/m^3)[a]	Location		Concentration (picograms/m^3)	Location		Concentration (picograms/m^3)	Concentration (picograms/m^3)
		W-E (m)	S-N (m)		W-E (m)	S-N (m)		
Arsenic	6.3E+01	1379.0	482.0	1.9E+00	1383.3	480.9	3.0E-02	5.0E-02
Barium	1.2E+03	1379.0	482.0	7.1E+01	1383.3	480.9	1.2E+00	2.1E+00
Beryllium	1.2E+00	1380.7	479.7	2.3E-01	1383.3	480.9	5.0E-03	6.0E-03
Cadmium	3.3E+00	1382.0	481.0	7.9E-01	1383.3	480.9	1.0E-02	1.0E-02
Chromium	7.7E+00	1379.0	482.0	4.0E-02	1378.5	477.4	7.0E-04	3.0E-03
Cobalt	1.0E+01	1380.7	481.0	1.2E+00	1380.9	483.9	2.0E-02	5.0E-02
Lead	1.7E+02	1380.7	479.7	2.3E+01	1383.3	480.9	5.5E-01	8.2E-01
Manganese	1.4E+02	1379.0	482.0	6.3E-01	1378.5	477.4	1.0E-02	5.0E-02
Mercury	5.3E-01	1380.7	479.7	7.0E-02	1383.3	480.9	2.0E-03	2.0E-03
Aroclor-1248	2.0E-02	1379.0	482.0	1.0E-04	1378.5	477.4	2.0E-06	9.0E-06
Aroclor-1254	1.3E+00	1380.7	481.0	2.4E-01	1383.3	480.9	5.0E-03	1.0E-02
Aroclor-1260	1.4E+00	1382.0	481.0	3.4E-01	1383.3	480.9	5.0E-03	7.0E-03
Benzo(a)pyrene	1.2E+01	1382.0	481.0	2.8E+00	1383.3	480.9	4.0E-02	5.0E-02

a 1×10^6 picograms/m^3 = 1 μg/m^3
b W-E (m) = 1394.2 and S-N (m) = 488.0
c W-E (m) = 1372.6 and S-N (m) = 472.2

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TABLE Q.4-3

ANNUAL AVERAGE CONCENTRATIONS OF AIRBORNE RADIONUCLIDES (CAP FAILURE SCENARIO)

Radionuclide[a]	Maximum On-property			Maximum Off-property			Elda School[c]	Township School[d]
	Concentration (attocuries/m^3)[b]	Location		Concentration (attocuries/m^3)[b]	Location		Concentration (attocuries/m^3)[b]	Concentration (attocuries/m^3)
		W-E (m)	S-N (m)		W-E (m)	S-N (m)		
Pa-231	3.1E+01	1378.7	480.7	5.0E-01	1378.5	477.4	4.6E-03	2.1E-02
Ra-226	7.6E+03	1378.7	480.3	1.5E+02	1378.5	477.4	2.0E+00	6.0E+00
Th-230	6.3E+03	1378.7	481.3	2.9E+02	1378.5	477.4	6.0E+00	2.2E+01
Th-232	1.1E+04	1381.7	481.3	2.3E+02	1383.3	480.9	2.0E+00	1.0E+00
U-233	3.1E+03	1380.0	479.4	1.1E+01	1378.5	477.4	3.0E-01	2.5E-02
U-234	8.4E+03	1380.3	480.7	6.5E+02	1380.9	483.9	1.8E+01	3.0E+01
U-235	3.8E+02	1380.3	480.7	2.9E+01	1380.9	483.9	1.0E+00	2.0E+00
U-238	8.6E+03	1380.3	480.7	7.2E+02	1380.9	483.9	2.1E+01	3.4E+01
Radon	2.5E+10	1378.4	480.3	1.8E+08	1383.3	480.9	2.4E+07	1.2E+07

a Short-lived daughters (half-life ≤30 years) are assumed to be in equilibrium.
b 1×10^6 attocuries/m^3 = 1 pCi/m^3
c W-E (m) = 1394.2 and S-N (m) = 488.0
d W-E (m) = 1372.6 and S-N (m) = 472.2

TABLE Q.4-4

ANNUAL AVERAGE CONCENTRATIONS OF RESUSPENDED AIRBORNE INORGANICS (CAP FAILURE SCENARIO)

Inorganic Contaminant	Maximum On-property			Maximum Off-property			Elda School[b]	Township School[c]
	Concentration (picograms/m^3)[a]	Location		Concentration (picograms/m^3)[a]	Location		Concentration (picograms/m^3)[a]	Concentration (picograms/m^3)[a]
		W-E (m)	S-N (m)		W-E (m)	S-N (m)		
Arsenic	6.8E+02	1378.4	481.3	3.1E+01	1377.3	480.6	3.8E-01	1.8E+00
Barium	3.2E+03	1379.0	481.7	1.2E+02	1377.3	480.6	2.0E+00	8.3E+00
Chromium	4.1E+01	1378.4	481.3	1.8E+00	1377.3	480.6	2.0E-02	1.2E-01
Cobalt	1.2E+02	1378.4	480.7	3.1E+00	1378.5	477.4	4.0E-02	1.5E-01
Lead	2.9E+03	1378.4	480.3	5.7E+01	1378.5	477.4	5.8E-01	2.2E+00
Manganese	1.8E+03	1379.0	481.7	6.4E+01	1378.5	477.4	1.2E+00	5.0E+00

a 1×10^6 picograms/m^3 = 1 μg/m^3
b W-E (m) = 1394.2 and S-N (m) = 488.0
c W-E (m) = 1372.6 and S-N (m) = 472.2

3580

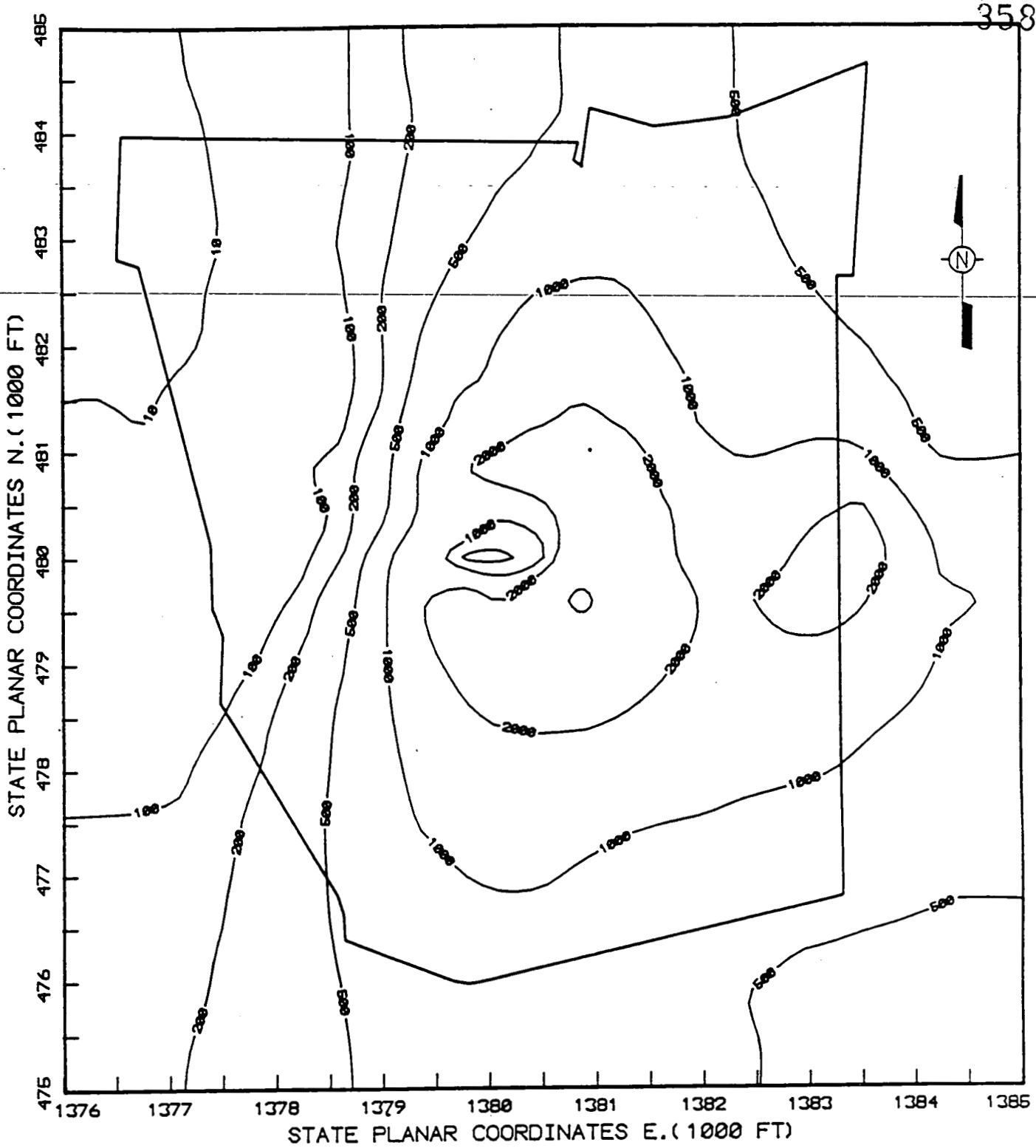

FIGURE Q.4-2 CURRENT CONCENTRATIONS OF U-234
(ATTOCURIES PER CUBIC METER)

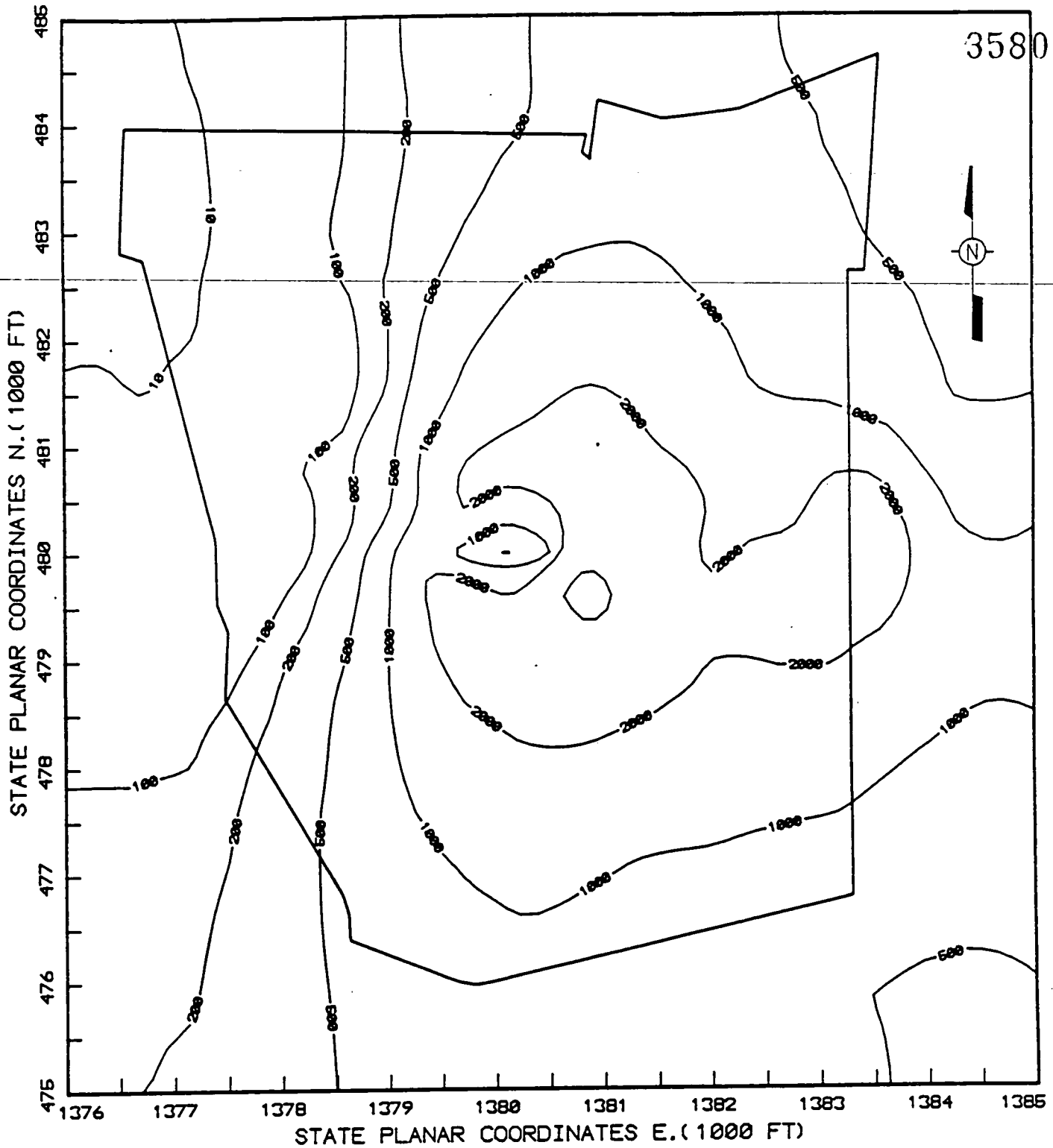

FIGURE Q.4–3 CURRENT CONCENTRATIONS OF U–238
(ATTOCURIES PER CUBIC METER)

229

3580

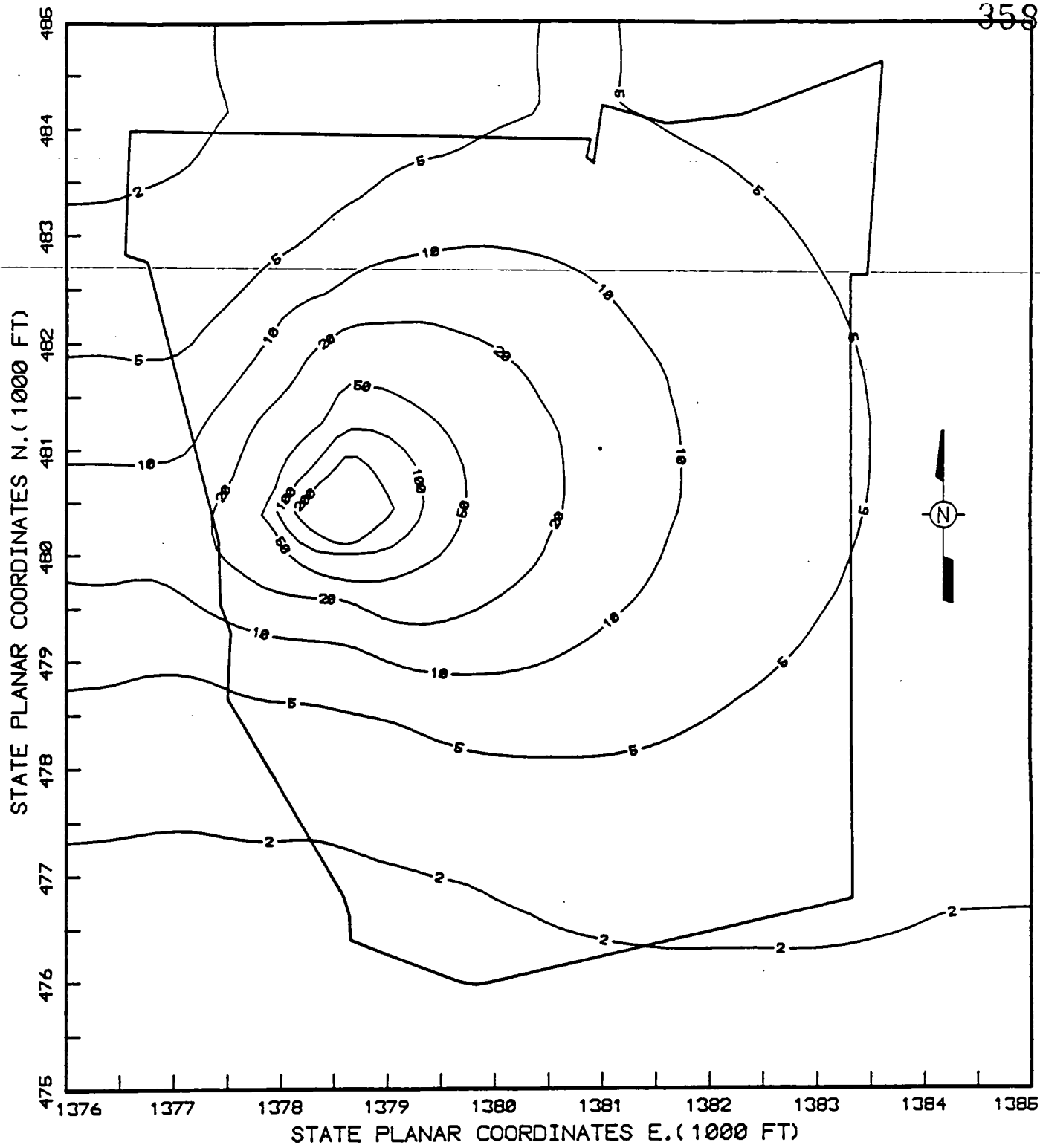

FIGURE Q.4–4 CURRENT CONCENTRATIONS OF RADON
(PICOCURIES PER CUBIC METER)

230

KNOX/SWCR/AC/3-5/SWCRAPPQ.TXT/07-21-92

3580

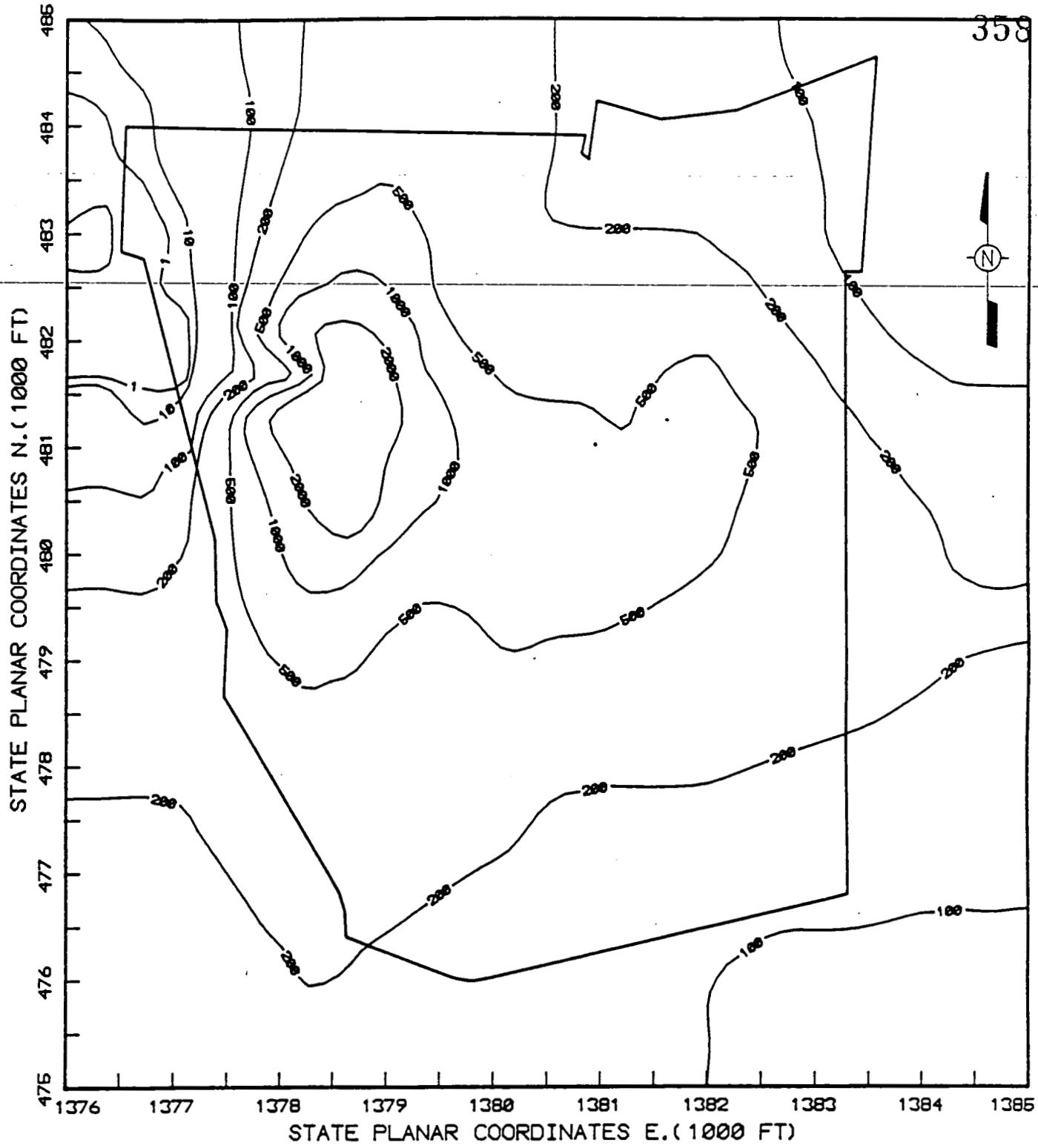

FIGURE Q.4-5 CONCENTRATIONS OF TH-230, ASSUMING ALL CAPS FAIL
(ATTOCURIES PER CUBIC METER)

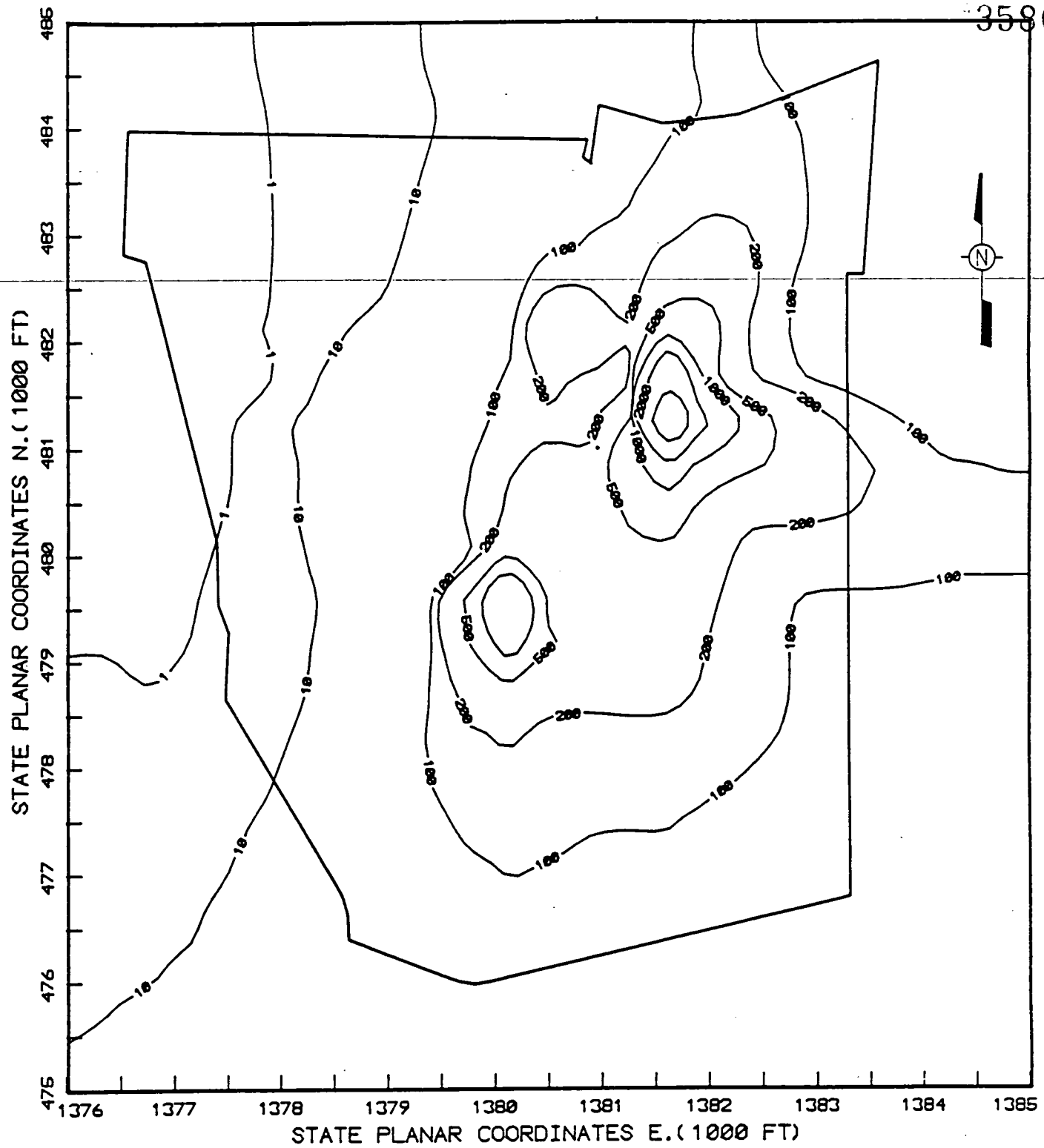

FIGURE Q.4-6 CONCENTRATIONS OF TH-232, ASSUMING ALL CAPS FAIL (ATTOCURIES PER CUBIC METER)

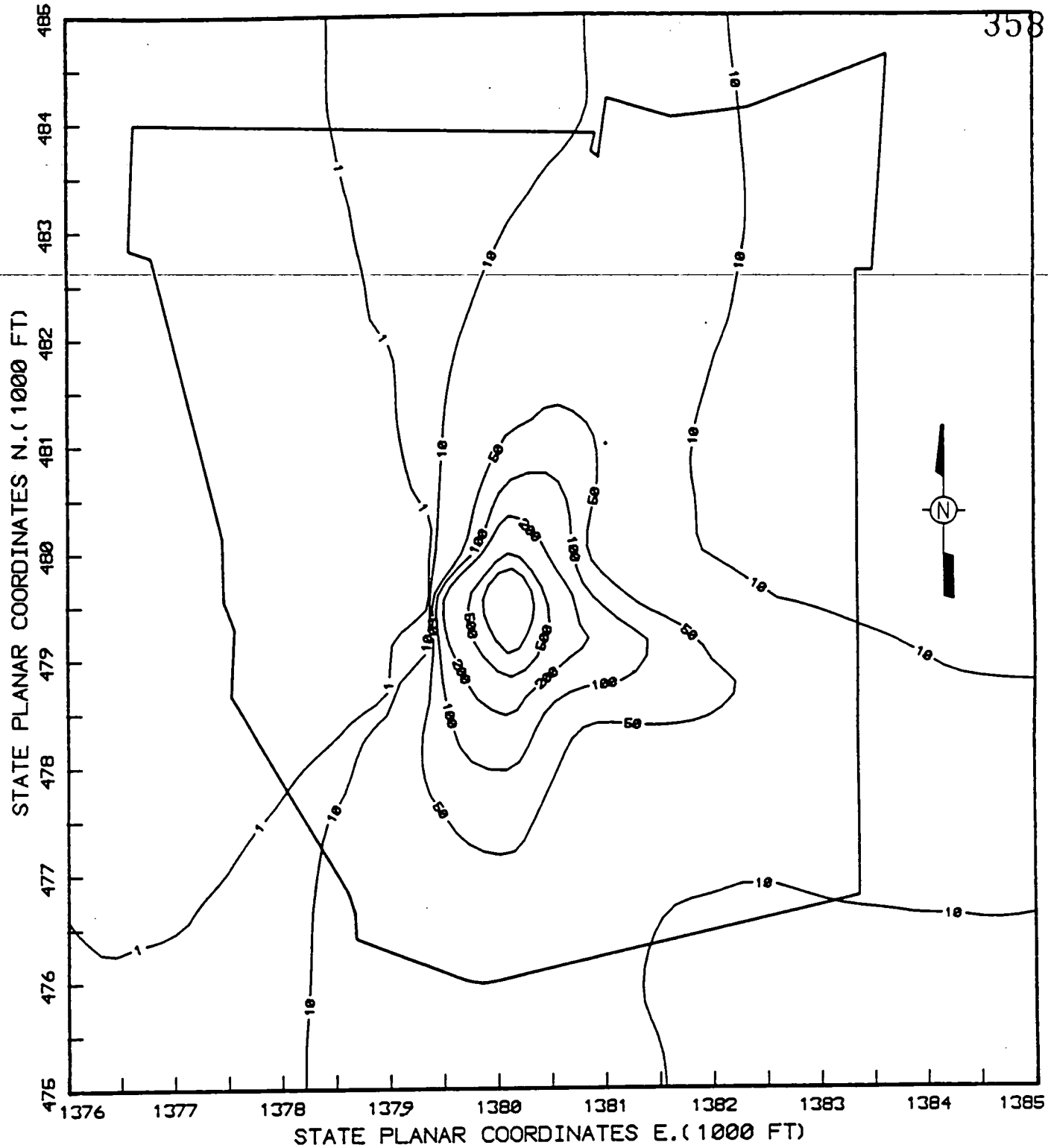

FIGURE Q.4-7 CONCENTRATIONS OF U-233, ASSUMING ALL CAPS FAIL (ATTOCURIES PER CUBIC METER)

3580

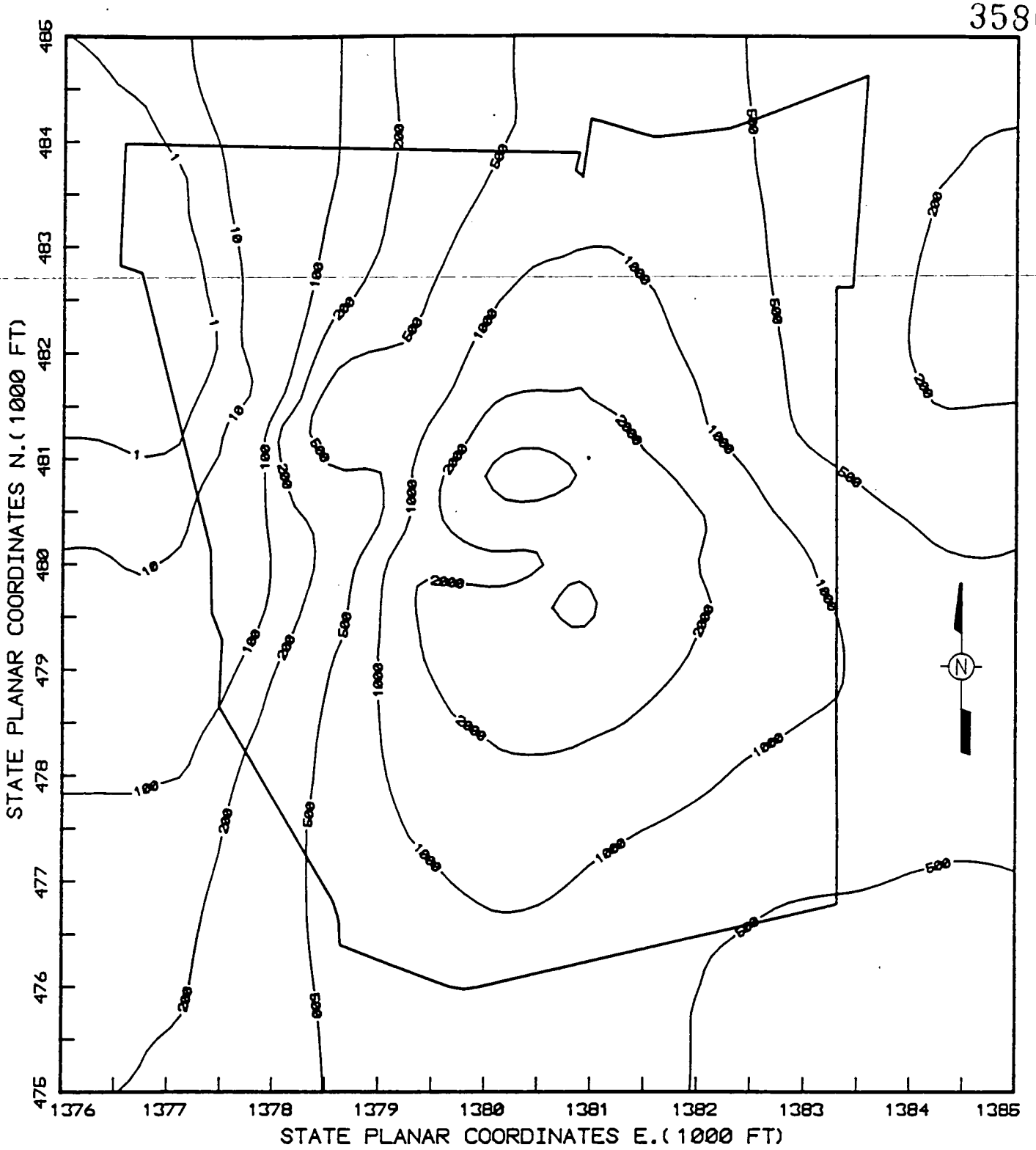

FIGURE Q.4-8 CONCENTRATIONS OF U-234, ASSUMING ALL CAPS FAIL (ATTOCURIES PER CUBIC METER)

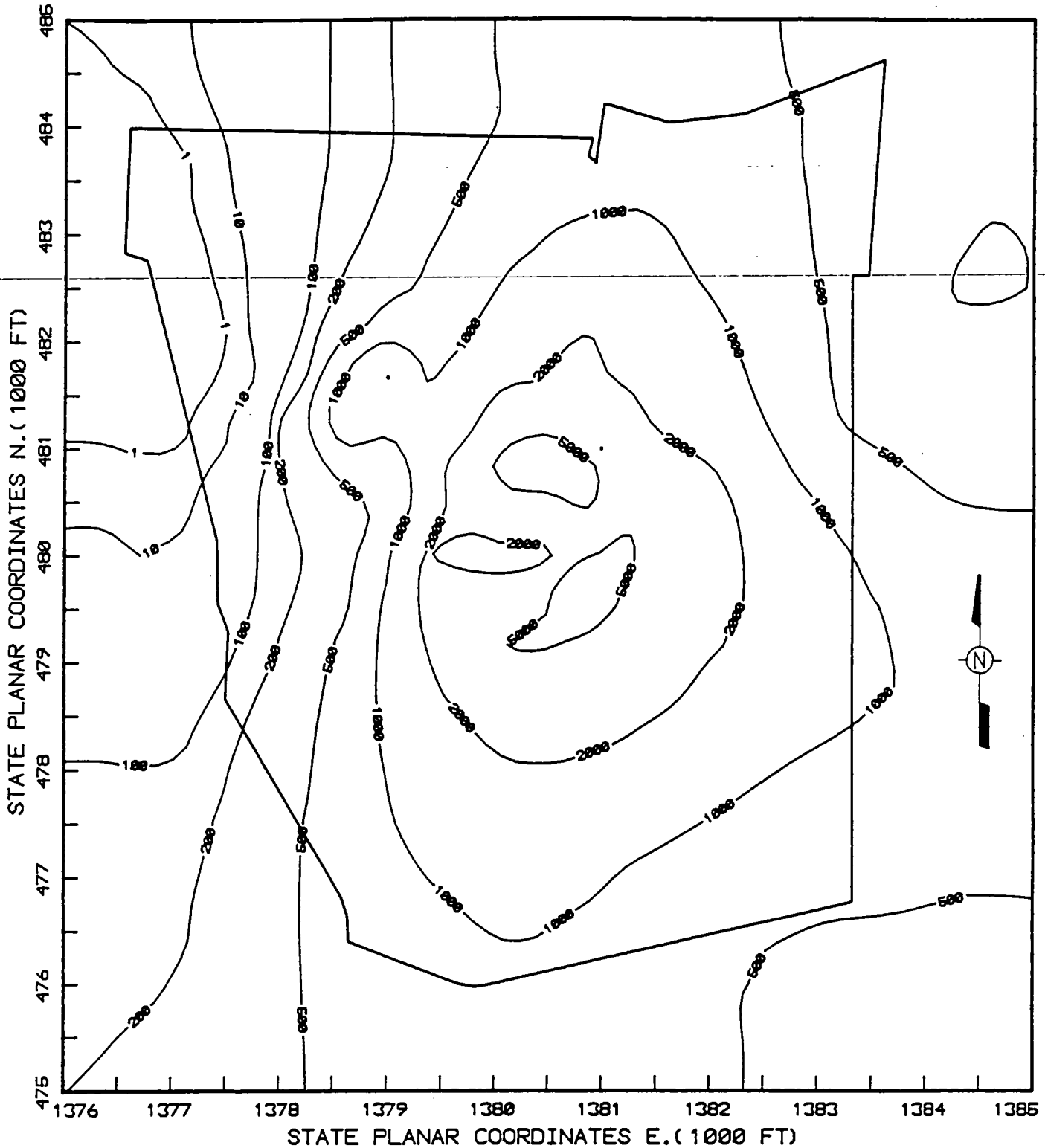

FIGURE Q.4-9 CONCENTRATIONS OF U-238, ASSUMING ALL CAPS FAIL (ATTOCURIES PER CUBIC METER)

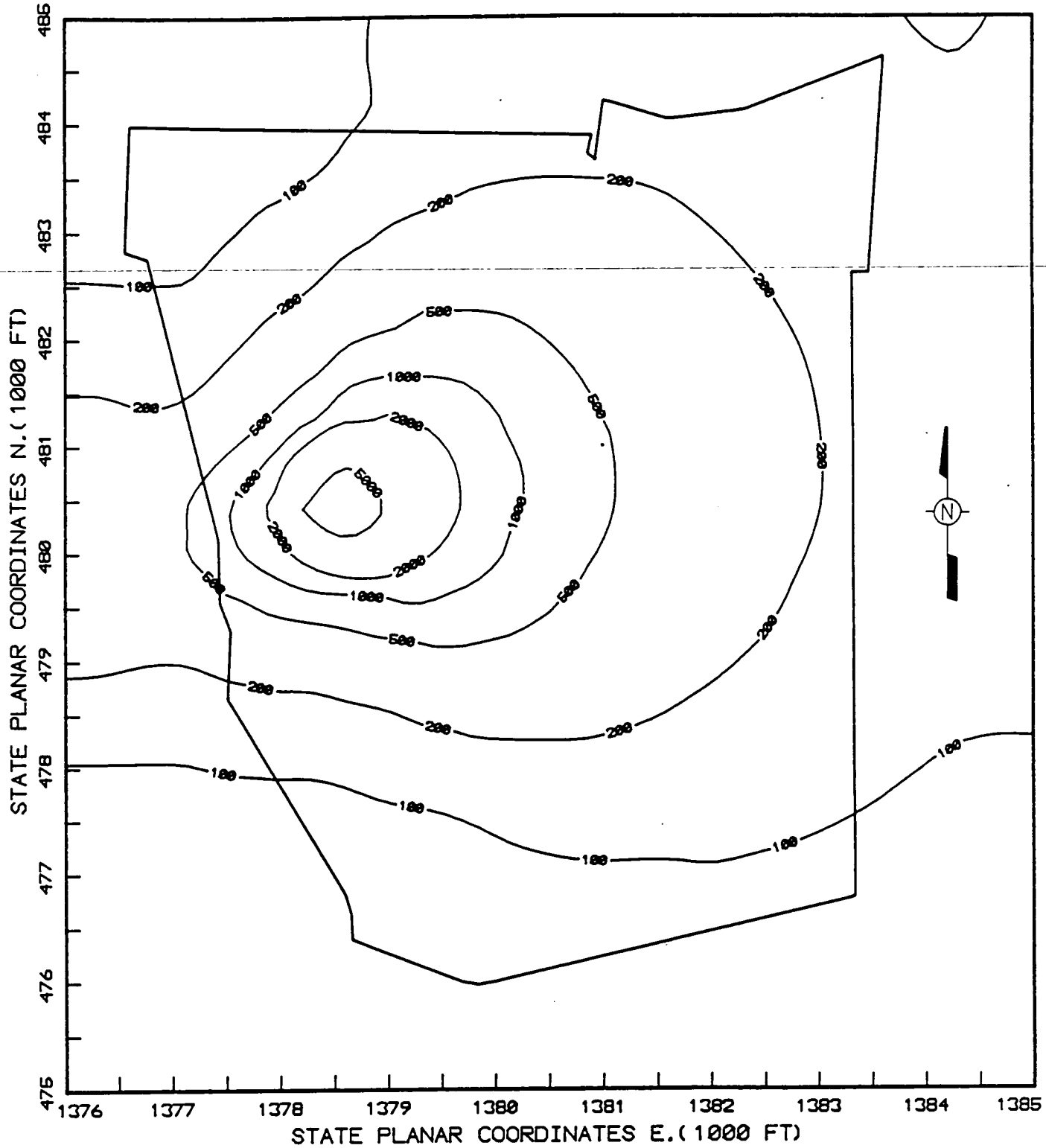

FIGURE Q.4-10 CONCENTRATIONS OF RADON, ASSUMING ALL CAPS FAIL (ATTOCURIES PER CUBIC METER)

REFERENCES

U.S. Environmental Protection Agency, 1987a, "A Method for Estimating Fugitive Particulate Emissions From Hazardous Waste Sites," EPA/600/2-87/066, EPA, Office of Research and Development, Cincinnati, OH.

U.S. Environmental Protection Agency, 1987b, "Industrial Source Complex (ISC) Model User's Guide - Second Edition (Revised)," EPA-450/4-88-002a, EPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC.

International Technology Corporation, 1989, "Assessment of Radiation Dose and Cancer Risk for Emissions from 1951 Through 1984, Feed Materials Production Center, Fernald, Ohio," prepared for U.S. DOE, Oak Ridge Operations Office, Oak Ridge, TN.

Westinghouse Materials Company of Ohio, 1991, "Feed Materials Production Center, Annual Environmental Report for Calendar Year 1990," FMPC-2245, WMCO, Cincinnati, OH, prepared for U.S. Dept. of Energy, Oak Ridge Operations Office, Oak Ridge, TN.

ATTACHMENT Q.I: EXAMPLE OF ISCLT MODEL PRINTOUT

- ISCLT INPUT DATA -

3580

NUMBER OF SOURCES = 10
NUMBER OF X AXIS GRID SYSTEM POINTS = 23
NUMBER OF Y AXIS GRID SYSTEM POINTS = 25
NUMBER OF SPECIAL POINTS = 9
NUMBER OF SEASONS = 1
NUMBER OF WIND SPEED CLASSES = 6
NUMBER OF STABILITY CLASSES = 6
NUMBER OF WIND DIRECTION CLASSES = 16
FILE NUMBER OF DATA FILE USED FOR REPORTS = 1
THE PROGRAM IS RUN IN RURAL MODE
CONCENTRATION (DEPOSITION) UNITS CONVERSION FACTOR =0.10000000E+07
ACCELERATION OF GRAVITY (METERS/SEC**2) = 9.800
HEIGHT OF MEASUREMENT OF WIND SPEED (METERS) = 10.000
CORRECTION ANGLE FOR GRID SYSTEM VERSUS DIRECTION DATA NORTH (DEGREES) = 0.000
DECAY COEFFICIENT =0.00000000E+00
PROGRAM OPTION SWITCHES = 1, 1, 1, 0, 0, 3, 2, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 1, 0,
ALL SOURCES ARE USED TO FORM SOURCE COMBINATION 1
DISTANCE X AXIS GRID SYSTEM POINTS (METERS)= -1200.00, -1100.00, -1000.00, -900.00, -800.00, -700.00,
-600.00, -500.00, -400.00, -300.00, -200.00, -100.00, 0.00, 100.00, 200.00, 300.00,
400.00, 500.00, 600.00, 700.00, 800.00, 900.00, 1000.00,
DISTANCE X SPECIAL DISCRETE POINTS (METERS)= -28.35, 783.95, 708.36, 651.66, -774.50, -1114.65,
-1322.53, 4023.06, -2560.02,
DISTANCE Y AXIS GRID SYSTEM POINTS (METERS)= -1500.00, -1400.00, -1300.00, -1200.00, -1100.00, -1000.00,
-900.00, -800.00, -700.00, -600.00, -500.00, -400.00, -300.00, -200.00, -100.00, 0.00,
100.00, 200.00, 300.00, 400.00, 500.00, 600.00, 700.00, 800.00, 900.00,
DISTANCE Y SPECIAL DISCRETE POINTS (METERS)= 878.43, 1095.76, -18.90, -1275.28, -1105.20, -122.83,
906.78, 2140.00, -2681.94,

- AMBIENT AIR TEMPERATURE (DEGREES KELVIN) -

	STABILITY CATEGORY 1	STABILITY CATEGORY 2	STABILITY CATEGORY 3	STABILITY CATEGORY 4	STABILITY CATEGORY 5	STABILITY CATEGORY 6
SEASON 1	290.8300	290.8300	290.8300	285.2200	279.5600	279.5600

- MIXING LAYER HEIGHT (METERS) -

SEASON 1

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
TABILITY CATEGORY 1	0.207600E+04	0.207600E+04	0.207600E+04	0.207600E+04	0.207600E+04	0.207600E+04
TABILITY CATEGORY 2	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04
TABILITY CATEGORY 3	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04
TABILITY CATEGORY 4	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04	0.138400E+04
TABILITY CATEGORY 5	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05
TABILITY CATEGORY 6	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05	0.100000E+05

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- ISCLT INPUT DATA (CONT.) -

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- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 1

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.0000MPS)	WIND SPEED CATEGORY 2 (3.0000MPS)	WIND SPEED CATEGORY 3 (5.0000MPS)	WIND SPEED CATEGORY 4 (7.0000MPS)	WIND SPEED CATEGORY 5 (9.0000MPS)	WIND SPEED CATEGORY 6 (10.0000MPS)
0.000	0.00000000	0.00048299	0.00084498	0.00000000	0.00000000	0.00000000
22.500	0.00000000	0.00036199	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00012100	0.00096498	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00012100	0.00241295	0.00012100	0.00000000	0.00000000	0.00000000
90.000	0.00000000	0.00108598	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00012100	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.00000000	0.00180997	0.00096498	0.00000000	0.00000000	0.00000000
225.000	0.00012100	0.00361993	0.00132697	0.00012100	0.00000000	0.00000000
247.500	0.00000000	0.00506790	0.00036199	0.00000000	0.00000000	0.00000000
270.000	0.00012100	0.00301594	0.00096498	0.00012100	0.00000000	0.00000000
292.500	0.00024100	0.00096498	0.00024100	0.00036199	0.00000000	0.00000000
315.000	0.00072399	0.00084498	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00012100	0.00072399	0.00072399	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 2

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.0000MPS)	WIND SPEED CATEGORY 2 (3.0000MPS)	WIND SPEED CATEGORY 3 (5.0000MPS)	WIND SPEED CATEGORY 4 (7.0000MPS)	WIND SPEED CATEGORY 5 (9.0000MPS)	WIND SPEED CATEGORY 6 (10.0000MPS)
0.000	0.00012100	0.00084498	0.00096498	0.00024100	0.00000000	0.00000000
22.500	0.00012100	0.00036199	0.00012100	0.00000000	0.00000000	0.00000000
45.000	0.00036199	0.00060299	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00072399	0.00229196	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00072399	0.00024100	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00012100	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00000000	0.00012100	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00024100	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00000000	0.00036199	0.00012100	0.00000000	0.00000000	0.00000000
202.500	0.00036199	0.00217196	0.00036199	0.00000000	0.00000000	0.00000000
225.000	0.00084498	0.00241295	0.00108598	0.00012100	0.00000000	0.00000000
247.500	0.00024100	0.00373993	0.00060299	0.00000000	0.00000000	0.00000000
270.000	0.00072399	0.00156897	0.00024100	0.00000000	0.00000000	0.00000000
292.500	0.00060299	0.00048299	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.00036199	0.00060299	0.00012100	0.00000000	0.00000000	0.00000000
337.500	0.00036199	0.00084498	0.00036199	0.00000000	0.00000000	0.00000000

- ISCLT INPUT DATA (CONT.) -

3580

- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 3

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.0000MPS)	WIND SPEED CATEGORY 2 (3.0000MPS)	WIND SPEED CATEGORY 3 (5.0000MPS)	WIND SPEED CATEGORY 4 (7.0000MPS)	WIND SPEED CATEGORY 5 (9.0000MPS)	WIND SPEED CATEGORY 6 (10.0000MPS)
0.000	0.00024100	0.00156897	0.00072399	0.00012100	0.00000000	0.00000000
22.500	0.00048299	0.00108598	0.00024100	0.00012100	0.00000000	0.00000000
45.000	0.00060299	0.00193096	0.00084498	0.00000000	0.00000000	0.00000000
67.500	0.00193096	0.00168897	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00180997	0.00048299	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00060299	0.00048299	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00048299	0.00084498	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00000000	0.00036199	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00012100	0.00132697	0.00012100	0.00000000	0.00000000	0.00000000
202.500	0.00060299	0.00229196	0.00048299	0.00000000	0.00000000	0.00000000
225.000	0.00156897	0.00410192	0.00060299	0.00000000	0.00000000	0.00000000
247.500	0.00180997	0.00277495	0.00060299	0.00000000	0.00000000	0.00000000
270.000	0.00060299	0.00180997	0.00060299	0.00000000	0.00000000	0.00000000
292.500	0.00036199	0.00156897	0.00036199	0.00000000	0.00000000	0.00000000
315.000	0.00048299	0.00132697	0.00048299	0.00000000	0.00000000	0.00000000
337.500	0.00036199	0.00144797	0.00036199	0.00000000	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 4

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.0000MPS)	WIND SPEED CATEGORY 2 (3.0000MPS)	WIND SPEED CATEGORY 3 (5.0000MPS)	WIND SPEED CATEGORY 4 (7.0000MPS)	WIND SPEED CATEGORY 5 (9.0000MPS)	WIND SPEED CATEGORY 6 (10.0000MPS)
0.000	0.00470591	0.01677068	0.00675687	0.00084498	0.00000000	0.00000000
22.500	0.00784285	0.01918364	0.00591189	0.00012100	0.00000000	0.00000000
45.000	0.00989381	0.02002862	0.00337794	0.00000000	0.00000000	0.00000000
67.500	0.01182377	0.02304456	0.00241295	0.00000000	0.00000000	0.00000000
90.000	0.00844584	0.00518790	0.00012100	0.00000000	0.00000000	0.00000000
112.500	0.00615288	0.00180997	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00458491	0.00205096	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00386093	0.00180997	0.00036199	0.00000000	0.00000000	0.00000000
180.000	0.00554989	0.00748086	0.00120698	0.00012100	0.00000000	0.00000000
202.500	0.01013481	0.01459872	0.00398192	0.00024100	0.00000000	0.00000000
225.000	0.01351374	0.01556470	0.00265395	0.00012100	0.00000000	0.00000000
247.500	0.01194477	0.00953182	0.00361993	0.00012100	0.00000000	0.00000000
270.000	0.00929082	0.00916983	0.00241295	0.00012100	0.00000000	0.00000000
292.500	0.00494691	0.01109979	0.00434392	0.00048299	0.00000000	0.00000000
315.000	0.00663587	0.01073780	0.00458491	0.00036199	0.00000000	0.00000000
337.500	0.00506790	0.00965282	0.00217196	0.00012100	0.00000000	0.00000000

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- ISCLT INPUT DATA (CONT.) -

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- FREQUENCY OF OCCURRENCE OF WIND SPEED, DIRECTION AND STABILITY -

SEASON 1

STABILITY CATEGORY 5

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.0000MPS)	WIND SPEED CATEGORY 2 (3.0000MPS)	WIND SPEED CATEGORY 3 (5.0000MPS)	WIND SPEED CATEGORY 4 (7.0000MPS)	WIND SPEED CATEGORY 5 (9.0000MPS)	WIND SPEED CATEGORY 6 (10.0000MPS)
0.000	0.00603289	0.00470591	0.00012100	0.00000000	0.00000000	0.00000000
22.500	0.00506790	0.00325794	0.00012100	0.00024100	0.00000000	0.00000000
45.000	0.00591189	0.00229196	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.01339274	0.00506790	0.00048299	0.00000000	0.00000000	0.00000000
90.000	0.00892883	0.00108598	0.00012100	0.00000000	0.00000000	0.00000000
112.500	0.00337794	0.00012100	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00518790	0.00060299	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00663587	0.00349893	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00868683	0.00579189	0.00108598	0.00012100	0.00000000	0.00000000
202.500	0.01737467	0.01363374	0.00434392	0.00036199	0.00000000	0.00000000
225.000	0.02811246	0.02159659	0.00289594	0.00000000	0.00000000	0.00000000
247.500	0.02606150	0.00772185	0.00072399	0.00000000	0.00000000	0.00000000
270.000	0.01701268	0.01109979	0.00193096	0.00000000	0.00000000	0.00000000
292.500	0.01339274	0.01218577	0.00325794	0.00036199	0.00000000	0.00000000
315.000	0.01037580	0.00579189	0.00072399	0.00000000	0.00000000	0.00000000
337.500	0.00723886	0.00289594	0.00072399	0.00012100	0.00000000	0.00000000

SEASON 1

STABILITY CATEGORY 6

DIRECTION (DEGREES)	WIND SPEED CATEGORY 1 (1.0000MPS)	WIND SPEED CATEGORY 2 (3.0000MPS)	WIND SPEED CATEGORY 3 (5.0000MPS)	WIND SPEED CATEGORY 4 (7.0000MPS)	WIND SPEED CATEGORY 5 (9.0000MPS)	WIND SPEED CATEGORY 6 (10.0000MPS)
0.000	0.00192996	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
22.500	0.00301694	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
45.000	0.00349893	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
67.500	0.00542890	0.00048299	0.00000000	0.00000000	0.00000000	0.00000000
90.000	0.00989381	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
112.500	0.00820484	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
135.000	0.00518790	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
157.500	0.00615388	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
180.000	0.00723886	0.00012100	0.00000000	0.00000000	0.00000000	0.00000000
202.500	0.01303075	0.00024100	0.00000000	0.00000000	0.00000000	0.00000000
225.000	0.02606150	0.00060299	0.00000000	0.00000000	0.00000000	0.00000000
247.500	0.04138421	0.00036199	0.00000000	0.00000000	0.00000000	0.00000000
270.000	0.04741709	0.00024100	0.00000000	0.00000000	0.00000000	0.00000000
292.500	0.03885026	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
315.000	0.02244257	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
337.500	0.00856684	0.00012100	0.00000000	0.00000000	0.00000000	0.00000000

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- ISCLT INPUT DATA (CONT.) -

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- VERTICAL POTENTIAL TEMPERATURE GRADIENT (DEGREES KELVIN/METER) -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+00
STABILITY CATEGORY 2	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+00
STABILITY CATEGORY 3	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+00
STABILITY CATEGORY 4	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+00
STABILITY CATEGORY 5	0.200000E-010	0.200000E-010	0.200000E-010	0.200000E-010	0.200000E-010	0.200000E-01
STABILITY CATEGORY 6	0.350000E-010	0.350000E-010	0.350000E-010	0.350000E-010	0.350000E-010	0.350000E-01

- WIND PROFILE POWER LAW EXPONENTS -

	WIND SPEED CATEGORY 1	WIND SPEED CATEGORY 2	WIND SPEED CATEGORY 3	WIND SPEED CATEGORY 4	WIND SPEED CATEGORY 5	WIND SPEED CATEGORY 6
STABILITY CATEGORY 1	0.700000E-010	0.700000E-010	0.700000E-010	0.700000E-010	0.700000E-010	0.700000E-01
STABILITY CATEGORY 2	0.700000E-010	0.700000E-010	0.700000E-010	0.700000E-010	0.700000E-010	0.700000E-01
STABILITY CATEGORY 3	0.100000E+000	0.100000E+000	0.100000E+000	0.100000E+000	0.100000E+000	0.100000E+00
STABILITY CATEGORY 4	0.150000E+000	0.150000E+000	0.150000E+000	0.150000E+000	0.150000E+000	0.150000E+00
STABILITY CATEGORY 5	0.350000E+000	0.350000E+000	0.350000E+000	0.350000E+000	0.350000E+000	0.350000E+00
STABILITY CATEGORY 6	0.550000E+000	0.550000E+000	0.550000E+000	0.550000E+000	0.550000E+000	0.550000E+00

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- SOURCE INPUT DATA -

A R D	A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE / ELEV- / ATION / (M) /	- SOURCE DETAILS DEPENDING ON TYPE -
X		4	AREA	-402.64	-447.45	0.00	0.00	WIDTH OF AREA (M)= 345.34

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	2.80000E-02	
5	0.00000E+00	
6	0.00000E+00	

X	5	AREA	-81.99	-469.70	0.00	0.00	WIDTH OF AREA (M)= 389.53

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	1.80000E-03	
5	0.00000E+00	
6	0.00000E+00	

X	6	AREA	-406.60	-47.55	0.00	0.00	WIDTH OF AREA (M)= 352.96

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	5.30000E-02	
5	0.00000E+00	
6	0.00000E+00	

X	7	AREA	-86.26	-70.10	0.00	0.00	WIDTH OF AREA (M)= 398.07

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	8.36000E-02	
5	0.00000E+00	
6	0.00000E+00	

X	18	AREA	526.39	-342.90	0.00	0.00	WIDTH OF AREA (M)= 183.79

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	1.55000E-02	
5	0.00000E+00	
6	0.00000E+00	

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- SOURCE INPUT DATA (CONT.) -

A R D	A P E	SOURCE NUMBER	SOURCE TYPE	X COORDINATE (M)	Y COORDINATE (M)	EMISSION HEIGHT (M)	BASE / ELEV- / ATION / (M) /	- SOURCE DETAILS DEPENDING ON TYPE -
X		19	AREA	-968.04	1.22	0.00	0.00	WIDTH OF AREA (M)= 414.83

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	1.58000E-01	
5	0.00000E+00	
6	0.00000E+00	

X		24	AREA	-648.31	324.61	0.00	0.00	WIDTH OF AREA (M)= 21.64

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	1.50000E+00	
5	0.00000E+00	
6	0.00000E+00	

X		26	AREA	-498.96	-1079.91	0.00	0.00	WIDTH OF AREA (M)= 149.96

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	1.28000E-02	
5	0.00000E+00	
6	0.00000E+00	

X		27	AREA	-380.09	-1160.98	0.00	0.00	WIDTH OF AREA (M)= 93.27

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	0.00000E+00	
5	0.00000E+00	
6	0.00000E+00	

X		28	AREA	-664.77	-995.17	0.00	0.00	WIDTH OF AREA (M)= 110.34

- SOURCE STRENGTHS (PICOCURIES PER SECOND PER SQUARE METER) -

SPEED CATEGORY	SEASON 1	SEASON
1	0.00000E+00	
2	0.00000E+00	
3	0.00000E+00	
4	5.90000E-03	
5	0.00000E+00	
6	0.00000E+00	

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** ANNUAL GROUND LEVEL CONCENTRATION (ATTOCURIES PER CUBIC METER) FROM ALL SOURCES COMBINED **

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

Y AXIS (DISTANCE , METERS)	-1200.000	-1100.000	-1000.000	-900.000	-800.000	-700.000	-600.000	-500.000	-400.000
	- CONCENTRATION -								
900.000	16.771310	38.058530	58.446480	80.828950	104.909200	121.125100	137.108300	154.886300	153.674000
800.000	17.650090	43.273110	67.818920	95.915340	123.470400	145.110400	162.979800	179.337000	168.765400
700.000	18.769490	50.291360	83.182330	116.776200	151.861900	179.273700	203.096300	209.696400	188.128700
600.000	19.935050	59.462100	104.294200	151.394600	189.867400	230.664100	263.596600	281.095800	238.265300
500.000	21.091050	71.828540	134.428500	183.208900	242.017500	295.665000	474.484700	373.043000	310.154900
400.000	22.173550	89.272830	149.127500	238.635600	1.012508	3.719510	784.060900	490.940300	388.085700
300.000	38.823080	88.576390	150.567000	0.162691	0.842974	21.836350	658.042700	720.124900	511.867900
200.000	75.320380	181.165700	301.117300	0.161920	2.439039	96.791150	132.222100	833.869000	635.490200
100.000	94.025420	174.429900	316.997900	0.691668	14.541730	61.526380	85.819150	771.165100	542.694500
0.000	104.460100	187.123800	273.543800	433.952500	752.994900	779.785400	729.086100	668.241200	586.636600
-100.000	106.267100	171.710200	270.710000	362.623300	567.209600	599.784400	584.642300	543.723300	531.183500
-200.000	105.158800	159.345900	232.816800	349.731200	426.188100	464.894900	464.350300	450.252800	459.633400
-300.000	103.501500	149.480800	203.333900	251.297800	323.569700	362.357800	378.851200	394.569500	357.453900
-400.000	102.201100	140.851400	179.438800	214.862700	252.175000	289.337400	311.823700	341.779600	360.722500
-500.000	100.339000	133.789900	161.766400	189.028200	222.864800	237.915100	261.671600	293.027300	317.028200
-600.000	98.170460	128.153800	148.007000	169.687700	198.936200	214.516700	224.076400	251.194900	274.208700
-700.000	96.451630	119.354600	136.097800	155.297900	179.500900	194.534000	206.146500	218.193900	238.728200
-800.000	94.866890	111.405700	126.546400	143.637000	163.801100	179.369300	191.347200	202.046900	209.645100
-900.000	91.339610	104.096300	118.369300	133.370300	150.685600	167.292900	171.254400	195.897900	201.416900
-1000.000	86.389880	97.825980	111.017800	124.981000	141.435100	157.899800	180.659900	184.340800	168.236700
-1100.000	81.822850	92.654920	104.378300	117.597900	133.771500	145.530300	157.716700	175.647100	197.418300
-1200.000	77.584550	87.897010	98.705070	111.074600	127.079500	135.883400	143.789300	153.220300	159.873100
-1300.000	74.181250	83.548560	93.825040	106.074100	120.361600	127.602400	132.126800	137.495400	138.537200
-1400.000	71.100890	79.602490	89.378200	101.528200	113.666200	120.246300	122.504100	125.098900	124.947400
-1500.000	68.224840	76.386180	85.883060	97.083600	107.432600	112.985300	114.203600	114.376800	113.972400

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

AXIS (DISTANCE , METERS)	-300.000	-200.000	-100.000	0.000	100.000	200.000	300.000	400.000	500.000
	- CONCENTRATION -								
900.000	143.779100	141.662100	137.988600	134.283600	135.050300	127.012500	118.276400	109.571200	94.923760
800.000	157.948600	155.077000	149.085900	147.707100	146.291400	137.405400	127.379900	116.316800	97.815730
700.000	173.754600	168.355900	163.411200	164.803000	160.234200	150.464300	138.465700	121.593700	104.282600
600.000	210.250600	202.410500	196.116000	195.728900	189.923000	176.857700	162.716600	137.939100	116.087400
500.000	264.867600	251.807200	246.982300	242.958700	230.898300	216.640500	219.454400	179.183300	146.199200
400.000	333.137300	310.405400	336.709400	303.937900	291.955800	277.619000	295.038900	246.092200	188.430500
300.000	415.345600	267.483600	410.900900	397.422000	200.167800	152.980500	399.528300	301.318200	229.378500
200.000	385.700200	295.920800	269.378100	328.948300	244.807300	180.823100	502.271100	367.569600	273.170200
100.000	412.395700	356.020300	376.616700	401.119900	287.504800	199.033100	153.430800	457.452700	324.496600
0.000	404.305900	370.590600	680.101700	399.520700	306.357000	221.864500	572.831400	446.921800	338.691500
-100.000	572.949600	587.977000	624.567300	614.277000	657.925500	575.787200	493.780200	410.620900	326.470000
-200.000	432.420500	442.266300	439.889600	588.116400	553.132800	492.344400	431.492400	364.191700	312.748000
-300.000	356.979300	371.023800	372.180400	502.400600	465.680900	410.747700	362.639800	326.665800	301.587900

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** ANNUAL GROUND LEVEL CONCENTRATION (ATTOCURIES PER CUBIC METER) FROM ALL SOURCES COMBINED (CONT.) **

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

Y AXIS (DISTANCE , METERS)	-300.000	-200.000	-100.000	0.000	100.000	200.000	300.000	400.000	500.000
	- CONCENTRATION -								
-400.000	301.372900	314.817000	456.609600	408.595000	385.778900	342.887900	320.590000	286.897500	265.699300
-500.000	362.821700	379.996700	367.546400	347.344500	324.082800	296.532900	274.369300	254.467500	232.429200
-600.000	299.779000	316.626300	304.034600	290.194900	276.554100	250.492300	232.902100	221.305200	205.614500
-700.000	251.760000	264.724500	257.076400	245.379800	234.309200	218.716900	200.901500	189.782300	178.715500
-800.000	219.078100	224.307500	219.249700	211.270500	202.288400	189.362500	178.777500	164.583100	155.562100
-900.000	203.000200	196.814300	189.335900	184.639300	177.598200	164.729700	157.181500	147.842300	136.661800
-1000.000	198.217200	177.244200	168.370400	162.527600	157.493000	146.359200	138.645900	131.357800	123.381000
-1100.000	180.192200	165.743800	151.767400	145.370200	140.568300	130.878300	122.862900	116.469000	110.163400
-1200.000	154.555100	149.615000	139.744000	131.072400	126.663800	117.351700	109.385800	104.023900	98.462290
-1300.000	136.048800	134.531800	127.961900	120.706400	113.878600	106.163000	98.644510	93.084480	88.641100
-1400.000	122.111800	121.822900	117.586300	111.627100	105.738900	95.793870	88.726010	82.789590	79.737200
-1500.000	111.882400	111.456400	107.830900	103.590100	98.599820	89.637180	80.672720	74.723560	71.086580

- GRID SYSTEM RECEPTORS -
- X AXIS (DISTANCE, METERS) -

Y AXIS (DISTANCE , METERS)	600.000	700.000	800.000	900.000	1000.000
	- CONCENTRATION -				
900.000	80.501060	69.605260	59.747340	50.757470	43.267970
800.000	84.394030	72.374660	60.868530	50.301360	42.246200
700.000	88.571750	74.059670	59.652780	49.220690	41.660310
600.000	96.594480	77.592130	61.962880	52.076640	43.156540
500.000	116.728700	91.899150	75.109930	62.195140	50.673050
400.000	144.552000	114.258600	93.520440	76.024170	61.407790
300.000	175.970200	136.573000	108.566300	87.415060	76.074140
200.000	201.567100	156.057600	124.351200	105.647500	90.356380
100.000	221.673700	170.126700	142.644900	120.973300	103.646300
0.000	242.500300	195.737700	162.000000	134.926200	115.479600
-100.000	266.025200	226.444900	185.074700	152.618700	129.288500
-200.000	244.204600	254.197900	204.074700	169.943600	143.597200
-300.000	234.696200	270.672600	209.563500	172.269400	151.192300
-400.000	262.011400	236.053400	195.390100	169.816800	153.242700
-500.000	218.165800	202.850200	180.029100	161.739200	148.197000
-600.000	191.689600	176.116100	161.925800	147.259800	137.435400
-700.000	168.687800	157.106900	145.017700	134.157200	126.072600
-800.000	147.334300	139.786100	130.012900	120.997000	114.961800
-900.000	129.355000	123.536300	117.074200	109.839500	102.632100
-1000.000	115.683300	109.560300	104.836600	99.920690	93.861950
-1100.000	105.668400	98.163480	93.736400	90.192670	86.233380
-1200.000	94.795680	90.701120	84.666140	81.301450	78.418270
-1300.000	84.835040	82.524240	78.286830	73.929120	71.139910
-1400.000	76.856700	74.355690	71.502160	68.694120	65.044310
-1500.000	69.224330	67.240890	65.298670	62.872230	60.747700

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** ANNUAL GROUND LEVEL CONCENTRATION (ATTOCURIES PER CUBIC METER) FROM ALL SOURCES COMBINED (CONT.) **

- DISCRETE RECEPTORS -

X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION	X DISTANCE (METERS)	Y DISTANCE (METERS)	CONCENTRATION
-28.4	878.4	137.305100	784.0	1095.8	57.883140	708.4	-18.9	197.649600
651.7	-1275.3	85.862380	-774.5	-1105.2	138.292000	-1114.7	-122.8	159.292100
-1322.5	906.8	9.141276	4023.1	2140.0	4.591960	-2560.0	-2681.9	11.936500

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APPENDIX R

APPENDIX R

STATISTICAL SUMMARIES AND SELECTION OF CONSTITUENTS OF POTENTIAL CONCERN FOR THE PRELIMINARY BASELINE RISK ASSESSMENT

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R.1.0 Contents of Silos 1-3

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INTRODUCTION

This appendix contains a complete set of statistical data summary tables generated for use in the preliminary baseline risk assessment. Tables are grouped by (locations) subareas of interest for each medium. If more than one data source exists for a given subarea, data are presented separately by source and, if appropriate, in combined form.

The tables provide the following statistical information for constituents detected within a subarea: frequency of detection, concentration in associated laboratory blanks, upper 95% confidence limit on the 95th quantile of the background distribution (upper tolerance limit [UTL]), range of detected concentrations, type of distribution, mean, and upper 95% confidence interval on the mean (upper confidence limit [UCL]). The tables also indicate whether a constituent is included as a constituent of potential concern and the reason for its selection or exclusion. The UCL for each constituent of potential concern is used either as an exposure point concentration or to estimate source terms for fate and transport modeling. Since sources of data, statistical methodology, and criteria for selecting constituents of potential concern are discussed briefly in Part II, Section 2.0, and at length in the Risk Assessment Work Plan Addendum, this information is not repeated here. Raw data used in statistical calculations were those data available as of December 1, 1991, except for post-bentonite radon data from December, 1991 sampling.

The statistical summary tables are grouped according to environmental or source medium as follows:

R.1 Contents of Silos, including results of RI/FS and WEMCO sampling of Silos 1, 2, and 3.

R.2 Radon in Air, including results of pre-bentonite (October, 1991) and post-bentonite (December, 1991) sampling by WEMCO at 13 monitoring stations on the FEMP.

R.3 Surface Water and Sediment, including results of RI/FS sampling of surface water and sediment in the Great Miami River, Paddys Run, the Storm Sewer Outfall Ditch (SSOD), and other surface water courses (e.g., drainage ditches), CIS (Characterization Investigation Study) sampling of standing water in the Waste Storage Area (Waste Pits 4, 5, 6; Clearwell) and sediment in areas other than the Great Miami River and Paddys Run (e.g., various drainage ditches), and WEMCO sampling of sediment in Paddys Run downstream of the SSOD and in the SSOD.

R.4 Groundwater, including results of RI/FS and RCRA sampling of groundwater in 21 potential RME well locations off property (see section 3.0 for further details) and of perched water in several on-property locations.

R.5 Surface Soil, including results of RI/FS sampling of surface soil ranging from 0 - 6 inches depth and 0 - 18 inches depth for the Waste Storage Area, the Inactive Flyash Pile, four quadrants of the former Production Area, the Incinerator/Waste Water Treatment Facility, the Silo Area, the remainder of the FEMP, and the entire FEMP and CIS sampling of surface soil ranging from 0 - 6 inches depth and 0 - 18 inches depth for the Waste Storage Area, the Active and Inactive Flyash Piles, and the South Field.

R.6 Subsurface Soil, including RI/FS and CIS sampling of subsurface soil in Waste Pits 1 - 6 and associated berms, the Burn Pit, the Clearwell, the Solid Waste Landfill, the Active and Inactive Flyash Piles, the North and South Lime Sludge Ponds, the South Field, the berms around Silos 1 and 2, the area beneath Silos 1 and 2, the vicinities of Plants 2/3, 6, 9, and the Pilot Plant in the former Production Area, the remainder of the former Production Area, the Fire Training Area, the K-65 Slurry Line, the Surge Lagoon, the Stormwater Retention Basin, the Incinerator Area, the rubble east of the waste pits, and the remainder of the FEMP. The area associated with the rubble west of the silos was considered, but there were no data for this area.

Data use is briefly addressed in each section. Data for radionuclides precede data for chemical constituents in each subsection. Note that the first ten footnotes are repeated for every table, regardless of whether each footnote is cited within a given table. Note also that the range given is the range of detected concentrations and does not include the detection limits for non-detects. As a result, in some cases the mean and the UCL may not fall within the range presented. Data for non-radioactive chemicals were not available for every area.

R.1 CONTENTS OF SILOS 1 - 3

Data available by December 1, 1991, for silo contents from RI/FS sampling were limited to the chemical contents of Silo 2. These data were supplemented with data from 1989 WEMCO sampling for the chemical and radiological contents of Silos 1,2 and 3. RI/FS and WEMCO data on the chemical contents of Silos 1,2 are presented separately and in combined form. The combined data are used for the baseline risk assessment. Tables R.1-1 and R.1-2 present data for radionuclides in the silos. Tables R.1-3 through R.1-6 present data for chemicals in the silos. The UCL for each constituent of potential concern in Silos 1,2 and 3 was used to estimate a source term for fate and transport modeling to predict concentrations in air and groundwater that might occur in the future.

TABLE R.1-1

SELECTION OF CONSTITUENTS OF CONCERN FROM WESTINGHOUSE SAMPLING OF THE CONTENTS OF SILOS 1 AND 2

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PB-210	13/13		2.230	48980 -399200	L	122252	176084	Y	Sample concentrations exceed background levels
RA-226	13/13		2.230	657.10 -192600	N	112627	140287	Y	Sample concentrations exceed background levels
TH-228	2/13		1.475	411.00 -638.00	N	285.77	355.305	Y	Sample concentrations exceed background levels
TH-230	13/13		2.109	8365.0 - 43771	N	28928	34499.5	Y	Sample concentrations exceed background levels
TH-232	2/13		1.475	766.00 -851.00	N	321.42	434.727	Y	Sample concentrations exceed background levels
U-234	13/13		2.109	121.00 -1404.0	N	772.62	933.668	Y	Sample concentrations exceed background levels
U-235/236	7/13		0.097^g	36.100 -73.900	N	39.219	49.137	Y	Sample concentrations exceed background levels
U-238	13/13		2.109	45.500 -1240.0	N	704.12	854.062	Y	Sample concentrations exceed background levels
Uranium*	13/13		3.230^g	137.00 -3717.0	N	2111.3	2560.91	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gFor U-235.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.1-2

SELECTION OF CONSTITUENTS OF CONCERN FROM WESTINGHOUSE SAMPLING OF THE CONTENTS OF SILO 3

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
AC-227	11/11		0.097	234.00 -1363.0	L	581.00	779.581	Y	Sample concentrations exceed background levels
PA-231	9/9		0.097	266.00 -931.00	L	557.44	755.530	Y	Sample concentrations exceed background levels
PB-210	11/11		2.230	454.00 -6427.0	L	2616.7	4729.52	Y	Sample concentrations exceed background levels
RA-224	11/11		1.475	64.000 -453.00	N	289.64	367.117	Y	Sample concentrations exceed background levels
RA-226	11/11		2.230	467.00 -6435.0	N	2972.5	3871.63	Y	Sample concentrations exceed background levels
RA-228	10/11		1.475	20.000 -559.00	N	297.68	405.774	Y	Sample concentrations exceed background levels
TH-228	7/11		1.475	459.00 -996.00	N	589.95	746.909	Y	Sample concentrations exceed background levels
TH-230	10/10		2.109	21010 - 68759	N	49164	58278.9	Y	Sample concentrations exceed background levels
TH-232	8/11		1.475	411.00 -1451.0	L	656.27	962.305	Y	Sample concentrations exceed background levels
U-234	11/11		2.109	348.00 -1935.0	N	1477.9	1726.96	Y	Sample concentrations exceed background levels
U-235/236	10/11		0.097^g	41.700 -158.00	N	93.600	117.301	Y	Sample concentrations exceed background levels
U-238	11/11		2.109	320.00 -2043.0	N	1500.4	1775.48	Y	Sample concentrations exceed background levels
Uranium*	11/11		3.230^g	738.00 -4554.0	N	2956.1	3694.99	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gFor U-235.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.1-3

SELECTION OF CONSTITUENTS OF CONCERN FROM RI/FS SAMPLING OF THE CONTENTS OF SILO 2

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,4-Dioxane	1/2		^f	0.078 - 0.078	^h	^h	0.078^j	Y	Positive detection with no reason for exclusion
2-Butanone	1/3	*	^f	0.009 - 0.009	N^i	0.007	0.009^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/3	*	^f	0.003 - 0.003	N^i	0.005	0.003^j	Y	Positive detection with no reason for exclusion
Acetone	3/3	*	^f	0.017 - 0.068	N	0.044	0.068^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		108233	752.00 -977.00	^h	^h	977.000^j	N	Sample concentrations are within background levels
Antimony	2/2		^f	18.200 -21.400	^h	^h	21.400^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1		^f	5.000 - 5.000	^h	^h	5.000^j	Y	Positive detection with no reason for exclusion
Arsenic	2/2		20.497	61.500 -73.800	^h	^h	73.800^j	Y	Sample concentrations exceed background levels
Barium	2/2		814.574	7630.0 -8040.0	^h	^h	8040.00^j	Y	Sample concentrations exceed background levels
Beryllium	2/2		2.150	1.200 - 1.300	^h	^h	1.300^j	N	Sample concentrations are within background levels
Boron	2/2		^f	53.500 -57.700	^h	^h	57.700^j	Y	Positive detection with no reason for exclusion
Cadmium	2/2		11.089	2.000 - 6.700	^h	^h	6.700^j	N	Sample concentrations are within background levels
Calcium	2/2		41294.0	10800 - 20600	^h	^h	20600.0^j	N	Common dietary element; Sample concentrations are within background levels
Chloride	3/3		^f	73.700 -141.00	L	96.136	141.000^j	N	Ubiquitous compound
Chromium	2/2		102.684	35.100 -73.300	^h	^h	73.300^j	N	Sample concentrations are within background levels
Cobalt	2/2		21.431	813.00 -1030.0	^h	^h	1030.00^j	Y	Sample concentrations exceed background levels
Copper	2/2		58.619	301.00 -332.00	^h	^h	332.000^j	Y	Sample concentrations exceed background levels
Cyanide	2/2		^f	6.300 - 7.100	^h	^h	7.100^j	Y	Positive detection with no reason for exclusion
Fluoranthene	1/1		^f	0.064 - 0.064	^h	^h	0.064^j	Y	Positive detection with no reason for exclusion
Iron	2/2		46245.7	8710.0 - 15300	^h	^h	15300.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	2/2		37.337	32300 - 34100	^h	^h	34100.0^j	Y	Sample concentrations exceed background levels
Magnesium	2/2		15895.7	2660.0 -3810.0	^h	^h	3810.00^j	N	Common dietary element; Sample concentrations are within background levels
Manganese	2/2		1144.01	96.200 -96.400	^h	^h	96.400^j	N	Sample concentrations are within background levels

Mercury	2/2		0.292	0.760 - 0.990	^h	^h	0.990^j	Y	Sample concentrations exceed background levels
Methylene chloride	3/3	*	^f	0.003 - 0.047	N^i	0.021	0.047^j	Y	Positive detection with no reason for exclusion
Molybdenum	2/2		8.849	198.00 -449.00	^h	^h	449.000^j	Y	Sample concentrations exceed background levels
Nickel	2/2		39.379	1320.0 -1740.0	^h	^h	1740.00^j	Y	Sample concentrations exceed background levels
Nitrate	3/3		^f	3350.0 -5110.0	N^i	3983.3	5110.00^j	Y	Positive detection with no reason for exclusion
Oil and Grease	2/2		^f	252.00 -991.70	^h	^h	991.700^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus (black, white, red	2/2		^f	623.00 -1400.0	^h	^h	1400.00^j	N	Ubiquitous compound
Potassium	2/2		23804.6	209.00 -252.00	^h	^h	252.000^j	N	Common dietary element; Sample concentrations are within background levels
Pyrene	1/1		^f	0.047 - 0.047	^h	^h	0.047^j	Y	Positive detection with no reason for exclusion
Pyridine	1/2		^f	0.045 - 0.045	^h	^h	0.045^j	Y	Positive detection with no reason for exclusion
Selenium	2/2		1.170	75.300 -125.00	^h	^h	125.000^j	Y	Sample concentrations exceed background levels
Silicon	2/2		^f	721.00 -764.00	^h	^h	764.000^j	Y	Positive detection with no reason for exclusion
Silver	2/2		8.028	11.800 -16.500	^h	^h	16.500^j	Y	Sample concentrations exceed background levels
Sodium	2/2		11359.6	2120.0 -2840.0	^h	^h	2840.00^j	N	Common dietary element; Sample concentrations are within background levels
Sulfate	3/3		^f	7420.0 - 11240	N^i	8983.3	11240.0^j	N	Ubiquitous compound
Thallium	2/2		10.940^g	0.890 - 0.900	^h	^h	0.900^j	N	Sample concentrations are within background levels
Toluene	3/3	*	^f	0.003 - 0.005	N^i	0.004	0.005^j	Y	Positive detection with no reason for exclusion
Total Organic Carbon	2/2		^f	148.00 - 12204	^h	^h	12204.0^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	1/2		^f	260.60 -260.60	^h	^h	260.600^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	2/2		172.171	269.00 -325.00	^h	^h	325.000^j	Y	Sample concentrations exceed background levels
Zinc	2/2		113.020	25.300 -159.00	^h	^h	159.000^j	Y	Sample concentrations exceed background levels
bis(2-Ethylhexyl) phthalate	1/1		^f	0.330 - 0.330	^h	^h	0.330^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data are theoretically available for these compounds, but has not yet been located.

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TABLE R.1-4

SELECTION OF CONSTITUENTS OF CONCERN FROM WESTINGHOUSE SAMPLING OF THE CONTENTS OF SILOS 1 AND 2

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	13/13		^f	7.100 -21.000	L	11.200	13.219	Y	Positive detection with no reason for exclusion
4-Methyl 2-Pentanone	4/4		^f	0.870 - 2.700	L	1.329	2.439	Y	Positive detection with no reason for exclusion
Acetone	10/10		^f	0.140 - 5.300	N	1.894	2.683	Y	Positive detection with no reason for exclusion
Aluminum	12/12		108233	60.400 -2570.0	N	982.70	1337.95	N	Sample concentrations are within background levels
Antimony	2/2		^f	6.400 - 7.200	^h	^h	7.200^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	5/5		^f	1.700 - 7.300	N^i	3.520	5.648	Y	Positive detection with no reason for exclusion
Aroclor-1254	13/13		^f	0.420 -10.000	L	3.640	7.797	Y	Positive detection with no reason for exclusion
Aroclor-1260	1/1		^f	0.340 - 0.340	^h	^h	0.340^j	Y	Positive detection with no reason for exclusion
Arsenic	12/12		20.497	14.700 -1960.0	N^i	238.08	522.272	Y	Sample concentrations exceed background levels
Barium	12/12		814.574	89.200 -8370.0	N	3923.3	5375.97	Y	Sample concentrations exceed background levels
Beryllium	12/12		2.150	0.660 - 6.000	L	1.953	2.892	Y	Sample concentrations exceed background levels
Bis(2-Ethylhexyl)Phthalate	12/12		^f	0.093 - 6.000	L	0.912	1.942	Y	Positive detection with no reason for exclusion
Cadmium	12/12		11.089	2.100 -19.100	L	5.150	7.607	Y	Sample concentrations exceed background levels
Calcium	12/12		41294.0	2150.0 -301000	L	32585	108980	N	Common dietary element
Chloroform	13 /13		^f	0.480 - 1.500	L	0.775	0.937	Y	Positive detection with no reason for exclusion
Chromium	12/12		102.684	12.900 -165.00	L	51.475	87.490	Y	Sample concentrations exceed background levels
Cobalt	12/12		21.431	6.200 -2430.0	N	753.02	1064.22	Y	Sample concentrations exceed background levels
Copper	11/11		58.619	122.00 -1790.0	L	375.82	608.450	Y	Sample concentrations exceed background levels
Cyanide	11/11		^f	0.900 - 4.500	L	2.117	3.229	Y	Positive detection with no reason for exclusion
Di-n-Octyl Phthalate	3/3		^f	0.045 - 0.820	N	0.455	0.820^j	Y	Positive detection with no reason for exclusion
Iron	12/12		46245.7	4010.0 - 75100	L	19051	39286.9	N	Common dietary element
Lead	12/12		37.337	153.00 - 85100	N	41263	55948.7	Y	Sample concentrations exceed background levels
Magnesium	12/12		15895.7	1500.0 -8740.0	L	3939.2	6003.06	N	Common dietary element; Sample concentrations are within background levels
Manganese	12/12		1144.01	33.500 -403.00	L	148.64	290.977	N	Sample concentrations are within background levels

Mercury	11/11	0.292	0.230 - 2.300	L	0.793	1.365	Y	Sample concentrations exceed background levels
Methylene chloride	13/13	^f	0.840 - 6.300	L	2.772	4.314	Y	Positive detection with no reason for exclusion
Nickel	12/12	39.379	14.600 -2580.0	N	1128.4	1482.48	Y	Sample concentrations exceed background levels
Potassium	12/12	23804.6	37.800 -492.00	N	266.15	332.931	N	Common dietary element Sample concentrations are within background levels
Selenium	11/11	1.170	91.100 -180.00	L	132.00	153.305	Y	Sample concentrations exceed background levels
Silver	11/11	8.028	5.000 -23.300	L	11.673	16.306	Y	Sample concentrations exceed background levels
Sodium	12/12	11359.6	226.00 - 13100	L	3910.3	13100.0^j	N	Common dietary element
Styrene	2 /2	^f	0.200 - 0.350	^h	^h	0.350^j	Y	Positive detection with no reason for exclusion
Thallium	9/9	10.940	0.240 - 1.400	L	0.576	0.885	N	Sample concentrations are within background levels
Toluene	10/10	^f	0.130 - 0.430	L	0.207	0.272	Y	Positive detection with no reason for exclusion
Total Xylenes	2/2	^f	0.130 - 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
Trichloroethane	1/1	^f	0.120 - 0.120	^h	^h	0.120^j	Y	Positive detection with no reason for exclusion
Vanadium	12/12	172.171	21.900 -214.00	N	131.43	160.766	Y	Sample concentrations exceed background levels
Zinc	12/12	113.020	11.200 -154.00	L	40.292	66.574	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.1-5

SELECTION OF CONSTITUENTS OF CONCERN FROM RI/FS AND WESTINGHOUSE SAMPLING OF THE CONTENTS OF SILOS 1 AND 2

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,4-Dioxane	1/2	^f		0.078 - 0.078	^h	^h	0.078^j	Y	Positive detection with no reason for exclusion
2-Butanone	14/16	^f		0.009 -21.000	N	9.101	11.579	Y	Positive detection with no Positive detection with no
4-Methyl 2-Pentanone	5/7	^f		0.003 - 2.700	N^i	0.848	1.575	Y	Positive detection with no Positive detection with no
Acetone	13/13	^f		0.017 - 5.300	N	1.467	2.175	Y	Positive detection with no Positive detection with no
Aluminum	14/14		108233	60.400 -2570.0	N	965.81	1265.57	N	Sample concentrations are within background levels
Antimony	4/4	^f		6.400 -21.400	N^i	13.300	21.400^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	5/5	^f		1.700 - 7.300	L	3.076	5.228	Y	Positive detection with no reason for exclusion
Aroclor-1254	14/14	^f		0.420 -10.000	L	3.737	7.619	Y	Positive detection with no reason for exclusion
Aroclor-1260	1/1	^f		0.340 - 0.340	^h	^h	0.340^j	Y	Positive detection with no reason for exclusion
Arsenic	14/14		20.497	14.700 -1960.0	N^i	213.74	454.191	Y	Sample concentrations exceed background levels
Barium	14/14		814.574	89.200 -8370.0	N	4482.1	5875.57	Y	Sample concentrations exceed background levels
Beryllium	14/14		2.150	0.660 - 6.000	L	1.853	2.510	Y	Sample concentrations exceed background levels
Boron	2/2	^f		53.500 -57.700	^h	^h	57.700^j	Y	Positive detection with no reason for exclusion
Cadmium	14/14		11.089	2.000 -19.100	L	5.036	7.154	Y	Sample concentrations exceed background levels
Calcium	14/14		41294.0	2150.0 -301000	L	30173	67178.9	N	Common dietary element
Chloride	3/3	^f		73.700 -141.00	L	96.136	141.000^j	N	Ubiquitous compound
Chloroform	13/16	^f		0.480 - 1.500	L	0.630	1.500^j	Y	Positive detection with no reason for exclusion
Chromium	14/14		102.684	12.900 -165.00	L	51.864	81.453	Y	Sample concentrations exceed background levels
Cobalt	14/14		21.431	6.200 -2430.0	N	777.09	1040.80	Y	Sample concentrations exceed background levels
Copper	13/13		58.619	122.00 -1790.0	L	366.69	537.031	Y	Sample concentrations exceed background levels
Cyanide	13/13	^f		0.900 - 7.100	L	2.822	4.664	Y	Positive detection with no reason for exclusion
Di-n-Octyl Phthalate	3/3	^f		0.045 - 0.820	N	0.455	0.820^j	Y	Positive detection with no reason for exclusion
Fluoranthene	1/1	^f		0.064 - 0.064	^h	^h	0.064^j	Y	Positive detection with no reason for exclusion
Iron	14/14		46245.7	4010.0 - 75100	L	18044	31174.3	N	Common dietary element
Lead	14/14		37.337	153.00 - 85100	N	40111	52522.9	Y	Sample concentrations exceed background levels

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Magnesium	14/14	15895.7	1500.0 -8740.0	L	3838.6	5332.07	N	Common dietary element; Sample concentrations are within background levels
Manganese	14/14	1144.01	33.500 -403.00	L	141.16	241.971	N	Sample concentrations are within background levels
Mercury	13/13	0.292	0.230 - 2.300	L	0.805	1.231	Y	Sample concentrations exceed background levels
Methylene chloride	16/16	^f	0.003 - 6.300	L	2.257	6.300^j	Y	Positive detection with no reason for exclusion
Molybdenum	2/2	8.849	198.00 -449.00	^h	^h	449.000^j	Y	Sample concentrations exceed background levels
Nickel	14/14	39.379	14.600 -2580.0	N	1185.8	1493.51	Y	Sample concentrations exceed background levels
Nitrate	3/3	^f	3350.0 -5110.0	L	3909.3	5110.00^j	Y	Positive detection with no reason for exclusion
Oil and Grease	2/2	^f	252.00 -991.70	^h	^h	991.700^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus (black, white, red	2/2	^f	623.00 -1400.0	^h	^h	1400.00^j	N	Ubiquitous compound
Potassium	14/14	23804.6	37.800 -492.00	N	261.06	317.614	N	Common dietary element; Sample concentrations are within background levels
Pyrene	1/1	^f	0.047 - 0.047	^h	^h	0.047^j	Y	Positive detection with no reason for exclusion
Pyridine	1/2	^f	0.045 - 0.045	^h	^h	0.045^j	Y	Positive detection with no reason for exclusion
Selenium	13/13	1.170	75.300 -180.00	L	127.10	148.111	Y	Sample concentrations exceed background levels
Silicon	2/2	^f	721.00 -764.00	^h	^h	764.000^j	Y	Positive detection with no reason for exclusion
Silver	13/13	8.028	5.000 -23.300	L	12.054	16.010	Y	Sample concentrations exceed background levels
Sodium	14/14	11359.6	226.00 - 13100	L	3705.9	10158.4	N	Common dietary element
Styrene	2/5	^f	0.200 - 0.350	L	0.018	0.189	Y	Positive detection with no reason for exclusion
Sulfate	3/3	^f	7420.0 - 11240	L	8842.5	11240.0^j	Y	Ubiquitous compound
Thallium	11/11	10.940	0.240 - 1.400	L	0.634	0.920	N	Sample concentrations are within background levels
Toluene	13/13	^f	0.003 - 0.430	N	0.160	0.219	Y	Positive detection with no reason for exclusion
Total Organic Carbon	2/2	^f	148.00 - 12204	^h	^h	12204.0^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	1/2	^f	260.60 -260.60	^h	^h	260.600^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Xylenes	2/2	^f	0.130 - 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
Trichloroethane	1/1	^f	0.120 - 0.120	^h	^h	0.120^j	Y	Positive detection with no reason for exclusion
Vanadium	14/14	172.171	21.900 -325.00	N	155.08	193.079	Y	Sample concentrations exceed background levels
Zinc	14/14	113.020	11.200 -159.00	L	47.700	80.791	Y	Sample concentrations exceed background levels
bis(2-Ethylhexyl)Phthalate	13/13	^f	0.093 - 6.000	L	0.867	1.670	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.1-6

SELECTION OF CONSTITUENTS OF CONCERN FROM WESTINGHOUSE SAMPLING OF THE CONTENTS OF SILO 3

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	5/5	^f		9.700 -16.000	N	13.340	15.642	Y	Positive detection with no reason for exclusion
Acetone	5/5	^f		3.400 -12.000	L	5.246	8.386	Y	Positive detection with no reason for exclusion
Aluminum	11/11	108233	10800	- 23700	N	17227	19267.3	N	Sample concentrations are within background levels
Arsenic	11/11	20.497	532.00	-6380.0	L	1952.9	3072.05	Y	Sample concentrations exceed background levels
Barium	11/11	814.574	118.00	-332.00	N	216.64	258.311	N	Sample concentrations are within background levels
Beryllium	11/11	2.150	10.000	-39.900	N	24.200	29.135	Y	Sample concentrations exceed background levels
Bis(2-Ethylhexyl)Phthalate	1/1	^f		0.040 - 0.040	^h	^h	0.040^j	Y	Positive detection with no reason for exclusion
Cadmium	11/11	11.089	21.500	-204.00	L	59.755	91.392	Y	Sample concentrations exceed background levels
Calcium	11/11	41294.0	21300	- 39900	L	29373	33212.2	N	Common dietary element; Sample concentrations are within background levels
Chloroform	5/5	^f		0.560 - 0.810	N	0.694	0.782	Y	Positive detection with no reason for exclusion
Chloromethane	1/1	^f		0.140 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Chromium	11/11	102.684	139.00	-560.00	L	288.09	387.777	Y	Sample concentrations exceed background levels
Cobalt	10/10	21.431	1100.0	-3520.0	L	2104.0	2820.18	Y	Sample concentrations exceed background levels
Copper	11/11	58.619	1610.0	-7060.0	L	2546.4	3283.79	Y	Sample concentrations exceed background levels
Iron	11/11	46245.7	13900	- 67600	L	37800	51289.1	N	Common dietary element
Lead	11/11	37.337	646.00	-4430.0	L	1727.8	2377.27	Y	Sample concentrations exceed background levels
Magnesium	11/11	15895.7	38200	- 80900	N	58582	66602.3	N	Common dietary element
Manganese	11/11	1144.01	2420.0	-6500.0	N	4380.0	5163.61	Y	Sample concentrations exceed background levels
Mercury	3/3	0.292	0.300	- 0.690	N^i	0.430	0.690^j	Y	Sample concentrations exceed background levels
Methylene Chloride	5/5	^f		1.000 - 2.800	N	1.680	2.349	Y	Positive detection with no reason for exclusion
Nickel	11/11	39.379	1200.0	-6170.0	L	2974.5	4159.17	Y	Sample concentrations exceed background levels
Potassium	11/11	23804.6	1300.0	- 22800	L	7258.2	13963.2	N	Common dietary element; Sample concentrations are within background levels
Selenium	11/11	1.170	101.00	-349.00	L	173.55	225.905	Y	Sample concentrations exceed background levels
Silver	11/11	8.028	9.200	-23.800	N	15.909	18.425	Y	Sample concentrations exceed background levels

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Sodium	11/11	11359.6	22900 - 51700	L	36100	41758.1	N	Common dietary element
Thallium	11/11	10.940	3.100 -73.900	L	19.018	50.196	Y	Sample concentrations exceed background levels
Toluene	5/5	^f	0.180 - 6.800	N	3.398	6.454	Y	Positive detection with no reason for exclusion
Vanadium	11/11	172.171	418.00 -4550.0	L	1819.7	3357.77	Y	Sample concentrations exceed background levels
Zinc	11/11	113.020	301.00 -672.00	L	450.00	534.651	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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R.2.0
Radon in Air

R.2 RADON IN AIR

Raw data, essential in order to perform statistical calculations, could only be obtained for measurements of radon in air. WEMCO conducted air sampling for radon at 13 locations on the FEMP. Raw data from pre-bentonite (October, 1991) sampling for radon and post-bentonite (December, 1991) sampling for radon were provided by WEMCO. Statistical analyses were performed separately on pre- and post-bentonite data from each of the 13 sampling locations. Results are presented in Tables R.2-1 through R.2-26. Post-bentonite data for radon concentrations in air were used to estimate current on-property exposure levels. Radon data were also used in air model calibration.

TABLE R.2-1

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-1

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	676/676		1.837	0.200 - 3.200	L	0.798	0.829	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-2

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-1

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	735/735		1.160	0.200 - 1.700	L	0.601	0.615	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-3

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-5

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	642/642		1.837	0.100 - 5.900	L	1.427	1.538	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-4

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-5

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	740/740		1.160	0.100 - 3.000	L	0.587	0.613	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-5

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-6

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	733/733		1.837	0.200 - 4.700	L	1.219	1.293	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-6

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-6

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	732/732		1.160	0.200 - 2.900	L	0.586	0.607	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-7

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-7

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	664/664		1.837	0.200 - 6.100	L	1.667	1.812	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-8

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT AMS-7

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	737/737		1.160	0.200 - 3.700	L	0.578	0.603	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-9

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT K-65, NW

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	560/560		1.837	0.200 -81.000	L	6.660	7.508	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-10

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT K-65, NW

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	725/725		1.160	0.200 - 9.400	L	0.947	0.998	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-11

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT K-65, SW

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	649/649		1.837	0.400 -149.60	L	8.555	9.695	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-12

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT K-65, SW

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	723/723		1.160	0.300 - 8.900	L	1.241	1.310	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-13

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINHOUSE SAMPLING AT K-65, NE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	731/731		1.837	0.200 -214.50	L	17.991	21.108	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-14

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT K-65, NE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	728/728		1.160	0.200 - 5.800	L	1.157	1.228	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-15

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT K-65, SE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	370/370		1.837	0.400 -241.30	L	23.405	30.792	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-16

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT K-65, SE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	728/728		1.160	0.100 - 8.600	L	1.215	1.308	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.2-17

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT PLANT 2/3

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	743/743		1.837	0.200 - 7.300	L	1.280	1.358	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-18

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT PLANT 2/3

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	739/739		1.160	0.200 - 2.100	L	0.524	0.541	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-19

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT PLANT 5

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	739/739		1.837	0.300 - 3.700	L	1.151	1.199	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-20

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT PLANT 5

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	700/700		1.160	0.200 - 2.300	L	0.652	0.670	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-21

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT THE PILOT PLANT

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	739/739		1.837	0.300 -11.200	L	1.753	1.858	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-22

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT THE PILOT PLANT

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	649/649		1.160	0.300 - 2.500	L	0.792	0.816	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-23

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT THE ADMINISTRATION BUILDING

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	592/592		1.837	0.300 - 5.300	L	1.197	1.270	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-24

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT THE ADMINISTRATION BUILDING

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	651/651		1.160	0.200 - 2.300	L	0.694	0.716	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-25

SELECTION OF CONSTITUENTS OF CONCERN FOR PRE-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT THE IN VIVO BUILDING

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RN-222	735/735		1.837	0.100 - 4.800	L	1.153	1.222	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.2-26

SELECTION OF CONSTITUENTS OF CONCERN FOR POST-BENTONITE K-65 RADON EMISSIONS FROM WESTINGHOUSE SAMPLING AT THE IN VIVO BUILDING

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Rn-222	703/703		1.160	0.200 - 2.200	L	0.546	0.563	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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R.3.0
Surface Water/Sediment

R.3 SURFACE WATER AND SEDIMENT

Data for surface water/standing water and sediment will be addressed in sections R.3.1 and R.3.2, respectively.

R.3.1 Surface/Standing Water

Data for radionuclides in surface water and standing water are presented first, followed by data for chemicals in surface water and standing water.

R.3.1.1 Surface Water

Surface water data for radionuclides and chemicals are presented separately in Tables R.3-1 through R.3-7 and Tables R.3-12 through R.3-18, respectively. Prior to statistical evaluation, surface water data were grouped as follows:

- Great Miami River upstream of the main FEMP effluent line
- Great Miami River between the main FEMP effluent line and the confluence with Paddys Run
- Great Miami River downstream of the confluence with Paddys Run
- Paddys Run between the FEMP northern property boundary and the SSOD
- Paddys Run downstream of the SSOD
- SSOD
- Surface water courses other than the Great Miami River, Paddys Run, and the SSOD (e.g., drainage ditches leading to Paddys Run or the SSOD)

These RI/FS data are used in evaluating current exposure to constituents in surface water.

R.3.1.2 Standing Water in the Waste Storage Area

Tables R.3-8 through R.3-11 and R.3-19 through R.3-22 present data for radionuclides and chemicals, respectively, in standing water in Waste Pits 4, 5, and 6 and the Clearwell. The CIS is the source of these data. These data were used in evaluating exposures under the current exposure scenario with no institutional controls.

R.3.2 Sediment

Sediment data for radionuclides are presented in Tables R.3-23 through R.3-35. Tables R.3-36 through R.3-39 present sediment data for chemicals. Prior to statistical evaluation, RI/FS sediment data were grouped as follows:

- Great Miami River upstream of the main FEMP effluent line (only radiological data available)
- Great Miami River between the main FEMP effluent line and the confluence with Paddys Run (only radiological data available)
- Great Miami River downstream of the confluence with Paddys Run (only radiological data available)
- Paddys Run upstream of the FEMP northern property boundary
- Paddys Run between the FEMP northern property boundary and the SSOD
- Paddys Run downstream of the SSOD
- SSOD (only radiological data available)
- Surface water courses other than the Great Miami River, Paddys Run, and the SSOD (e.g., drainage ditches leading to Paddys Run or the SSOD)

Data from RI/FS sampling efforts were sufficient for all areas except for radionuclides in sediment in Paddys Run downstream of the SSOD and in the SSOD. For these two areas WEMCO data are also presented. RI/FS and WEMCO data are combined for these two areas for use in the baseline risk assessment.

Sediment data from CIS sampling of radionuclides in areas other than the Great Miami River and Paddys Run (e.g., various drainage ditches) are also evaluated.

These data are used in evaluating current exposure through dermal contact, ingestion, and direct radiation.

TABLE R.3-1

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF GMR UPSTREAM OF THE CONFLUENCE WITH THE FEMP MAIN EFFLUENT LINE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/13		^f	2.400 - 2.400	N	0.646	0.907	Y	Positive detection with no reason for exclusion
TH-228	1/13		^f	1.500 - 1.500	N	0.577	0.714	Y	Positive detection with no reason for exclusion
U-234	1/13		0.781	1.100 - 1.100	N	0.550	0.632	Y	Sample concentrations exceed background levels
Uranium*	6/11		2.366	1.00 - 2.00	N	1.000	1.000	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in ug/L.

TABLE R.3-2

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF GMR BETWEEN THE CONFLUENCE WITH THE EFFLUENT LINE AND THE CONFLUENCE WITH PADDYS RUN

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TC-99	2/20		^f	40.100 -95.900	N^i	20.300	27.513	Y	Positive detection with no reason for exclusion
TH-228	2/20		^f	1.500 - 1.800	N	0.615	0.753	Y	Positive detection with no reason for exclusion
U-234	9/20		0.781	1.100 - 2.200	N	0.985	1.223	Y	Sample concentrations exceed background levels
U-238	9/20		0.781	1.000 - 1.900	N	0.900	1.092	Y	Sample concentrations exceed background levels
Uranium*	20/20		2.366	1.0 - 5.0	L	3.000	3.000	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in ug/L.

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TABLE R.3-3

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF GMR DOWNSTREAM OF CONFLUENCE WITH PADDYS RUN

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-228	1/12		^f	5.000 - 5.000	N	1.829	2.351	Y	Positive detection with no reason for exclusion
TH-228	1/12		^f	2.600 - 2.600	N^i	0.675	0.989	Y	Positive detection with no reason for exclusion
TH-230	1/12		^f	1.300 - 1.300	N	0.567	0.686	Y	Positive detection with no reason for exclusion
U-234	5/12		0.781	1.000 - 1.800	N	0.875	1.139	Y	Sample concentrations exceed background levels
U-238	3/12		0.781	1.000 - 2.000	N	0.775	1.058	Y	Sample concentrations exceed background levels
Uranium*	12/12		2.366	2.0 - 5.0	N	3.000	3.000	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in ug/L.

TABLE R.3-4

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF PADDYS RUN BETWEEN THE FEMP NORTHERN PROPERTY BOUNDARY AND THE CONFLUENCE WITH THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
SR-90	1/8		^f	24.000 -24.000	L	3.317	5.667	Y	Positive detection with no reason for exclusion
TH-230	4/8		^f	1.120 - 6.740	L	1.148	2.260	Y	Positive detection with no reason for exclusion
Thorium*	1/6		^f	4.0 - 4.0	N	2.000	3.000	Y	Positive detection with no reason for exclusion
U-234	7/8		0.781	1.300 - 5.000	N	3.094	3.946	Y	Sample concentrations exceed background levels
U-238	7/8		0.781	2.000 - 6.800	L	3.604	5.249	Y	Sample concentrations exceed background levels
Uranium*	7/8		2.366	5.0 - 19.0	L	11.00	16.00	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in ug/L.

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TABLE R.3-5

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF PADDYS RUN DOWNSTREAM OF THE CONFLUENCE WITH THE STORM SEWER OUFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-228	3/8		^f	1.780 - 4.500	L	0.924	1.674	Y	Positive detection with no reason for exclusion
TH-230	2/8		^f	1.560 - 2.050	N	0.826	1.240	Y	Positive detection with no reason for exclusion
U-234	7/8		0.781	1.600 - 3.760	L	2.131	3.760^j	Y	Sample concentrations exceed background levels
U-238	7/8		0.781	2.490 - 4.500	L	3.056	4.500^j	Y	Sample concentrations exceed background levels
Uranium*	7/8		2.366	7.0 - 15.0	N^i	8.000	11.00	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in ug/L.

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TABLE R.3-6

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATAER FROM RI/FS SAMPLING OF STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
GROSS ALPHA	3/3		^f	8.000 -21.000	N^i	13.667	21.000^j	Y	Positive detection with no reason for exclusion
GROSS BETA	2/2		^f	5.000 - 7.000	^h	^h	7.000^j	Y	Positive detection with no reason for exclusion
U-238	1/1		0.781	1.300 - 1.300	^h	^h	1.300^j	Y	Sample concentrations exceed background levels
Uranium*	4/4		2.366	2.0 - 24.0	N	13.00	24.00^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in ug/L.

TABLE R.3-7

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF SURFACE WATER COURSES OTHER THAN GMR, PADDYS RUN, AND THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
GROSS ALPHA	12/12		^f	8.000 -1300.0	L	287.83	1300.00^j	Y	Positive detection with no reason for exclusion
GROSS BETA	12/12		^f	9.000 -1100.0	L	155.33	755.168	Y	Positive detection with no reason for exclusion
RA-226	5/32		^f	1.100 -16.300	L	0.644	0.799	Y	Positive detection with no reason for exclusion
RA-228	3/32		^f	4.200 -127.20	L	1.893	2.451	Y	Positive detection with no reason for exclusion
TC-99	6/15		^f	36.900 -206.00	L	29.276	44.650	Y	Positive detection with no reason for exclusion
U-234	15/15		0.781	1.600 -653.00	L	171.29	653.000^j	Y	Sample concentrations exceed background levels
U-235/236	12/15		0.035	1.600 -51.500	L	12.480	51.500^j	Y	Sample concentrations exceed background levels
U-238	15/15		0.781	2.900 -2840.0	L	499.31	2840.00^j	Y	Sample concentrations exceed background levels
Uranium*	32/32		2.366	8.0 - 9318	L	3036.0	9318.0^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in ug/L.

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TABLE R.3-8

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF WASTE PIT 4

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TC-99	1/1		^f	190.00 -190.00	^h	^h	190.000^j	Y	Positive detection with no reason for exclusion
TH-230	1/1		^f	0.200 - 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
U-234	1/1		0.781	3400.0 -3400.0	^h	^h	3400.00^j	Y	Sample concentrations exceed background levels
U-235	1/1		0.035	220.00 -220.00	^h	^h	220.000^j	Y	Sample concentrations exceed background levels
U-238	1/1		0.781	11400 - 11400	^h	^h	11400.0^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-9

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF WASTE PIT 5

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	2/2		^f	51.000 -90.000	^h	^h	90.000^j	Y	Positive detection with no reason for exclusion
SR-90	2/2		^f	41.000 -47.000	^h	^h	47.000^j	Y	Positive detection with no reason for exclusion
TC-99	2/2		^f	240.00 -320.00	^h	^h	320.000^j	Y	Positive detection with no reason for exclusion
TH-230	2/2		^f	0.100 - 0.100	^h	^h	0.100^j	Y	Positive detection with no reason for exclusion
U-234	2/2		0.781	410.00 -420.00	^h	^h	420.000^j	Y	Sample concentrations exceed background levels
U-235	2/2		0.035	18.000 -19.000	^h	^h	19.000^j	Y	Sample concentrations exceed background levels
U-238	2/2		0.781	370.00 -400.00	^h	^h	400.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-10

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF WASTE PIT 6

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-228	4/4		^f	4.000 -13.000	N	7.500	12.057	Y	Positive detection with no reason for exclusion
TC-99	4/4		^f	420.00 -600.00	N	535.00	600.000^j	Y	Positive detection with no reason for exclusion
TH-230	4/4		^f	0.100 - 0.300	N^i	0.175	0.288	Y	Positive detection with no reason for exclusion
U-234	4/4		0.781	22.000 -77.000	N^i	59.250	77.000^j	Y	Sample concentrations exceed background levels
U-235	4/4		0.035	1.500 - 9.000	N	5.875	9.000^j	Y	Sample concentrations exceed background levels
U-238	4/4		0.781	120.00 -460.00	L	296.92	460.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-11

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF THE CLEAR WELL

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	2/2		^f	1.100 - 1.100	^h	^h	1.100^j	Y	Positive detection with no reason for exclusion
RA-228	2/2		^f	11.000 -12.000	^h	^h	12.000^j	Y	Positive detection with no reason for exclusion
TC-99	2/2		^f	2000.0 -4000.0	^h	^h	4000.00^j	Y	Positive detection with no reason for exclusion
TH-230	1/2		^f	0.400 - 0.400	^h	^h	0.400^j	Y	Positive detection with no reason for exclusion
U-234	2/2		0.781	1800.0-1900.0	^h	^h	1900.00^j	Y	Sample concentrations exceed background levels
U-235	2/2		0.035	110.00 -120.00	^h	^h	120.000^j	Y	Sample concentrations exceed background levels
U-238	2/2		0.781	5400.0 -6200.0	^h	^h	6200.00^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-12

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF GMR UPSTREAM OF THE CONFLUENCE WITH THE FEMP MAIN EFFLUENT LINE

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Ammonia	6/6		^f	0.100 - 1.900	L	0.286	0.854	Y	Positive detection with no reason for exclusion
Barium	2/2		^f	0.049 - 0.050	^h	^h	0.050^j	Y	Positive detection with no reason for exclusion
Cadmium	2/2		^f	0.003 - 0.010	^h	^h	0.010^j	Y	Positive detection with no reason for exclusion
Calcium	2/2		^f	61.200 -63.400	^h	^h	63.400^j	N	Common dietary element
Chloride	6/6		^f	17.990 -325.00	N	139.66	232.923	N	Ubiquitous compound
Chromium	1/2		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Copper	2/2		^f	0.009 - 0.012	^h	^h	0.012^j	Y	Positive detection with no reason for exclusion
Fluoride	6/6		^f	0.260 - 0.900	N^i	0.672	0.900^j	N	Ubiquitous compound
Iron	2/2		^f	0.164 - 0.216	^h	^h	0.216^j	N	Common dietary element
Lead	2/2		^f	0.002 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Magnesium	2/2		^f	21.400 -21.500	^h	^h	21.500^j	N	Common dietary element
Manganese	2/2		^f	0.009 - 0.010	^h	^h	0.010^j	Y	Positive detection with no reason for exclusion
Mercury	2/2		^f	0.001 - 0.010	^h	^h	0.010^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/2		^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Nickel	2/2		^f	0.011 - 0.013	^h	^h	0.013^j	Y	Positive detection with no reason for exclusion
Nitrate	6/6		^f	0.400 - 8.270	N	3.708	6.328	Y	Positive detection with no reason for exclusion
Phenols	3/6		^f	0.010 - 0.010	N	0.008	0.010	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphate	2/2		^f	1.100 - 3.900	^h	^h	3.900^j	N	Ubiquitous compound
Phosphorus (black, white, red	4/4		^f	0.299 - 0.900	L	0.489	0.878	N	Ubiquitous compound
Potassium	2/2		^f	2.300 - 2.990	^h	^h	2.990^j	N	Common dietary element
Sodium	2/2		^f	12.900 -13.500	^h	^h	13.500^j	N	Common dietary element
Sulfate	6/6		^f	78.220 -4310.0	L	203.59	708.105	N	Ubiquitous compound
Total Kjeldahl Nitrogen	2 /2		^f	1.480 - 1.840	^h	^h	1.840^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	2/2		^f	18.500 -25.700	^h	^h	25.700^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	4/6		^f	0.019 - 0.190	N^i	0.068	0.126	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	6/6		^f	0.200 - 1.730	N	0.915	1.373	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

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^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-13

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF GMR BETWEEN THE CONFLUENCE WITH THE EFFLUENT LINE AND THE CONFLUENCE WITH PADDYS RUN

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Ammonia	7/10		^f	0.188 - 1.400	N	0.502	0.799	Y	Positive detection with no reason for exclusion
Arsenic	1/3		^f	0.002 - 0.002	N	0.001	0.002^j	Y	Positive detection with no reason for exclusion
Barium	3/3		^f	0.048 - 0.049	N	0.048	0.049^j	Y	Positive detection with no reason for exclusion
Cadmium	3/3		^f	0.003 - 0.003	N	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Calcium	3/3		^f	60.600 -61.900	N	61.100	61.900^j	N	Common dietary elemtent
Chloride	10/10		^f	16.000 -252.00	N	111.70	154.713	N	Ubiquitous compound
Chromium	1/3		^f	0.004 - 0.004	N^i	0.002	0.004^j	Y	Positive detection with no reason for exclusion
Copper	3/3		^f	0.010 - 0.014	N	0.011	0.014^j	Y	Positive detection with no reason for exclusion
Fluoride	10/10		^f	0.290 - 0.900	N^i	0.688	0.845	N	Ubiquitous compound
Iron	3/3		^f	0.175 - 0.194	N	0.186	0.194^j	N	Common dietary element
Lead	3/3		^f	0.002 - 0.003	N	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Magnesium	3/3		^f	21.200 -21.400	N	21.300	21.400^j	N	Common dietary element
Manganese	3/3		^f	0.008 - 0.009	N	0.009	0.009^j	Y	Positive detection with no reason for exclusion
Mercury	1/3		^f	0.001 - 0.001	L	0.000	0.001^j	Y	Positive detection with no reason for exclusion
Nickel	3/3		^f	0.011 - 0.011	N	0.011	0.011^j	Y	Positive detection with no reason for exclusion
Nitrate	10/10		^f	0.400 - 7.680	L	3.340	7.680^j	Y	Positive detection with no reason for exclusion
Phenols	5/10		^f	0.010 - 0.030	N^i	0.012	0.017	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphate	3/3		^f	0.560 - 1.100	N^i	0.887	1.100^j	N	Ubiquitous compound
Phosphorus (black, white, red	7/7		^f	0.050 - 0.386	N	0.222	0.332	N	Ubiquitous compound
Potassium	3/3		^f	2.090 - 2.270	N	2.207	2.270^j	N	Common dietary element
Sodium	3/3		^f	12.200 -13.200	N	12.700	13.200^j	N	Common dietary element
Sulfate	10/10		^f	81.000 -132.00	N	103.65	112.669	N	Ubiquitous compound
Total Kjeldahl Nitrogen	3/3		^f	1.250 - 1.475	N	1.356	1.475^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	4/4		^f	19.500 -22.700	N	21.313	22.700^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	7/10		^f	0.018 - 0.160	L	0.061	0.131	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	9/10		^f	0.100 - 1.375	N	0.700	0.994	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.3-14

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF GMR DOWNSTREAM OF THE CONFLUENCE WITH PADDYS RUN

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
								Y	Positive detection with no
Ammonia	5/6		^f	0.200 - 0.800	N	0.460	0.712	Y	Positive detection with no reason for exclusion
Barium	2/2		^f	0.038 - 0.038	^h	^h	0.038^j	Y	Positive detection with no reason for exclusion
Cadmium	2/2		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Calcium	2/2		^f	48.600 -49.200	^h	^h	49.200^j	N	Common dietary element
Chloride	6/6		^f	10.000 -154.00	L	59.340	154.000^j	N	Ubiquitous Compound
Copper	2/2		^f	0.006 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Fluoride	6/6		^f	0.250 - 0.900	L	0.564	0.900^j	N	Ubiquitous Compound
Iron	2/2		^f	0.410 - 0.522	^h	^h	0.522^j	N	Common dietary element
Lead	2/2		^f	0.005 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Magnesium	2/2		^f	16.400 -16.500	^h	^h	16.500^j	N	Common dietary element
Manganese	2/2		^f	0.011 - 0.012	^h	^h	0.012^j	Y	Positive detection with no reason for exclusion
Mercury	2/2		^f	0.001 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Nickel	1/2		^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Nitrate	4/6		^f	0.800 - 4.120	N	2.180	3.604	Y	Positive detection with no reason for exclusion
Phenols	1/6		^f	0.020 - 0.020	N	0.008	0.013	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphate	2/2		^f	2.300 - 4.900	^h	^h	4.900^j	N	Ubiquitous Compound
Phosphorus (black, white, red	4/4		^f	0.050 - 1.340	N^i	0.900	1.340^j	N	Ubiquitous Compound
Potassium	2/2		^f	2.170 - 2.260	^h	^h	2.260^j	N	Common dietary element
Selenium	1/2		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Sodium	2/2		^f	12.800 -13.200	^h	^h	13.200^j	N	Common dietary element
Sulfate	6/6		^f	87.000 -191.90	N^i	134.43	172.139	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	2/2		^f	2.615 - 3.124	^h	^h	3.124^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	2/2		^f	19.000 -21.200	^h	^h	21.200^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	4/6		^f	0.016 - 0.110	N	0.046	0.075	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	4/6		^f	1.000 - 2.707	N	1.189	2.076	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.3-15

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF PADDYS RUN BETWEEN FEMP NORTHERN PROPERTY BOUNDARY AND THE CONFLUENCE WITH THE STORM SEWER OUTFALL DITCH

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	3/5		^f	0.076 - 0.451	L	0.086	0.257	N	Ubiquitous compound
Ammonia	3/6		^f	0.100 - 0.452	N^i	0.185	0.343	Y	Positive detection with no reason for exclusion
Antimony	1/2		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Arsenic	1/6		^f	0.019 - 0.019	L	0.002	0.004	Y	Positive detection with no reason for exclusion
Barium	6/6		^f	0.029 - 0.066	N	0.046	0.057	Y	Positive detection with no reason for exclusion
Beryllium	2/2		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Cadmium	5/6		^f	0.003 - 0.003	N	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Calcium	6/6		^f	45.200 -87.400	N	66.700	81.572	N	Common dietary element
Chloride	6/6		^f	9.210 -19.990	N	13.578	17.081	N	Ubiquitous compound
Chromium	5/6		^f	0.014 - 0.026	N	0.018	0.025	Y	Positive detection with no reason for exclusion
Copper	2/6		^f	0.010 - 0.015	N	0.007	0.011	Y	Positive detection with no reason for exclusion
Diethyl phthalate	1/2		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Fluoride	6/6		^f	0.180 - 0.230	N	0.212	0.227	N	Ubiquitous compound
Iron	6/6		^f	0.024 - 0.556	L	0.109	0.345	N	Common dietary element
Lead	4/6		^f	0.002 - 0.009	L	0.003	0.006	Y	Positive detection with no reason for exclusion
Magnesium	6/6		^f	9.970 -20.900	L	15.745	20.391	N	Common dietary element
Manganese	6/6		^f	0.009 - 0.028	N^i	0.018	0.025	Y	Positive detection with no reason for exclusion
Mercury	2/6		^f	0.0003 - 0.0003	N	0.00017	0.00027	Y	Positive detection with no reason for exclusion
Molybdenum	1/6		^f	0.021 - 0.021	N	0.008	0.014	Y	Positive detection with no reason for exclusion
N-Nitrosodiphenylamine	1/2		^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Nickel	1/6		^f	0.025 - 0.025	N	0.013	0.018	Y	Positive detection with no reason for exclusion
Nitrate	6/6		^f	2.120 -12.100	L	4.270	7.803	Y	Positive detection with no reason for exclusion
Phenols	1/6		^f	0.020 - 0.020	N	0.008	0.013	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus (black, white, red	4/5		^f	0.140 - 0.482	N	0.211	0.378	N	Ubiquitous compound
Potassium	6/6		^f	1.680 - 3.190	N^i	2.722	3.165	N	Common dietary element
Selenium	1/6		^f	0.017 - 0.017	L	0.002	0.005	Y	Positive detection with no reason for exclusion
Silicon	3/3		^f	2.250 - 4.610	N^i	3.777	4.610^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Silver	2/6		^f	0.012 - 0.013	N^i	0.006	0.010	Y	Positive detection with no reason for exclusion
Sodium	6/6		^f	5.903 -10.400	N^i	8.894	10.218	N	Common dietary element
Sulfate	6/6		^f	37.000 -57.360	N	46.143	52.431	N	Ubiquitous compound

Total Kjeldahl Nitrogen	4/4		^f	0.347 - 1.810	N^i	1.232	1.810^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	2/4		^f	4.110 - 5.590	L	1.548	5.590^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	2/4		^f	0.010 - 0.031	N^i	0.013	0.027	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	6/6		^f	0.347 - 1.360	N^i	0.830	1.189	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	4/5		^f	0.011 - 0.018	N	0.012	0.016	Y	Positive detection with no reason for exclusion
Zinc	2/2		^f	0.011 - 0.037	^h	^h	0.037^j	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	1/2	*	^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-16

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF PADDYS RUN DOWNSTREAM OF THE CONFLUENCE WITH THE STORM SEWER OUTFALL DITCH

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	2/4		^f	0.071 - 0.071	N	0.051	0.071^j	N	Ubiquitous compound
Ammonia	1/5		^f	0.163 - 0.163	N	0.073	0.121	Y	Positive detection with no reason for exclusion
Arsenic	2/4		^f	0.002 - 0.003	N	0.002	0.003	Y	Positive detection with no reason for exclusion
Barium	4/4		^f	0.037 - 0.047	N	0.043	0.047^j	Y	Positive detection with no reason for exclusion
Cadmium	3/4		^f	0.004 - 0.005	N	0.004	0.005^j	Y	Positive detection with no reason for exclusion
Calcium	4/4		^f	84.700 -97.200	N	91.275	97.200^j	N	Common dietary element
Chloride	5/5		^f	9.160 -19.100	N^i	14.702	18.890	N	Ubiquitous compound
Chromium	3/4		^f	0.017 - 0.020	N	0.015	0.020^j	Y	Positive detection with no reason for exclusion
Copper	2/4		^f	0.012 - 0.012	N	0.009	0.012^j	Y	Positive detection with no reason for exclusion
Fluoride	5/5		^f	0.210 - 0.300	N	0.251	0.294	N	Ubiquitous compound
Iron	4/4		^f	0.015 - 0.029	N^i	0.023	0.029^j	N	Common dietary element
Lead	2/4		^f	0.003 - 0.007	L	0.002	0.007	Y	Positive detection with no reason for exclusion
Magnesium	4/4		^f	20.500 -23.600	N	22.250	23.600^j	N	Common dietary element
Manganese	4/4		^f	0.008 - 0.032	N	0.021	0.032^j	Y	Positive detection with no reason for exclusion
Mercury	1/4		^f	0.0002 - 0.0002	N	0.00012	0.00019	Y	Positive detection with no reason for exclusion
Nitrate	5/5		^f	2.280 -11.300	L	3.907	7.483	Y	Positive detection with no reason for exclusion
Phenols	1/5		^f	0.020 - 0.020	N	0.008	0.014	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus (black, white, red	5/5		^f	0.032 - 0.390	N	0.166	0.298	N	Ubiquitous compound
Potassium	4/4		^f	1.550 - 2.990	N	2.235	2.932	N	Common dietary element
Silicon	4/4		^f	1.730 - 4.650	L	3.443	4.650^j	N	Ubiquitous compound
Silver	3/4		^f	0.011 - 0.019	N	0.014	0.019^j	Y	Positive detection with no reason for exclusion
Sodium	4/4		^f	9.880 -10.500	N	10.103	10.433	N	Common dietary element
Sulfate	5/5		^f	28.570 -57.360	N	43.542	53.708	N	Ubiquitous compound
Total Kjeldahl Nitrogen	2/2		^f	0.347 - 1.140	^h	^h	1.140^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	4/4		^f	3.741 - 5.060	N	4.360	5.060^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	5/5		^f	0.200 - 0.977	L	0.381	0.714	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
bis(2-Ethylhexyl) phthalate	1/1	*	^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

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^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.3-17

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF STORM SEWER OUTFALL DITCH

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	1/1		^f	0.087 - 0.087	^h	^h	0.087^j	N	Ubiquitous compound
Ammonia	2/2		^f	0.126 - 0.162	^h	^h	0.162^j	Y	Positive detection with no reason for exclusion
Barium	2/2		^f	0.027 - 0.040	^h	^h	0.040^j	Y	Positive detection with no reason for exclusion
Calcium	2/2		^f	39.000 -72.300	^h	^h	72.300^j	N	Common dietary element
Chloride	2/2		^f	29.000 -34.000	^h	^h	34.000^j	N	Ubiquitous compound
Chromium	1/2		^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Copper	1/2		^f	0.011 - 0.011	^h	^h	0.011^j	Y	Positive detection with no reason for exclusion
Fluoride	2/2		^f	0.190 - 0.210	^h	^h	0.210^j	N	Ubiquitous compound
Iron	2/2		^f	0.066 - 0.292	^h	^h	0.292^j	N	Common dietary element
Lead	2/2		^f	0.002 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Magnesium	2/2		^f	19.900 -107.00	^h	^h	107.000^j	N	Common dietary element
Manganese	2/2		^f	0.008 - 0.010	^h	^h	0.010^j	Y	Positive detection with no reason for exclusion
Mercury	1/2		^f	0.0003 - 0.0003	^h	^h	0.0003^j	Y	Positive detection with no reason for exclusion
Nitrate	2/2		^f	0.710 - 5.440	^h	^h	5.440^j	Y	Positive detection with no reason for exclusion
Phosphorus (black, white, red	2/2		^f	0.161 - 0.194	^h	^h	0.194^j	N	Ubiquitous compound
Potassium	2/2		^f	1.840 - 1.880	^h	^h	1.880^j	N	Common dietary element
Silicon	1/1		^f	3.890 - 3.890	^h	^h	3.890^j	N	Ubiquitous compound
Sodium	2/2		^f	14.600 -138.00	^h	^h	138.000^j	N	Common dietary element
Sulfate	2/2		^f	47.600 -51.300	^h	^h	51.300^j	N	Ubiquitous compound
Total Kjeldahl Nitrogen	2/2		^f	0.691 - 0.977	^h	^h	0.977^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	2/2		^f	0.565 - 0.815	^h	^h	0.815^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected

concentration is substituted.

TABLE R.3-18

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM RI/FS SAMPLING OF SURFACE WATER COURSES OTHER THAN GMR, PADDYS RUN, AND THE STORM SEWER OUTFALL DITCH

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	4/4	*	^f	0.001 - 0.004	N	0.003	0.004^j	Y	Positive detection with no reason for exclusion
Aluminum	4/4		^f	0.161 - 0.395	N	0.293	0.395^j	N	Ubiquitous compound
Ammonia	4/7		^f	0.121 - 0.188	N	0.111	0.155	Y	Positive detection with no reason for exclusion
Arsenic	2/7		^f	0.007 - 0.046	L	0.002	0.007	Y	Positive detection with no reason for exclusion
Barium	7/7		^f	0.027 - 0.063	N	0.051	0.060	Y	Positive detection with no reason for exclusion
Beryllium	4/4		^f	0.001 - 0.002	N^i	0.001	0.002^j	Y	Positive detection with no reason for exclusion
Cadmium	5/7		^f	0.002 - 0.006	N	0.003	0.005	Y	Positive detection with no reason for exclusion
Calcium	7/7		^f	38.300 -89.000	N	68.400	82.074	N	Common dietary element
Chloride	7/7		^f	3.500 -60.000	L	22.071	60.000^j	N	Ubiquitous compound
Chromium	6/7		^f	0.016 - 0.053	N	0.025	0.038	Y	Positive detection with no reason for exclusion
Cobalt	4/4		^f	0.002 - 0.014	N	0.008	0.014^j	Y	Positive detection with no reason for exclusion
Copper	7/7		^f	0.008 - 0.031	N	0.019	0.024	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	2/4		^f	0.003 - 0.003	N^i	0.004	0.003^j	Y	Positive detection with no reason for exclusion
Diethyl phthalate	1/4		^f	0.003 - 0.003	N^i	0.005	0.003^j	Y	Positive detection with no reason for exclusion
Fluoride	7/7		^f	0.140 - 0.850	N	0.580	0.791	N	Ubiquitous compound
Iron	7/7		^f	0.048 - 0.334	N	0.190	0.268	N	Common dietary element
Lead	2/7		^f	0.008 - 0.036	L	0.002	0.007	Y	Positive detection with no reason for exclusion
Magnesium	7/7		^f	10.100 -268.00	L	74.443	268.000^j	N	Common dietary element
Manganese	7/7		^f	0.002 - 0.158	N	0.080	0.124	Y	Positive detection with no reason for exclusion
Mercury	5/7		^f	0.0002 - 0.001	N	0.0005	0.0008	Y	Positive detection with no reason for exclusion
Methylene chloride	1/4	•	^f	0.001 - 0.001	N^i	0.002	0.001^j	Y	Positive detection with no reason for exclusion
Molybdenum	5/7		^f	0.006 - 0.063	L	0.011	0.034	Y	Positive detection with no reason for exclusion
Nickel	7/7		^f	0.008 - 0.020	N	0.014	0.017	Y	Positive detection with no reason for exclusion
Nitrate	7/7		^f	0.120 -10.900	L	3.633	10.900^j	Y	Positive detection with no reason for exclusion
Phosphorus (black, white, red	7/7		^f	0.110 - 1.100	L	0.543	1.100^j	N	Ubiquitous compound
Potassium	7/7		^f	1.520 - 3.850	L	2.563	3.377	N	Common dietary element
Selenium	2/7		^f	0.004 - 0.029	L	0.002	0.005	Y	Positive detection with no reason for exclusion
Sodium	7/7		^f	1.990 -87.800	L	32.760	87.800^j	N	Common dietary element
Sulfate	7/7		^f	36.800 -327.00	N	165.69	236.349	N	Ubiquitous compound
Total Kjeldahl Nitrogen	7/7		^f	0.709 - 2.030	L	1.219	1.811	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

Total Organic Halides	5/7		^f	0.015 - 0.029	N	0.021	0.025	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	7/7		^f	0.624 - 1.880	L	1.130	1.678	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	4/4		^f	0.013 - 0.028	N	0.021	0.028^j	Y	Positive detection with no reason for exclusion
Zinc	4/4		^f	0.010 - 0.033	N	0.020	0.032	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	4/4	*	^f	0.003 - 0.004	N	0.004	0.004^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-19

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF WASTE PIT 4

Chemical	Frequency of Detection	Highest Blank[a] (mg/l)	Upper 95% TL for BKG^b (mg/l)	Range of Detection (mg/l)	Dist.^c	Mean^d (mg/l)	Upper 95% CI on Mean^e (mg/l)	Include? Y-YES N-NO	Reason for Inclusion/ Exclusion
1,1-dichloroethene	1/1		^f	0.006- 0.006	^h	^h	0.006[j]	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.017- 0.017	^h	^h	0.017[j]	Y	Positive detection with no reason for exclusion
Aluminum	1/1		^f	1.290- 1.290	^h	^h	1.290[j]	N	Ubiguitous compound
Arsenic, soluble	1/1		^f	0.010- 0.010	d	^h	0.010[j]	Y	Positive detection with no reason for exclusion
Bicarbonate	1/1		^f	268.00-268.00	^h	^h	268.000[j]	N	Ubiquitous compound
Bis(2-ethylhexyl)phthalate	1/1		^f	0.004- 0.004	^h	^h	0.004[j]	Y	Positive detection with no reason for exclusion
Calcium	1/1		^f	22.877-22.877	^h	^h	22.877[j]	N	Common dietary element
Carbonate	1/1		^f	216.00-216.00	^h	^h	216.000[j]	N	Ubiquitous compound
Chloride	1/1		^f	502.21-502.21	^h	^h	502.210[j]	N	Ubiquitous compound
Copper	1/1		^f	0.046- 0.046	^h	^h	0.046[j]	Y	Positive detection with no reason for exclusion
Fluoride	1/1		^f	19.040-19.040	^h	^h	19.040[j]	N	Ubiquitous compound
Iron	1/1		^f	0.666- 0.666	^h	^h	0.666[j]	N	Common dietary element
Magnesium	1/1		^f	53.792-53.792	^h	^h	53.792[j]	N	Common dietary element
Manganese	1/1		^f	0.051- 0.051	^h	^h	0.051[j]	Y	Positive detection with no reason for exclusion
Methylene chloride	1/1		^f	0.004- 0.004	^h	^h	0.004[j]	Y	Positive detection with no reason for exclusion
Phenol	1/1		^f	0.005- 0.005	^h	^h	0.005[j]	Y	Positive detection with no reason for exclusion
Phosphate	1/1		^f	0.270- 0.270	^h	^h	0.270[j]	N	Ubiquitous compound
Potassium	1/1		^f	230.00-230.00	^h	^h	230.000[j]	N	Common dietary element
Sodium	1/1		^f	208.22-208.22	^h	^h	208.219[j]	N	Common dietary element
Sulfate	1/1		^f	67.740-67.740	^h	^h	67.740[j]	N	Ubiquitous compound
Vanadium	1/1		^f	0.059- 0.059	^h	^h	0.059[j]	Y	Positive detection with no reason for exclusion

[a]If blank data are available.
[b]Upper 95% tolerance level for background data with a 95% level of confidence.
[c]Background data are either not available or inappropriate.
[d]Not applicable if sample size ≤ 2.
[e]If the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
[f]If the distribution is normal or is the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% CI on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
[g]If the upper 95% confidence interval on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

*Distribution could not be determined from available data; therefore, a normal distribution was assumed.
**If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data and a histogram.

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TABLE R.3-20

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF WASTE PIT 5

Chemical	Frequency of Detection	Highest Blank[a] (mg/l)	Upper 95% TL for BKG[b] (mg/l)	Range of Detects	Distri-bution[c]	Mean[d] (mg/l)	Upper 95% CI on Mean[e] (mg/l)	Include?	Reason
Acetone	2/2	0.009	^f	0.007- 0.009	^h	^h	0.009[j]	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
Benzene	1/1		^f	0.011- 0.011	^h	^h	0.011[j]	Y	Positive detection with no reason for exclusion
Bicarbonate	2/2		^f	20.000-52.000	^h	^h	52.000[j]	N	Ubiquitous compound
Calcium	2/2		^f	177.71-183.83	^h	^h	183.830[j]	N	Common dietary element
Carbonate	2/2		^f	40.000-40.000	^h	^h	40.000[j]	N	Ubiquitous compound
Chloride	2/2		^f	244.34-244.34	^h	^h	244.340[j]	N	Ubiquitous compound
Cyanide	2/2		^f	0.067- 0.087	^h	^h	0.087[j]	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	2/2		^f	0.001- 0.001	^h	^h	0.001[j]	Y	Positive detection with no reason for exclusion
Fluoride	1/1		^f	10.120-10.120	^h	^h	10.120[j]	N	Ubiquitous compound
Magnesium	2/2		^f	386.04-387.36	^h	^h	387.360[j]	N	Common dietary element
Methylene chloride	2/2	0.001	^f	0.001- 0.002	^h	^h	0.002[j]	N	Common laboratory contaminant maximum detection ≤ 10 X highest blank concentration
Nitrate/nitrite	2/2		^f	1160.8-1394.9	^h	^h	1394.85[j]	Y	Positive detection with no reason for exclusion
Phosphate	2/2		^f	0.330- 0.330	^h	^h	0.330[j]	N	Ubiquitous compound
Potassium	2/2		^f	48.000-92.000	^h	^h	92.000[j]	N	Common dietary element
Sodium	2/2		^f	1150.0-1320.0	^h	^h	1320.00[j]	N	Common dietary element
Sulfate	3/3		^f	100.32-102.11	N^i	100.92	102.110[j]	N	Ubiquitous compound
Toluene	1/1		^f	0.001- 0.001	^h	^h	0.001[j]	Y	Positive detection with no reason for exclusion
Zinc	1/1		^f	0.094- 0.094	^h	^h	0.094[j]	Y	Positive detection with no reason for exclusion

[a]If blank data are available.
[b]Upper 95% tolerance level for background data with a 95% level of confidence.
[c]Background data are either not available or inappropriate.
[d]Not applicable if sample size ≤ 2.
[e]If the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
[f]If the distribution is normal or is the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% CI on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
[g]If the upper 95% confidence interval on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

*Distribution could not be determined from available data; therefore, a normal distribution was assumed.
**If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data and a histogram.

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TABLE R.3-21

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF WASTE PIT 6

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	1/1		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Aluminum	4/4		^f	0.283 - 0.492	N^i	0.420	0.492^j	N	Ubiquitous compound
Bis(2-ethylhexyl)phthalate	2/2		^f	0.004 - 0.010	^h	^h	0.010^j	Y	Positive detection with no reason for exclusion
Calcium	5/5		^f	62.810 -111.07	N^i	95.146	111.070^j	N	Common dietary element
Chloride	5/5		^f	149.19 -207.63	N^i	166.58	190.660	N	Ubiquitous compound
Chlorobenzene	1/1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Chloroform	4/4		^f	0.002 - 0.003	N^i	0.002	0.003	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	2/2		^f	0.001 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Fluoride	1/1		^f	10.620 -10.620	^h	^h	10.620^j	N	Ubiquitous compound
Magnesium	5/5		^f	0.664 - 5.483	N^i	1.673	3.704	N	Common dietary element
Mercury	1/1		^f	0.00025 - 0.00025	^h	^h	0.00025^j	Y	Positive detection with no reason for exclusion
Methylene chloride	4/4		^f	0.002 - 0.004	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Nitrate	1/1		^f	29.520 -29.520	^h	^h	29.520^j	Y	Positive detection with no reason for exclusion
Nitrate/nitrite	4/4		^f	10.550 -20.290	N^i	17.090	20.290^j	Y	Positive detection with no reason for exclusion
Phosphate	3/3		^f	0.020 - 0.020	N	0.020	0.020	N	Ubiquitous compound
Potassium	5/5		^f	26.000 -42.000	N^i	36.800	42.000^j	N	Common dietary element
Sodium	5/5		^f	90.000 -114.00	N^i	96.000	105.723	N	Common dietary element
Sulfate	7/7		^f	54.520 -79.470	N^i	61.650	67.652	N	Ubiquitous compound
Tetrachloroethene	5/5		^f	0.001 - 0.002	N^i	0.002	0.002^j	Y	Positive detection with no reason for exclusion
Toluene	3/3		^f	0.001 - 0.002	N^i	0.001	0.002^j	Y	Positive detection with no reason for exclusion
Zinc, soluble	1/1		^f	0.114 - 0.114	^h	^h	0.114^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected

concentration is substituted.

TABLE R.3-22

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE WATER FROM CIS SAMPLING OF CLEAR WELL

Chemical	Frequency of Detection	Highest Blank[a] (mg/l)	Upper 95% TL for BKG[b] (mg/l)	Range of Detects	Distri-bution[c]	Mean[d] (mg/l)	Upper 95% CI on Mean[e] (mg/l)	Include?	Reason
2-nitrophenol	1/1		^f	0.004- 0.004	^h	^h	0.004[j]	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.005- 0.005	^h	^h	0.005[j]	Y	Positive detection with no reason for exclusion
Bis(2-ethylhexyl)phthalate	1/1		^f	0.004- 0.004	^h	^h	0.004[j]	Y	Positive detection with no reason for exclusion
Calcium	2/2		^f	84.810-536.35	^h	^h	536.350[j]	N	Common dietary element
Chloride	2/2		^f	164.47-195.65	^h	^h	195.650[j]	N	Ubiquitous compound
Chloroform	1/1		^f	0.007- 0.007	^h	^h	0.007[j]	Y	Positive detection with no reason for exclusion
Copper	1/1		^f	0.030- 0.030	^h	^h	0.030[j]	Y	Positive detection with no reason for exclusion
Cyanide	1/1		^f	0.087- 0.087	^h	^h	0.087[j]	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	1/1		^f	0.001- 0.001	^h	^h	0.001[j]	Y	Positive detection with no reason for exclusion
Fluoride	2/2		^f	4.930- 6.170	^h	^h	6.170[j]	N	Ubiquitous compound
Iron	2/2		^f	0.130- 0.295	^h	^h	0.295[j]	N	Common dietary element
Magnesium	2/2		^f	95.090-150.12	^h	^h	150.120[j]	N	Common dietary element
Manganese	1/1		^f	0.031- 0.031	^h	^h	0.031[j]	Y	Positive detection with no reason for exclusion
Mercury	2/2		^f	0.00031- 0.00072	^h	^h	0.00072[j]	Y	Positive detection with no reason for exclusion
Methylene chloride	2/2		^f	0.002- 0.002	^h	^h	0.002[j]	Y	Positive detection with no reason for exclusion
Nitrate nitrite	2/2		^f	219.52-265.59	^h	^h	265.590[j]	Y	Positive detection with no reason for exclusion
Phosphate	2/2		^f	0.230- 0.350	^h	^h	0.350[j]	N	Ubiquitous compound
Potassium	2/2		^f	30.000-50.000	^h	^h	50.000[j]	N	Common dietary element
Silver	1/1		^f	0.016- 0.016	^h	^h	0.016[j]	Y	Positive detection with no reason for exclusion
Sodium	2/2		^f	232.00-512.00	^h	^h	512.000[j]	N	Common dietary element
Sulfate	2/2		^f	125.00-133.60	^h	^h	133.600[j]	N	Ubiquitous compound

[a]If blank data are available.
[b]Upper 95% tolerance level for background data with a 95% level of confidence.
[c]Background data are either not available or inappropriate.
[d]Not applicable if sample size ≤ 2.
[e]If the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
[f]If the distribution is normal or is the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% CI on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
[g]If the upper 95% confidence interval on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

[h]Distribution could not be determined from available data; therefore, a normal distribution was assumed.
[j]If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data and a histogram.

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TABLE R.3-23

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF THE GREAT MIAMI RIVER UPSTREAM OF CONFLUENCE WITH THE MAIN FEMP EFFLUENT LINE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	6/6		2.200	0.400 - 0.700	N	0.507	0.600	N	Sample concentrations are within background levels
SR-90	2/6		^f	0.700 - 0.700	N	0.400	0.591	Y	Positive detection with no reason for exclusion
TH-230	3/6		2.100	0.700 - 1.900	N^i	0.883	1.513	N	Sample concentrations are within background levels
Thorium*	2/2		^f	2.000 - 3.000	^h	^h	3.000^j	Y	Positive detection with no reason for exclusion
U-234	1/6		2.100	0.600 - 0.600	N	0.350	0.451	N	Sample concentrations are within background levels
U-238	1/6		2.100	0.600 - 0.600	N	0.350	0.451	N	Sample concentrations are within background levels
Uranium*	4/4		3.230^g	1.000 - 3.000	N	2.000	2.961	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in mg/kg.

TABLE R.3-24

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF THE GREAT MIAMI RIVER BETWEEN ITS CONFLUENCE WITH THE MAIN FEMP EFFLUENT LINE AND PADDYS RUN

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	9/9		2.200	0.385 - 0.800	L	0.516	0.620	N	Sample concentrations are within background levels
RA-228	1/9		1.500	0.600 - 0.600	N	0.289	0.361	N	Sample concentrations are within background levels
SR-90	3/9		^f	0.600 - 0.800	N	0.411	0.565	Y	Positive detection with no reason for exclusion
TH-230	6/9		2.100	0.800 - 2.300	N	1.033	1.462	Y	Sample concentrations exceed background levels
Thorium*	3/3		^f	2.000 - 3.000	N	2.333	3.000^j	Y	Positive detection with no reason for exclusion
U-234	3/9		2.100	0.700 - 1.400	N	0.511	0.744	N	Sample concentrations are within background levels
U-238	3/9		2.100	0.600 - 1.100	N	0.478	0.661	N	Sample concentrations are within background levels
Uranium*	9/9		3.230^g	1.000 - 3.000	N	2.000	2.537	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are given in MG/KG.

TABLE R.3-25

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDEIMENT FROM RI/FS SAMPLING OF THE GREAT MIAMI RIVER DOWNSTREAM OF THE CONFLUENCE WITH PADDYS RUN

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	6/6		2.200	0.400 - 0.912	L	0.549	0.711	N	Sample concentrations are within background levels
SR-90	1/6		^f	0.600 - 0.600	N	0.308	0.426	Y	Positive detection with no reason for exclusion
TH-230	4/6		2.100	0.700 - 1.500	N^i	0.817	1.207	N	Sample concentrations are within background levels
Thorium*	2/2		^f	2.000 - 2.000	^h	^h	2.000^j	Y	Positive detection with no reason for exclusion
U-234	2/6		2.100	0.600 - 0.700	N	0.417	0.568	N	Sample concentrations are within background levels
U-238	2/6		2.100	0.700 - 0.900	N	0.467	0.685	N	Sample concentrations are within background levels
Uranium*	4/4		3.230^g	1.000 - 3.000	N	2.250	3.000^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in MG/KG.

TABLE R.3-26

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF PADDYS RUN UPSTREAM OF FEMP NORTHERN PROPERTY BOUNDARY

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
GROSS ALPHA	2/2		^f	7.000 -11.000	^h	^h	11.000^j	Y	Positive detection with no reason for exclusion
GROSS BETA	2/2		^f	11.000 -12.000	^h	^h	12.000^j	Y	Positive detection with no reason for exclusion
RA-226	3/3		2.200	0.400 - 0.500	N	0.433	0.500^j	N	Sample concentrations are within background levels
Uranium*	3/3		3.230^g	1.000 - 3.000	N^i	1.667	3.000^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in MG/KG.

TABLE R.3-27

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF PADDYS RUN BETWEEN THE FEMP NORTHERN BOUNDARY AND THE CONFLUENCE WITH THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
GROSS ALPHA	3/4		^f	9.000 -34.000	N	14.875	31.225	Y	Positive detection with no reason for exclusion
GROSS BETA	2/4		^f	10.000 -13.000	N	7.750	13.000^j	Y	Positive detection with no reason for exclusion
RA-226	6/6		2.200	0.400 - 1.000	N	0.700	0.895	N	Sample concentrations are within background levels
Uranium*	5/6		3.230^g	1.000 - 4.000	N	1.917	3.033	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in MG/KG.

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REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

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TABLE R.3-28

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS
SAMPLING OF PADDYS RUN DOWNSTREAM OF THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
GROSS ALPHA	1/1		^f	16.000 -16.000	^h	^h	16.000^j	Y	Positive detection with no reason for exclusion
RA-226	3/3		2.200	0.400 - 0.500	N^i	0.467	0.500^j	N	Sample concentrations are within background levels
TH-230	1/1		2.100	0.800 - 0.800	^h	^h	0.800^j	N	Sample concentrations are within background levels
Uranium*	3/3		3.230^g	1.000 - 3.000	N	2.000	3.000^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in MG/KG.

TABLE R.3-29

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM WESTINGHOUSE SAMPLING OF PADDYS RUN DOWNSTREAM OF THE CONFLUENCE WITH THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PU-238	12/53		^f	0.015 - 0.032	N^i	0.010	0.012	Y	Positive detection with no reason for exclusion
PU-239/240	13/53		^f	0.012 - 0.097	L	0.009	0.010	Y	Positive detection with no reason for exclusion
RA-224	52/53		1.500	0.111 - 0.923	L	0.436	0.512	N	Sample concentrations are within background levels
RA-226	46/53		2.200	0.113 - 1.260	N	0.492	0.546	N	Sample concentrations are within background levels
RA-228	45/53		1.500	0.078 - 1.000	L	0.384	0.437	N	Sample concentrations are within background levels
TC-99	1/53		^f	0.964 - 0.964	N	0.460	0.476	Y	Positive detection with no reason for exclusion
TH-228	2/53		1.500	4.480 - 6.550	L	0.547	0.608	Y	Sample concentrations exceed background levels
TH-230	8/52		2.100	1.120 -11.200	L	0.608	0.690	Y	Sample concentrations exceed background levels
TH-232	2/53		1.500	1.240 - 1.310	N	0.529	0.564	N	Sample concentrations are within background levels
U-234	6/53		2.100	1.010 - 3.590	N^i	0.655	0.778	Y	Sample concentrations exceed background levels
U-238	10/53		2.100	1.020 - 3.920	L	0.616	0.689	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-30

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS AND WESTINGHOUSE SAMPLING OF PADDYS RUN DOWNSTREAM OF THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
GROSS ALPHA	1/1	^f		16.000 -16.000	^h	^h	16.000^j	Y	Positive detection with no reason for exclusion
PU-238	12/54	^f		0.015 - 0.032	N^i	0.015	0.024	Y	Positive detection with no reason for exclusion
PU-239/240	13/54	^f		0.012 - 0.097	L	0.009	0.011	Y	Positive detection with no reason for exclusion
RA-224	52/53		1.500	0.111 - 0.923	L	0.436	0.512	N	Sample concentrations are within background levels
RA-226	49/56		2.200	0.113 - 1.260	N	0.490	0.541	N	Sample concentrations are within background levels
RA-228	45/56		1.500	0.078 - 1.000	L	0.376	0.426	N	Sample concentrations are within background levels
TC-99	1/54	^f		0.964 - 0.964	N	0.460	0.475	Y	Positive detection with no reason for exclusion
TH-228	2/54		1.500	4.480 - 6.550	L	0.541	0.601	Y	Sample concentrations exceed background levels
TH-230	10/54		2.100	0.800 -11.200	L	0.630	0.719	Y	Sample concentrations exceed background levels
TH-232	2/54		1.500	1.240 - 1.310	N	0.525	0.559	N	Sample concentrations are within background levels
U-234	6/54		2.100	1.010 - 3.590	N^i	0.649	0.770	Y	Sample concentrations exceed background levels
U-238	10/54		2.100	1.020 - 3.920	N^i	0.722	0.868	Y	Sample concentrations exceed background levels
URANIUM*	3/3		3.230	1.000 - 3.000	N^i	2.000	3.000^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.3-31

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/1		2.200	0.700 - 0.700	^h	^h	0.700^j	N	Sample concentrations are within background levels
TH-230	1/1		2.100	2.600 - 2.600	^h	^h	2.600^j	Y	Sample concentrations exceed background levels
U-234	1/1		2.100	2.700 - 2.700	^h	^h	2.700^j	Y	Sample concentrations exceed background levels
U-238	1/1		2.100	2.800 - 2.800	^h	^h	2.800^j	Y	Sample concentrations exceed background levels
Uranium*	1/1		3.230^g	9.000 - 9.000	^h	^h	9.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* units reported in MG/KG

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TABLE R.3-32

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM WESTINGHOUSE SAMPLING OF THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PU-238	10/24		^f	0.014 - 0.094	N	0.036	0.071	Y	Positive detection with no reason for exclusion
PU-239/240	11/24		^f	0.011 - 0.084	N	0.046	0.081	Y	Positive detection with no reason for exclusion
RA-224	24/24		1.500	0.285 - 1.900	L	0.698	0.854	Y	Sample concentrations exceed background levels
RA-226	24/24		2.200	0.387 - 2.350	L	0.758	0.874	Y	Sample concentrations exceed background levels
RA-228	21/24		1.500	0.280 - 2.020	L	0.649	0.836	Y	Sample concentrations exceed background levels
TH-228	4/24		1.500	1.090 - 1.150	N	0.602	0.684	N	Sample concentrations are within background levels
TH-230	12/24		2.100	1.160 - 3.390	N	1.222	1.536	Y	Sample concentrations exceed background levels
TH-232	3/24		1.500	1.010 - 1.100	N	0.571	0.639	N	Sample concentrations are within background levels
U-234	19/24		2.100	1.300 -19.300	L	4.158	7.810	Y	Sample concentrations exceed background levels
U-235/236	2/24		0.097	1.560 - 1.760	N	0.597	0.712	Y	Sample concentrations exceed background levels
U-238	19/24		2.100	1.410 -21.600	L	4.903	10.524	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.3-33

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS AND WESTINGHOUSE SAMPLING OF THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PU-238	10/25	^f		0.014 - 0.094	L	0.015	0.023	Y	Positive detection with no reason for exclusion
PU-239/240	11/25	^f		0.011 - 0.084	L	0.021	0.032	Y	Positive detection with no reason for exclusion
RA-224	24/24		1.500	0.285 - 1.900	L	0.698	0.854	Y	Sample concentrations exceed background levels
RA-226	25/25		2.200	0.387 - 2.350	L	0.756	0.865	Y	Sample concentrations exceed background levels
RA-228	21/25		1.500	0.280 - 2.020	L	0.633	0.812	Y	Sample concentrations exceed background levels
TH-228	4/25		1.500	1.090 - 1.150	N	0.590	0.671	N	Sample concentrations are within background levels
TH-230	13/25		2.100	1.160 - 3.390	N	1.277	1.592	Y	Sample concentrations exceed background levels
TH-232	3/25		1.500	1.010 - 1.100	N	0.560	0.628	N	Sample concentrations are within background levels
U-234	20/25		2.100	1.300 -19.300	L	4.099	7.451	Y	Sample concentrations exceed background levels
U-235/236	2/25		0.097	1.560 - 1.760	N	0.585	0.697	Y	Sample concentrations exceed background levels
U-238	20/25		2.100	1.410 -21.600	L	4.819	9.917	Y	Sample concentrations exceed background levels
Uranium*	1/1		3.230	9.000 - 9.000	^h	^h	9.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.3-34

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF SURFACE WATER COURSES OTHER THAN THE GREAT MIAMI RIVER, PADDYS RUN, AND THE STORM SEWER OUTFALL DITCH

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
GROSS ALPHA	7/7		^f	6.000 -41.000	L	18.143	36.305	Y	Positive detection with no reason for exclusion
GROSS BETA	7/7		^f	13.000 -109.00	L	36.143	78.348	Y	Positive detection with no reason for exclusion
RA-226	7/7		2.200	0.637 - 2.890	N^i	1.096	1.698	Y	Sample concentrations exceed background levels
RA-228	7/7		1.500	0.690 - 2.770	N^i	1.127	1.668	Y	Sample concentrations exceed background levels
Uranium*	7/7		3.230^g	4.530 -51.800	N	23.959	36.902	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in MG/KG.

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TABLE R.3-35

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM CIS SAMPLING OF SURFACE WATER COURSES OTHER THAN THE GREAT MIAMI RIVER AND PADDYS RUN

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	5/195	^f		0.400 - 1.100	N	0.439	0.511	Y	Positive detection with no reason for exclusion
PU-238	6/22	^f		0.100 - 0.300	N	0.107	0.143	Y	Positive detection with no reason for exclusion
PU-239/240	6/21	^f		0.100 - 0.300	N	0.098	0.130	Y	Positive detection with no reason for exclusion
RA-226	116/194		2.200	0.300 -15.700	L	1.375	1.571	Y	Sample concentrations exceed background levels
TC-99	11/22	^f		6.800 -17.000	L	5.882	17.000^j	Y	Positive detection with no reason for exclusion
TH-228	21/22		1.500	0.100 - 2.600	L	0.577	1.053	Y	Sample concentrations exceed background levels
TH-230	21/22		2.100	0.100 - 9.000	L	2.393	8.892	Y	Sample concentrations exceed background levels
TH-232	129/195		1.500	0.100 -21.400	L	2.083	2.578	Y	Sample concentrations exceed background levels
U-234	22/22		2.100	1.000 -133.00	L	45.982	133.000^j	Y	Sample concentrations exceed background levels
U-235	22/22		0.097	0.100 -33.000	N^i	9.402	13.958	Y	Sample concentrations exceed background levels
U-238	158/195		2.100	2.300 -761.00	N^i	105.63	124.535	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.3-36

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF PADDYS RUN UPSTREAM OF THE FEMP NORTHERN BOUNDARY

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	1/1	*	^f	0.018 - 0.018	^h	^h	0.018^j	Y	Positive detection with no reason for exclusion
Aluminum	1/1		108200	1970.0 -1970.0	^h	^h	1970.00^j	N	Sample concentrations are within background levels
Arsenic	1/1		20.500	7.000 - 7.000	^h	^h	7.000^j	N	Sample concentrations are within background levels
Barium	1/1		815.000	21.000 -21.000	^h	^h	21.000^j	N	Sample concentrations are within background levels
Beryllium	1/1		2.100	0.500 - 0.500	^h	^h	0.500^j	N	Sample concentrations are within background levels
Cadmium	1/1		11.100	3.700 - 3.700	^h	^h	3.700^j	N	Sample concentrations are within background levels
Calcium	1/1		41290.0	25900 - 25900	^h	^h	25900.0^j	N	Common dietary element Sample concentrations are within background levels
Chromium	1/1		102.700	18.300 -18.300	^h	^h	18.300^j	N	Sample concentrations are within background levels
Cobalt	1/1		21.000	4.900 - 4.900	^h	^h	4.900^j	N	Sample concentrations are within background levels
Copper	1/1		58.600	10.800 -10.800	^h	^h	10.800^j	N	Sample concentrations are within background levels
Di-n-butyl phthalate	1/1	*	^f	0.039 - 0.039	^h	^h	0.039^j	Y	Positive detection with no reason for exclusion
Iron	1/1		46200.0	6700.0 -6700.0	^h	^h	6700.00^j	N	Common dietary element Sample concentrations are within background levels
Lead	1/1		37.000	9.300 - 9.300	^h	^h	9.300^j	N	Sample concentrations are within background levels
Magnesium	1/1		15900.0	18700 - 18700	^h	^h	18700.0^j	N	Common dietary element
Manganese	1/1		1144.00	411.00 -411.00	^h	^h	411.000^j	N	Sample concentrations are within background levels
Methylene chloride	1/1	*	^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Nickel	1/1		39.000	13.700 -13.700	^h	^h	13.700^j	N	Sample concentrations are within background levels
Potassium	1/1		23800.0	307.00 -307.00	^h	^h	307.000^j	N	Common dietary element Sample concentrations are within background levels
Sodium	1/1		11400.0	197.00 -197.00	^h	^h	197.000^j	N	Common dietary element Sample concentrations are within background levels
Vanadium	1/1		172.000	12.400 -12.400	^h	^h	12.400^j	N	Sample concentrations are within background levels
Zinc	1/1		113.000	13.500 -13.500	^h	^h	13.500^j	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	1/1	*	^f	0.460 - 0.460	^h	^h	0.460^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

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^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

*Blank data exist, but have not yet been located.

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TABLE R.3-37

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF PADDYS RUN BETWEEN FEMP NORTHERN PROPERTY BOUNDARY AND THE CONFLUENCE WITH THE STORM SEWER OUTFALL DITCH

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	1/2	•	^f	0.008 - 0.008	^h	^h	0.008^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		108200	2080.0 -3920.0	^h	^h	3920.00^j	N	Sample concentrations are within background levels
Arsenic	2/2		20.500	2.700 - 6.500	^h	^h	6.500^j	N	Sample concentrations are within background levels
Barium	2/2		815.000	21.000 -31.200	^h	^h	31.200^j	N	Sample concentrations are within background levels
Beryllium	2/2		2.100	0.500 - 0.500	^h	^h	0.500^j	N	Sample concentrations are within background levels
Cadmium	2/2		11.100	3.900 - 4.500	^h	^h	4.500^j	N	Sample concentrations are within background levels
Calcium	2/2		41290.0	78700 -110000	^h	^h	110000^j	N	Common dietary element
Chromium	2/2		102.700	17.400 -18.400	^h	^h	18.400^j	N	Sample concentrations are within background levels
Cobalt	2/2		21.000	4.700 - 6.500	^h	^h	6.500^j	N	Sample concentrations are within background levels
Copper	2/2		58.600	11.700 -14.500	^h	^h	14.500^j	N	Sample concentrations are within background levels
Di-n-butyl phthalate	2/2	•	^f	0.051 - 0.055	^h	^h	0.055^j	Y	Positive detection with no reason for exclusion
Iron	2/2		46200.0	5940.0 -8830.0	^h	^h	8830.00^j	N	Common dietary element Sample concentrations are within background levels
Lead	2/2		37.000	4.600 -11.400	^h	^h	11.400^j	N	Sample concentrations are within background levels
Magnesium	2/2		15900.0	18300 - 26600	^h	^h	26600.0^j	N	Common dietary element
Manganese	2 /2		1144.00	362.00 -415.00	^h	^h	415.000^j	N	Sample concentrations are within background levels
Methylene chloride	1/2	*	^f	0.015 - 0.015	^h	^h	0.015^j	Y	Positive detection with no reason for exclusion
Nickel	2/2		39.000	16.400 -19.500	^h	^h	19.500^j	N	Sample concentrations are within background levels
Potassium	2/2		23800.0	366.00 -655.00	^h	^h	655.000^j	N	Common dietary element Sample concentrations are within background levels
Sodium	2/2		11400.0	180.00 -188.00	^h	^h	188.000^j	N	Common dietary element Sample concentrations are within background levels
Vanadium	2/2		172.000	13.700 -14.000	^h	^h	14.000^j	N	Sample concentrations are within background levels
Zinc	2/2		113.000	13.400 -24.400	^h	^h	24.400^j	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	2/2	*	^f	0.500 - 0.590	^h	^h	0.590^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram,

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and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

*Blank data exist, but have not yet been obtained.

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TABLE R.3-38

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF PADDYS RUN DOWNSTREAM OF THE STORM SEWER OUTFALL DITCH

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	1/1		^f	0.012 - 0.012	^h	^h	0.012^j	Y	Positive detection with no reason for exclusion
2-Hexanone	1/1		^f	0.011 - 0.011	^h	^h	0.011^j	Y	Positive detection with no reason for exclusion
Acetone	1/1	*	^f	0.014 - 0.014	^h	^h	0.014^j	Y	Positive detection with no reason for exclusion
Aluminum	1/1		108200	2480.0 -2480.0	^h	^h	2480.00^j	N	Sample concentrations are within background levels
Arsenic	1/1		20.500	2.600 - 2.600	^h	^h	2.600^j	N	Sample concentrations are within background levels
Barium	1/1		815.000	21.200 -21.200	^h	^h	21.200^j	N	Sample concentrations are within background levels
Beryllium	1/1		2.100	0.500 - 0.500	^h	^h	0.500^j	N	Sample concentrations are within background levels
Cadmium	1/1		11.100	5.500 - 5.500	^h	^h	5.500^j	N	Sample concentrations are within background levels
Calcium	1/1		41290.0	103000 -103000	^h	^h	103000^j	N	Common dietary element
Chromium	1/1		102.700	16.900 -16.900	^h	^h	16.900^j	N	Sample concentrations are within background levels
Cobalt	1/1		21.000	5.200 - 5.200	^h	^h	5.200^j	N	Sample concentrations are within background levels
Copper	1/1		58.600	11.500 -11.500	^h	^h	11.500^j	N	Sample concentrations are within background levels
Iron	1/1		46200.0	5600.0 -5600.0	^h	^h	5600.00^j	N	Common dietary element Sample concentrations are within background levels
Lead	1/1		37.000	4.600 - 4.600	^h	^h	4.600^j	N	Sample concentrations are within background levels
Magnesium	1/1		15900.0	35900 - 35900	^h	^h	35900.0^j	N	Common dietary element
Manganese	1/1		1144.00	273.00 -273.00	^h	^h	273.000^j	N	Sample concentrations are within background levels
Methylene chloride	1/1	*	^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Nickel	1/1		39.000	17.900 -17.900	^h	^h	17.900^j	N	Sample concentrations are within background levels
Potassium	1/1		23800.0	421.00 -421.00	^h	^h	421.000^j	N	Common dietary element Sample concentrations are within background levels
Sodium	1/1		11400.0	188.00 -188.00	^h	^h	188.000^j	N	Common dietary element Sample concentrations are within background levels
Vanadium	1/1		172.000	15.400 -15.400	^h	^h	15.400^j	N	Sample concentrations are within background levels
Zinc	1 /1		113.000	15.300 -15.300	^h	^h	15.300^j	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	1/1	*	^f	0.400 - 0.400	^h	^h	0.400^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

*Blank data exist, but have not yet been obtained.

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TABLE R.3-39

SELECTION OF CONSTITUENTS OF CONCERN FOR SEDIMENT FROM RI/FS SAMPLING OF SURFACE WATER COURSES OTHER THAN THE GREAT MIAMI RIVER, PADDYS RUN, AND THE STORM SEWER OUTFALL DITCH

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	2/2	*	^f	0.055 - 0.094	^h	^h	0.094^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		108200	5460.0 -8830.0	^h	^h	8830.00^j	N	Sample concentrations are within background levels
Ammonia	2/2		^f	50.400 -93.600	^h	^h	93.600^j	Y	Positive detection with no reason for exclusion
Arsenic	2/2		20.500	3.500 - 5.400	^h	^h	5.400^j	N	Sample concentrations are within background levels
Barium	2/2		815.000	49.400 -56.700	^h	^h	56.700^j	N	Sample concentrations are within background levels
Beryllium	2/2		2.100	0.200 - 0.400	^h	^h	0.400^j	N	Sample concentrations are within background levels
Calcium	2/2		41290.0	25200 - 63200	^h	^h	63200.0^j	N	Common dietary element
Chloride	2/2		^f	40.000 -230.00	^h	^h	230.000^j	N	Ubiquitous compound
Chromium	2/2		102.700	6.900 -12.500	^h	^h	12.500^j	N	Sample concentrations are within background levels
Cobalt	2/2		21.000	3.800 - 8.100	^h	^h	8.100^j	N	Sample concentrations are within background levels
Copper	2/2		58.600	9.200 -16.100	^h	^h	16.100^j	N	Sample concentrations are within background levels
Fluoride	2/2		^f	5.690 - 7.580	^h	^h	7.580^j	N	Ubiquitous compound
Iron	2/2		46200.0	10000 - 19000	^h	^h	19000.0^j	N	Common dietary element Sample concentrations are within background levels
Lead	2/2		37.000	12.000 -18.400	^h	^h	18.400^j	N	Sample concentrations are within background levels
Magnesium	2/2		15900.0	8580.0 - 21600	^h	^h	21600.0^j	N	Common dietary element
Manganese	2/2		1144.00	399.00 -500.00	^h	^h	500.000^j	N	Sample concentrations are within background levels
Mercury	2/2		0.290	1.300 - 1.700	^h	^h	1.700^j	Y	Sample concentrations exceed background levels
Methylene chloride	2/2	*	^f	0.016 - 0.019	^h	^h	0.019^j	Y	Positive detection with no reason for exclusion
Nickel	2/2		39.000	9.400 -19.100	^h	^h	19.100^j	N	Sample concentrations are within background levels
Nitrate	2/2		^f	2.620 - 2.760	^h	^h	2.760^j	Y	Positive detection with no reason for exclusion
Phosphorus (black, white, red	2/2		^f	37.400 -38.900	^h	^h	38.900^j	N	Ubiquitous compound
Potassium	2/2		23800.0	659.00 -871.00	^h	^h	871.000^j	N	Common dietary element Sample concentrations are within background levels
Sodium	2/2		11400.0	111.00 -130.00	^h	^h	130.000^j	N	Common dietary element Sample concentrations are within background levels
Sulfate	2/2		^f	418.00 -697.00	^h	^h	697.000^j	N	Ubiquitous compound
Total Organic Nitrogen	2/2		^f	355.00 -794.00	^h	^h	794.000^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	2/2		172.000	8.400 -14.400	^h	^h	14.400^j	N	Sample concentrations are within background levels

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Zinc	2 /2	113.000	37.300 -47.600	^h	^h	47.600^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data exist, but have not yet been obtained.

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R.4.0
Groundwater

R.4 GROUNDWATER

Groundwater data for 1000-series through 4000-series wells, which represent current concentrations in the aquifers beneath the FEMP, are presented by series in appendix M. The groundwater data are grouped by means other than according to series and aquifer flow for use in the risk assessment. Data for off-property wells are used for risk assessment purposes for the current land-use scenario. Off-property groundwater data are used to determine potential current exposure concentrations. Potential future concentrations in groundwater are modeled assuming that leaching occurs from subsurface soil/waste areas to the Great Miami Aquifer. Perched water (1000 series wells) from certain areas on the site can also serve as a potential source for leaching into the Great Miami Aquifer. Hence, perched water for various areas are summarized for consideration as a source term for groundwater modeling. Off-property groundwater data are discussed in section R.4.1, and perched water data are discussed in section R.4.2.

R.4.1 Off-Property Groundwater

All RI/FS and RCRA data available from the RI/FS Database as of December, 1991, for each off-property well were obtained. A subset of data consisting of data for those wells containing the highest concentrations of each constituent of potential concern (or for highly toxic and prevalent constituents those wells containing the three highest concentrations) was derived. This subset of data includes the following wells: 2015, 2060, 2061, 2094, 2095, 2097, 2106, 2126, 2127, 2128, 2129, 2384, 2391, 2393, 2558, 3043, 3066, 3094, 3126, 3127, and 3128. Data for each of these wells are summarized separately and are presented in Tables R.4-1 through R.4-21 for radionuclides and Tables R.4-22 through R.4-42 for chemicals. The UCLs in these data summaries were used as exposure point concentrations in determining the RME locations for groundwater exposure pathways under the current land-use scenario.

R.4.2 Perched Water as a Potential Source Term

Perched water is not considered to be a reasonable source of water for household use. However, if there are areas with significant concentrations of constituents, perched water pockets could serve as a potential source term for leaching into the Great Miami Aquifer. To determine which areas have the highest concentrations in perched water, it was necessary to summarize data from many areas on the FEMP. Comparison of data sets from different areas on the FEMP indicated that certain areas of the former Production Area are the only locations on the property where perched water could serve as a significant source term for leaching into the Great Miami Aquifer.

R.4.2.1 Perched Water in Portions of the Former Production Area

Tables R.4-43 thorough R.4-46 present statistical summaries of data from RI/FS and RCRA sampling of radionuclides in perched water associated with Plants 2/3, 6, 9, and the Pilot Plant in

the former Production Area. Tables R.4-47 through R.4-50 present data for chemicals in perched water associated with these same areas. These data are used as source terms for groundwater modeling.

R.4.2.2 Perched Water on the Remainder of the FEMP Property

Summaries of data for perched water from RI/FS and RCRA sampling are presented for the following areas of the FEMP: the remainder of the former Production Area (excluding Plants 2/3, 6, 9, and the Pilot Plant), the Fire Training Area, the rubble west of the silos (no data available), the K-65 Slurry Line, the Surge Lagoon, the Retention Basin, the Incinerator Area, the rubble east of the waste pits, and the remainder of the FEMP (excluding preceding areas). These data are presented in Tables R.4-51 thorough R.4-62 for radionuclides and Tables R.4-63 through R.4-70 for chemicals. A comparison of concentrations and total quantities of contaminants in perched water in these areas with data for constituents in perched water associated with Plants 2/3, 6, 9, and the Pilot Plant shows that perched water from the former areas are not significant as source terms for groundwater modeling.

TABLE R.4-1

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2015

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/6		<1	1.500 - 1.500	N	0.667	1.003	Y	Positive detection with no reason for exclusion
RA-228	1/6		<3	5.800 - 5.800	N^i	2.250	3.681	Y	Positive detection with no reason for exclusion
TH-228	1/6		<1	1.000 - 1.000	N	0.608	0.774	Y	Positive detection with no reason for exclusion
U-234	6/6		<1	54.300 -62.900	N	59.250	61.879	Y	Positive detection with no reason for exclusion
U-235/236	6/6		^f	2.100 - 3.550	N	2.742	3.166	Y	Positive detection with no reason for exclusion
U-238	6/6		<1	53.500 -69.800	N	60.683	65.225	Y	Positive detection with no reason for exclusion
Uranium*	6/6		^f	0.168 - 0.290	N^i	0.196	0.234	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-2

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2060

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-228	1/6		<3	3.800 - 3.800	N	1.883	2.656	Y	Positive detection with no reason for exclusion
TH-228	1/6		<1	4.200 - 4.200	L	0.713	1.457	Y	Positive detection with no reason for exclusion
TH-230	2/6		<1	1.100 - 1.490	N	0.765	1.118	Y	Positive detection with no reason for exclusion
U-234	6/6		<1	45.700 -84.200	N	67.850	79.476	Y	Positive detection with no reason for exclusion
U-235/236	6/6		^f	2.700 - 5.100	N	3.670	4.355	Y	Positive detection with no reason for exclusion
U-238	6/6		<1	46.700 -99.300	N	71.900	86.593	Y	Positive detection with no reason for exclusion
Uranium*	6/6		^f	0.171 - 0.332	N	0.237	0.282	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^EIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^Fbackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-3

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2061

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
U-234	5/5		<1	77.600 -104.00	N^i	90.560	99.712	Y	Positive detection with no reason for exclusion
U-235/236	5/5		^f	2.900 - 5.540	N	4.288	5.196	Y	Positive detection with no reason for exclusion
U-238	5/5		<1	76.000 -104.00	N	90.760	100.451	Y	Positive detection with no reason for exclusion
Uranium*	5/5		^f	0.247 - 0.312	N	0.274	0.300	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-4

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2094

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	4/7		<1	1.000 - 7.720	L	1.609	4.105	Y	Positive detection with no reason for exclusion
RA-228	2/7		<3	3.100 - 3.600	N	2.036	2.704	Y	Positive detection with no reason for exclusion
TH-228	2/7		<1	2.040 - 2.260	N^i	0.971	1.565	Y	Positive detection with no reason for exclusion
TH-230	1/7		<1	1.480 - 1.480	N	0.640	0.912	Y	Positive detection with no reason for exclusion
U-234	2/7		<1	1.500 -34.100	L	1.069	3.414	Y	Positive detection with no reason for exclusion
U-235/236	1/7		^f	3.330 - 3.330	L	0.656	1.110	Y	Positive detection with no reason for exclusion
U-238	2/7		<1	1.570 -34.600	L	1.079	3.461	Y	Positive detection with no reason for exclusion
Uranium*	4/7		^f	0.002 - 0.062	L	0.002	0.009	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-5

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2095

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	2/8	<1		1.400 - 7.360	L	0.796	1.522	Y	Positive detection with no reason for exclusion
TH-228	2/8	<1		1.200 - 1.510	N	0.714	0.985	Y	Positive detection with no reason for exclusion
TH-230	1/8	<1		4.530 - 4.530	L	0.659	1.110	Y	Positive detection with no reason for exclusion
U-234	8/8	<1		17.700 -59.200	N	43.988	53.999	Y	Positive detection with no reason for exclusion
U-235/236	7/8	^f		1.080 - 3.300	N	2.026	2.672	Y	Positive detection with no reason for exclusion
U-238	8/8	<1		18.000 -61.400	N	45.988	56.210	Y	Positive detection with no reason for exclusion
Uranium*	8/8	^f		0.087 - 0.208	N	0.152	0.181	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-6

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2097

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-230	1/6		<1	1.000 - 1.000	N	0.583	0.751	Y	Positive detection with no reason for exclusion
U-234	1/6		<1	1.400 - 1.400	N	0.650	0.952	Y	Positive detection with no reason for exclusion
U-238	1/6		<1	1.500 - 1.500	N	0.667	1.003	Y	Positive detection with no reason for exclusion
Uranium*	6/6		^f	0.001 - 0.002	N^i	0.001	0.002	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-7

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2106

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
SR-90	1/5		^f	7.240 - 7.240	N	3.448	5.469	Y	Positive detection with no reason for exclusion
TH-228	1/5		<1	1.690 - 1.690	N	0.738	1.245	Y	Positive detection with no reason for exclusion
U-234	5/5		<1	4.500 -23.700	L	15.094	23.700^j	Y	Positive detection with no reason for exclusion
U-235/236	4/5		^f	1.400 - 1.600	N	1.324	1.600^j	Y	Positive detection with no reason for exclusion
U-238	5/5		<1	4.000 -24.900	L	15.489	24.900^j	Y	Positive detection with no reason for exclusion
Uranium*	5/5		^f	0.016 - 0.089	L	0.052	0.089^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-8

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2126

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-228	1/6	<3		3.250 - 3.250	N	1.792	2.379	Y	Positive detection with no reason for exclusion
TC-99	1/6	^f		100.00 -100.00	N^i	29.167	57.713	Y	Positive detection with no reason for exclusion
TH-228	1/6	<1		2.380 - 2.380	N^i	0.788	1.432	Y	Positive detection with no reason for exclusion
TH-230	1/6	<1		1.370 - 1.370	N	0.620	0.926	Y	Positive detection with no reason for exclusion
U-234	2/6	<1		1.950 - 2.160	N^i	1.018	1.681	Y	Positive detection with no reason for exclusion
U-238	2/6	<1		1.130 - 2.570	N^i	0.950	1.635	Y	Positive detection with no reason for exclusion
Uranium*	1/6	^f		0.00028 - 0.00028	N^i	0.00046	0.00028^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-9

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2127

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
SR-90	1/4		^f	12.100 -12.100	N^i	4.900	10.548	Y	Positive detection with no reason for exclusion
TH-228	1/4		<1	1.500 - 1.500	N	0.750	1.338	Y	Positive detection with no reason for exclusion
TH-232	1/4		<1	1.100 - 1.100	N	0.650	1.003	Y	Sample concentrations exceed background levels
Thorium*	2/4		^f	0.003 - 0.010	L	0.004	0.008	Y	Positive detection with no reason for exclusion
U-234	4/4		<1	1.800 - 9.600	L	3.427	8.090	Y	Positive detection with no reason for exclusion
U-238	4/4		<1	1.900 -10.900	L	3.824	9.241	Y	Positive detection with no reason for exclusion
Uranium*	4/4		^f	0.006 - 0.037	L	0.013	0.032	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-10

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2128

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
SR-90	2/4		^f	7.610 -17.400	N^i	7.503	15.768	Y	Positive detection with no reason for exclusion
TH-228	1/4		<1	2.310 - 2.310	N^i	0.953	2.017	Y	Positive detection with no reason for exclusion
TH-230	1/4		<1	1.320 - 1.320	N^i	0.705	1.187	Y	Positive detection with no reason for exclusion
U-234	4/4		<1	1.230 - 3.720	N^i	2.580	3.720^j	Y	Positive detection with no reason for exclusion
U-238	3/4		<1	1.830 - 3.460	N^i	1.923	3.347	Y	Positive detection with no reason for exclusion
Uranium*	4/4		^f	0.003 - 0.015	L	0.007	0.015	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-11

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2129

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	2/6		<1	1.800 - 2.360	N^i	1.027	1.713	Y	Positive detection with no reason for exclusion
TH-228	3/6		<1	1.100 - 2.400	N^i	1.085	1.715	Y	Positive detection with no reason for exclusion
TH-232	1/6		<1	1.800 - 1.800	N	0.717	1.153	Y	Positive detection with no reason for exclusion
Thorium*	1/6		^f	0.016 - 0.016	L	0.002	0.005	Y	Positive detection with no reason for exclusion
U-234	3/6		<1	1.340 - 2.400	N^i	1.147	1.795	Y	Positive detection with no reason for exclusion
U-238	3/6		<1	1.450 - 2.800	N^i	1.223	1.981	Y	Positive detection with no reason for exclusion
Uranium*	2/6		^f	0.008 - 0.011	L	0.001	0.005	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-12

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2384

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-228	1/2		<1	1.520 - 1.520	^h	^h	1.520^j	Y	Positive detection with no reason for exclusion
TH-230	1/2		<1	3.440 - 3.440	^h	^h	3.440^j	Y	Positive detection with no reason for exclusion
Uranium*	2/2		^f	0.001 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-13

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2391

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/2		<1	1.720 - 1.720	^h	^h	1.720^j	Y	Positive detection with no reason for exclusion
TH-228	2/2		<1	1.540 - 2.250	^h	^h	2.250^j	Y	Positive detection with no reason for exclusion
TH-230	1/2		<1	1.510 - 1.510	^h	^h	1.510^j	Y	Positive detection with no reason for exclusion
TH-232	1/2		<1	1.480 - 1.480	^h	^h	1.480^j	Y	Positive detection with no reason for exclusion
Thorium*	1/2		^f	0.013 - 0.013	^h	^h	0.013^j	Y	Positive detection with no reason for exclusion
U-234	1/1		<1	1.290 - 1.290	^h	^h	1.290^j	Y	Positive detection with no reason for exclusion
U-238	1/1		<1	1.140 - 1.140	^h	^h	1.140^j	Y	Positive detection with no reason for exclusion
Uranium*	2/2		^f	0.003 - 0.015	^h	^h	0.015^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/l.

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TABLE R.4-14

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2393

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-230	1/2	<1		1.580 - 1.580	^h	^h	1.580^j	Y	Positive detection with no reason for exclusion
U-234	1/2	<1		1.020 - 1.020	^h	^h	1.020^j	Y	Positive detection with no reason for exclusion
U-238	1/2	<1		1.090 - 1.090	^h	^h	1.090^j	Y	Positive detection with no reason for exclusion
Uranium*	1/2	^f		0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-15

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2558

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/4	<1		1.560 - 1.560	N	0.765	1.389	Y	Positive detection with no reason for exclusion
RA-228	1/4	<3		3.020 - 3.020	N	2.068	2.923	Y	Positive detection with no reason for exclusion
TH-228	1/4	<1		1.560 - 1.560	N	0.765	1.389	Y	Positive detection with no reason for exclusion
U-234	2/4	<1		1.230 - 2.170	N	1.100	2.032	Y	Positive detection with no reason for exclusion
U-238	3/4	<1		1.080 - 2.010	N^i	1.178	1.911	Y	Positive detection with no reason for exclusion
Uranium*	4/5	^f		0.004 - 0.009	N	0.005	0.007	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-16

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3043

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	3 /5		< 1	1.200 - 8.500	L	1.341	4.070	Y	Positive detection with no reason for exclusion
RA-228	1 /5		< 3	3.800 - 3.800	N	1.980	2.951	Y	Positive detection with no reason for exclusion
TH-228	1 /7		< 1	1.600 - 1.600	N	0.657	0.962	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-17

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3066

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	2/4		<1	1.600 - 1.900	N	1.125	1.900^j	Y	Positive detection wit no reason for exclusion
Uranium*	1/6		^f	0.002 - 0.002	N	0.001	0.001	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-18

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3094

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	4/5	<1		3.300 - 4.800	N	3.180	4.710	Y	Positive detection with no reason for exclusion
RA-228	3/5	<3		4.500 - 7.100	N	3.920	6.222	Y	Positive detection with no reason for exclusion
Uranium*	1/5	^f		0.001 - 0.001	N	0.000	0.001^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-19

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3126

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-228	1/5	<1		2.060 - 2.060	N	0.812	1.477	Y	Positive detection with no reason for exclusion
U-234	2/5	<1		1.030 - 1.790	N	0.864	1.404	Y	Positive detection with no reason for exclusion
U-238	1/5	<1		2.090 - 2.090	N	0.818	1.496	Y	Positive detection with no reason for exclusion
Uranium*	4/6	^f		0.001 - 0.008	N	0.002	0.005	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-20

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3127

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-228	1/7		<1	1.340 - 1.340	N	0.641	0.871	Y	Positive detection with no reason for exclusion
U-234	1/7		<1	12.100 -12.100	L	0.788	1.909	Y	Positive detection with no reason for exclusion
U-238	1/7		<1	9.900 - 9.900	L	0.766	1.755	Y	Positive detection with no reason for exclusion
Uranium*	3/7		^f	0.001 - 0.003	N	0.001	0.002	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-21

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3128

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/5		<1	39.800 -39.800	L	1.200	7.756	Y	Positive detection with no reason for exclusion
TH-228	2/5		<1	1.500 - 2.060	N	1.135	1.774	Y	Positive detection with no reason for exclusion
TH-230	1/5		<1	1.150 - 1.150	N	0.668	0.937	Y	Positive detection with no reason for exclusion
U-234	3/5		<1	1.070 -19.500	L	2.248	11.929	Y	Positive detection with no reason for exclusion
U-235/236	1/5		^f	1.260 - 1.260	N	0.652	0.976	Y	Positive detection with no reason for exclusion
U-238	2/5		<1	8.980 -21.700	L	1.894	11.049	Y	Positive detection with no reason for exclusion
Uranium*	3/5		^f	0.00036 - 0.045	L	0.003	0.027	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occurring.
^gWhen background sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/l.

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TABLE R.4-22

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2015

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/2		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
2-Butanone	1/2		^f	0.035 - 0.035	^h	^h	0.035^j	Y	Positive detection with no reason for exclusion
Acetone	1/2		^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		^f	0.070 - 0.134	^h	^h	0.134^j	N	Ubiquitous Compound
Antimony	1/2		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Arsenic	1/6		0.050	0.002 - 0.002	N^i	0.003	0.002^j	N	Sample concentrations are within background levels
Barium	4/6		0.051	0.036 - 0.042	N^i	0.059	0.042^j	N	Sample concentrations are within background levels
Cadmium	1/6		^f	0.005 - 0.005	N^i	0.002	0.003	Y	Positive detection with no reason for exclusion
Calcium	6/6		100.000	70.100 -95.900	N^i	81.867	88.905	N	Common dietary element Sample concentrations are within background levels
Chloride	6/6		30.000	8.800 -23.000	N^i	19.317	23.000^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chloroform	1/2		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Chromium	2/6		^f	0.024 - 0.069	N^i	0.020	0.041	Y	Positive detection with no reason for exclusion
Copper	1/6		0.090	0.021 - 0.021	N^i	0.011	0.017	N	Sample concentrations are within background levels
Fluoride	6/6		0.470	0.260 - 1.800	N^i	0.753	1.210	Y	Sample concentrations exceed background levels
Iron	4/6		0.600	0.010 - 0.055	N^i	0.037	0.053	N	Common dietary element Sample concentrations are within background levels
Lead	2/6		^f	0.020 - 0.021	N^i	0.008	0.016	Y	Positive detection with no reason for exclusion
Magnesium	6/6		28.000	18.000 -23.700	N^i	20.067	21.981	N	Common dietary element Sample concentrations are within background levels
Manganese	3/6		0.011	0.002 - 0.010	N^i	0.007	0.010^j	N	Sample concentrations are within background levels
Methylene chloride	1/2		^f	0.047 - 0.047	^h	^h	0.047^j	Y	Positive detection with no reason for exclusion
Nitrate	6/6		19.400	0.950 - 3.700	N^i	2.298	3.235	N	Sample concentrations are within background levels
Phosphorus	4/6		0.16	0.030 - 0.180	N^i	0.071	0.132	N	Ubiquitous Compound
Potassium	4/6		2.000	2.230 - 3.250	N^i	2.562	2.854	N	Common dietary element
Sodium	6/6		4.800	9.900 -11.800	N^i	10.783	11.315	N	Common dietary element
Sulfate	6/6		60.000	52.000 -122.00	N^i	68.767	90.446	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	1/2		^f	0.808 - 0.808	^h	^h	0.808^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	1/1		^f	4.190 - 4.190	^h	^h	4.190^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

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Total Organic Halides	1/3	^f	0.043 - 0.043	N^i	0.031	0.043^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	3/6	^f	0.122 - 0.808	N^i	0.280	0.556	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	2/2	^f	0.011 - 0.019	^h	^h	0.019^j	Y	Positive detection with no reason for exclusion
Zinc	2/2	^f	0.019 - 0.243	^h	^h	0.243^j	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	1/1	^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-23

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2060

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
2-Butanone	1/1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Aluminum	1/1		^f	0.133 - 0.133	^h	^h	0.133^j	N	Ubiquitous Compound
Ammonia	2/6		^f	0.100 - 0.120	N^i	0.070	0.096	Y	Positive detection with no reason for exclusion
Barium	4/6		0.051	0.037 - 0.054	N^i	0.045	0.054^j	Y	Sample concentrations exceed background levels
Cadmium	1/5		^f	0.002 - 0.002	N^i	0.002	0.002^j	Y	Positive detection with no reason for exclusion
Calcium	6/6		100.000	78.900 -90.600	N^i	83.300	86.688	N	Common dietary element Sample concentrations are within background levels
Chloride	6/6		30.000	13.200 -30.000	N^i	22.567	27.133	N	Ubiquitous compound; Sample concentrations are within background levels
Chromium	2/6		^f	0.030 - 0.034	N^i	0.017	0.027	Y	Positive detection with no reason for exclusion
Copper	1/6		0.090	0.018 - 0.018	N^i	0.009	0.014	N	Sample concentrations are within background levels
Fluoride	6/6		0.470	0.290 - 0.620	N^i	0.508	0.604	N	Ubiquitous compound
Iron	5/6		0.600	0.011 - 0.161	N^i	0.080	0.123	N	Common dietary element Sample concentrations are within background levels
Magnesium	6/6		28.000	20.400 -24.300	N^i	21.817	23.084	N	Common dietary element Sample concentrations are within background levels
Manganese	3/6		0.011	0.001 - 0.010	N^i	0.008	0.010^j	N	Sample concentrations are within background levels
Mercury	1/6		^f	0.001 - 0.001	N^i	0.000	0.001	Y	Positive detection with no reason for exclusion
Methylene chloride	1/1		^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/6		^f	0.035 - 0.035	N^i	0.016	0.025	Y	Positive detection with no reason for exclusion
Nitrate	6/6		19.400	0.300 - 7.420	N^i	1.998	4.228	N	Sample concentrations are within background levels
Phenols	4/6		0.034	0.010 - 0.020	N^i	0.013	0.018	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	5/6		0.16	0.030 - 0.090	N^i	0.057	0.084	N	Ubiquitous compound; Sample concentrations are within background levels
Potassium	5/6		2.000	2.180 - 5.580	N^i	3.177	4.223	N	Common dietary element
Silver	1/6		^f	0.020 - 0.020	N^i	0.007	0.012	Y	Positive detection with no reason for exclusion
Sodium	6/6		4.800	10.000 -13.600	N^i	11.217	12.326	N	Common dietary element
Sulfate	6/6		60.000	15.000 -78.300	N^i	50.750	69.009	N	Ubiquitous Compound

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Total Kjeldahl Nitrogen	1/2	^f	0.148 - 0.148	^h	^h	0.148^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	1/1	^f	0.978 - 0.978	^h	^h	0.978^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	2/3	^f	0.013 - 0.033	N^i	0.024	0.033^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	1/6	^f	0.148 - 0.148	N^i	0.066	0.099	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Zinc	1/1	^f	0.098 - 0.098	^h	^h	0.098^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-24

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2061

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	1/1		^f	0.114 - 0.114	^h	^h	0.114^j	N	Ubiquitous Compound
Ammonia	1/5		^f	0.207 - 0.207	N^i	0.121	0.207^j	Y	Positive detection with no reason for exclusion
Arsenic	1/4		0.050	0.310 - 0.310	N^i	0.078	0.260	Y	Sample concentrations exceed background levels
Barium	4/5		0.051	0.037 - 0.049	N^i	0.039	0.047	N	Sample concentrations are within background levels
Cadmium	2/5		^f	0.003 - 0.006	N^i	0.003	0.005	Y	Positive detection with no reason for exclusion
Calcium	5/5		100.000	75.800 -91.800	N^i	82.460	88.973	N	Common dietary element Sample concentrations are within background levels
Chloride	5/5		30.000	17.880 -48.400	N^i	26.756	38.598	N	Ubiquitous Compound
Chromium	2/5		^f	0.026 - 0.036	N^i	0.018	0.030	Y	Positive detection with no reason for exclusion
Copper	4/5		0.090	0.019 - 0.048	N^i	0.024	0.039	N	Sample concentrations are within background levels
Fluoride	5/5		0.470	0.280 - 0.450	N^i	0.370	0.437	N	Ubiquitous compound; Sample concentrations are within background levels
Iron	2/5		0.600	0.065 - 0.180	N^i	0.055	0.126	N	Common dietary element Sample concentrations are within background levels
Lead	3/3		^f	0.002 - 0.004	N^i	0.003	0.004^j	Y	Positive detection with no reason for exclusion
Magnesium	5/5		28.000	19.300 -23.900	N^i	21.272	23.171	N	Common dietary element Sample concentrations are within background levels
Manganese	4/5		0.011	0.004 - 0.019	N^i	0.011	0.017	Y	Sample concentrations exceed background levels
Molybdenum	1/5		^f	0.025 - 0.025	N^i	0.012	0.019	Y	Positive detection with no reason for exclusion
Nitrate	5/5		19.400	0.300 - 9.840	N^i	2.388	6.364	N	Sample concentrations are within background levels
Phenols	2/5		0.034	0.010 - 0.030	N^i	0.011	0.021	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are are within background levels
Phosphorus	2/5		0.16	0.020 - 0.051	N^i	0.023	0.039	N	Ubiquitous compound; Sample concentrations are within background levels
Potassium	5/5		2.000	2.270 - 3.500	N^i	2.950	3.396	N	Common dietary element
Selenium	1/3		^f	0.002 - 0.002	N^i	0.001	0.002^j	Y	Positive detection with no reason for exclusion
Silicon	1/1		^f	4.260 - 4.260	^h	^h	4.260^j	N	Ubiquitous Compound
Silver	1/5		^f	0.011 - 0.011	N^i	0.005	0.009	Y	Positive detection with no reason for exclusion
Sodium	5/5		4.800	10.030 -13.700	N^i	11.546	13.110	N	Common dietary element
Sulfate	5/5		60.000	6.000 -70.600	N^i	40.680	65.861	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	2/2		^f	0.139 - 0.148	^h	^h	0.148^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

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Total Organic Nitrogen	1/5	^f	0.148 - 0.148	N^i	0.110	0.148^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	1/1	^f	0.017 - 0.017	^h	^h	0.017^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-25

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2094

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	2/2	^f		0.004 - 0.011	^h	^h	0.011^j	Y	Positive detection with no reason for exclusion
Aluminum	1/3	^f		0.074 - 0.074	N^i	0.039	0.074^j	N	Ubiquitous Compound
Ammonia	4/5	^f		0.300 - 3.690	N^i	1.254	2.659	Y	Positive detection with no reason for exclusion
Arsenic	5/5		0.050	0.151 - 0.275	N^i	0.204	0.247	Y	Sample concentrations exceed background levels
Barium	5/5		0.051	0.834 - 1.250	N^i	1.063	1.235	Y	Sample concentrations exceed background levels
Benzene	1/2	^f		0.160 - 0.160	^h	^h	0.160^j	Y	Positive detection with no reason for exclusion
Beryllium	1/2	^f		0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Cadmium	3/5	^f		0.007 - 0.012	N^i	0.007	0.011	Y	Positive detection with no reason for exclusion
Calcium	5/5		100.000	67.100 -87.000	N^i	73.340	81.081	N	Common dietary element Sample concentrations are within background levels
Chloride	5/5		30.000	84.060 -185.00	N^i	132.61	172.579	N	Ubiquitous Compound
Chromium	3/5	^f		0.018 - 0.030	N^i	0.017	0.027	Y	Positive detection with no reason for exclusion
Copper	2/5		0.090	0.009 - 0.026	N^i	0.009	0.018	N	Sample concentrations are within background levels
Di-n-butyl phthalate	1/2	^f		0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Ethylbenzene	1/2	^f		0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Fluoride	4/5		0.470	0.120 - 1.800	N^i	0.470	1.181	N	Ubiquitous compound
Iron	5/5		0.600	10.300 -21.200	N^i	16.320	20.216	N	Common dietary element
Lead	1/5	^f		0.005 - 0.005	N^i	0.002	0.004	Y	Positive detection with no reason for exclusion
Magnesium	5/5		28.000	44.300 -55.800	N^i	49.360	53.653	N	Common dietary element
Manganese	5/5		0.011	0.129 - 0.256	N^i	0.178	0.223	Y	Sample concentrations exceed background levels
Mercury	3/5	^f		0.001 - 0.009	N^i	0.002	0.005	Y	Positive detection with no reason for exclusion
Methylene chloride	1/2	^f		0.008 - 0.008	^h	^h	0.008^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/5	^f		0.012 - 0.012	N^i	0.012	0.012^j	Y	Positive detection with no reason for exclusion
Nickel	3/5	^f		0.025 - 0.052	N^i	0.024	0.042	Y	Positive detection with no reason for exclusion
Nitrate	1/5		19.400	0.100 - 0.100	N^i	0.060	0.081	N	Sample concentrations are within background levels
Phenols	4/5		0.034	0.006 - 0.013	N^i	0.013	0.013^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	5/5		0.16	0.372 - 4.670	N^i	2.595	4.122	N	Ubiquitous Compound
Potassium	5/5		2.000	157.00 -1800.0	N^i	514.00	1199.84	N	Common dietary element
Silicon	1/1	^f		17.400 -17.400	^h	^h	17.400^j	N	Ubiquitous Compound
Sodium	5/5		4.800	11.300 -109.00	N^i	67.540	101.433	N	Common dietary element

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Sulfate	5/5	60.000	1.000 -150.00	N^i	61.524	114.873	N	Ubiquitous Compound
Toluene	1/2	^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Total Kjeldahl Nitrogen	4/4	^f	0.980 - 1.940	N^i	1.523	1.940^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	3/5	^f	0.018 -17.700	N^i	3.810	11.232	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	3/3	^f	0.280 - 1.940	N^i	0.958	1.940^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total xylenes	2/2	^f	0.007 - 0.190	^h	^h	0.190^j	Y	Positive detection with no reason for exclusion
Vanadium	2/3	^f	0.009 - 0.011	N^i	0.008	0.011^j	Y	Positive detection with no reason for exclusion
Zinc	2/2	^f	0.017 - 0.017	^h	^h	0.017^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-26

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2095

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/1		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
2-Butanone	1/1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
2-Hexanone	1/1		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Aluminum	2/3		^f	0.070 - 0.091	N^i	0.064	0.091^j	N	Ubiquitous Compound
Ammonia	1/7		^f	0.151 - 0.151	N	0.064	0.092	Y	Positive detection with no reason for exclusion
Arsenic	1/8		0.050	0.003 - 0.003	N	0.001	0.002	N	Sample concentrations are within background levels
Barium	8/8		0.051	0.040 - 0.056	N	0.048	0.051	Y	Sample concentrations exceed background levels
Cadmium	6/8		^f	0.003 - 0.005	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Calcium	8/8		100.000	92.000 -110.00	L	99.563	103.357	N	Common dietary element
Chloride	7/7		30.000	4.000 -44.400	N	28.411	38.440	N	Ubiquitous Compound
Chromium	6/8		^f	0.013 - 0.030	N	0.019	0.024	Y	Positive detection with no reason for exclusion
Copper	4/8		0.090	0.010 - 0.014		0.009	0.011	N	Sample concentrations are within background levels
Fluoride	7/7		0.470	0.160 - 0.300	L	0.206	0.250	N	Ubiquitous compound; Sample concentrations are within background levels
Iron	7/8		0.600	0.024 - 0.216	N^i	0.054	0.099	N	Common dietary element Sample concentrations are within background levels
Lead	3/8		^f	0.006 - 0.259	L	0.003	0.012	Y	Positive detection with no reason for exclusion
Magnesium	8/8		28.000	22.800 -26.800	L	24.088	24.961	N	Common dietary element Sample concentrations are within background levels
Manganese	8/8		0.011	0.003 - 0.024	L	0.009	0.016	Y	Sample concentrations exceed background levels
Mercury	4/8		^f	0.0004 - 0.012	L	0.00044	0.002	Y	Positive detection with no reason for exclusion
Methylene chloride	1/1		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Molybdenum	2/7		^f	0.004 - 0.009	L	0.005	0.009	Y	Positive detection with no reason for exclusion
Nickel	2/8		^f	0.007 - 0.017	L	0.009	0.012	Y	Positive detection with no reason for exclusion
Nitrate	7/7		19.400	1.720 -17.500	L	6.479	16.177	N	Sample concentrations are within background levels
Phenols	4/7		0.034	0.007 - 0.050	L	0.010	0.021	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus	6/7		0.16	0.063 - 2.650	L	0.298	1.429	N	Ubiquitous Compound
Potassium	8/8		2.000	2.110 - 2.640	N	2.438	2.544	N	Common dietary element
Silicon	2/2		^f	3.510 - 3.620	^h	^h	3.620^j	N	Ubiquitous Compound
Silver	2/8		^f	0.011 - 0.023	N	0.007	0.012	Y	Positive detection with no

								reason for exclusion
Sodium	8/8	4.800	14.400 -27.300	N	20.988	24.214	N	Common dietary element
Sulfate	7/7	60.000	17.500 -137.00	L	57.874	120.197	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	4/4	^f	0.473 - 0.600	N^i	0.560	0.600^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	1/2	^f	1.600 - 1.600	^h	^h	1.600^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	3/7	^f	0.081 -45.100	L	0.107	1.331	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	7/7	^f	0.100 - 1.240	L	0.533	1.240^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	1/3	^f	0.016 - 0.016	N^i	0.009	0.016^j	Y	Positive detection with no reason for exclusion
Zinc	1/1	^f	0.038 - 0.038	^h	^h	0.038^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-27

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2097

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	2/2		0.140	0.092 - 0.094	^h	^h	0.094^j	N	Ubiquitous Compound Sample concentrations are within background levels
Barium	6/6		1.000	0.047 - 0.082	N^i	0.063	0.075	N	Sample concentrations are within background levels
Cadmium	4/6		0.030	0.004 - 0.006	N^i	0.004	0.005	N	Sample concentrations are within background levels
Calcium	6/6		140.000	92.200 -128.00	N^i	109.60	122.058	N	Common dietary element Sample concentrations are within background levels
Chloride	6/6		110.000	9.000 -121.00	N^i	64.250	102.580	N	Ubiquitous Compound
Chromium	4/6		0.039	0.013 - 0.030	N^i	0.017	0.024	N	Sample concentrations are within background levels
Copper	4/6		^f	0.011 - 0.015	N^i	0.011	0.014	Y	Positive detection with no reason for exclusion
Fluoride	6/6		1.300	0.140 - 0.320	N^i	0.227	0.289	N	Ubiquitous compound; Sample concentrations are within background levels
Iron	5/6		4.100	0.010 - 0.074	N^i	0.036	0.060	N	Common dietary element Sample concentrations are within background levels
Lead	1/6		0.051	0.007 - 0.007	N^i	0.002	0.004	N	Sample concentrations are within background levels
Magnesium	6/6		47.000	28.100 -35.100	N^i	30.967	33.556	N	Common dietary element Sample concentrations are within background levels
Manganese	6/6		0.270	0.006 - 0.008	N^i	0.007	0.008^j	N	Sample concentrations are within background levels
Mercury	3/6		^f	0.0002 - 0.0003	N^i	0.00018	0.00028	Y	Positive detection with no reason for exclusion
Molybdenum	3/6		0.014	0.003 - 0.051	N^i	0.013	0.028	Y	Sample concentrations exceed background levels
Nickel	2/6		^f	0.019 - 0.019	N^i	0.013	0.017	Y	Positive detection with no reason for exclusion
Nitrate	6/6		0.250	0.207 -10.100	N^i	3.890	7.837	Y	Sample concentrations exceed background levels
Phenols	1/6		0.061	0.010 - 0.010	N^i	0.006	0.008	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	6/6		0.730	0.045 - 1.320	N^i	0.792	1.244	N	Ubiquitous Compound
Potassium	6/6		5.100	1.610 - 2.250	N^i	1.925	2.129	N	Common dietary element Sample concentrations are within background levels
Silicon	2/2		^f	4.000 -63.400	^h	^h	63.400^j	N	Ubiquitous Compound
Silver	2/6		^f	0.020 - 0.021	N^i	0.009	0.016	Y	Positive detection with no reason for exclusion
Sodium	6/6		100.000	4.140 -61.200	N^i	22.175	38.920	N	Common dietary element Sample concentrations are within background levels
Sulfate	6/6		130.000	60.800 -269.00	N^i	144.08	213.573	N	Ubiquitous Compound
Sulfide	2/2		^f	32.800 -36.200	^h	^h	36.200^j	N	Ubiquitous Compound

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Total Kjeldahl Nitrogen	5/5	^f	0.418 - 0.782	N^i	0.653	0.782^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	5/6	^f	0.013 - 0.046	N^i	0.026	0.037	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	5/6	^f	0.418 - 0.782	N^i	0.553	0.782^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-28

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2106

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/1		^f	0.010 - 0.010	^h	^h	0.010^j	Y	Positive detection with no reason for exclusion
2-Butanone	1/1		^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		^f	0.094 - 0.145	^h	^h	0.145^j	N	Ubiquitous Compound
Barium	4/4		0.051	0.039 - 0.047	N^i	0.042	0.046	N	Sample concentrations are within background levels
Cadmium	4/4		^f	0.002 - 0.006	N^i	0.004	0.006^j	Y	Positive detection with no reason for exclusion
Calcium	4/4		100.000	85.300 -112.00	N^i	98.400	112.000^j	N	Common dietary element
Chloride	4/4		30.000	8.600 -25.500	N^i	18.475	25.500^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	4/4		^f	0.016 - 0.028	N^i	0.023	0.028^j	Y	Positive detection with no reason for exclusion
Copper	3/4		0.090	0.011 - 0.017	N^i	0.011	0.017	N	Sample concentrations are within background levels
Fluoride	4/4		0.470	0.260 - 0.330	N^i	0.295	0.330^j	N	Sample concentrations are within background levels
Iron	4/4		0.600	0.038 - 0.112	N^i	0.070	0.111	N	Common dietary element Sample concentrations are within background levels
Lead	1/4		^f	0.006 - 0.006	N^i	0.002	0.005	Y	Positive detection with no reason for exclusion
Magnesium	4/4		28.000	22.000 -27.100	N^i	23.775	26.550	N	Common dietary element Sample concentrations are within background levels
Manganese	4/4		0.011	0.009 - 0.015	N^i	0.011	0.015	Y	Sample concentrations exceed background levels
Methylene chloride	1/1		^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Nitrate	4/4		19.400	1.120 - 1.450	N^i	1.345	1.450^j	N	Sample concentrations are within background levels
Phenols	1/4		0.034	0.014 - 0.014	N^i	0.007	0.013	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	4/4		0.16	0.100 - 1.440	N^i	0.793	1.440^j	N	Ubiquitous Compound
Potassium	4/4		2.000	2.280 - 3.700	N^i	2.940	3.670	N	Common dietary element
Selenium	1/4		^f	0.002 - 0.002	N^i	0.001	0.002	Y	Positive detection with no reason for exclusion
Silicon	1/1		^f	3.510 - 3.510		3.510	3.510^j	N	Ubiquitous Compound
Silver	1/4		^f	0.027 - 0.027	N^i	0.008	0.023	Y	Positive detection with no reason for exclusion
Sodium	4/4		4.800	10.100 -12.320	N^i	11.130	12.320^j	N	Common dietary element
Sulfate	4/4		60.000	49.200 -73.100	N^i	60.575	72.185	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	2/2		^f	0.198 - 0.882	^h	^h	0.882^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

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Total Organic Carbon	2/2	^f	1.690 - 2.610	^h	^h	2.610^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	1/4	^f	0.086 - 0.086	N^i	0.030	0.075	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	4/4	^f	0.141 - 0.882	N^i	0.360	0.771	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Trichloroethene	1/1	^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Vanadium	2/2	^f	0.012 - 0.014	^h	^h	0.014^j	Y	Positive detection with no reason for exclusion
Zinc	1/1	^f	0.238 - 0.238	^h	^h	0.238^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-29

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2126

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	4/4		^f	0.063 - 0.142	N^i	0.099	0.138	N	Ubiquitous Compound
Arsenic	4/4		0.050	0.003 - 0.008	N^i	0.005	0.007	N	Sample concentrations are within background levels
Barium	4/4		0.051	0.003 - 0.005	N^i	0.004	0.005	N	Sample concentrations are within background levels
Cadmium	4/4		^f	0.003 - 0.005	N^i	0.004	0.005	Y	Positive detection with no reason for exclusion
Calcium	4/4		100.000	104.00 -116.00	N^i	109.23	115.271	N	Common dietary element
Chloride	4/4		30.000	3.910 - 9.850	N^i	6.685	9.850^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	4/4		^f	0.020 - 0.031	N^i	0.027	0.031^j	Y	Positive detection with no reason for exclusion
Copper	1/4		0.090	0.014 - 0.014	N^i	0.007	0.013	N	Sample concentrations are within background levels
Fluoride	2/4		0.470	0.105 - 0.350	N^i	0.133	0.308	N	Sample concentrations are within background levels
Iron	4/4		0.600	0.019 - 0.113	N^i	0.044	0.098	N	Common dietary element Sample concentrations are within background levels
Magnesium	4/4		28.000	23.600 -29.300	N^i	26.590	29.300^j	N	Common dietary element
Manganese	4/4		0.011	0.060 - 0.095	N^i	0.076	0.095	Y	Sample concentrations exceed background levels
Molybdenum	2/4		^f	0.012 - 0.013	N^i	0.009	0.013^j	Y	Positive detection with no reason for exclusion
Nickel	1/4		^f	0.030 - 0.030	N^i	0.015	0.027	Y	Positive detection with no reason for exclusion
Nitrate	3/4		19.400	0.170 -316.00	N^i	79.105	264.938	Y	Sample concentrations exceed background levels
Phenols	3/4		0.034	0.010 - 0.024	N^i	0.013	0.022	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	4/4		0.16	4.050 -38.600	N^i	19.340	36.170	N	Ubiquitous Compound
Potassium	4/4		2.000	2.750 - 6.410	N^i	3.945	5.905	N	Common dietary element
Silicon	4/4		^f	4.530 - 5.350	N^i	4.929	5.331	N	Ubiquitous Compound
Silver	3/4		^f	0.022 - 0.025	N^i	0.019	0.025^j	Y	Positive detection with no reason for exclusion
Sodium	4/4		4.800	3.400 -14.500	N^i	7.074	13.103	N	Common dietary element
Sulfate	4/4		60.000	41.600 -69.800	N^i	60.280	69.800^j	N	Ubiquitous Compound
Sulfide	1/4		^f	11.200 -11.200	N^i	2.988	9.430	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	1/1		^f	0.510 - 0.510	^h	^h	0.510^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	4/4		^f	1.860 -42.000	N^i	11.965	35.526	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	4/4		^f	0.105 - 0.510	N^i	0.264	0.475	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

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Vanadium	3/4	^f	0.013 - 0.022	N^i	0.014	0.022^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-30

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2127

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	3/3		^f	0.112 - 0.129	N^i	0.122	0.129^j	N	Ubiquitous Compound
Ammonia	3/4		^f	0.119 - 1.932	N^i	0.579	1.643	Y	Positive detection with no reason for exclusion
Arsenic	1/3		0.050	0.004 - 0.004	N^i	0.002	0.004^j	N	Sample concentrations are within background levels
Barium	4/4		0.051	0.086 - 0.163	N^i	0.132	0.163^j	Y	Sample concentrations exceed background levels
Cadmium	4/4		^f	0.002 - 0.004	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Calcium	4/4		100.000	81.100 -114.00	N^i	101.53	114.000^j	N	Common dietary element
Chloride	4/4		30.000	9.200 -16.000	N^i	13.300	16.000^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	4/4		^f	0.002 - 0.039	N^i	0.028	0.039^j	Y	Positive detection with no reason for exclusion
Copper	1/4		0.090	0.012 - 0.012	N^i	0.007	0.011	N	Sample concentrations are within background levels
Fluoride	4/4		0.470	0.090 - 0.250	N^i	0.148	0.231	N	Ubiquitous compound Sample concentrations are within background levels
Iron	4/4		0.600	0.071 - 0.155	N^i	0.097	0.143	N	Common dietary element Sample concentrations are within background levels
Lead	2/3		^f	0.004 - 0.005	N^i	0.003	0.005^j	Y	Positive detection with no reason for exclusion
Magnesium	4/4		28.000	20.200 -25.600	N^i	23.825	25.600^j	N	Common dietary element Sample concentrations are within background levels
Manganese	4/4		0.011	0.161 - 2.450	N^i	0.870	2.121	Y	Sample concentrations exceed background levels
Nickel	1/4		^f	0.011 - 0.011	N^i	0.010	0.011	Y	Positive detection with no reason for exclusion
Nitrate	3/4		19.400	0.380 - 2.200	N^i	0.762	1.906	N	Sample concentrations are within background levels
Phenols	1/4		0.034	0.013 - 0.013	N^i	0.007	0.012	N	General classes of compounds cannot be evaluated in a quantitative risk assessment Sample concentrations are within background levels
Phosphorus	4/4		0.16	0.700 - 3.740	N^i	2.168	3.740^j	N	Ubiquitous Compound
Potassium	4/4		2.000	2.420 -2390.0	N^i	599.58	2004.08	N	Common dietary element
Silicon	3/3		^f	3.850 - 4.960	N^i	4.357	4.960^j	N	Ubiquitous Compound
Silver	2/4		^f	0.013 - 0.013	N^i	0.008	0.013^j	Y	Positive detection with no reason for exclusion
Sodium	4/4		4.800	7.810 -12.800	N^i	9.723	12.522	N	Common dietary element
Sulfate	4/4		60.000	60.000 -363.60	N^i	147.65	317.750	N	Ubiquitous Compound
Sulfide	1/3		^f	23.800 -23.800	N^i	8.100	23.800^j	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	3/4		^f	0.786 - 1.980	N^i	0.963	1.900	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	1/2		^f	2.340 - 2.340	^h	^h	2.340^j	N	General classes of compounds cannot be evaluated in a

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								quantitative risk assessment
Total Organic Halides	2/4	^f	0.018 - 0.025	N^i	0.013	0.025^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	2/4	^f	0.573 - 0.915	N^i	0.397	0.896	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	3/3	^f	0.014 - 0.021	N^i	0.018	0.021^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-31

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2128

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	3/4		^f	0.071 - 0.152	N^i	0.088	0.148	N	Ubiquitous Compound
Ammonia	1/4		^f	0.062 - 0.062	N^i	0.053	0.060	Y	Positive detection with no reason for exclusion
Arsenic	2/4		0.050	0.010 - 0.019	N^i	0.008	0.018	N	Sample concentrations are within background levels
Barium	4/4		0.051	0.040 - 0.051	N^i	0.047	0.051^j	N	Sample concentrations are within background levels
Cadmium	3/4		^f	0.004 - 0.005	N^i	0.003	0.005^j	Y	Positive detection with no reason for exclusion
Calcium	4/4		100.000	89.200 -112.00	N^i	100.95	112.000^j	N	Common dietary element
Chloride	4/4		30.000	7.200 -25.200	N^i	18.550	25.200^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	4/4		^f	0.023 - 0.026	N^i	0.025	0.026^j	Y	Positive detection with no reason for exclusion
Copper	1/4		0.090	0.013 - 0.013	N^i	0.007	0.012	N	Sample concentrations are within background levels
Fluoride	4/4		0.470	0.190 - 0.380	N^i	0.300	0.380^j	N	Ubiquitous compound Sample concentrations are within background levels
Iron	4/4		0.600	0.025 - 0.065	N^i	0.039	0.060	N	Common dietary element Sample concentrations are within background levels
Lead	1/4		^f	0.014 - 0.014	N^i	0.004	0.012	Y	Positive detection with no reason for exclusion
Magnesium	4/4		28.000	23.800 -27.700	N^i	26.300	27.700^j	N	Common dietary element Sample concentrations are within background levels
Manganese	4/4		0.011	0.008 - 0.040	N^i	0.021	0.037	Y	Sample concentrations exceed background levels
Molybdenum	1/4		^f	0.013 - 0.013	N^i	0.007	0.012	Y	Positive detection with no reason for exclusion
Nitrate	4/4		19.400	1.410 -397.00	N^i	100.56	333.103	Y	Sample concentrations exceed background levels
Phenols	1/4		0.034	0.013 - 0.013	N^i	0.007	0.012	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	4/4		0.16	0.130 -16.200	N^i	5.017	13.898	N	Ubiquitous Compound
Potassium	4/4		2.000	1.740 - 3.440	N^i	2.343	3.226	N	Common dietary element
Silicon	4/4		^f	4.970 - 8.080	N^i	6.258	7.886	N	Ubiquitous Compound
Silver	3/4		^f	0.015 - 0.025	N^i	0.017	0.025^j	Y	Positive detection with no reason for exclusion
Sodium	4/4		4.800	18.400 -70.900	N^i	38.475	65.612	N	Common dietary element
Sulfate	4/4		60.000	0.380 -65.900	N^i	45.620	65.900^j	N	Ubiquitous Compound
Total Organic Carbon	4/4		^f	1.840 - 6.000	N^i	3.463	5.591	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	1/4		^f	0.061 - 0.061	N^i	0.019	0.052	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	3/4		^f	0.160 - 1.960	N^i	0.603	1.671	N	General classes of compounds

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Vanadium	3/4	^f	0.011 - 0.016	N^i	0.011	0.016^j	Y	cannot be evaluated in a quantitative risk assessment Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-32

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2129

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	1/1		^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Aluminum	2/3		^f	0.087 - 0.436	N^i	0.184	0.436^j	N	Ubiquitous Compound
Ammonia	2/3		^f	0.370 - 1.500	N^i	0.640	1.500^j	Y	Positive detection with no reason for exclusion
Arsenic	3/3		0.050	0.045 - 0.094	N^i	0.064	0.094^j	Y	Sample concentrations exceed background levels
Barium	3/3		0.051	0.037 - 0.045	N^i	0.042	0.045^j	N	Sample concentrations are within background levels
Beryllium	1/1		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Cadmium	3/3		^f	0.003 - 0.007	N^i	0.005	0.007^j	Y	Positive detection with no reason for exclusion
Calcium	3/3		100.000	67.700 -83.200	N^i	77.667	83.200^j	N	Common dietary element Sample concentrations are within background levels
Chloride	3/3		30.000	24.800 -35.600	N^i	29.733	35.600^j	N	Ubiquitous Compound
Chromium	3/3		^f	0.017 - 0.024	N^i	0.020	0.024^j	Y	Positive detection with no reason for exclusion
Copper	2/3		0.090	0.011 - 0.019	N^i	0.012	0.019^j	N	Sample concentrations are within background levels
Fluoride	2/3		0.470	0.120 - 0.150	N^i	0.098	0.150^j	N	Sample concentrations are within background levels
Iron	3/3		0.600	0.016 - 0.660	N^i	0.233	0.660^j	N	Common dietary element
Lead	3/3		^f	0.003 - 0.006	N^i	0.004	0.006^j	Y	Positive detection with no reason for exclusion
Magnesium	3/3		28.000	31.400 -34.100	N^i	33.200	34.100^j	N	Common dietary element
Manganese	3/3		0.011	0.006 - 0.083	N^i	0.038	0.083^j	Y	Sample concentrations exceed background levels
Molybdenum	3/3		^f	0.013 - 0.018	N^i	0.015	0.018^j	Y	Positive detection with no reason for exclusion
Nickel	1/3		^f	0.025 - 0.025	N^i	0.015	0.025^j	Y	Positive detection with no reason for exclusion
Nitrate	3/3		19.400	2.440 -43.200	N^i	16.133	43.200^j	Y	Sample concentrations exceed background levels
Phenols	3/3		0.034	0.011 - 0.021	N^i	0.017	0.021^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	3/3		0.16	4.080 -29.550	N^i	20.277	29.550^j	N	Ubiquitous Compound
Potassium	3/3		2.000	29.900 -59.200	N^i	40.633	59.200^j	N	Common dietary element
Selenium	1/3		^f	0.004 - 0.004	N^i	0.002	0.004^j	Y	Positive detection with no reason for exclusion
Silicon	3/3		^f	0.015 - 7.670	N^i	5.075	7.670^j	N	Ubiquitous Compound
Silver	2/3		^f	0.015 - 0.018	N^i	0.013	0.018^j	Y	Positive detection with no reason for exclusion
Sodium	3/3		4.800	71.500 -103.00	N^i	87.767	103.000^j	N	Common dietary element
Sulfate	3/3		60.000	59.500 -117.00	N^i	94.833	117.000^j	N	Ubiquitous Compound
Sulfide	1/3		^f	0.629 - 0.629	N^i	0.376	0.629^j	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	1/1		^f	2.140 - 2.140	^h	^h	2.140^j	N	General classes of compounds

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								cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	3/3	^f	2.900 -250.00	N^i	87.057	250.000^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	3/3	^f	0.111 - 1.770	N^i	1.164	1.770^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	3/3	^f	0.010 - 0.018	N^i	0.014	0.018^j	Y	Positive detection with no reason for exclusion
Zinc	1/1	^f	0.032 - 0.032	^h	^h	0.032^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-33

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2384

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	2/2		0.140	0.075 - 0.152	^h	^h	0.152^j	N	Ubiquitous Compound
Barium	2/2		1.000	0.102 - 0.109	^h	^h	0.109^j	N	Sample concentrations are within background levels
Cadmium	2/2		0.030	0.006 - 0.006	^h	^h	0.006^j	N	Sample concentrations are within background levels
Calcium	2/2		140.000	149.00 -168.00	^h	^h	168.000^j	N	Common dietary element
Chloride	2/2		110.000	33.200 -39.000	^h	^h	39.000^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	2/2		0.039	0.041 - 0.045	^h	^h	0.045^j	Y	Sample concentrations exceed background levels
Copper	1/2		^f	0.013 - 0.013	^h	^h	0.013^j	Y	Positive detection with no reason for exclusion
Fluoride	1/2		1.300	0.118 - 0.118	^h	^h	0.118^j	N	Ubiquitous compound; Sample concentrations are within background levels
Iron	2/2		4.100	0.076 - 0.113	^h	^h	0.113^j	N	Common dietary element Sample concentrations are within background levels
Lead	2/2		0.051	0.004 - 0.005	^h	^h	0.005^j	N	Sample concentrations are within background levels
Magnesium	2/2		47.000	42.200 -46.500	^h	^h	46.500^j	N	Common dietary element Sample concentrations are within background levels
Manganese	2/2		0.270	0.017 - 0.029	^h	^h	0.029^j	N	Sample concentrations are within background levels
Nickel	1/2		^f	0.030 - 0.030	^h	^h	0.030^j	Y	Positive detection with no reason for exclusion
Nitrate	2/2		0.250	5.820 - 6.870	^h	^h	6.870^j	Y	Sample concentrations exceed background levels
Phenols	1/2		0.061	0.012 - 0.012	^h	^h	0.012^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	1/2		0.730	0.110 - 0.110	^h	^h	0.110^j	N	Ubiquitous Compound Sample concentrations are within background levels
Potassium	2/2		5.100	2.880 - 2.880	^h	^h	2.880^j	N	Common dietary element Sample concentrations are within background levels
Silicon	2/2		^f	5.990 - 6.140	^h	^h	6.140^j	N	Ubiquitous Compound
Silver	2/2		^f	0.014 - 0.023	^h	^h	0.023^j	Y	Positive detection with no reason for exclusion
Sodium	2/2		100.000	30.700 -47.100	^h	^h	47.100^j	N	Common dietary element Sample concentrations are within background levels
Sulfate	2/2		130.000	135.30 -152.00	^h	^h	152.000^j	N	Ubiquitous Compound
Total Organic Carbon	1/1		^f	2.050 - 2.050	^h	^h	2.050^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	1/2		^f	0.096 - 0.096	^h	^h	0.096^j	N	General classes of compounds cannot be evaluated in a

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Total Organic Nitrogen	1/2	^f	0.180 - 0.180	^h	^h	0.180^j	N	quantitative risk assessment General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	2/2	0.020	0.017 - 0.025	^h	^h	0.025^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-34

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2391

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	1/2		^f	0.131 - 0.131	^h	^h	0.131^j	N	Ubiquitous Compound
Ammonia	1/2		6.300	0.140 - 0.140	^h	^h	0.140^j	N	Sample concentrations are within background levels
Barium	2/2		1.100	0.050 - 0.053	^h	^h	0.053^j	N	Sample concentrations are within background levels
Cadmium	1/2		^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Calcium	2/2		122.000	98.800 -103.00	^h	^h	103.000^j	N	Common dietary element Sample concentrations are within background levels
Chloride	2/2		178.000	11.400 -16.000	^h	^h	16.000^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	1/2		0.030	0.027 - 0.027	^h	^h	0.027^j	N	Sample concentrations are within background levels
Copper	1/2		0.032	0.020 - 0.020	^h	^h	0.020^j	N	Sample concentrations are within background levels
Fluoride	2/2		1.600	0.140 - 0.200	^h	^h	0.200^j	N	Ubiquitous compound Sample concentrations are within background levels
Iron	2/2		4.100	0.064 - 0.240	^h	^h	0.240^j	N	Common dietary element Sample concentrations are within background levels
Lead	2/2		0.042	0.003 - 0.007	^h	^h	0.007^j	N	Sample concentrations are within background levels
Magnesium	2/2		36.000	26.500 -30.400	^h	^h	30.400^j	N	Common dietary element Sample concentrations are within background levels
Manganese	2/2		0.520	0.091 - 0.122	^h	^h	0.122^j	N	Sample concentrations are within background levels
Nitrate	2/2		13.000	0.110 - 0.280	^h	^h	0.280^j	N	Sample concentrations are within background levels
Phenols	2/2		0.026	0.008 - 0.010	^h	^h	0.010^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus	2/2		0.370	0.540 - 2.590	^h	^h	2.590^j	N	Ubiquitous Compound
Potassium	2/2		6.800	2.000 - 3.980	^h	^h	3.980^j	N	Common dietary element Sample concentrations are within background levels
Silicon	2/2		^f	3.700 - 4.660	^h	^h	4.660^j	N	Ubiquitous Compound
Silver	1/2		0.010	0.010 - 0.010	^h	^h	0.010^j	N	Sample concentrations are within background levels
Sodium	2/2		148.000	12.800 -17.100	^h	^h	17.100^j	N	Common dietary element Sample concentrations are within background levels
Sulfate	2/2		135.000	96.000 -99.700	^h	^h	99.700^j	N	Ubiquitous Compound Sample concentrations are within background levels
Total Organic Carbon	2/2		^f	0.303 - 1.000	^h	^h	1.000^j	N	General classes of compounds cannot be evaluated in a

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Total Organic Nitrogen	2/2	^f	0.240 - 1.230	^h	^h	1.230^j	N	quantitative risk assessment General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	1/2	^f	0.016 - 0.016	^h	^h	0.016^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-35

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2393

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	2/2		^f	0.040 - 0.084	^h	^h	0.084^j	N	Ubiquitous Compound
Arsenic	2/2		0.050	0.011 - 0.013	^h	^h	0.013^j	N	Sample concentrations are within background levels
Barium	2/2		0.051	0.021 - 0.026	^h	^h	0.026^j	N	Sample concentrations are within background levels
Cadmium	1/2		^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Calcium	2/2		100.000	107.00 -115.00	^h	^h	115.000^j	N	Common dietary element
Chloride	1/1		30.000	5.540 - 5.540	^h	^h	5.540^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	1/2		^f	0.031 - 0.031	^h	^h	0.031^j	Y	Positive detection with no reason for exclusion
Copper	1/2		0.090	0.010 - 0.010	^h	^h	0.010^j	N	Sample concentrations are within background levels
Iron	2/2		0.600	0.030 - 0.174	^h	^h	0.174^j	N	Common dietary element Sample concentrations are within background levels
Lead	1/2		^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Magnesium	2/2		28.000	31.400 -33.500	^h	^h	33.500^j	N	Common dietary element
Manganese	2/2		0.011	0.004 - 0.078	^h	^h	0.078^j	Y	Sample concentrations exceed background levels
Molybdenum	1/2		^f	0.090 - 0.090	^h	^h	0.090^j	Y	Positive detection with no reason for exclusion
Nickel	1/2		^f	0.020 - 0.020	^h	^h	0.020^j	Y	Positive detection with no reason for exclusion
Nitrate	1/1		19.400	1.210 - 1.210	^h	^h	1.210^j	N	Sample concentrations are within background levels
Phosphorus	1/1		0.16	10.800 -10.800	^h	^h	10.800^j	N	Ubiquitous Compound
Potassium	2/2		2.000	9.000 -17.800	^h	^h	17.800^j	N	Common dietary element
Silicon	2/2		^f	6.360 - 7.300	^h	^h	7.300^j	N	Ubiquitous Compound
Silver	2/2		^f	0.007 - 0.015	^h	^h	0.015^j	Y	Positive detection with no reason for exclusion
Sodium	2/2		4.800	11.700 -15.700	^h	^h	15.700^j	N	Common dietary element
Sulfate	1/1		60.000	5431.0 -5431.0	^h	^h	5431.00^j	N	Ubiquitous Compound
Total Organic Carbon	1/1		^f	3.020 - 3.020	^h	^h	3.020^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	1/1		^f	0.271 - 0.271	^h	^h	0.271^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	1/2		^f	0.013 - 0.013	^h	^h	0.013^j	Y	Positive detection with no reason for exclusion
Zinc	1/1		^f	1.200 - 1.200	^h	^h	1.200^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram,

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and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-36

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 2558

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	2/2		^f	0.070 - 0.075	^h	^h	0.075^j	N	Ubiquitous Compound
Ammonia	2/3		^f	0.120 - 0.120	N^i	0.097	0.120^j	Y	Positive detection with no reason for exclusion
Barium	2/2		0.051	0.031 - 0.033	^h	^h	0.033^j	N	Sample concentrations are within background levels
Cadmium	1/2		^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Calcium	2/2		100.000	105.80 -112.00	^h	^h	112.000^j	N	Common dietary element
Chloride	3/3		30.000	10.800 -19.300	N^i	16.167	19.300^j	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	1/2		^f	0.024 - 0.024	^h	^h	0.024^j	Y	Positive detection with no reason for exclusion
Copper	2/2		0.090	0.012 - 0.020	^h	^h	0.020^j	N	Sample concentrations are within background levels
Fluoride	3/3		0.470	0.070 - 0.140	N^i	0.110	0.140^j	N	Ubiquitous compound Sample concentrations are within background levels
Iron	2/2		0.600	0.022 - 0.280	^h	^h	0.280^j	N	Common dietary element Sample concentrations are within background levels
Magnesium	2/2		28.000	22.900 -23.230	^h	^h	23.230^j	N	Common dietary element Sample concentrations are within background levels
Manganese	2/2		0.011	0.012 - 0.029	^h	^h	0.029^j	Y	Sample concentrations exceed background levels
Nitrate	3/3		19.400	0.697 - 2.100	N^i	1.289	2.100^j	N	Sample concentrations are within background levels
Phosphorus	3/3		0.16	0.820 - 8.650	N^i	3.547	8.650^j	N	Ubiquitous Compound
Potassium	2/2		2.000	2.660 - 3.000	^h	^h	3.000^j	N	Common dietary element
Silicon	2/2		^f	3.630 - 3.900	^h	^h	3.900^j	N	Ubiquitous Compound
Silver	1/2		^f	0.024 - 0.024	^h	^h	0.024^j	Y	Positive detection with no reason for exclusion
Sodium	2/2		4.800	12.900 -13.790	^h	^h	13.790^j	N	Common dietary element
Sulfate	3/3		60.000	70.500 -102.00	N^i	86.833	102.000^j	N	Ubiquitous Compound
Total Organic Carbon	3/3		^f	1.020 - 2.980	N^i	2.127	2.980^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	1/3		^f	0.014 - 0.014	N^i	0.008	0.014^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	2/3		^f	0.100 - 0.200	N^i	0.117	0.200^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	1/2		^f	0.012 - 0.012	^h	^h	0.012^j	Y	Positive detection with no reason for exclusion
Zinc	1/1		^f	2.300 - 2.300	^h	^h	2.300^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.

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If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-37

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3043

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	1/2		^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		0.140	0.090 - 0.156	^h	^h	0.156^j	N	Ubiquitous Compound
Ammonia	4/4		7.100	3.180 -12.600	N^i	5.843	11.185	Y	Sample concentrations exceed background levels
Arsenic	4/4		0.390	0.010 - 0.014	N^i	0.012	0.014	N	Sample concentrations are within background levels
Barium	6/6		1.000	0.214 - 0.300	N^i	0.266	0.294	N	Sample concentrations are within background levels
Beryllium	1/2		0.001	0.002 - 0.002	^h	^h	0.002^j	Y	Sample concentrations exceed background levels
Cadmium	2/5		0.003	0.005 - 0.006	N^i	0.003	0.005	Y	Sample concentrations exceed background levels
Calcium	6/6		140.000	78.400 -144.00	N^i	94.900	114.997	N	Common dietary element
Carbon disulfide	1/1		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Chloride	5/5		110.000	2.750 -23.000	N^i	12.830	19.787	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	3/6		0.039	0.021 - 0.029	N^i	0.016	0.024	N	Sample concentrations are within background levels
Copper	1/6		^f	0.022 - 0.022	N^i	0.010	0.016	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	1/1		^f	0.010 - 0.010	^h	^h	0.010^j	Y	Positive detection with no reason for exclusion
Fluoride	6/6		1.300	0.190 - 0.460	N^i	0.330	0.403	N	Ubiquitous Compound Sample concentrations are within background levels
Iron	6/6		4.100	1.520 - 4.140	N^i	3.425	4.140^j	N	Common dietary element
Lead	4/5		0.051	0.003 - 0.029	N^i	0.009	0.020	N	Sample concentrations are within background levels
Magnesium	6/6		47.000	23.500 -29.000	N^i	26.283	27.953	N	Common dietary element Sample concentrations are within background levels
Manganese	5/5		0.270	0.050 - 0.078	N^i	0.061	0.073	N	Sample concentrations are within background levels
Mercury	1/5		^f	0.0002 - 0.0002	N^i	0.00013	0.00019	Y	Positive detection with no reason for exclusion
Methylene chloride	1/2		^f	0.008 - 0.008	^h	^h	0.008^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/4		0.014	0.030 - 0.030	N^i	0.019	0.030^j	Y	Sample concentrations exceed background levels
Nickel	2/6		^f	0.020 - 0.022	N^i	0.015	0.020	Y	Positive detection with no reason for exclusion
Nitrate	1/6		0.250	0.120 - 0.120	N^i	0.062	0.085	N	Sample concentrations are within background levels

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Phenols	3/4	0.061	0.010 - 0.050	N^i	0.021	0.045	N	General classes of compounds cannot be evaluated in a quantitative risk assessment Sample concentrations are within background levels
Phosphorus	4/4	^f	0.080 - 0.520	N^i	0.326	0.520^j	N	Ubiquitous Compound
Potassium	4/5	5.100	1.010 - 1.220	N^i	1.374	1.220^j	N	Common dietary element Sample concentrations are within background levels
Selenium	1/4	^f	0.005 - 0.005	N^i	0.002	0.005	Y	Positive detection with no reason for exclusion
Silver	1/6	^f	0.014 - 0.014	N^i	0.006	0.009	Y	Positive detection with no reason for exclusion
Sodium	5/5	100.000	13.800 -16.300	N^i	15.200	16.146	N	Common dietary element Sample concentrations are within background levels
Sulfate	5/6	130.000	4.750 -182.00	N^i	35.542	94.642	N	Ubiquitous Compound
Toluene	1/2	^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Total Kjeldahl Nitrogen	2/2	^f	3.440 - 4.000	^h	^h	4.000^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	2/2	^f	2.150 - 3.320	^h	^h	3.320^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	1/4	^f	0.021 - 0.021	N^i	0.014	0.021^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	2/4	^f	0.100 - 0.390	N^i	0.148	0.340	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Trichloroethene	1/2	^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Vanadium	2/2	0.020	0.014 - 0.023	^h	^h	0.023^j	Y	Sample concentrations exceed background levels
Zinc	2/2	0.045	0.027 - 0.032	^h	^h	0.032^j	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	1/1	^f	0.015 - 0.015	^h	^h	0.015^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-38

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3066

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	2/2		^f	0.004 - 0.011	^h	^h	0.011^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		0.140	0.112 - 0.142	^h	^h	0.142^j	N	Ubiquitous Compound
Ammonia	4/4		7.100	0.300 -28.600	N^i	16.975	28.600^j	Y	Sample concentrations exceed background levels
Arsenic	3/3		0.390	0.084 - 0.100	N^i	0.095	0.100^j	N	Sample concentrations are within background levels
Barium	6/6		1.000	0.072 - 0.538	N^i	0.432	0.538^j	N	Sample concentrations are within background levels
Beryllium	1/2		0.001	0.001 - 0.001	^h	^h	0.001^j	N	Sample concentrations are within background levels
Calcium	6/6		140.000	150.00 -169.00	N^i	158.00	163.482	N	Common dietary element
Chloride	6/6		110.000	80.000 -826.00	N^i	604.67	822.869	N	Ubiquitous Compound
Chromium	3/6		0.039	0.027 - 0.038	N^i	0.020	0.031	N	Sample concentrations are within background levels
Fluoride	5/6		1.300	0.094 - 0.400	N^i	0.167	0.273	N	Ubiquitous Compound Sample concentrations are within background levels
Iron	6/6		4.100	0.289 -19.300	N^i	14.748	19.300^j	N	Common dietary element
Lead	1/5		0.051	0.002 - 0.002	N^i	0.002	0.002^j	N	Sample concentrations are within background levels
Magnesium	6/6		47.000	26.200 -54.600	N^i	45.683	54.009	N	Common dietary element
Manganese	4/4		0.270	0.110 - 0.122	N^i	0.118	0.122^j	N	Sample concentrations are within background levels
Mercury	1/4		^f	0.001 - 0.001	N^i	0.000	0.001	Y	Positive detection with no reason for exclusion
Methylene chloride	2/2		^f	0.002 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/4		0.014	0.020 - 0.020	N^i	0.016	0.020^j	Y	Sample concentrations exceed background levels
Nickel	1/6		^f	0.027 - 0.027	N^i	0.015	0.021	Y	Positive detection with no reason for exclusion
Nitrate	2/6		0.250	0.230 - 2.500	N^i	0.488	1.301	Y	Sample concentrations exceed background levels
Phosphate	1/1		^f	1.100 - 1.100	^h	^h	1.100^j	N	Ubiquitous Compound
Phosphorus	3/3		^f	0.085 - 1.500	N^i	0.753	1.500^j	N	Ubiquitous Compound
Potassium	3/4		5.100	3.470 - 3.960	N^i	3.433	3.960^j	N	Common dietary element Sample concentrations are within background levels
Silver	2/6		^f	0.011 - 0.018	N^i	0.007	0.013	Y	Positive detection with no reason for exclusion
Sodium	4/4		100.000	270.00 -320.00	N^i	285.00	312.612	N	Common dietary element
Sulfate	5/6		130.000	9.680 -105.00	N^i	37.472	69.808	N	Ubiquitous Compound Sample concentrations are within background levels
Toluene	1/2		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion

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Total Kjeldahl Nitrogen	2/2	^f	0.600 -28.600	^h	^h	28.600^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	2/2	^f	2.910 -14.513	^h	^h	14.513^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	3/4	^f	0.200 - 3.200	N^i	0.938	2.716	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	2/2	0.020	0.018 - 0.026	^h	^h	0.026^j	Y	Sample concentrations exceed background levels
Zinc	2/2	0.045	0.025 - 0.038	^h	^h	0.038^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-39

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3094

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	1/1		^f	0.079 - 0.079	^h	^h	0.079^j	N	Ubiquitous Compound
Ammonia	5/5		^f	0.100 - 3.500	N^i	2.288	3.500^j	Y	Positive detection with no reason for exclusion
Arsenic	2/5		0.050	0.003 - 0.003	N^i	0.003	0.003^j	N	Sample concentrations are within background levels
Barium	5/5		0.051	0.209 - 0.393	N^i	0.318	0.388	Y	Sample concentrations exceed background levels
Cadmium	3/5		^f	0.003 - 0.007	N^i	0.004	0.006	Y	Positive detection with no reason for exclusion
Calcium	5/5		100.000	57.100 -108.00	N^i	87.460	108.000^j	N	Common dietary element
Chloride	5/5		30.000	67.430 -140.00	N^i	113.89	140.000^j	N	Ubiquitous Compound
Chromium	3/5		^f	0.017 - 0.032	N^i	0.018	0.028	Y	Positive detection with no reason for exclusion
Copper	2/5		0.090	0.009 - 0.020	N^i	0.011	0.017	N	Sample concentrations are within background levels
Fluoride	5/5		0.470	0.130 - 1.600	N^i	0.432	1.055	N	Ubiquitous Compound
Iron	5/5		0.600	1.550 - 4.430	N^i	3.174	4.203	N	Common dietary element
Lead	3/5		^f	0.003 - 0.026	N^i	0.008	0.018	Y	Positive detection with no reason for exclusion
Magnesium	5/5		28.000	25.200 -58.100	N^i	43.200	57.041	N	Common dietary element
Manganese	5/5		0.011	0.148 - 0.251	N^i	0.208	0.249	Y	Sample concentrations exceed background levels
Mercury	1/5		^f	0.002 - 0.002	N^i	0.001	0.001	Y	Positive detection with no reason for exclusion
Molybdenum	3/5		^f	0.012 - 0.033	N^i	0.020	0.029	Y	Positive detection with no reason for exclusion
Nickel	4/5		^f	0.034 - 0.066	N^i	0.046	0.066^j	Y	Positive detection with no reason for exclusion
Phenols	3/5		0.034	0.010 - 0.029	N^i	0.017	0.027	N	Sample concentrations are within background levels General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus	5/5		^f	0.880 - 3.290	N^i	1.619	2.537	N	Ubiquitous Compound
Potassium	5/5		2.000	173.00 -1830.0	N^i	537.00	1226.55	N	Common dietary element
Silicon	1/1		^f	9.970 - 9.970	^h	^h	9.970^j	N	Ubiquitous Compound
Sodium	5/5		4.800	41.200 -103.00	N^i	77.900	100.079	N	Common dietary element
Sulfate	5/5		60.000	41.200 -84.340	N^i	64.948	84.176	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	3/3		^f	1.520 - 3.630	N^i	2.237	3.630^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	2/4		^f	0.019 - 3.900	N^i	0.987	3.272	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	1/3		^f	0.130 - 0.130	N^i	0.077	0.130^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

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Vanadium	1/1	^f	0.012 - 0.012	^h	^h	0.012^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-40

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3126

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	1/1		^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Aluminum	4/4		^f	0.073 - 5.770	N^i	1.521	4.854	N	Ubiquitous Compound
Ammonia	2/4		^f	0.210 - 0.453	N^i	0.191	0.415	Y	Positive detection with no reason for exclusion
Arsenic	2/4		0.050	0.002 - 0.005	N^i	0.002	0.005	N	Sample concentrations are within background levels
Barium	4/4		0.051	0.024 - 0.042	N^i	0.029	0.039	N	Sample concentrations are within background levels
Benzene	1/1		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Beryllium	1/1		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Cadmium	3/4		^f	0.003 - 0.008	N^i	0.004	0.008^j	Y	Positive detection with no reason for exclusion
Calcium	4/4		100.000	89.400 -176.00	N^i	114.40	162.867	N	Common dietary element
Chloride	4/4		30.000	2.920 -23.000	N^i	9.410	20.375	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	4/4		^f	0.023 - 0.049	N^i	0.031	0.045	Y	Positive detection with no reason for exclusion
Copper	2/4		0.090	0.011 - 0.012	N^i	0.008	0.012^j	N	Sample concentrations are within background levels
Fluoride	4/4		0.470	0.070 - 0.480	N^i	0.218	0.430	N	Ubiquitous Compound
Iron	4/4		0.600	0.019 - 6.540	N^i	1.684	5.494	N	Common dietary element
Lead	1/4		^f	0.007 - 0.007	N^i	0.003	0.006	Y	Positive detection with no reason for exclusion
Magnesium	4/4		28.000	22.500 -64.900	N^i	33.800	58.209	N	Common dietary element
Manganese	4 /4		0.011	0.004 - 0.227	N^i	0.069	0.194	Y	Sample concentrations exceed background levels
Mercury	1/4		^f	0.003 - 0.003	N^i	0.001	0.003	Y	Positive detection with no reason for exclusion
Methylene chloride	1/1		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Nickel	2/4		^f	0.025 - 0.028	N^i	0.018	0.028^j	Y	Positive detection with no reason for exclusion
Nitrate	3/4		19.400	2.270 -445.00	N^i	112.61	373.360	Y	Sample concentrations exceed background levels
Phenols	3/4		0.034	0.016 -11.500	N^i	2.888	9.644	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus	3/4		^f	0.020 -10.100	N^i	2.730	8.527	N	Ubiquitous Compound
Potassium	4/4		2.000	0.811 - 8.320	N^i	2.848	7.145	N	Common dietary element
Silicon	3/3		^f	5.700 - 6.100	N^i	5.933	6.100^j	N	Ubiquitous Compound
Silver	2/4		^f	0.021 - 0.022	N^i	0.013	0.022^j	Y	Positive detection with no reason for exclusion
Sodium	4/4		4.800	3.060 -59.700	N^i	17.318	50.565	N	Common dietary element

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Sulfate	4/4	60.000	18.100 -165.00	N^i	56.475	141.649	N	Ubiquitous Compound
Thallium	1/1	^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Toluene	1/1	^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Total Kjeldahl Nitrogen	1/2	^f	0.252 - 0.252	^h	^h	0.252^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	3/4	^f	1.180 -11.500	N^i	3.795	9.882	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	2/4	^f	0.014 - 0.016	N^i	0.010	0.016^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	1/4	^f	0.128 - 0.128	N^i	0.070	0.115	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	4/4	^f	0.011 - 0.038	N^i	0.021	0.035	Y	Positive detection with no reason for exclusion
Zinc	1/1	^f	0.030 - 0.030	^h	^h	0.030^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-41

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3127

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	4/4		^f	0.081 -103.00	N^i	25.852	86.371	N	Ubiquitous Compound
Arsenic	1/4		0.050	0.014 - 0.014	N^i	0.004	0.012	N	Sample concentrations are within background levels
Barium	5/5		0.051	0.028 -26.000	N^i	5.224	16.297	Y	Sample concentrations exceed background levels
Cadmium	5/5		^f	0.003 - 3.200	N^i	0.643	2.006	Y	Positive detection with no reason for exclusion
Calcium	5/5		100.000	88.700 - 94700	N^i	19014	59351.6	N	Common dietary element
Chloride	5/5		30.000	7.100 -20.000	N^i	12.180	16.801	N	Ubiquitous Compound Sample concentrations are within background levels
Chromium	5/5		^f	0.009 -23.800	N^i	4.781	14.918	Y	Positive detection with no reason for exclusion
Copper	1/4		0.090	0.012 - 0.012	N^i	0.007	0.011	N	Sample concentrations are within background levels
Fluoride	5/5		0.470	0.120 - 0.160	N^i	0.140	0.158	N	Ubiquitous Compound Sample concentrations are within background levels
Iron	5/5		0.600	0.115 -102.00	N^i	20.580	63.974	N	Common dietary element
Lead	2/5		^f	0.020 - 3.600	N^i	0.725	2.257	Y	Positive detection with no reason for exclusion
Magnesium	5/5		28.000	25.100 - 24300	N^i	4880.9	15230.6	N	Common dietary element
Manganese	5/5		0.011	0.091 -76.100	N^i	15.295	47.702	Y	Sample concentrations exceed background levels
Mercury	1/4		^f	0.006 - 0.006	N^i	0.002	0.005	Y	Positive detection with no reason for exclusion
Nickel	1/4		^f	0.013 - 0.013	N^i	0.011	0.013	Y	Positive detection with no reason for exclusion
Nitrate	3/5		19.400	0.130 -13.200	N^i	2.712	8.302	N	Sample concentrations are within background levels
Phenols	2/5		0.034	0.010 - 0.020	N^i	0.009	0.015	N	General classes of compounds cannot be evaluated in a quantitative risk assessment Sample concentrations are within background levels
Phosphorus	1/5		^f	0.030 - 0.030	N^i	0.014	0.023	N	Ubiquitous Compound
Potassium	5/5		2.000	2.100 -2300.0	N^i	461.83	1441.51	N	Common dietary element
Selenium	1/4		^f	0.011 - 0.011	N^i	0.004	0.009	Y	Positive detection with no reason for exclusion
Silicon	4/4		^f	5.940 -6140.0	N^i	1539.6	5148.39	N	Ubiquitous Compound
Silver	3/5		^f	0.012 -19.400	N^i	3.886	12.154	Y	Positive detection with no reason for exclusion
Sodium	5/5		4.800	7.220 -6310.0	N^i	1268.0	3955.21	N	Common dietary element
Sulfate	5/5		60.000	26.700 -70.000	N^i	52.560	69.324	N	Ubiquitous Compound
Sulfide	2/4		^f	1.760 -26.300	N^i	7.140	22.193	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	3/4		^f	0.063 - 0.473	N^i	0.174	0.411	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

Total Organic Carbon	2/3	^f	1.785 - 4.280	N^i	2.188	4.280^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	2/5	^f	0.004 - 0.024	N^i	0.009	0.017	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	2/5	^f	0.110 - 0.473	N^i	0.147	0.322	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	4/4	^f	0.010 -10.400	N^i	2.612	8.721	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-42

SELECTION OF CONSTITUENTS OF CONCERN FOR GROUNDWATER FROM RI/FS AND RCRA SAMPLING OF WELL 3128

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	3/4		^f	0.076 - 0.093	N^i	0.072	0.093^j	N	Ubiquitous Compound
Ammonia	3/4		^f	0.018 - 0.150	N^i	0.082	0.150^j	Y	Positive detection with no reason for exclusion
Barium	4/4		0.051	0.068 - 0.083	N^i	0.074	0.081	Y	Sample concentrations exceed background levels
Cadmium	3/4		^f	0.004 - 0.004	N^i	0.003	0.004^j	Y	Positive detection with no reason for exclusion
Calcium	4/4		100.000	90.000 -100.00	N^i	94.900	99.710	N	Common dietary element Sample concentrations are within background levels
Chloride	4/4		30.000	13.300 -33.900	N^i	27.525	33.900^j	N	Ubiquitous Compound
Chromium	4/4		^f	0.020 - 0.040	N^i	0.028	0.038	Y	Positive detection with no reason for exclusion
Copper	1/4		0.090	0.011 - 0.011	N^i	0.007	0.010	N	Sample concentrations are within background levels
Fluoride	4/4		0.470	0.150 - 0.350	N^i	0.208	0.321	N	Ubiquitous Compound Sample concentrations are within background levels
Iron	4/4		0.600	0.117 - 1.550	N^i	0.879	1.550^j	N	Common dietary element
Magnesium	4/4		28.000	21.800 -24.900	N^i	23.425	24.900^j	N	Common dietary element Sample concentrations are within background levels
Manganese	4/4		0.011	0.211 - 0.229	N^i	0.221	0.229^j	Y	Sample concentrations exceed background levels
Nitrate	1/4		19.400	0.188 - 0.188	N^i	0.085	0.166	N	Sample concentrations are within background levels
Phenols	2/4		0.034	0.013 - 0.021	N^i	0.011	0.020	N	General classes of compounds cannot be evaluated in a quantitative risk assessment Sample concentrations are within background levels
Phosphorus	3/4		^f	0.020 - 0.100	N^i	0.048	0.096	N	Ubiquitous Compound
Potassium	4/4		2.000	2.050 - 3.360	N^i	2.805	3.360^j	N	Common dietary element
Silicon	4/4		^f	4.060 - 4.500	N^i	4.318	4.500^j	N	Ubiquitous Compound
Silver	3/4		^f	0.016 - 0.023	N^i	0.017	0.023^j	Y	Positive detection with no reason for exclusion
Sodium	4/4		4.800	13.100 -21.400	N^i	16.050	20.364	N	Common dietary element
Sulfate	4/4		60.000	0.350 -786.00	N^i	232.74	668.578	N	Ubiquitous Compound
Total Kjeldahl Nitrogen	1/1		^f	0.580 - 0.580	^h	^h	0.580^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	4/4		^f	2.000 - 4.040	N^i	2.750	3.805	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	1/4		^f	0.165 - 0.165	N^i	0.045	0.139	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

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Total Organic Nitrogen	2/4	^f	0.190 - 0.440	N^i	0.183	0.399	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	4/4	^f	0.011 - 0.012	N^i	0.012	0.012^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-43

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF PLANTS 2 AND 3 IN THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	10/16	<1		1.010 - 7.250	N	2.382	3.337	Y	Positive detection with no reason for exclusion
RA-228	4/16	<3		3.330 -202.00	L	2.408	4.136	Y	Positive detection with no reason for exclusion
SR-90	1/16	^f		5.350 - 5.350	N	2.706	3.019	Y	Positive detection with no reason for exclusion
TC-99	14/16	^f		51.000 - 13230	L	1481.0	10280.4	Y	Positive detection with no reason for exclusion
TH-228	6/16	<1		1.090 - 5.990	L	0.837	1.153	Y	Positive detection with no reason for exclusion
TH-230	8/16	<1		1.040 - 4.280	N	1.544	2.148	Y	Positive detection with no reason for exclusion
TH-232	6/16	<1		1.240 - 4.230	N	1.296	1.802	Y	Positive detection with no reason for exclusion
Thorium*	7/16	^f		0.002 - 0.038	N^i	0.010	0.015	Y	Positive detection with no reason for exclusion
U-234	15/15	<1		158.00 - 50553	L	6823.2	50553.0^j	Y	Positive detection with no reason for exclusion
U-235/236	15/15	<1		11.900 -6088.0	L	687.04	5843.49	Y	Positive detection with no reason for exclusion
U-238	15/15	<1		163.00 - 59924	L	7301.5	56830.8	Y	Positive detection with no reason for exclusion
Uranium*	85/85	^f		0.002 -154.40	L	19.265	40.767	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/L.

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TABLE R.4-44

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF PLANT 6 IN THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	3/11	<1		0.300 - 2.310	N	0.695	1.003	Y	Positive detection with no reason for exclusion
RA-228	5/10	<3		0.930 -219.00	L	5.471	16.587	Y	Positive detection with no reason for exclusion
SR-90	1/11	^f		7.680 - 7.680	N	2.971	3.824	Y	Positive detection with no reason for exclusion
TC-99	7/11	^f		13.800 -2140.0	N^i	697.39	1166.00	Y	Positive detection with no reason for exclusion
TH-228	4/11	<1		1.630 - 5.290	L	1.095	1.719	Y	Positive detection with no reason for exclusion
TH-230	5/11	<1		2.520 -13.000	L	1.602	2.921	Y	Positive detection with no reason for exclusion
TH-232	3/11	<1		4.010 -11.300	L	1.374	2.569	Y	Positive detection with no reason for exclusion
Thorium*	5/10	^f		0.005 - 0.102	N^i	0.026	0.045	Y	Positive detection with no reason for exclusion
U-234	11/11	<1		39.700 - 37617	N^i	16204	25392.7	Y	Positive detection with no reason for exclusion
U-235/236	11/11	<1		1.800 -2956.0	L	986.26	2956.00^j	Y	Positive detection with no reason for exclusion
U-238	11/11	<1		39.600 - 80968	L	22028	80968.0^j	Y	Positive detection with no reason for exclusion
Uranium*	17/17	^f		0.027 - 201.0	N^i	76.247	108.526	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/L.

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TABLE R.4-45

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF PLANT 9 IN THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-228	1/2		<3	21.700 -21.700	^h	^h	21.700^j	Y	Positive detection with no reason for exclusion
TC-99	2/2		^f	1762.0 -2277.0	^h	^h	2277.00^j	Y	Positive detection with no reason for exclusion
TH-228	1/1		<1	4.070 - 4.070	^h	^h	4.070^j	Y	Positive detection with no reason for exclusion
TH-230	1/1		<1	6.980 - 6.980	^h	^h	6.980^j	Y	Positive detection with no reason for exclusion
TH-232	1/1		<1	3.130 - 3.130	^h	^h	3.130^j	Y	Positive detection with no reason for exclusion
Thorium*	1/1		^f	0.028 - 0.028	^h	^h	0.028^j	Y	Positive detection with no reason for exclusion
U-234	1/1		<1	127982 -127982	^h	^h	127982^j	Y	Positive detection with no reason for exclusion
U-235/236	1/1		<1	7494.0 -7494.0	^h	^h	7494.00^j	Y	Positive detection with no reason for exclusion
U-238	1/1		<1	121642 -121642	^h	^h	121642^j	Y	Positive detection with no reason for exclusion
Uranium*	5/5		^f	15.000 - 696.00	L	130.77	696.000^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/L.

TABLE R.4-46

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF THE PILOT PLANT

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/1		<1	4.700 - 4.700	^h	^h	4.700^j	Y	Positive detection with no reason for exclusion
RA-228	1/1		<3	14.300 -14.300	^h	^h	14.300^j	Y	Positive detection with no reason for exclusion
SR-90	1/1		^f	6.780 - 6.780	^h	^h	6.780^j	Y	Positive detection with no reason for exclusion
TH-228	1/1		<1	49.700 -49.700	^h	^h	49.700^j	Y	Positive detection with no reason for exclusion
TH-230	1/1		<1	16.600 -16.600	^h	^h	16.600^j	Y	Positive detection with no reason for exclusion
TH-232	1/1		<1	40.800 -40.800	^h	^h	40.800^j	Y	Positive detection with no reason for exclusion
Thorium*	1/1		^f	0.368 - 0.368	^h	^h	0.368^j	Y	Positive detection with no reason for exclusion
U-234	1/1		<1	433.00 -433.00	^h	^h	433.000^j	Y	Positive detection with no reason for exclusion
U-235/236	1/1		<1	41.700 -41.700	^h	^h	41.700^j	Y	Positive detection with no reason for exclusion
U-238	1/1		<1	429.00 -429.00	^h	^h	429.000^j	Y	Positive detection with no reason for exclusion
Uranium*	7/7		^f	0.177- 9.444	L	1.766	9.444^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/L.

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TABLE R.4-47

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF PLANTS 2 AND 3 IN PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	7/13		^f	0.002 - 0.130	L	0.022	0.109	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	9/13		^f	0.001 - 0.170	L	0.021	0.080	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	4/13		^f	0.001 - 0.015	N^i	0.005	0.007	Y	Positive detection with no reason for exclusion
1,2-Dichlorobenzene	1/15		^f	0.004 - 0.004	N^i	0.005	0.004^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1/13		^f	0.001 - 0.001	N^i	0.002	0.001^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	2/13		^f	0.003 - 0.009	N	0.003	0.004	Y	Positive detection with no reason for exclusion
2-Butanone	11/13	*	^f	0.003 - 0.006	N^i	0.005	0.005	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	2/13		^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
Acetone	11/13	*	^f	0.002 - 0.008	L	0.003	0.004	Y	Positive detection with no reason for exclusion
Aluminum	13/13		0.18	0.066 - 1.250	L	0.335	0.690	N	Ubiquitous compound
Antimony	6/13		^f	0.036 - 0.069	N^i	0.032	0.042	Y	Positive detection with no reason for exclusion
Barium	13/13		0.13	0.047 - 0.163	L	0.087	0.116	Y	Sample concentrations exceed background levels
Beryllium	6/13		0.001	0.004 - 0.010	N^i	0.003	0.005	Y	Sample concentrations exceed background levels
Cadmium	13/13		0.003	0.003 - 0.015	L	0.007	0.010	Y	Sample concentrations exceed background levels
Calcium	12/12		130	65.100 -254.00	L	120.12	156.717	N	Common dietary element
Carbon disulfide	3/13		^f	0.002 - 0.003	N^i	0.002	0.003	Y	Positive detection with no reason for exclusion
Chromium	13/13		0.076	0.024 - 0.324	L	0.097	0.180	Y	Sample concentrations exceed background levels
Cobalt	6/13		^f	0.017 - 0.026	N^i	0.012	0.017	Y	Positive detection with no reason for exclusion
Copper	10/13		0.04	0.011 - 0.059	L	0.021	0.039	Y	Sample concentrations exceed background levels
Cyanide	5/13		^f	0.002 - 0.007	N	0.003	0.004	Y	Positive detection with no reason for exclusion
Iron	13/13		1.8	0.027 - 1.500	L	0.305	1.309	N	Common dietary element Sample concentrations are within background levels
Lead	3/13		0.005	0.002 - 0.003	N	0.001	0.002	N	Sample concentrations are within background levels
Magnesium	12/12		57	15.200 -79.100	L	36.258	52.267	N	Common dietary element
Manganese	13/13		0.2	0.007 - 1.930	L	0.437	1.930^j	Y	Sample concentrations exceed background levels
Mercury	6/13		^f	0.0003 - 0.005	L	0.00028	0.0006	Y	Positive detection with no reason for exclusion

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Methylene chloride	13/13	•	^f	0.001 - 0.013	L	0.005	0.010	Y	Positive detection with no reason for exclusion
Molybdenum	1/3		^f	0.015 - 0.015	N	0.008	0.015^j	Y	Positive detection with no reason for exclusion
Nickel	8/13		0.10	0.0003 - 0.053	N	0.023	0.031	N	Sample concentrations are within background levels
Nitrate	66/90		0.34	0.110 -386.00	L	119.22	386.000^j	Y	Sample concentrations exceed background levels
Potassium	13/13		26	0.792 - 3.600	L	2.136	2.892	N	Common dietary element reason for exclusion
Silver	13/13		^f	0.015 - 0.127	L	0.041	0.066	Y	Positive detection with no reason for exclusion
Sodium	13/13		60	5.180 -42.500	N	26.434	33.015	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	2/13		^f	0.001 - 0.002	N^i	0.002	0.002^j	Y	Positive detection with no reason for exclusion
Thallium	1/13		^f	0.003 - 0.003	N	0.001	0.001	Y	Positive detection with no reason for exclusion
Tributyl phosphate	2/4		^f	0.410 - 0.450	L	0.051	0.450^j	Y	Positive detection with no reason for exclusion
Trichloroethene	3/13		^f	0.001 - 0.003	N^i	0.002	0.003	Y	Positive detection with no reason for exclusion
Vanadium	13/13		0.023	0.012 - 0.101	L	0.035	0.057	Y	Sample concentrations exceed background levels
Vinyl chloride	1/13		^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
Zinc	13/13		0.039	0.007 - 0.019	N	0.013	0.015	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-48

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF PLANT 6 IN THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/1		^f	0.310 - 0.310	^h	^h	0.310^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	1/1		^f	0.074 - 0.074	^h	^h	0.074^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1/1		^f	0.460 - 0.460	^h	^h	0.460^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1/1		^f	0.086 - 0.086	^h	^h	0.086^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	1/1		^f	0.430 - 0.430	^h	^h	0.430^j	Y	Positive detection with no reason for exclusion
2-Butanone	1/1		^f	0.067 - 0.067	^h	^h	0.067^j	Y	Positive detection with no reason for exclusion
Acetone	1/1		^f	0.009 - 0.009	^h	^h	0.009^j	Y	Positive detection with no reason for exclusion
Aluminum	1/1		0.18	3.410 - 3.410	^h	^h	3.410^j	N	Ubiquitous compuond
Ammonia	3/4		0.36	0.200 - 2.500	L	0.294	1.979	Y	Sample concentrations exceed background levels
Antimony	1/1		^f	0.068 - 0.068	^h	^h	0.068^j	Y	Positive detection with no reason for exclusion
Barium	4/4		0.13	0.103 - 0.589	L	0.170	0.452	Y	Sample concentrations exceed background levels
Benzene	1/1		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Beryllium	1/1		0.001	0.034 - 0.034	^h	^h	0.034^j	Y	Sample concentrations exceed background levels
Cadmium	3/4		0.003	0.004 - 0.040	L	0.007	0.028	Y	Sample concentrations exceed background levels
Calcium	4/4		130	108.00 -976.00	N^i	335.00	837.961	N	Common dietary element
Carbon Tetrachloride	1/1		^f	0.005 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Chloride	4/4		40	25.000 -50.800	N^i	32.000	46.786	N	Ubiquitous compound
Chloroform	1/1		^f	0.026 - 0.026	^h	^h	0.026^j	Y	Positive detection with no reason for exclusion
Chromium	2/4		0.076	0.030 - 0.818	L	0.040	0.460	Y	Sample concentrations exceed background levels
Cobalt	1/1		^f	0.089 - 0.089	^h	^h	0.089^j	Y	Positive detection with no reason for exclusion
Copper	1/4		0.046	0.092 - 0.092	L	0.010	0.057	Y	Sample concentrations exceed background levels
Cyanide	1/1		^f	0.248 - 0.248	^h	^h	0.248^j	Y	Positive detection with no reason for exclusion
Fluoride	4/4		1.6	0.125 - 0.500	N	0.344	0.500^j	N	Ubiquitous compound; Sample concentrations are within background levels
Iron	3/4		1.8	0.060 - 0.790	N^i	0.303	0.727	N	Common dietary element; Sample concentrations are within background levels

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Lead	1/3	0.005	0.004 - 0.004	N^i	0.002	0.004^j	Y	Sample concentrations are within background levels
Magnesium	4/4	57	43.300 -251.00	L	68.147	189.543	N	Common dietary element
Manganese	4/4	0.2	0.016 - 1.580	L	0.129	1.374	Y	Sample concentrations exceed background levels
Mercury	1/4	^f	0.0003 - 0.0003	N	0.00015	0.00029	Y	Positive detection with no reason for exclusion
Methylene chloride	1/1	^f	0.028 - 0.028	^h	^h	0.028^j	Y	Positive detection with no reason for exclusion
Molybdenum	4/4	^f	0.020 - 0.053	N	0.037	0.053^j	Y	Positive detection with no reason for exclusion
Nickel	2/4	0.10	0.021 - 0.227	L	0.029	0.152	Y	Sample concentrations exceed background levels
Nitrate	15/15	0.34	0.220 -843.00	L	182.06	843.000^j	Y	Sample concentrations exceed background levels
Phenols	3/4	0.049	0.008 - 0.080	N^i	0.041	0.080^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus (black, white, red	3/4	0.49	0.385 -39.800	L	0.560	30.330	N	Ubiquitous compound
Potassium	4/4	26	1.900 - 4.500	N^i	2.880	4.247	N	Common dietary element Sample concentrations are within background levels
Silver	1/4	^f	0.264 - 0.264	L	0.013	0.139	Y	Positive detection with no reason for exclusion
Sodium	4/4	60	23.100 -207.00	N^i	70.150	177.512	N	Common dietary element
Sulfate	4/4	210	98.200 -120.00	N	107.88	120.000^j	N	Ubiquitous compound; Sample concentrations are within background levels
Tetrachloroethene	1/1	^f	0.014 - 0.014	^h	^h	0.014^j	Y	Positive detection with no reason for exclusion
Total Kjeldahl Nitrogen	3/3	^f	0.640 - 7.270	N^i	2.937	7.270^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	1/1	^f	39.900 -39.900	^h	^h	39.900^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	1/3	^f	0.652 - 0.652	N^i	0.234	0.652^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	4/4	^f	0.400 - 4.770	L	0.962	3.490	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Trichloroethene	1/1	^f	1.400 - 1.400	^h	^h	1.400^j	Y	Positive detection with no reason for exclusion
Vanadium	1/1	0.023	0.299 - 0.299	^h	^h	0.299^j	Y	Sample concentrations exceed background levels
Zinc	1/1	0.039	0.268 - 0.268	^h	^h	0.268^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram,

and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-49

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF PLANT 9 IN THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	3/3		^f	0.100 - 0.140	N	0.120	0.140^j	Y	Positive detection with no reason for exclusion
1,1,2-Trichloroethane	1/3		^f	0.002 - 0.002	N	0.002	0.002^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	3/3		^f	0.007 - 0.120	L	0.018	0.120^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	3/3		^f	0.029 - 0.088	N	0.051	0.088^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1/3		^f	0.026 - 0.026	L	0.005	0.026^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	3/3		^f	0.004 - 0.022	N	0.013	0.022^j	Y	Positive detection with no reason for exclusion
2,6-Dinitrotoluene	1/1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
2-Butanone	3/3	*	^f	0.005 - 0.008	N	0.006	0.008^j	Y	Positive detection with no reason for exclusion
Acetone	3/3	*	^f	0.002 - 0.004	N	0.003	0.004^j	Y	Positive detection with no reason for exclusion
Aluminum	3/3		0.18	0.608 - 8.570	L	3.492	8.570^j	N	Ubiquitous compound
Antimony	3/3		^f	0.042 - 0.310	L	0.154	0.310^j	Y	Positive detection with no reason for exclusion
Barium	3/3		0.13	0.068 - 0.174	N	0.124	0.174^j	Y	Sample concentrations exceed background levels
Beryllium	3/3		0.001	0.005 - 0.076	L	0.030	0.076^j	Y	Sample concentrations exceed background levels
Cadmium	3/3		0.003	0.011 - 0.039	N	0.029	0.039^j	Y	Sample concentrations exceed background levels
Calcium	3/3		130	204.00 -294.00	N	236.33	294.000^j	N	Common dietary element
Chromium	3/3		0.076	0.161 - 2.140	L	0.895	2.140^j	Y	Sample concentrations exceed background levels
Cobalt	3/3		^f	0.014 - 0.206	L	0.084	0.206^j	Y	Positive detection with no reason for exclusion
Copper	3/3		0.046	0.036 - 0.409	L	0.174	0.409^j	Y	Sample concentrations exceed background levels
Cyanide	2/3		^f	0.009 - 0.012	N	0.007	0.012^j	Y	Positive detection with no reason for exclusion
Heptachlor epoxide	1/3		^f	0.000 - 0.000	N	0.000	0.000^j	Y	Positive detection with no reason for exclusion
Iron	3/3		1.8	0.092 - 0.580	L	0.312	0.580^j	N	Common dietary element Sample concentrations are within background levels
Lead	1/3		0.005	0.007 - 0.007	N	0.003	0.007^j	Y	Sample concentrations exceed background levels
Magnesium	3/3		57	54.000 -76.100	N	62.167	76.100^j	N	Common dietary element

Manganese	3/3		0.2	1.010 - 1.130	N	1.053	1.130^j	Y	Sample concentrations exceed background levels
Mercury	1/3		^f	0.0003 - 0.0003	N	0.00017	0.0003^j	Y	Positive detection with no reason for exclusion
Methylene chloride	3/3	*	^f	0.002 - 0.011	L	0.005	0.011^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/1		^f	0.140 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Nickel	1/3		0.10	0.042 - 0.264	L	0.142	0.264^j	Y	Sample concentrations exceed background levels
Nitrate	3/3		0.34	9.950 -51.100	L	27.136	51.100^j	Y	Sample concentrations exceed background levels
Potassium	3/3		26	7.110 -11.600	N	9.310	11.600^j	N	Common dietary element; Sample concentrations are within background levels
Silver	3/3		^f	0.073 - 0.847	L	0.367	0.847^j	Y	Positive detection with no reason for exclusion
Sodium	3/3		60	74.300 -89.800	N	82.700	89.800^j	N	Common dietary element
Tetrachloroethene	2/3		^f	0.220 - 0.350	L	0.058	0.350^j	Y	Positive detection with no reason for exclusion
Toluene	1/3		^f	0.001 - 0.001	N	0.002	0.001^j	Y	Positive detection with no reason for exclusion
Trichloroethene	3/3		^f	0.120 - 6.400	L	1.291	6.400^j	Y	Positive detection with no reason for exclusion
Vanadium	3/3		0.023	0.054 - 0.691	L	0.290	0.691^j	Y	Sample concentrations exceed background levels
Vinyl chloride	^f		^f	0.002 - 0.002	N	0.004	0.002^j	Y	Positive detection with no reason for exclusion
Zinc	3/3		0.039	0.014 - 0.038	N	0.028	0.038^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically available, but they have not yet been located.

TABLE R.4-50

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF THE PILOT PLANT

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	3/3		^f	0.005 - 0.032	L	0.012	0.032^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	2/3		^f	0.021 - 0.030	L	0.012	0.030^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1/3		^f	0.003 - 0.003	N	0.003	0.003^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	3/3		^f	0.002 - 0.550	L	0.024	0.550^j	Y	Positive detection with no reason for exclusion
2-Butanone	2/3	*	^f	0.001 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Acetone	2/3	*	^f	0.002 - 0.003	N^i	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Aluminum	3/3		0.18	0.070 - 0.103	L	0.081	0.103^j	N	Ubiguitous compound Sample concentrations are within background levels
Arsenic	1/3		^f	0.003 - 0.003	N	0.002	0.003^j	Y	Positive detection with no reason for exclusion
Barium	3/3		0.13	0.050 - 0.164	N^i	0.093	0.164^j	Y	Sample concentrations exceed background levels
Cadmium	3/3		0.003	0.004 - 0.006	N	0.005	0.006^j	Y	Sample concentrations exceed background levels
Calcium	3/3		130	69.700 -154.00	N^i	122.90	154.000^j	N	Common dietary element
Chromium	3/3		0.076	0.034 - 0.037	N	0.036	0.037^j	N	Sample concentrations are within background levels
Copper	1/3		0.046	0.011 - 0.011	N	0.007	0.011^j	N	Sample concentrations are within background levels
Cyanide	1/3		^f	0.006 - 0.006	N^i	0.003	0.006^j	Y	Positive detection with no reason for exclusion
Iron	3/3		1.8	0.037 - 2.650	L	0.164	2.650^j	N	Common dietary element
Lead	1/3		0.005	0.002 - 0.002	N	0.001	0.002^j	N	Sample concentrations are within background levels
Magnesium	3/3		57	16.400 -38.500	N^i	30.533	38.500^j	N	Common dietary element; Sample concentrations are within background levels
Manganese	3/3		0.2	0.074 - 1.790	L	0.293	1.790^j	Y	Sample concentrations exceed background levels
Mercury	1/3		^f	0.0003 - 0.0003	N^i	0.00017	0.0003^j	Y	Positive detection with no reason for exclusion
Methylene chloride	2/3	*	^f	0.003 - 0.004	N	0.003	0.004^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/1		^f	0.018 - 0.018	^h	^h	0.018^j	Y	Positive detection with no reason for exclusion
Nickel	1/3		0.10	0.038 - 0.038	N^i	0.019	0.038^j	N	Sample concentrations are within background levels

Nitrate	4/9		0.34	0.300 - 1.600	L	0.150	0.351	Y	Sample concentrations exceed background levels
Phenol	1/3		^f	0.001 - 0.001	N^i	0.004	0.001^j	Y	Positive detection with no reason for exclusion
Potassium	3/3		26	0.446 - 1.890	N^i	1.103	1.890^j	N	Common dietary element; Sample concentrations are within background levels
Selenium	1/3		^f	0.002 - 0.002	N	0.001	0.002^j	Y	Positive detection with no reason for exclusion
Silver	3/3		^f	0.017 - 0.021	N	0.019	0.021^j	Y	Positive detection with no reason for exclusion
Sodium	3/3		60	11.700 -45.400	N^i	23.200	45.400^j	N	Common dietary element Sample concentrations are within background levels
Tetrachloroethene	3/3		^f	0.006 - 0.043	N	0.026	0.043^j	Y	Positive detection with no reason for exclusion
Thallium	1/3		^f	0.002 - 0.002	N	0.001	0.002^j	Y	Positive detection with no reason for exclusion
Toluene	1/3	*	^f	0.001 - 0.001	N^i	0.002	0.001^j	Y	Positive detection with no reason for exclusion
Trichloroethene	3/3		^f	0.005 - 0.092	L	0.024	0.092^j	Y	Positive detection with no reason for exclusion
Vanadium	3/3		0.023	0.014 - 0.015	N	0.014	0.015^j	N	Sample concentrations are within background levels
Vinyl chloride	1/3		^f	0.007 - 0.007	N	0.006	0.007^j	Y	Sample concentrations are within background levels
Zinc	1/3		0.039	0.022 - 0.022	N^i	0.009	0.022^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically available, but they have not been located.
**Units in MG/L.

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TABLE R.4-51

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF THE REMAINDER OF THE PRODUCTION AREA (EXCLUDING PLANTS 2 AND 3, 6, 9, AND THE PILOT PLANT)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	8/31		<1	1.100 - 3.440	N^i	0.918	1.171	Y	Positive detection with no reason for exclusion
RA-228	1/31		<3	3.800 - 3.800	N	1.574	1.700	Y	Positive detection with no reason for exclusion
SR-90	1/34		^f	27.200 -27.200	L	2.682	3.020	Y	Positive detection with no reason for exclusion
TC-99	11/31		^f	76.400 -6382.0	L	74.819	152.169	Y	Positive detection with no reason for exclusion
TH-228	12/30		<1	1.010 - 5.850	N^i	1.306	1.737	Y	Positive detection with no reason for exclusion
TH-230	8/30		<1	1.400 - 6.860	L	0.785	1.007	Y	Positive detection with no reason for exclusion
TH-232	9/30		<1	1.000 - 7.300	L	0.761	0.969	Y	Positive detection with no reason for exclusion
Thorium*	12/23		^f	0.003 - 0.066	L	0.012	0.026	Y	Positive detection with no reason for exclusion
U-234	29/30		<1	1.400 - 12837	L	1648.7	12837.0^j	Y	Positive detection with no reason for exclusion
U-235/236	14/30		<1	1.100 -802.00	L	3.697	8.818	Y	Positive detection with no reason for exclusion
U-238	29/29		<1	1.700 -8851.0	L	1440.2	8851.00^j	Y	Positive detection with no reason for exclusion
Uranium*	185/188		^f	0.002 -58.200	L	1.635	3.034	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/L.

TABLE R.4-52

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF FIRE TRAINING AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/2		<1	3.370 - 3.370	^h	^h	3.370^j	Y	Positive detection with no reason for exclusion
TH-228	1/2		<1	3.400 - 3.400	^h	^h	3.400^j	Y	Positive detection with no reason for exclusion
TH-230	1/2		<1	3.440 - 3.440	^h	^h	3.440^j	Y	Positive detection with no reason for exclusion
TH-232	1/2		<1	2.840 - 2.840	^h	^h	2.840^j	Y	Positive detection with no reason for exclusion
Thorium*	1/2		^f	0.026 - 0.026	^h	^h	0.026^j	Y	Positive detection with no reason for exclusion
U-234	2/2		<1	15.700 -23.600	^h	^h	23.600^j	Y	Positive detection with no reason for exclusion
U-235/236	2/2		<1	1.200 - 2.480	^h	^h	2.480^j	Y	Positive detection with no reason for exclusion
U-238	2/2		<1	15.200 -20.200	^h	^h	20.200^j	Y	Positive detection with no reason for exclusion
Uranium*	4/4		^f	0.031 - 0.057	N	0.048	0.057^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in mg/L.

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TABLE R.4-53

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF THE K65 SLURRY LINE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-230	1/4		<1	1.400 - 1.400	N	0.725	1.255	Y	Positive detection with no reason for exclusion
Thorium^*	1/3		^f	0.003 - 0.003	N	0.002	0.003^j	Y	Positive detection with no reason for exclusion
U-234	4/4		<1	3.300 - 7.100	N	4.750	6.760	Y	Positive detection with no reason for exclusion
U-238	4/4		<1	3.000 - 8.200	N^i	4.925	7.682	Y	Positive detection with no reason for exclusion
Uranium^*	4/4		^f	0.009 - 0.023	N^i	0.015	0.022	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*Units are reported in mg/l.

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TABLE R.4-54

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RCRA SAMPLING OF K65 SLURRY LINE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
U-234	1/1	<1	5.640 - 5.640	^h	^h	5.640^j	Y	Positive detection with no reason for exclusion
U-238	1/1	<1	6.130 - 6.130	^h	^h	6.130^j	Y	Positive detection with no reason for exclusion
Uranium*	1/1	^f	0.024 - 0.024	^h	^h	0.024^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in mg/L.

TABLE R.4-55

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS AND RCRA SAMPLING OF THE K65 SLURRY LINE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-230	1/5		<1	1.400 - 1.400	N	0.680	1.064	Y	Positive detection with no reason for exclusion
Thorium^*	1/3		^f	0.003 - 0.003	N	0.002	0.003^j	Y	Positive detection with no reason for exclusion
U-234	5/5		<1	3.300 - 7.100	N	4.928	6.388	Y	Positive detection with no reason for exclusion
U-238	5/5		<1	3.000 - 8.200	N	5.166	7.168	Y	Positive detection with no reason for exclusion
Uranium^*	5/5		^f	0.009 - 0.024	N	0.016	0.023	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*Units are reported in mg/l.

TABLE R.4-56

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF SURGE LAGOON

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
U-234	1/1		<1	15.200 -15.200	^h	^h	15.200^j	Y	Positive detection with no reason for exclusion
U-238	1/1		<1	10.500 -10.500	^h	^h	10.500^j	Y	Positive detection with no reason for exclusion
Uranium*	1/1		^f	0.030 - 0.030	^h	^h	0.030^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in mg/L.

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TABLE R.4-57

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RCRA SAMPLING OF SURGE LAGOON

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
U-234	1/1		<1	6.150 - 6.150	^h	^h	6.150^j	Y	Positive detection with no reason for exclusion
U-238	1/1		<1	6.620 - 6.620	^h	^h	6.620^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-58

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS & RCRA SAMPLING OF SURGE LAGOON

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
U-234	2/2		<1	6.150 -15.200	^h	^h	15.200^j	Y	Positive detection with no reason for exclusion
U-238	2/2		<1	6.620 -10.500	^h	^h	10.500^j	Y	Positive detection with no reason for exclusion
Uranium*	1/2		^f	0.030 - 0.030	^h	^h	0.030^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units are reported in mg/L

TABLE R.4-59

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF INCINERATOR AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	5/9	<1		1.170 - 4.490	L	1.074	1.815	Y	Positive detection with no reason for exclusion
TC-99	5/8	^f		344.00 -3185.0	L	167.18	693.068	Y	Positive detection with no reason for exclusion
TH-228	3/9	<1		1.750 - 4.150	L	0.898	1.577	Y	Positive detection with no reason for exclusion
TH-230	3/9	<1		2.770 -10.500	L	1.047	2.158	Y	Positive detection with no reason for exclusion
TH-232	3/9	<1		1.280 - 3.320	L	0.809	1.297	Y	Positive detection with no reason for exclusion
Thorium*	5/9	^f		0.003 - 0.030	L	0.004	0.009	Y	Positive detection with no reason for exclusion
U-234	7/8	<1		5.280 -219.00	L	75.160	219.000^j	Y	Positive detection with no reason for exclusion
U-235/236	6/8	<1		0.913 -22.300	L	3.067	8.737	Y	Positive detection with no reason for exclusion
U-238	7/8	<1		4.280 -227.00	N	78.686	140.936	Y	Positive detection with no reason for exclusion
Uranium*	14/14	^f		0.013 - 6.400	L	0.667	6.400^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Units reported in mg/L.

TABLE R.4-60

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF THE REMAINDER OF THE FEMP (EXCLUDING THE PRODUCTION AREA, THE FIRE TRAINING AREA, THE K65 SLURRY LINE, THE SURGE LAGOON, THE RETENTION BASIN, THE INCINERATOR AREA, THE RUBBLE EAST OF THE WASTE PITS, AND THE RUBBLE WEST OF THE SILOS,)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/8		<1	5.930 - 5.930	L	0.681	1.223	Y	Positive detection with no reason for exclusion
TH-228	1/8		<1	1.290 - 1.290	N	0.599	0.786	Y	Positive detection with no reason for exclusion
TH-230	3/8		<1	1.210 - 2.670	N^i	0.958	1.473	Y	Positive detection with no reason for exclusion
TH-232	1/8		<1	1.310 - 1.310	N	0.601	0.793	Y	Positive detection with no reason for exclusion
Thorium*	5/8		^f	0.003 - 0.012	L	0.004	0.006	Y	Positive detection with no reason for exclusion
U-234	7/7		<1	2.940 -47.100	L	18.056	47.100^j	Y	Positive detection with no reason for exclusion
U-235/236	2/7		<1	2.400 - 3.740	L	0.834	1.595	Y	Positive detection with no reason for exclusion
U-238	7/7		<1	2.710 -45.300	L	16.474	45.300^j	Y	Positive detection with no reason for exclusion
Uranium*	26/26		^f	0.011 - 0.966	L	0.120	0.218	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/l.

TABLE R.4-61

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RCRA SAMPLING OF THE REMAINDER OF THE FEMP (EXCLUDING THE PRODUCTION AREA, THE FIRE TRAINING AREA, THE INCINERATOR AREA, THE SURGE LAGOON, THE K65 SLURRY LINE, THE RETENTION BASIN, THE RUBBLE EAST OF THE WASTE PITS, THE RUBBLE WEST OF THE SILOS)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-228	6/20		^f	1.040 - 4.400	L	0.736	0.948	Y	Positive detection with no reason for exclusion
TH-230	5/20		^f	1.070 -34.800	L	0.802	1.186	Y	Positive detection with no reason for exclusion
TH-232	1/1		^f	3.800 - 3.800	^h	^h	3.800^j	Y	Positive detection with no reason for exclusion
U-234	19/21		^f	1.060 -67.600	L	6.393	9.801	Y	Positive detection with no reason for exclusion
U-235	1/12		^f	4.290 - 4.290	L	0.598	0.825	Y	Positive detection with no reason for exclusion
U-238	15/21		^f	1.070 -76.700	L	6.368	11.425	Y	Positive detection with no reason for exclusion
Uranium*	20/21		^f	0.001 - 0.337	L	0.024	0.043	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/L.

TABLE R.4-62

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RCRA AND RI/FS SAMPLING OF THE REMAINDER OF THE FEMP (EXCLUDING THE PRODUCTION AREA, FIRE TRAINING AREA, THE K65 SLURRY LINE, THIS SURGE LAGOON, THE RETENTION BASIN, THE INCINERATOR AREA, THE RUBBLE EAST OF THE WASTE PITS, AND THE RUBBLE WEST OF THE SILOS)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/L)	Upper 95% TL for BKG^b (pCi/L)	Range of Detection	Dist^c	Mean^d (pCi/L)	Upper 95% CI on Mean^e (pCi/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1/9		<1	5.930 - 5.930	L	0.658	1.097	Y	Positive detection with no reason for exclusion
TH-228	7/28		<1	1.040 - 4.400	L	0.682	0.824	Y	Positive detection with no reason for exclusion
TH-230	8/28		<1	1.070 -34.800	L	0.794	1.065	Y	Positive detection with no reason for exclusion
TH-232	2/9		<1	1.310 - 3.800	L	0.697	1.083	Y	Positive detection with no reason for exclusion
Thorium^*	5/8		^f	0.003 - 0.012	L	0.004	0.006	Y	Positive detection with no reason for exclusion
U-234	26/28		<1	1.060 -67.600	L	9.309	16.317	Y	Positive detection with no reason for exclusion
U-235	1/12		<1	4.290 - 4.290	L	0.598	0.825	Y	Positive detection with no reason for exclusion
U-235/236	3/28		<1	2.400 - 3.740	L	0.6	0.82	Y	Positive detection with no reason for exclusion
U-238	22/28		<1	1.070 -76.700	L	8.895	18.963	Y	Positive detection with no reason for exclusion
Uranium^*	46/47		^f	0.001 - 0.966	L	0.073	0.146	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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^*Units are expressed in mg/l.

KN/SWCR/JK.APR/05-14-92

TABLE R.4-63

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF REMAINDER OF THE PRODUCTION AREA (EXCLUDING PLANTS 2 AND 3, 6, 9 AND THE PILOT PLANT)

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	2/12		^f	0.210 - 0.230	L	0.005	0.013	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	4/12		^f	0.004 - 0.680	L	0.006	0.018	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	2/12		^f	0.046 - 0.140	L	0.004	0.009	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1/12		^f	0.003 - 0.003	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	3/12		^f	0.001 - 0.590	L	0.006	0.017	Y	Positive detection with no reason for exclusion
2-Butanone	3/12	*	^f	0.001 - 0.003	N^i	0.004	0.003^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	2/12	*	^f	0.009 - 0.010	N	0.006	0.007	Y	Positive detection with no reason for exclusion
Acetone	7/12	*	^f	0.002 - 0.031	L	0.007	0.013	Y	Positive detection with no reason for exclusion
Aluminum	8/16		0.18	0.050 - 0.160	N	0.058	0.077	N	Ubiquitous compounds; Sample concentrations are within background levels
Ammonia	12/15		0.36	0.100 - 3.500	L	0.485	0.888	Y	Sample concentrations exceed background levels
Antimony	4/16		^f	0.001 - 0.031	N^i	0.005	0.009	Y	Positive detection with no reason for exclusion
Arsenic	1/23		^f	0.002 - 0.002	N^i	0.002	0.002	Y	Positive detection with no reason for exclusion
Barium	25/25		0.13	0.040 - 0.200	L	0.093	0.110	Y	Sample concentrations exceed background levels
Benzene	2/12		^f	0.004 - 0.014	N	0.004	0.005	Y	Positive detection with no reason for exclusion
Beryllium	2/16		0.001	0.001 - 0.001	N	0.001	0.001	Y	Positive detection with no reason for exclusion
Cadmium	6/25		0.003	0.007 - 0.012	N	0.003	0.004	Y	Sample concentrations exceed background levels
Calcium	25/25		130	81.600 -341.00	L	132.64	151.523	N	Common dietary element
Chloride	15/15		40	1.300 -495.00	L	81.560	495.000^j	N	Ubiquitous compound
Chromium	7/25		0.076	0.030 - 0.059	N	0.018	0.023	N	Sample concentrations are within background levels
Cobalt	2/16		^f	0.010 - 0.011	N	0.006	0.007	Y	Positive detection with no reason for exclusion
Copper	5/25		0.046	0.011 - 0.021	N	0.007	0.009	N	Sample concentrations are within background levels
Ethylbenzene	1/12		^f	0.038 - 0.038	L	0.003	0.005	Y	Positive detection with no reason for exclusion

Fluoride	15/15		1.6	0.300 - 1.800	L	0.754	0.991	N	Ubiquitous compound
Iron	17/25		1.8	0.013 - 0.572	L	0.110	0.572^j	N	Common dietary element
Lead	2/23		0.005	0.002 - 0.002	N^i	0.002	0.002^j	N	Sample concentrations are within background levels
Magnesium	25/25		57	36.200 -84.700	N	59.766	64.213	N	Common dietary element
Manganese	24/25		0.2	0.012 - 1.240	L	0.334	0.830	Y	Sample concentrations exceed background levels
Mercury	3/26		^f	0.0002 - 0.0003	N	0.00012	0.00014	Y	Positive detection with no reason for exclusion
Methylene chloride	5/12	*	^f	0.003 - 0.024	N^i	0.005	0.009	Y	Positive detection with no reason for exclusion
Molybdenum	12/24		^f	0.010 - 0.068	L	0.021	0.028	Y	Positive detection with no reason for exclusion
Nickel	3/25		0.10	0.024 - 0.032	N	0.013	0.015	N	Sample concentrations are within background levels
Nitrate	98/213		0.34	0.030 -288.00	L	0.166	0.205	Y	Sample concentrations exceed background levels
Oil and Grease	5/5		^f	1.440 - 6.400	L	2.830	4.927	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phenol	2/10		^f	0.001 - 0.001	N^i	0.004	0.001^j	N	Positive detection with no reason for exclusion
Phenols	6/15		0.049	0.010 - 0.051	N^i	0.014	0.020	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphorus (black, white, red	8/13		0.049	0.020 - 7.400	L	0.789	7.400^j	N	Ubiquitous compound
Potassium	24/25		26	0.340 -31.000	L	4.884	10.419	N	Common dietary element
Selenium	1/24		^f	0.019 - 0.019	N^i	0.002	0.004	Y	Positive detection with no reason for exclusion
Silver	6/25		^f	0.020 - 0.060	N^i	0.010	0.016	Y	Positive detection with no reason for exclusion
Sodium	25/25		60	9.740 -41.200	L	19.833	23.141	N	Common dietary element; Sample concentration are within background levels
Sulfate	15/15		210	7.000 -345.00	N	125.80	173.017	N	Ubiquitous compound
Tetrachloroethene	2/12		^f	0.001 - 0.032	L	0.003	0.004	Y	Positive detection with no reason for exclusion
Thallium	1/16		^f	0.003 - 0.003	N	0.001	0.002	Y	Positive detection with no reason for exclusion
Toluene	1/12		^f	0.006 - 0.006	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Total Kjeldahl Nitrogen	5/6		^f	0.500 -16.100	L	1.740	5.776	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	12/14		^f	0.200 -14.700	L	1.581	5.538	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total xylenes	2/12		^f	0.300 - 0.400	L	0.006	0.015	Y	Positive detection with no reason for exclusion
Trichloroethene	2/12		^f	0.072 - 0.320	L	0.005	0.012	Y	Positive detection with no reason for exclusion
Vanadium	7/16		0.023	0.011 - 0.028	L	0.009	0.012	Y	Sample concentration exceed background levels
Vinyl Acetate	2/12		^f	0.001 - 0.002	N^i	0.004	0.002^j	Y	Positive detection with no reason for exclusion

Zinc	4/16	0.039	0.007 - 0.020	N	0.007	0.010	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	1/10	^f	0.006 - 0.006	N^i	0.005	0.005	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-64

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF FIRE TRAINING AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1-Dichloroethane	1/2		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Aluminum	2/2		0.18	0.092 - 0.842	^h	^h	0.842^j	N	Ubiquitous compound
Arsenic	1/2		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Barium	2/2		0.13	0.077 - 0.078	^h	^h	0.078^j	N	Sample concentrations are within background levels
Cadmium	2/2		0.003	0.003 - 0.004	^h	^h	0.004^j	Y	Sample concentrations exceed background levels
Calcium	2/2		130	105.00 -116.00	^h	^h	116.000^j	N	Common dietary element; Sample concentrations are within background levels
Chromium	2/2		0.076	0.025 - 0.028	^h	^h	0.028^j	N	Sample concentrations are within background levels
Iron	2/2		1.8	0.059 - 0.555	^h	^h	0.555^j	N	Common dietary element Sample concentrations are within background levels
Lead	1/2		0.005	0.005 - 0.005	^h	^h	0.005^j	N	Sample concentrations are within background levels
Magnesium	2/2		57	30.500 -32.000	^h	^h	32.000^j	N	Common dietary element; Sample concentrations are within background levels
Manganese	2/2		0.2	1.220 - 1.470	^h	^h	1.470^j	Y	Sample concentrations exceed background levels
Mercury	1/2		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Methylene chloride	2/2		^f	0.001 - 0.001	^h	^h	0.001^j	Y	Positive detection with no reason for exclusion
Nickel	1/2		0.10	0.020 - 0.020	^h	^h	0.020^j	N	Sample concentrations are within background levels
Potassium	2/2		26	1.030 - 2.380	^h	^h	2.380^j	N	Common dietary element Sample concentrations are within background levels
Silver	2/2		^f	0.018 - 0.019	^h	^h	0.019^j	Y	Positive detection with no reason for exclusion
Sodium	2/2		60	12.200 -19.500	^h	^h	19.500^j	N	Common dietary element; Sample concentrations are within background levels
Vanadium	2/2		0.023	0.014 - 0.014	^h	^h	0.014^j	N	Sample concentrations are within background levels
Zinc	2/2		0.039	0.009 - 0.018	^h	^h	0.018^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-65

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF THE K65 SLURRY LINE

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Ammonia	1/4		0.36	0.200 - 0.200	N^i	0.138	0.200^j	N	Sample concentrations are within background levels
Barium	4/4		0.13	0.057 - 0.093	N	0.073	0.091	N	Sample concentrations are within background levels
Calcium	4/4		130	89.300 -120.00	N	104.83	120.000^j	N	Common dietary element; Sample concentrations are within background levels
Chloride	4/4		40	1.250 -29.500	N	12.738	26.800	N	Ubiquitous compound; Sample concentrations are within background levels
Chromium	1/4		0.076	0.030 - 0.030	N	0.015	0.027	N	Sample concentrations are within background levels
Copper	2/4		0.046	0.010 - 0.012	N	0.008	0.012^j	N	Sample concentrations are within background levels
Fluoride	4/4		1.6	0.400 - 0.660	N	0.543	0.660^j	N	Ubiquitous compound; Sample concentrations are within background levels
Iron	4/4		1.8	0.007 - 0.940	L	0.060	0.771	N	Common dietary element; Sample concentrations are within background levels
Lead	2/4		0.005	0.002 - 0.002	N	0.002	0.002^j	N	Sample concentrations are within background levels
Magnesium	4/4		57	35.300 -58.800	L	42.826	56.185	N	Common dietary element
Manganese	4/4		0.2	0.026 - 0.210	L	0.053	0.165	Y	Sample concentrations exceed background levels
Molybdenum	2/4		^f	0.010 - 0.033	N	0.016	0.029	Y	Positive detection with no reason for exclusion
Nickel	1/4		0.10	0.021 - 0.021	N	0.014	0.020	N	Sample concentrations are within background levels
Nitrate	3/4		0.34	0.100 - 0.640	L	0.148	0.523	Y	Sample concentrations exceed background levels
Phenols	2/4		0.049	0.020 - 0.020	N^i	0.012	0.020^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment; Sample concentrations are within background levels
Phosphorus (black, white, red	4/4		0.49	0.060 - 0.310	N^i	0.185	0.310^j	N	Ubiquitous compound; Sample concentrations are within background levels
Potassium	4/4		26	0.527 - 7.630	L	1.547	6.301	N	Common dietary element; Sample concentrations are within background levels
Sodium	4/4		60	11.400 -24.000	N^i	15.375	22.363	N	Common dietary element; Sample concentrations are

								within background levels
Sulfate	4/4	210	75.000 -116.00	N	99.250	116.000^j	N	Ubiquitous compound; Sample concentrations within background levels
Total Kjeldahl Nitrogen	2/2	^f	0.300 - 0.490	^h	^h	0.490^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	3/4	^f	0.100 - 0.490	N^i	0.310	0.490^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-66

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RCRA SAMPLING OF THE SURGE LAGOON

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	1/1		0.18	0.188 - 0.188	^h	^h	0.188^j	N	Ubiquitous compound
Barium	1/1		0.13	0.065 - 0.065	^h	^h	0.065^j	N	Sample concentrations are within background levels
Calcium	1/1		130	154.00 -154.00	^h	^h	154.000^j	N	Common dietary element
Chromium	1 /1		0.076	0.044 - 0.044	^h	^h	0.044^j	N	Sample concentrations are within background levels
Iron	1/1		1.8	0.105 - 0.105	^h	^h	0.105^j	N	Common dietary element; Sample concentrations are within background levels
Magnesium	1/1		57	111.00 -111.00	^h	^h	111.000^j	N	Common dietary element
Methylene chloride	1/1		^f	0.008 - 0.008	^h	^h	0.008^j	Y	Positive detection with no reason for exclusion
Nickel	1/1		0.10	0.136 - 0.136	^h	^h	0.136^j	Y	Sample concentrations exceed backgrouhd levels
Silver	1/1		^f	0.015 - 0.015	^h	^h	0.015^j	Y	Positive detection with no reason for exclusion
Vanadium	1/1		0.023	0.033 - 0.033	^h	^h	0.033^j	Y	Sample concentrations exceed background levels
Zinc	1/1		0.039	0.027 - 0.027	^h	^h	0.027^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.4-67

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF INCINERATOR AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/6		^f	0.004 - 0.004	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	3/6		^f	0.001 - 0.001	N^i	0.002	0.001^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	3/6		^f	0.010 - 0.045	N^i	0.018	0.035	Y	Positive detection with no reason for exclusion
2-Butanone	4/6	*	^f	0.003 - 0.017	N^i	0.006	0.011	Y	Positive detection with no reason for exclusion
Acetone	4/6	*	^f	0.003 - 0.020	N^i	0.007	0.012	Y	Positive detection with no reason for exclusion
Aluminum	6/6		0.18	0.066 - 1.010	L	0.130	0.302	N	Ubiquitous compound
Barium	6/6		0.13	0.056 - 0.093	N	0.074	0.088	N	Sample concentrations are within background levels
Beryllium	1/6		0.001	0.002 - 0.002	N	0.001	0.002	Y	Sample concentrations exceed background levels
Cadmium	6/6		0.003	0.005 - 0.009	N	0.007	0.008	Y	Sample concentrations exceed background levels
Calcium	6/6		130	100.00 -151.00	N^i	112.00	127.952	N	Common dietary element
Carbon disulfide	3/6		^f	0.002 - 0.002	N^i	0.002	0.002^j	Y	Positive detection with no reason for exclusion
Chromium	6/6		0.076	0.025 - 0.043	N	0.036	0.041	N	Sample concentrations are within background levels
Copper	4/6		0.046	0.010 - 0.018	N	0.011	0.015	N	Background concentrations are within background levels
Di-n-butyl phthalate	1/6		^f	0.003 - 0.003	N^i	0.005	0.003^j	Y	Positive detection with no reason for exclusion
Iron	6/6		1.8	0.021 - 1.500	L	0.075	0.259	N	Common dietary element; Sample concentrations are within background levels
Lead	2/6		0.005	0.003 - 0.004	N	0.002	0.003	N	Sample concentrations are within background levels
Magnesium	6/6		57	37.800 -52.700	N	43.933	48.764	N	Common dietary element; Sample concentrations are within background levels
Manganese	6/6		0.2	0.013 - 0.591	L	0.097	0.344	Y	Sample concentrations exceed background levels
Mercury	1/6		^f	0.0002 - 0.0002	N	0.00012	0.00016	Y	Positive detection with no reason for exclusion
Methylene chloride	5/6	*	^f	0.002 - 0.021	N^i	0.009	0.016	Y	Positive detection with no reason for exclusion
Molybdenum	4/6		^f	0.010 - 0.017	N	0.010	0.014	Y	Positive detection with no reason for exclusion
Nickel	5/6		0.10	0.021 - 0.037	N	0.026	0.034	N	Sample concentrations are within background levels

Nitrate	10/12	0.34	0.100 -22.100	L	6.026	22.100^j	Y	Sample concentrations exceed background levels
Phenol	1/6	^f	0.001 - 0.001	N^i	0.004	0.001^j	Y	Positive detection with no reason for exclusion
Potassium	6/6	26	0.262 - 2.810	N^i	1.490	2.340	N	Common dietary element; Sample concentrations are within background levels
Silver	6/6	^f	0.015 - 0.022	N	0.019	0.020	Y	Positive detection with no reason for exclusion
Sodium	6/6	60	11.300 -74.100	N	42.450	60.401	N	Common dietary element
Tetrachloroethene	3/6	^f	0.005 - 0.008	N	0.005	0.007	Y	Positive detection with no reason for exclusion
Trichloroethene	3/6	^f	0.006 - 0.006	N	0.004	0.006	Y	Positive detection with no reason for exclusion
Vanadium	6/6	0.023	0.012 - 0.020	N	0.016	0.019	N	Sample concentrations are within background levels
Zinc	6/6	0.039	0.012 - 0.024	N	0.020	0.023	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data exist but have not yet been located.

TABLE R.4-68

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS SAMPLING OF THE REMAINDER OF THE FEMP AREA (EXCLUDING THE PRODUCTION AREA, THE FIRE TREATMENT AREA, KGS SLURRY LINE, SURGE LAGOON, RETENTION BASIN, INCINERATOR AREA, RUBBLE EAST OF THE WASTE RI/FS, AND RUBBLE WEST OF THE SILOS)

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	2/8		^f	0.005 - 2.900	L	0.007	0.034	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	3/8		^f	0.001 - 2.500	L	0.006	0.033	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1/8		^f	0.490 - 0.490	L	0.005	0.017	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1/8		^f	0.019 - 0.019	L	0.003	0.005	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	2/8		^f	0.005 - 1.500	L	0.006	0.027	Y	Positive detection with no reason for exclusion
2,4-Dimethylphenol	1/8		^f	0.040 - 0.040	L	0.006	0.011	Y	Positive detection with no reason for exclusion
4-Methylphenol	1/8		^f	0.015 - 0.015	N	0.006	0.009	Y	Positive detection with no reason for exclusion
Acetone	2/8		^f	0.005 - 0.059	L	0.007	0.012	Y	Positive detection with no reason for exclusion
Aluminum	6/6		0.18	0.027 - 0.162	N	0.108	0.146	N	Ubiquitous compound; Sample concentrations are within background levels
Ammonia	39/80		0.36	0.100 - 4.500	L	0.150	0.195	Y	Sample concentrations exceed background levels
Arsenic	10/61		^f	0.002 - 0.350	N^i	0.011	0.021	Y	Positive detection with no reason for exclusion
Barium	75/85		0.13	0.034 - 0.459	N^i	0.140	0.163	Y	Sample concentrations exceed background levels
Benzoic acid	1/8		^f	0.025 - 0.025	N^i	0.025	0.025^j	Y	Positive detection with no reason for exclusion
Benzyl alcohol	1/8		^f	0.005 - 0.005	N^i	0.005	0.005	Y	Positive detection with no reason for exclusion
Bromochloromethane	1/1		^f	0.050 - 0.050	^h	^h	0.050^j	Y	Positive detection with no reason for exclusion
Cadmium	24/84		0.003	0.003 - 0.016	L	0.003	0.003	Y	Sample concentrations exceed background levels
Calcium	84/84		130	16.000 -274.00	N	106.94	114.960	N	Common dietary element
Chloride	78/80		40	0.500 -1095.0	L	69.338	132.305	N	Ubiquitous compound
Chloroethane	1/8		^f	0.110 - 0.110	N	0.018	0.043	Y	Positive detection with no reason for exclusion
Chromium	28/85		0.076	0.013 - 0.120	L	0.012	0.014	Y	Sample concentrations exceed background levels
Copper	24/85		0.046	0.010 - 0.190	L	0.008	0.009	Y	Sample concentrations exceed background levels

Ethylbenzene	1/8	^f	0.013 - 0.013	N	0.004	0.006	Y	Positive detection with no reason for exclusion
Fluoride	78/80	1.6	0.100 - 3.500	L	0.678	0.778	N	Ubiquitous compound
Iron	74/85	1.8	0.005 - 4.900	L	0.669	1.199	N	Common dietary element
Lead	17/58	0.005	0.002 - 0.118	N	0.005	0.009	Y	Sample concentrations exceed background levels
Magnesium	84/84	57	6.000 -109.60	N	38.146	41.503	N	Common dietary element
Manganese	78/85	0.2	0.003 - 2.540	L	0.188	0.298	Y	Sample concentrations exceed background levels
Mercury	14/85	^f	0.0002 - 0.004	L	0.00015	0.00017	Y	Sample concentrations are within background levels
Methylene chloride	3/8	^f	0.001 - 0.026	L	0.003	0.005	Y	Positive detection with no reason for exclusion
Molybdenum	19/85	^f	0.008 - 0.043	N	0.015	0.016	Y	Positive detection with no reason for exclusion
Nickel	18/85	0.10	0.019 - 0.180	L	0.014	0.015	Y	Sample concentrations exceed background levels
Nitrate	57/109	0.34	0.012 - 8.300	L	0.349	0.506	Y	Sample concentrations exceed background levels
Oil and Grease	3/3	^f	1.620 - 3.300	N	2.473	3.300^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phenols	39/80	0.049	0.005 - 0.100	L	0.010	0.012	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphate	1/2	^f	5.600 - 5.600	^h	^h	5.600^j	N	Ubiquitous compound
Phosphorus (black, white, red	56/70	0.49	0.022 - 5.027	L	0.341	0.575	N	Ubiquitous compound
Potassium	76/84	26	0.514 -31.500	L	3.131	3.883	N	Common dietary element
Selenium	4/63	^f	0.002 - 0.016	N	0.002	0.003	Y	Positive detection with no reason for exclusion
Silver	13/85	^f	0.010 - 0.200	L	0.003	0.004	Y	Positive detection with no reason for exclusion
Sodium	85/85	60	1.600 -350.00	L	41.569	57.378	N	Common dietary element
Sulfate	71/80	210	2.000 -598.00	N^i	98.604	117.613	N	Ubiquitous compound
Tetrachloroethene	1/8	^f	0.280 - 0.280	L	0.005	0.014	Y	Positive detection with no reason for exclusion
Toluene	1/8	^f	0.260 - 0.260	L	0.004	0.013	Y	Positive detection with no reason for exclusion
Total Kjeldahl Nitrogen	39/44	^f	0.103 -21.000	L	1.451	2.703	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	7/46	^f	0.004 - 0.024	N^i	0.021	0.023	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	58/78	^f	0.000 - 5.500	L	0.505	0.730	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total xylenes	1/8	^f	0.055 - 0.055	N	0.009	0.021	Y	Positive detection with no reason for exclusion
Trichloroethene	2/8	^f	0.007 - 0.098	N^i	0.015	0.037	Y	Positive detection with no reason for exclusion
Vanadium	5/6	0.023	0.013 - 0.019	N	0.013	0.018	N	Sample concentrations are within background levels

Zinc	6/6	0.039	0.011 - 0.030	L	0.015	0.020	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	1/8	^f	0.004 - 0.004	N^i	0.005	0.004^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.4-69

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RCRA SAMPLING OF THE REMAINDER OF THE FEMP (EXCLUDING THE PRODUCITON AREA, THE FIRE TRAINING AREA, THE K65 SLURRY LINE, THE SURGLE LAGOON, THE RETENTION BASIN, THE INCINERATOR AREA, THE RUBBLE EAST OF THE WASTE PITS, AND THE RUBBLE WEST OF THE SILOS)

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	5/5	*	^f	0.002 - 0.029	N^i	0.008	0.019	Y	Positive detection with no reason for exclusion
Aluminum	8/8		0.18	0.121 - 1.990	N^i	0.456	0.887	N	Ubiquitous compound
Antimony	2/3		^f	0.100 - 0.112	N^i	0.076	0.112^j	Y	Positive detection with no reason for exclusion
Barium	8/8		0.13	0.043 - 0.112	L	0.072	0.099	N	Sample concentrations are within background levels
Beryllium	4/8		0.001	0.001 - 0.002	N	0.001	0.001	Y	Sample concentrations exceed background levels
Cadmium	3/3		0.003	0.005 - 0.013	N	0.010	0.013^j	Y	Sample concentrations exceed background levels
Calcium	8/8		130	89.200 -189.00	L	128.16	158.706	N	Common dietary element
Carbon disulfide	1/1		^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Chloride	8/9		40	1.500 -14.200	N	7.406	10.621	N	Ubiquitous compound; Sample concentrations are within background levels
Chromium	8/8		0.076	0.024 - 0.050	N	0.035	0.041	N	Sample concentrations are within background levels
Cobalt	3/8		^f	0.010 - 0.014	N^i	0.008	0.010	Y	Positive detection with no reason for exclusion
Copper	3/8		0.046	0.014 - 0.026	N^i	0.010	0.015	N	Sample concentrations are within background levels
Cyanide	1/3		^f	0.032 - 0.032	L	0.007	0.032^j	Y	Positive detection with no reason for exclusion
Fluoride	8/9		1.6	0.500 - 1.000	N	0.726	0.917	N	Ubiquitous compound Sample concentrations are within background levels
Iron	8/8		1.8	0.079 - 4.600	L	1.001	4.600^j	N	Common dietary element
Lead	6/8		0.005	0.003 - 0.010	L	0.003	0.004	Y	Sample concentrations exceed background levels
Magnesium	8/8		57	44.000 -82.600	N	58.500	68.728	N	Common dietary element
Manganese	3/3		0.2	0.019 - 0.394	N	0.208	0.394^j	Y	Sample concentrations exceed background levels
Methylene chloride	4/5	*	^f	0.003 - 0.010	N	0.007	0.010	Y	Positive detection with no reason for exclusion
Molybdenum	2/2		^f	0.024 - 0.028	^h	^h	0.028^j	Y	Positive detection with no reason for exclusion
N-Nitrosodiphenylamine	1/1		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion

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Nickel	6/8		0.10	0.013 - 0.055	L	0.021	0.032	N	Sample concentrations are within background levels
Nitrate	4/8		0.34	0.150 -136.00	N^i	30.575	68.704	Y	Sample concentrations exceed background levels
Phenol	1/1		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Phosphorus (black, white, red	1/1		0.49	0.140 - 0.140	^h	^h	0.140^j	N	Ubiquitous compound Sample concentrations are within background levels
Potassium	3/3		26	1.420 - 6.520	N	4.507	6.520^j	N	Common dietary element Sample concentrations are within background levels
Silicon	2/2		^f	7.330 - 7.750	^h	^h	7.750^j	N	Ubiqutious compound
Silver	8/8		^f	0.011 - 0.039	N^i	0.018	0.025	Y	Positive detection with no reason for exclusion
Sodium	3/3		60	10.400 -32.800	L	16.345	32.800^j	N	Common dietary element Sample concentrations are within background levels
Sulfate	8/8		210	49.100 -282.00	N	180.09	236.056	N	Ubiquituos compound
Toluene	1/5	*	^f	0.002 - 0.002	N^i	0.002	0.002^j	Y	Positive detection with no reason for exclusion
Total Organic Carbon	5/8		^f	1.960 - 4.690	N	2.245	3.329	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Halides	4/7		^f	0.008 - 0.067	N^i	0.016	0.033	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	8/8		0.023	0.018 - 0.033	L	0.024	0.029	Y	Sample concentrations exceed background levels
Zinc	8/8		0.039	0.012 - 0.042	N	0.030	0.038	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Blank data exist, but have not been located.

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TABLE R.4-70

SELECTION OF CONSTITUENTS OF CONCERN FOR PERCHED WATER FROM RI/FS AND RCRA SAMPLING OF THE REMAINDER OF THE FEMP AREA (EXCLUDING THE PRODUCTION AREA, THE FIRE TRAINING AREA, THE K65 SLURRY LINE, THE SLUDGE LAGOON, THE RETENTION BASIN, THE INCINERATOR AREA, THE RUBBLE EAST OF THE WASTE PITS, AND THE RUBBLE WEST OF THE SILOS)

Chemical	Frequency of Detection	Highest Blank^a (mg/L)	Upper 95% TL for BKG^b (mg/L)	Range of Detection	Dist^c	Mean^d (mg/L)	Upper 95% CI on Mean^e (mg/L)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	2/9		^f	0.005 - 2.900	L	0.006	0.025	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	3/13		^f	0.001 - 2.500	L	0.004	0.012	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1/9		^f	0.490 - 0.490	L	0.004	0.013	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1/9		^f	0.019 - 0.019	L	0.003	0.005	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	2/8		^f	0.005 - 1.500	L	0.006	0.027	Y	Positive detection with no reason for exclusion
2,4-Dimethylphenol	1/9		^f	0.040 - 0.040	N^i	0.009	0.016	Y	Positive detection with no reason for exclusion
4-Methylphenol	1/9		^f	0.015 - 0.015	N	0.006	0.008	Y	Positive detection with no reason for exclusion
Acetone	7/13		^f	0.002 - 0.059	L	0.010	0.020	Y	Positive detection with no reason for exclusion
Aluminum	14/14		0.18	0.027 - 1.990	L	0.307	0.590	N	Ubiquitous Compound
Ammonia	39/82		0.36	0.100 - 4.500	L	0.146	0.189	Y	Sample concentrations exceed background levels
Antimony	2/9		^f	0.100 - 0.112	L	0.024	0.041	Y	Positive detection with no reason for exclusion
Arsenic	10/64		^f	0.002 - 0.350	N^i	0.010	0.020	Y	Positive detection with no reason for exclusion
Barium	83/93		0.13	0.034 - 0.459	L	0.131	0.154	Y	Sample concentrations exceed background levels
Benzoic acid	1/8		^f	0.025 - 0.025	N	0.025	0.025^j	Y	Positive detection with no reason for exclusion
Benzyl alcohol	1/9		^f	0.005 - 0.005	N^i	0.005	0.005	Y	Positive detection with no reason for exclusion
Beryllium	4/14		0.001	0.001 - 0.002	N	0.001	0.001	Y	Sample concentrations exceed background levels
Bromochloromethane	1/1		^f	0.050 - 0.050	^h	^h	0.050^j	Y	Positive detection with no reason for exclusion
Cadmium	27/87		0.003	0.003 - 0.016	L	0.003	0.003	Y	Sample concentrations exceed background levels
Calcium	92/92		130	16.000 -274.00	N	108.79	116.358	N	Common dietary element
Carbon disulfide	1/9		^f	0.004 - 0.004	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Chloride	86/89		40	0.500 -1095.0	L	59.567	107.985	N	Ubiquitous Compound
Chloroethane	1/9		^f	0.110 - 0.110	L	0.007	0.013	Y	Positive detection with no reason for exclusion
Chromium	36/93		0.076	0.013 - 0.120	L	0.013	0.015	Y	Sample concentrations

								exceed background levels
Cobalt	3/14	^f	0.010 - 0.014	N	0.006	0.008	Y	Positive detection with no reason for exclusion
Copper	27/93	0.046	0.010 - 0.190	L	0.008	0.009	Y	Sample concentrations exceed background levels
Cyanide	1/9	^f	0.032 - 0.032	N^i	0.008	0.013	Y	Positive detection with no reason for exclusion
Ethylbenzene	1/9	^f	0.013 - 0.013	N^i	0.004	0.006	Y	Positive detection with no reason for exclusion
Fluoride	86/89	1.6	0.100 - 3.500	L	0.695	0.801	N	Ubiquitous Compound
Iron	82/93	1.8	0.005 - 4.900	L	0.722	1.247	N	Common dietary element
Lead	23/66	0.005	0.002 - 0.118	N^i	0.005	0.008	Y	Sample concentrations exceed background levels
Magnesium	92/92	57	6.000 -109.60	N	39.916	43.218	N	Common dietary element
Manganese	81/88	0.2	0.003 - 2.540	L	0.192	0.301	Y	Sample concentrations exceed background levels
Mercury	14/88	^f	0.0002 - 0.004	N^i	0.00014	0.00017	Y	Positive detection with no reason for exclusion
Methylene chloride	7/13	^f	0.001 - 0.026	L	0.006	0.011	Y	Positive detection with no reason for exclusion
Molybdenum	21/87	^f	0.008 - 0.043	N^i	0.015	0.017	Y	Positive detection with no reason for exclusion
N-Nitrosodiphenylamine	1/9	^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
Nickel	24/93	0.10	0.013 - 0.180	N^i	0.017	0.020	Y	Sample concentrations exceed background levels
Nitrate	61/117	0.34	0.012 -136.00	L	0.543	0.859	Y	Sample concentrations exceed background levels
Oil and Grease	3/3	^f	1.620 - 3.300	N^i	2.473	3.300^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phenol	1/9	^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
Phenols	39/82	0.049	0.005 - 0.100	L	0.010	0.012	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Phosphate	1/2	^f	5.600 - 5.600	^h	^h	5.600^j	N	Ubiquitous Compound
Phosphorus (black, white, red	57/71	0.49	0.022 - 5.027	L	0.337	0.564	N	Ubiquitous Compound
Potassium	79/87	26	0.514 -31.500	L	3.193	3.945	N	Common dietary element
Selenium	4/66	^f	0.002 - 0.016	N^i	0.002	0.003	Y	Positive detection with no reason for exclusion
Silicon	2/2	^f	7.330 - 7.750	^h	^h	7.750^j	N	Ubiquitous Compound
Silver	21/93	^f	0.010 - 0.200	L	0.004	0.005	Y	Positive detection with no reason for exclusion
Sodium	88/88	60	1.600 -350.00	L	40.464	55.211	N	Common dietary element
Sulfate	79/88	210	2.000 -598.00	N	106.01	124.252	N	Ubiquitous Compound
Tetrachloroethene	1/13	^f	0.280 - 0.280	L	0.004	0.007	Y	Positive detection with no reason for exclusion
Toluene	2/13	^f	0.002 - 0.260	L	0.004	0.007	Y	Positive detection with no reason for exclusion
Total Kjeldahl Nitrogen	39/44	^f	0.103 -21.000	L	1.451	2.703	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Carbon	5/9	^f	1.960 - 4.690	L	1.395	2.591	N	General classes of compounds cannot be evaluated in a

								quantitative risk assessment
Total Organic Halides	11/53	^f	0.004 - 0.067	N^i	0.021	0.023	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total Organic Nitrogen	57/79	^f	0.100 - 5.500	L	0.490	0.706	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total xylenes	1/9	^f	0.055 - 0.055	L	0.004	0.007	Y	Positive detection with no reason for exclusion
Trichloroethene	2/13	^f	0.007 - 0.098	L	0.004	0.006	Y	Positive detection with no reason for exclusion
Vanadium	13/14	0.023	0.013 - 0.033	L	0.020	0.033^j	Y	Sample concentrations exceed background levels
Zinc	14/14	0.039	0.011 - 0.042	L	0.024	0.033	Y	Sample concentrations exceed background levels
bis(2-Ethylhexyl) phthalate	1/9	^f	0.004 - 0.004	N^i	0.005	0.004^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

R.5.0
Surface Soils

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R.5 SURFACE SOILS

RI/FS data were available for surface soils for the following areas: the Waste Storage Area, the Inactive Flyash Pile, four quadrants of the former Production Area, the Incinerator/Waste Water Treatment Facility, the Silo Area, and the remainder of the site. Data from CIS sampling of surface soils were used to supplement the RI/FS data for the following areas: the Waste Storage Area, the Active Flyash Pile, the Inactive Flyash Pile, and the South Field. Data are summarized separately by source and in combined form in Tables R.5-1 through R.5-28 for radionuclides and in Tables R.5-29 through R.5-42 for chemicals. Combined data are used in the baseline risk assessment. Data are presented for two depth ranges (0 - 6" and 0 - 18"). Surface soil data are used for estimating current exposure to soil, as a source term for estimating the concentration of constituents in air due to dust suspension under the current and future exposure scenarios, and as a source term for estimating the concentration in surface water and sediment for the future exposure scenario.

TABLE R.5-1

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE ENTIRE SITE (OFF AND ON PROPERTY)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	265/346	^f		0.200 -14.400	L	0.574	0.632	Y	Positive detection with no reason for exclusion
PU-238	14/346	^f		0.700 -151.00	L	0.336	0.358	Y	Positive detection with no reason for exclusion
PU-239/240	11/346	^f		1.100 -12.900	L	0.323	0.336	Y	Positive detection with no reason for exclusion
RA-226	295/346		2.200	0.400 -2950.0	N^i	18.670	37.781	Y	Sample concentrations exceed background levels
RA-228	294/346		1.500	0.500 -558.00	N^i	9.399	14.506	Y	Sample concentrations exceed background levels
SR-90	156/344	^f		0.500 -26.300	N^i	0.868	1.019	Y	Positive detection with no reason for exclusion
TC-99	65/346	^f		0.900 -320.00	L	0.709	0.771	Y	Positive detection with no reason for exclusion
TH-228	334/346		1.500	0.600 -315.00	N^i	4.651	6.726	Y	Sample concentrations exceed background levels
TH-230	344/346		2.100	0.700 -7901.0	N^i	48.397	88.932	Y	Sample concentrations exceed background levels
TH-232	324/346		1.500	0.600 -283.00	N^i	5.496	7.788	Y	Sample concentrations exceed background levels
U-234	370/371		2.100	0.700 - 13262	L	58.428	77.378	Y	Sample concentrations exceed background levels
U-235/236	176/371		0.097^*	0.600 -1730.0	L	0.868	0.992	Y	Sample concentrations exceed background levels
U-238	370/371		2.100	0.700 - 25670	L	72.051	95.739	Y	Sample concentrations exceed background levels
Uranium^**	210/210		3.23^g	1.000 - 23000	L	216.47	307.035	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

TABLE R.5-2

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE ENTIRE SITE (ON AND OFF PROPERTY)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	278/438	^f		0.200 -14.400	L	0.485	0.533	Y	Positive detection with no reason for exclusion
PU-238	26/438	^f		0.700 -151.00	L	0.352	0.374	Y	Positive detection with no reason for exclusion
PU-239/240	14/438	^f		0.700 -12.900	L	0.322	0.333	Y	Positive detection with no reason for exclusion
RA-226	385/438	2.200		0.400 -2950.0	N^i	21.959	40.029	Y	Sample concentrations exceed background levels
RA-228	379/438	1.500		0.500 -558.00	N^i	8.821	12.944	Y	Sample concentrations exceed background levels
SR-90	200/436	^f		0.500 -26.300	N^i	0.846	0.969	Y	Positive detection with no reason for exclusion
TC-99	92/438	^f		0.900 -320.00	L	0.739	0.799	Y	Positive detection with no reason for exclusion
TH-228	421/438	1.500		0.600 -315.00	N^i	4.717	6.400	Y	Sample concentrations exceed background levels
TH-230	436/438	2.100		0.700 -7901.0	N^i	50.194	83.905	Y	Sample concentrations exceed background levels
TH-232	404/438	1.500		0.600 -283.00	N^i	5.284	7.134	Y	Sample concentrations exceed background levels
U-234	460/461	2.100		0.700 - 13262	L	80.350	103.922	Y	Sample concentrations exceed background levels
U-235/236	248/461	0.097^*		0.600 -1730.0	L	3.941	4.838	Y	Sample concentrations exceed background levels
U-238	460/461	2.100		0.700 - 25670	L	104.78	136.135	Y	Sample concentrations exceed background levels
Uranium^**	302/302	3.23^g		1.000 - 23000	L	324.39	436.795	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-3

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6"; NO ADDITIONAL DATA FOR 0-18" DEPTH RANGE) FROM RI/FS SAMPLING IN THE WASTE STORAGE AREA (PITS 1-4 AND BURNPIT)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
NP-237	1/21	^f		2.400 - 2.400	L	0.331	0.393	Y	Positive detection with no reason for exclusion
PU-239/240	1/21	^f		0.800 - 0.800	N	0.324	0.365	Y	Positive detection with no reason for exclusion
RA-226	20/20		2.200	0.800 -117.00	L	25.190	117.000^j	Y	Sample concentrations exceed background levels
RA-228	21/21		1.500	0.700 -44.700	L	10.481	31.983	Y	Sample concentrations exceed background levels
SR-90	8/21	^f		1.100 - 2.400	L	0.496	0.697	Y	Positive detection with no reason for exclusion
TC-99	4/21	^f		1.200 - 2.400	N	0.674	0.868	Y	Positive detection with no reason for exclusion
TH-228	20/21		1.500	0.700 -94.000	L	13.038	51.478	Y	Sample concentrations exceed background levels
TH-230	21/21		2.100	1.100 -7597.0	L	1184.0	7597.00^j	Y	Sample concentrations exceed background levels
TH-232	21/21		1.500	0.700 -93.200	N^i	13.848	23.155	Y	Sample concentrations exceed background levels
U-234	21/21		2.100	1.400 -423.00	L	115.52	423.000^j	Y	Sample concentrations exceed background levels
U-235/236	12/21		0.097	1.100 -22.600	N	6.624	9.686	Y	Sample concentrations exceed background levels
U-238	21/21		2.100	1.700 -473.00	L	131.03	473.000^j	Y	Sample concentrations exceed background levels
Uranium *	21/21		3.230	4.000 -2050.0	L	508.00	2050.00^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.5-4

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM CIS SAMPLING OF THE WASTE STORAGE AREA (PITS 1-4 AND BURNPIT)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	38/452		^f	0.400 -16.000	L	0.425	0.455	Y	Positive detection with no reason for exclusion
NP-237	1/41		^f	0.700 - 0.700	N^i	0.091	0.121	Y	Positive detection with no reason for exclusion
PU-238	10/41		^f	0.000 - 0.700	N^i	0.117	0.155	Y	Positive detection with no reason for exclusion
PU-239/240	11/41		^f	0.000 - 0.600	N^i	0.106	0.138	Y	Positive detection with no reason for exclusion
RA-226	246/453		2.200	0.400 -50.800	L	1.792	1.959	Y	Sample concentrations exceed background levels
RU-106	1/454		^f	6.200 - 6.200	L	2.972	3.202	Y	Positive detection with no reason for exclusion
SR-90	1/41		^f	1.500 - 1.500	L	0.205	0.240	Y	Positive detection with no reason for exclusion
TC-99	22/41		^f	2.600 -58.000	L	9.538	19.376	Y	Positive detection with no reason for exclusion
TH-228	40/41		1.500	0.100 -48.000	L	2.371	4.758	Y	Sample concentrations exceed background levels
TH-230	41/41		2.100	0.100 -972.00	L	25.734	78.875	Y	Sample concentrations exceed background levels
TH-232	344/454		1.500	0.100 -31.000	L	2.292	2.548	Y	Sample concentrations exceed background levels
U-234	41/41		2.100	1.700 -241.00	L	83.984	148.820	Y	Sample concentrations exceed background levels
U-235	41/41		0.097	0.100 -33.000	L	13.058	31.778	Y	Sample concentrations exceed background levels
U-238	434/454		2.100	2.500 -2560.0	L	214.29	259.972	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-5

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM CIS AND RI/FS SAMPLING OF THE WASTE STORAGE AREA (PITS 1-4; BURN PIT)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	37/472	^f		0.400 -16.000	L	0.404	0.433	Y	Positive detection with no reason for exclusion
NP-237	2/62	^f		0.700 - 2.400	L	0.118	0.144	Y	Positive detection with no reason for exclusion
PU-238	10/62	^f		0.000 - 0.700	N	0.179	0.210	Y	Positive detection with no reason for exclusion
PU-239/240	12/62	^f		0.000 - 0.800	N	0.180	0.213	Y	Positive detection with no reason for exclusion
RA-226	269/473	2.200		0.400 -117.00	L	2.128	2.354	Y	Sample concentrations exceed background levels
RA-228	21/21	1.500		0.700 -44.700	L	10.481	31.983	Y	Sample concentrations exceed background levels
RU-106	1/475	^f		6.200 - 6.200	L	2.807	3.027	Y	Positive detection with no reason for exclusion
SR-90	9/62	^f		1.100 - 2.400	L	0.277	0.330	Y	Positive detection with no reason for exclusion
TC-99	26/62	^f		1.200 -58.000	L	1.738	2.384	Y	Positive detection with no reason for exclusion
TH-228	60/62	1.500		0.100 -94.000	L	5.382	10.604	Y	Sample concentrations exceed background levels
TH-230	62/62	2.100		0.100 -7597.0	L	342.68	1577.50	Y	Sample concentrations exceed background levels
TH-232	365/475	1.500		0.100 -93.200	L	2.562	2.855	Y	Sample concentrations exceed background levels
U-234	62/62	2.100		1.400 -423.00	L	116.30	208.725	Y	Sample concentrations exceed background levels
U-235/236	53/62	0.097		0.100 -33.000	L	12.035	24.313	Y	Sample concentrations exceed background levels
U-238	456/476	2.100		1.700 -2560.0	L	220.50	267.449	Y	Sample concentrations exceed background levels
Uranium^*	21/21	3.230		4.000 -2050.0	L	508.00	2050.00^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*Units are reported in mg/kg.

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TABLE R.5-6

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM CIS SAMPLING OF THE WASTE STORATE AREA (PITS 1 - 5; BURN PIT)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	41/541	^f		0.400 -16.000	L	0.407	0.434	Y	Positive detection with no reason for exclusion
NP-237	2/45	^f		0.700 - 4.600	L	0.075	0.093	Y	Positive detection with no reason for exclusion
PU-238	13/45	^f		0.000 -34.000	L	0.100	0.135	Y	Positive detection with no reason for exclusion
PU-239/240	14/45	^f		0.000 - 8.600	N^i	0.300	0.618	Y	Positive detection with no reason for exclusion
RA-226	309/542	2.200		0.400 -50.800	L	1.892	2.060	Y	Sample concentrations exceed background levels
RU-106	1/543	^f		6.200 - 6.200	L	2.908	3.118	Y	Positive detection with no reason for exclusion
SR-90	1/45	^f		1.500 - 1.500	L	0.213	0.246	Y	Positive detection with no reason for exclusion
TC-99	24/45	^f		2.600 -1540.0	L	15.171	35.677	Y	Positive detection with no reason for exclusion
TH-228	44/45	1.500		0.100 -61.000	L	3.340	6.761	Y	Sample concentrations exceed background levels
TH-230	45/45	2.100		0.100 -972.00	L	31.094	89.441	Y	Sample concentrations exceed background levels
TH-232	418/543	1.500		0.100 -170.00	L	2.463	2.716	Y	Sample concentrations exceed background levels
U-234	45/45	2.100		1.700 -780.00	L	97.064	179.615	Y	Sample concentrations exceed background levels
U-235	45/45	0.097		0.100 -81.000	L	14.518	33.444	Y	Sample concentrations exceed background levels
U-238	521/543	2.100		2.500 -3490.0	L	198.59	237.166	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-7

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM CIS AND RI/FS SAMPLING OF THE WASTE STORAGE AREA (PITS 1 - 5, BURN PIT)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	41/562	^f		0.400 -16.000	L	0.389	0.415	Y	Positive detection with no reason for exclusion
NP-237	3/66	^f		0.700 - 4.600	L	0.120	0.148	Y	Positive detection with no reason for exclusion
PU-238	13/66	^f		0.000 -34.000	L	0.142	0.179	Y	Positive detection with no reason for exclusion
PU-239/240	15/66	^f		0.000 - 8.600	N^i	0.308	0.523	Y	Positive detection with no reason for exclusion
RA-226	329/562	2.200		0.400 -117.00	L	2.162	2.376	Y	Sample concentrations exceed background levels
RA-228	21/21	1.500		0.700 -44.700	L	10.481	31.983	Y	Sample concentrations exceed background levels
RU-106	1/564	^f		6.200 - 6.200	L	2.761	2.961	Y	Positive detection with no reason for exclusion
SR-90	9/66	^f		1.100 - 2.400	L	0.279	0.328	Y	Positive detection with no reason for exclusion
TC-99	28/66	^f		1.200 -1540.0	L	1.917	2.705	Y	Positive detection with no reason for exclusion
TH-228	64/66	1.500		0.100 -94.000	L	6.174	12.005	Y	Sample concentrations exceed background levels
TH-230	66/66	2.100		0.100 -7597.0	L	307.83	1153.59	Y	Sample concentrations exceed background levels
TH-232	439/564	1.500		0.100 -170.00	L	2.664	2.943	Y	Sample concentrations exceed background levels
U-234	66/66	2.100		1.400 -780.00	L	126.26	222.154	Y	Sample concentrations exceed background levels
U-235/236	57/66	0.097		0.100 -81.000	L	13.174	25.958	Y	Sample concentrations exceed background levels
U-238	542/564	2.100		1.700 -3490.0	L	201.92	241.079	Y	Sample concentrations exceed background levels
Uranium^*	21/21	3.230^g		4.000 -2050.0	L	508.00	2050.00^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*Units are reported in mg/kg.

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TABLE R.5-8

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM CIS SAMPLING OF THE ACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	2/4		2.200	0.600 - 0.700	N	0.475	0.700^j	N	Sample concentrations are within background levels
TH-232	4/4		1.500	0.600 - 1.100	N	0.800	1.054	N	Sample concentrations are within background levels
U-238	2/4		2.100	2.200 - 2.800	N^i	3.825	2.800^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-9

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-6"; No greater depths available) FROM RI/FS SAMPLING OF THE INACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	1/1		^f	0.700 - 0.700	^h	^h	0.700^j	Y	Positive detection with no reason for exclusion
RA-226	1/1		2.200	1.400 - 1.400	^h	^h	1.400^j	N	Sample concentrations are within background levels
TH-228	1/1		1.500	0.900 - 0.900	^h	^h	0.900^j	N	Sample concentrations are within background levels
TH-230	1/1		2.100	5.300 - 5.300	^h	^h	5.300^j	Y	Sample concentrations exceed background levels
TH-232	1/1		1.500	1.800 - 1.800	^h	^h	1.800^j	Y	Sample concentrations exceed background levels
U-234	1/1		2.100	5.100 - 5.100	^h	^h	5.100^j	Y	Sample concentrations exceed background levels
U-238	1/1		2.100	4.900 - 4.900	^h	^h	4.900^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-10

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM CIS SAMPLING OF THE INACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	3/3		2.200	33.500 -48.880	N	41.227	48.880^j	Y	Sample concentrations exceed background levels
TH-230	1/1		2.100	59.000 -59.000	^h	^h	59.000^j	Y	Sample concentrations exceed background levels
U-234	1/1		2.100	82.000 -82.000	^h	^h	82.000^j	Y	Sample concentrations exceed background levels
U-235	1/1		0.097	1.900 - 1.900	^h	^h	1.900^j	Y	Sample concentrations exceed background levels
U-238	1/3		2.100	40.000 -40.000	N^i	21.783	40.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-11

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS AND CIS SAMPLING OF THE INACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	1/4		^f	0.700 - 0.700	L	0.435	0.700^j	Y	Positive detection with no reason for exclusion
RA-226	4/4		2.200	1.400 -48.880	L	17.541	48.880^j	Y	Sample concentrations exceed background levels
TH-228	1/2		1.500	0.900 - 0.900	^h	^h	0.900^j	N	Sample concentrations are within background levels
TH-230	2/2		2.100	5.300 -59.000	^h	^h	59.000^j	Y	Sample concentrations exceed background levels
TH-232	1/4		1.500	1.800 - 1.800	L	0.721	1.800^j	Y	Sample concentrations exceed background levels
U-234	2/2		2.100	5.100 -82.000	^h	^h	82.000^j	Y	Sample concentrations exceed background levels
U-235/236	1/2		0.097	1.900 - 1.900	^h	^h	1.900^j	Y	Sample concentrations exceed background levels
U-238	2/4		2.100	4.900 -40.000	L	13.024	37.378	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-12

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM CIS SAMPLING OF THE INACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	7/7		2.200	1.700 -48.880	N	25.740	38.503	Y	Sample concentrations exceed background levels
TH-230	1/1		2.100	59.000 -59.000	^h	^h	59.000^j	Y	Sample concentrations exceed background levels
TH-232	2/7		1.500	2.200 - 2.300	N^i	1.957	2.300^j	Y	Sample concentrations exceed background levels
U-234	1/1		2.100	82.000 -82.000	^h	^h	82.000^j	Y	Sample concentrations exceed background levels
U-235	1/1		0.097	1.900 - 1.900	^h	^h	1.900^j	Y	Sample concentrations exceed background levels
U-238	2/7		2.100	5.200 -40.000	N^i	15.171	23.796	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-13

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-18") FROM RI/FS AND CIS SAMPLING OF THE INACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	1 /8		^f	0.700 - 0.700	N	0.481	0.700^j	Y	Positive detection with no reason for exclusion
RA-226	8 /8		2.200	1.400 -48.880	N	22.698	34.919	Y	Sample concentrations exceed background levels
TH-228	1 /2		1.500	0.900 - 0.900	^h	^h	0.900^j	N	Sample concentrations are within background levels
TH-230	2 /2		2.100	5.300 -59.000	^h	^h	59.000^j	Y	Sample concentrations exceed background levels
TH-232	3 /8		1.500	1.800 - 2.300	N^i	1.938	2.300^j	Y	Sample concentrations exceed background levels
U-234	2 /2		2.100	5.100 -82.000	^h	^h	82.000^j	Y	Sample concentrations exceed background levels
U-235/236	1 /2		0.097	1.900 - 1.900	^h	^h	1.900^j	Y	Sample concentrations exceed background levels
U-238	3 /8		2.100	4.900 -40.000	N	13.888	21.565	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-14

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM CIS SAMPLING OF THE SOUTHFIELD AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	21/224	^f		0.300 - 0.700	L	0.432	0.466	Y	Positive detection with no reason for exclusion
RA-226	201/224		2.200	0.200 -353.60	L	21.242	27.954	Y	Sample concentrations exceed background levels
TH-228	19/21		1.500	0.100 -39.000	L	4.667	20.681	Y	Sample concentrations exceed background levels
TH-230	21/21		2.100	0.200 -164.00	L	29.743	128.101	Y	Sample concentrations exceed background levels
TH-232	90/223		1.500	0.100 -70.200	L	1.656	1.891	Y	Sample concentrations exceed background levels
U-234	21/21		2.100	4.200 -2850.0	L	196.99	519.291	Y	Sample concentrations exceed background levels
U-235	21/21		0.097	0.200 -356.00	L	19.576	34.333	Y	Sample concentrations exceed background levels
U-238	97/224		2.100	2.000 -2940.0	L	12.382	13.831	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-15

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM CIS SAMPLING OF THE SOUTHFIELD AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	21/305	^f		0.300 - 0.700	L	0.423	0.454	Y	Positive detection with no reason for exclusion
RA-226	265/305	2.200		0.200 -353.60	L	21.587	27.466	Y	Sample concentrations exceed background levels
RU-106	1/305	^f		14.600 -14.600	L	2.970	3.239	Y	Positive detection with no reason for exclusion
TH-228	25/28	1.500		0.100 -129.00	L	8.486	30.499	Y	Sample concentrations exceed background levels
TH-230	28/28	2.100		0.200 -2330.0	L	145.35	470.809	Y	Sample concentrations exceed background levels
TH-232	126/304	1.500		0.100 -130.00	L	1.719	1.946	Y	Sample concentrations exceed background levels
U-234	28/28	2.100		4.200 -2850.0	L	160.43	255.046	Y	Sample concentrations exceed background levels
U-235	28/28	0.097		0.200 -356.00	L	15.282	15.200	Y	Sample concentrations exceed background levels
U-238	124/305	2.100		2.000 -2940.0	L	12.120	13.266	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-16

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-6") FROM RI/FS SAMPLING OF THE NORTHWEST QUADRANT OF THE PRODUCTION AREA0

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	10/15	^f		0.200 - 0.800	L	0.393	0.696	Y	Positive detection with no reason for exclusion
RA-226	15/15		2.200	0.600 -2720.0	N^i	188.13	506.734	Y	Sample concentrations exceed background levels
RA-228	15/15		1.500	0.500 -56.200	L	10.140	43.709	Y	Sample concentrations exceed background levels
SR-90	4/15		^f	0.600 - 3.100	L	0.408	0.616	Y	Positive detection with no reason for exclusion
TC-99	1/15		^f	2.500 - 2.500	N^i	0.587	0.827	Y	Positive detection with no reason for exclusion
TH-228	15/15		1.500	0.600 -31.200	L	5.453	15.640	Y	Sample concentrations exceed background levels
TH-230	15/15		2.100	1.600 -2729.0	N^i	210.87	530.123	Y	Sample concentrations exceed background levels
TH-232	14/15		1.500	0.600 -31.400	L	7.947	31.400^j	Y	Sample concentrations exceed background levels
U-234	15/15		2.100	6.900 -3857.0	L	354.13	1687.36	Y	Sample concentrations exceed background levels
U-235/236	12/15		0.097^*	0.700 -204.00	L	19.040	103.626	Y	Sample concentrations exceed background levels
U-238	15/15		2.100	9.100 -4108.0	L	390.55	1926.92	Y	Sample concentrations exceed background levels
Uranium^**	9/9		3.23^g	25.000 -140.00	L	67.889	120.542	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-17

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE NORTHWEST QUADRANT OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	12/31		^f	0.200 - 1.700	N^i	0.382	0.516	Y	Positive detection with no reason for exclusion
PU-238	1/31		^f	0.900 - 0.900	N	0.319	0.352	Y	Positive detection with no reason for exclusion
RA-226	31/31		2.200	0.600 -2720.0	N^i	189.84	393.189	Y	Sample concentrations exceed background levels
RA-228	28/31		1.500	0.500 -56.200	L	5.699	12.402	Y	Sample concentrations exceed background levels
SR-90	9/31		^f	0.500 - 3.100	N^i	0.516	0.716	Y	Positive detection with no reason for exclusion
TC-99	3/31		^f	1.000 - 2.500	N^i	0.565	0.689	Y	Positive detection with no reason for exclusion
TH-228	29/31		1.500	0.600 -31.200	L	4.253	7.848	Y	Sample concentrations exceed background levels
TH-230	31/31		2.100	0.800 -2749.0	N^i	208.42	415.717	Y	Sample concentrations exceed background levels
TH-232	27/31		1.500	0.600 -31.400	L	5.507	12.144	Y	Sample concentrations exceed background levels
U-234	31/31		2.100	5.800 -3857.0	L	173.70	419.188	Y	Sample concentrations exceed background levels
U-235/236	26/31		0.097^*	0.600 -204.00	L	8.725	21.319	Y	Sample concentrations exceed background levels
U-238	31/31		2.100	7.400 -4108.0	L	222.52	537.313	Y	Sample concentrations exceed background levels
Uranium^**	25/25		3.23^g	19.000 -6140.0	L	446.68	765.994	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-18

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE NORTHEAST QUADRANT OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	24/26	^f		0.200 - 0.800	N	0.450	0.511	Y	Positive detection with no reason for exclusion
RA-226	25/26		2.200	0.600 - 9.000	L	1.860	2.331	Y	Sample concentrations exceed background levels
RA-228	25/26		1.500	0.700 -558.00	N^i	23.099	59.650	Y	Sample concentrations exceed background levels
SR-90	6/26	^f		0.500 - 2.700	N	0.458	0.636	Y	Positive detection with no reason for exclusion
TC-99	11/26	^f		0.900 - 2.600	N	0.910	1.124	Y	Positive detection with no reason for exclusion
TH-228	25/26		1.500	0.700 -39.200	L	3.219	3.746	Y	Sample concentrations exceed background levels
TH-230	26/26		2.100	1.300 -7901.0	N^i	317.44	835.796	Y	Sample concentrations exceed background levels
TH-232	25/26		1.500	0.600 -194.00	N^i	12.862	26.970	Y	Sample concentrations exceed background levels
U-234	26/26		2.100	4.200 -7075.0	L	300.01	146.362	Y	Sample concentrations exceed background levels
U-235/236	24/26		0.097^*	0.700 -69.900	L	4.500	4.947	Y	Sample concentrations exceed background levels
U-238	26/26		2.100	4.800 -7178.0	N^i	308.41	777.818	Y	Sample concentrations exceed background levels
Uranium^**	23/23		3.23^g	12.000 -217.00	N	91.217	110.197	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-19

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE NORTHEAST QUADRANT OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	27/50		^f	0.200 - 0.800	N	0.305	0.357	Y	Positive detection with no reason for exclusion
RA-226	48/50		2.200	0.600 - 9.000	L	1.488	1.735	Y	Sample concentrations exceed background levels
RA-228	49/50		1.500	0.700 -558.00	N^i	12.569	31.233	Y	Sample concentrations exceed background levels
SR-90	21/50		^f	0.500 - 3.600	L	0.502	0.622	Y	Positive detection with no reason for exclusion
TC-99	20/50		^f	0.900 - 8.100	L	0.863	1.073	Y	Positive detection with no reason for exclusion
TH-228	49/50		1.500	0.600 -39.200	L	1.779	2.181	Y	Sample concentrations exceed background levels
TH-230	50/50		2.100	1.000 -7901.0	N^i	166.49	431.231	Y	Sample concentrations exceed background levels
TH-232	44/50		1.500	0.600 -194.00	N^i	7.184	14.456	Y	Sample concentrations exceed background levels
U-234	50/50		2.100	3.100 -7075.0	L	52.960	85.139	Y	Sample concentrations exceed background levels
U-235/236	41/50		0.097^*	0.700 -69.900	L	2.549	3.870	Y	Sample concentrations exceed background levels
U-238	50/50		2.100	3.100 -7178.0	L	61.063	97.744	Y	Sample concentrations exceed background levels
Uranium^**	47/47		3.23^g	9.000 -2270.0	L	107.31	146.031	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-20

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE SOUTHWEST QUADRANT OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	15/22		^f	0.200 - 2.900	L	0.636	1.126	Y	Positive detection with no reason for exclusion
PU-238	9/22		^f	0.700 -151.00	L	1.279	2.952	Y	Positive detection with no reason for exclusion
PU-239/240	6/22		^f	0.700 -12.900	L	0.671	1.120	Y	Positive detection with no reason for exclusion
RA-226	16/22		2.200	0.700 - 2.700	L	1.245	1.627	Y	Sample concentrations exceed background levels
RA-228	22/22		1.500	0.700 -546.00	N^i	92.245	157.532	Y	Sample concentrations exceed background levels
SR-90	10/22		^f	0.600 -26.300	L	0.637	1.032	Y	Positive detection with no reason for exclusion
TC-99	12/22		^f	1.100 -320.00	L	18.668	38.044	Y	Positive detection with no reason for exclusion
TH-228	22/22		1.500	0.600 -315.00	L	42.132	307.581	Y	Sample concentrations exceed background levels
TH-230	22/22		2.100	1.200 -288.00	L	51.795	279.900	Y	Sample concentrations exceed background levels
TH-232	22/22		1.500	0.600 -283.00	L	43.445	283.000^j	Y	Sample concentrations exceed background levels
U-234	22/22		2.100	5.200 - 13262	L	1325.2	13262.0^j	Y	Sample concentrations exceed background levels
U-235/236	20/22		0.097^*	0.700 -950.00	L	64.645	486.574	Y	Sample concentrations exceed background levels
U-238	22/22		2.100	5.400 - 14321	L	1379.4	14321.0^j	Y	Sample concentrations exceed background levels
Uranium^**	19/19		3.23^g	14.000 - 21100	L	1977.3	17340.7	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*For U-235.
^**Units are reported in mg/kg.

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TABLE R.5-21

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE SOUTHWEST QUADRANT OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	17/44	^f		0.200 - 2.900	N	0.389	0.523	Y	Positive detection with no reason for exclusion
PU-238	17/44	^f		0.700 -151.00	L	1.068	1.766	Y	Positive detection with no reason for exclusion
PU-239/240	9/44	^f		0.700 -12.900	L	0.502	0.665	Y	Positive detection with no reason for exclusion
RA-226	37/44	2.200		0.700 - 2.700	L	1.187	1.342	Y	Sample concentrations exceed background levels
RA-228	44/44	1.500		0.700 -546.00	L	47.528	150.696	Y	Sample concentrations exceed background levels
SR-90	17/44	^f		0.600 -26.300	L	0.517	0.687	Y	Positive detection with no reason for exclusion
TC-99	18/44	^f		1.100 -320.00	L	1.245	1.817	Y	Positive detection with no reason for exclusion
TH-228	44/44	1.500		0.600 -315.00	L	23.690	59.281	Y	Sample concentrations exceed background levels
TH-230	44/44	2.100		1.200 -288.00	L	27.001	61.076	Y	Sample concentrations exceed background levels
TH-232	42/44	1.500		0.600 -283.00	L	29.993	88.934	Y	Sample concentrations exceed background levels
U-234	44/44	2.100		5.200 - 13262	L	673.39	1933.83	Y	Sample concentrations exceed background levels
U-235/236	42/44	0.097^*		0.700 -950.00	L	31.861	79.038	Y	Sample concentrations exceed background levels
U-238	44/44	2.100		5.400 - 14321	L	710.18	2060.23	Y	Sample concentrations exceed background levels
Uranium^**	41/41	3.23^g		14.000 - 21100	L	1133.6	2811.57	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-22

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE SOUTHEAST QUADRANT OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	10 /15	^f		0.300 -14.400	L	1.347	2.855	Y	Positive detection with no reason for exclusion
PU-239/240	1 /15	^f		1.100 - 1.100	N	0.353	0.447	Y	Positive detection with no reason for exclusion
RA-226	15 /15		2.200	0.900 - 3.000	L	1.487	1.824	Y	Sample concentrations exceed background levels
RA-228	15 /15		1.500	0.700 - 5.400	N^i	1.680	2.372	Y	Sample concentrations exceed background levels
SR-90	2 /15	^f		1.000 - 2.500	N^i	0.450	0.722	Y	Positive detection with no reason for exclusion
TC-99	4 /15	^f		1.000 - 2.000	N	0.763	1.025	Y	Positive detection with no reason for exclusion
TH-228	15 /15		1.500	0.700 - 7.500	N^i	1.947	2.950	Y	Sample concentrations exceed background levels
TH-230	15 /15		2.100	1.000 -40.300	L	7.520	17.970	Y	Sample concentrations exceed background levels
TH-232	14 /15		1.500	0.700 - 9.100	L	1.987	3.515	Y	Sample concentrations exceed background levels
U-234	15 /15		2.100	4.000 -970.00	L	124.68	595.643	Y	Sample concentrations exceed background levels
U-235/236	9 /15		0.097^*	0.700 -41.600	L	6.100	35.261	Y	Sample concentrations exceed background levels
U-238	15 /15		2.100	4.400 -986.00	L	135.91	704.369	Y	Sample concentrations exceed background levels
Uranium^**	14 /14		3.23^g	17.000 -3150.0	L	490.93	3067.25	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*For U-235.
^**Units are reported in mg/kg.

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TABLE R.5-23

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE SOUTHEAST QUADRANT OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	11/23	^f		0.200 -14.400	L	0.246	0.382	Y	Positive detection with no reason for exclusion
PU-238	1/23	^f		1.700 - 1.700	N	0.361	0.465	Y	Positive detection with no reason for exclusion
PU-239/240	1/23	^f		1.100 - 1.100	N	0.335	0.395	Y	Positive detection with no reason for exclusion
RA-226	23/23	2.200		0.800 - 3.800	L	1.474	1.741	Y	Sample concentrations exceed background levels
RA-228	22/23	1.500		0.700 - 5.400	L	1.613	2.120	Y	Sample concentrations exceed background levels
SR-90	5/23	^f		0.500 - 2.500	N^i	0.439	0.621	Y	Positive detection with no reason for exclusion
TC-99	7/23	^f		1.000 - 5.500	L	0.763	1.046	Y	Positive detection with no reason for exclusion
TH-228	22/23	1.500		0.700 - 7.500	L	1.852	2.600	Y	Sample concentrations exceed background levels
TH-230	23/23	2.100		1.000 -275.00	N^i	17.826	38.171	Y	Sample concentrations exceed background levels
TH-232	22/23	1.500		0.600 - 9.100	L	1.965	2.851	Y	Sample concentrations exceed background levels
U-234	23/23	2.100		3.700 -970.00	L	118.07	308.680	Y	Sample concentrations exceed background levels
U-235/236	14/23	0.097^*		0.700 -41.600	L	6.109	21.844	Y	Sample concentrations exceed background levels
U-238	23/23	2.100		3.900 -986.00	L	131.22	420.357	Y	Sample concentrations exceed background levels
Uranium^**	22/22	3.23^g		9.000 -3150.0	L	427.59	1455.04	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-24

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE INCINERATOR/WASTE WATER TREATMENT FACILITY AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	22/32		^f	0.300 - 1.100	N	0.527	0.625	Y	Positive detection with no reason for exclusion
PU-238	2/32		^f	1.400 - 1.500	N	0.372	0.457	Y	Positive detection with no reason for exclusion
PU-239/240	2/32		^f	1.100 - 1.500	N	0.363	0.438	Y	Positive detection with no reason for exclusion
RA-226	29/32		2.200	0.900 -188.00	N^i	11.628	22.258	Y	Sample concentrations exceed background levels
RA-228	26/32		1.500	0.600 -18.000	L	2.818	4.264	Y	Sample concentrations exceed background levels
SR-90	25/32		^f	0.500 - 3.700	L	1.264	1.755	Y	Positive detection with no reason for exclusion
TC-99	14/32		^f	1.000 -228.00	L	1.686	2.608	Y	Positive detection with no reason for exclusion
TH-228	31/32		1.500	0.700 -24.800	L	3.099	4.685	Y	Sample concentrations exceed background levels
TH-230	32/32		2.100	1.200 -806.00	L	49.845	155.080	Y	Sample concentrations exceed background levels
TH-232	32/32		1.500	0.600 -61.900	L	3.898	6.311	Y	Sample concentrations exceed background levels
U-234	32/32		2.100	3.700 - 10977	L	1399.4	7882.37	Y	Sample concentrations exceed background levels
U-235/236	28/32		0.097^*	0.600 -1730.0	L	102.37	726.605	Y	Sample concentrations exceed background levels
U-238	32/32		2.100	4.100 - 25670	L	1777.9	10509.9	Y	Sample concentrations exceed background levels
Uranium^**	22/22		3.23^g	12.000 - 23000	L	2393.9	23000.0^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

TABLE R.5-25

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE INCINERATOR/WASTE WATER TREATMET FACILITY AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	25/40		^f	0.200 - 1.100	N	0.454	0.541	Y	Positive detection with no reason for exclusion
PU-238	4/40		^f	1.400 - 2.400	N	0.445	0.567	Y	Positive detection with no reason for exclusion
PU-239/240	2/40		^f	1.100 - 1.500	N	0.350	0.410	Y	Positive detection with no reason for exclusion
RA-226	37/40		2.200	0.900 -188.00	N^i	9.720	18.207	Y	Sample concentrations exceed background levels
RA-228	34/40		1.500	0.600 -18.000	L	2.877	4.058	Y	Sample concentrations exceed background levels
SR-90	30/40		^f	0.500 - 3.900	L	1.206	1.645	Y	Positive detection with no reason for exclusion
TC-99	20/40		^f	1.000 -228.00	L	6.824	14.406	Y	Positive detection with no reason for exclusion
TH-228	39/40		1.500	0.700 -24.800	L	3.153	4.426	Y	Sample concentrations exceed background levels
TH-230	40/40		2.100	1.200 -806.00	L	77.462	249.716	Y	Sample concentrations exceed background levels
TH-232	40/40		1.500	0.600 -61.900	L	3.907	5.911	Y	Sample concentrations exceed background levels
U-234	38/38		2.100	3.700 - 10977	L	1539.7	6822.26	Y	Sample concentrations exceed background levels
U-235/236	34/38		0.097^*	0.600 -1730.0	L	105.07	486.986	Y	Sample concentrations exceed background levels
U-238	38/38		2.100	4.100 - 25670	L	1913.4	8807.21	Y	Sample concentrations exceed background levels
Uranium^**	30/30		3.23^g	12.000 - 23000	L	2075.3	21831.0	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
^**Units are reported in mg/kg.

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TABLE R.5-26

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6"; No greater depths available) FROM RI/FS SAMPLING OF THE SILO AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	7/7		2.200	1.000 - 4.200	L	1.700	2.946	Y	Sample concentrations exceed background levels
RA-228	7/7		1.500	1.000 - 1.700	L	1.314	1.499	Y	Sample concentrations exceed background levels
SR-90	6/7		^f	0.800 - 2.600	N	1.136	1.692	Y	Positive detection with no reason for exclusion
TC-99	1/7		^f	1.200 - 1.200	N	0.571	0.777	Y	Positive detection with no reason for exclusion
TH-228	7/7		1.500	0.900 - 1.400	L	1.100	1.260	N	Sample concentrations are within background levels
TH-230	7/7		2.100	1.900 - 4.300	N	3.057	3.711	Y	Sample concentrations exceed background levels
TH-232	7/7		1.500	0.900 - 1.700	L	1.171	1.414	Y	Sample concentrations exceed background levels
U-234	4/4		2.100	2.400 - 6.900	N	4.125	6.635	Y	Sample concentrations exceed background levels
U-238	4/4		2.100	2.400 -20.800	L	6.467	18.733	Y	Sample concentrations exceed background levels
Uranium^*	7/7		3.23^g	4.000 -64.000	L	21.571	64.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.5-27

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE REMAINDER OF THE SITE (EXCLUDING THE PRODUCTION AREA, INCINERATOR/WASTE WATER TREATMENT FACILITY, WASTE STORAGE AREA, FLYASH/SOUTHFIELD AREA, AND SILO AREA)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	181/218		^f	0.200 - 1.600	N	0.573	0.616	Y	Positive detection with no reason for exclusion
PU-238	3/218		^f	0.900 - 2.200	N	0.316	0.333	Y	Positive detection with no reason for exclusion
PU-239/240	2/218		^f	1.900 - 2.900	N	0.319	0.342	Y	Positive detection with no reason for exclusion
RA-226	179/218		2.200	0.400 -2950.0	N^i	14.434	36.781	Y	Sample concentrations exceed background levels
RA-228	177/218		1.500	0.500 -45.500	N^i	1.496	1.948	Y	Sample concentrations exceed background levels
SR-90	100/216		^f	0.500 - 6.500	N^i	0.793	0.905	Y	Positive detection with no reason for exclusion
TC-99	21/218		^f	0.900 -27.300	L	0.595	0.644	Y	Positive detection with no reason for exclusion
TH-228	208/218		1.500	0.600 -38.900	N^i	1.629	2.001	Y	Sample concentrations exceed background levels
TH-230	216/218		2.100	0.700 -1137.0	N^i	7.721	16.323	Y	Sample concentrations exceed background levels
TH-232	199/218		1.500	0.600 -11.400	L	1.187	1.279	Y	Sample concentrations exceed background levels
U-234	245/246		2.100	0.700 -2899.0	L	11.614	13.911	Y	Sample concentrations exceed background levels
U-235/236	82/246		0.097^*	0.600 -49.300	L	0.506	0.554	Y	Sample concentrations exceed background levels
U-238	245/246		2.100	0.700 -1849.0	L	15.552	18.921	Y	Sample concentrations exceed background levels
Uranium^**	109/109		3.23^g	1.000 -1180.0	L	54.629	72.050	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

TABLE R.5-28

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE REMAINDER OF THE SITE (EXCLUDING THE PRODUCTION AREA, INCINERATOR/WASTE WATER TREATMENT FACILITY, WASTE STORAGE AREA, FLYASH/SOUTHFIELD AREA, AND SILO AREA)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	183/232		^f	0.200 - 1.600	N	0.545	0.588	Y	Positive detection with no reason for exclusion
PU-238	3/232		^f	0.900 - 2.200	N	0.315	0.331	Y	Positive detection with no reason for exclusion
PU-239/240	2/232		^f	1.900 - 2.900	N	0.318	0.340	Y	Positive detection with no reason for exclusion
RA-226	193/232		2.200	0.400 -2950.0	N^i	13.624	34.617	Y	Sample concentrations exceed background levels
RA-228	188/232		1.500	0.500 -45.500	N^i	1.650	2.100	Y	Sample concentrations exceed background levels
SR-90	109/230		^f	0.500 - 6.500	N^i	0.788	0.895	Y	Positive detection with no reason for exclusion
TC-99	22/232		^f	0.900 -27.300	N^i	1.033	1.343	Y	Positive detection with no reason for exclusion
TH-228	220/232		1.500	0.600 -38.900	L	1.525	1.669	Y	Sample concentrations exceed background levels
TH-230	230/232		2.100	0.700 -1137.0	N^i	7.493	15.573	Y	Sample concentrations exceed background levels
TH-232	211/232		1.500	0.600 -11.400	L	1.191	1.282	Y	Sample concentrations exceed background levels
U-234	259/260		2.100	0.700 -2899.0	N^i	24.362	42.987	Y	Sample concentrations exceed background levels
U-235/236	90/260		0.097^*	0.600 -49.300	N^i	1.108	1.471	Y	Sample concentrations exceed background levels
U-238	259/260		2.100	0.700 -1849.0	L	19.935	24.493	Y	Sample concentrations exceed background levels
Uranium^**	123/123		3.23^g	1.000 -1790.0	L	87.161	117.878	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*For U-235.
**Units are reported in mg/kg.

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TABLE R.5-29

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-6") FROM RI/FS SAMPLING OF THE ENTIRE SITE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/12		^f	0.007 - 0.007	N	0.003	0.004	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	1/12		^f	0.001 - 0.001	N^i	0.003	0.001^j	Y	Positive detection with no reason for exclusion
2-Butanone	10/12		^f	0.001 - 0.026	L	0.007	0.015	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	4/8		^f	0.100 - 0.760	N^i	0.266	0.406	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/12		^f	0.003 - 0.003	N^i	0.005	0.003^j	Y	Positive detection with no reason for exclusion
Acenaphthene	3/11		^f	0.110 - 4.800	L	0.406	0.739	Y	Positive detection with no reason for exclusion
Acetone	9/12		^f	0.006 - 0.027	N	0.012	0.016	Y	Positive detection with no reason for exclusion
Aluminum	60/60		108200	9.560 - 16500	N	7938.5	8677.54	N	Sample concentrations are within background levels
Anthracene	4/11		^f	0.170 - 6.200	L	0.424	0.810	Y	Positive detection with no reason for exclusion
Antimony	50/60		^f	9.700 -35.200	N^i	22.279	24.413	Y	Positive detection with no reason for exclusion
Aroclor-1254	29/29		^f	0.010 - 1.500	L	0.368	1.500^j	Y	Positive detection with no reason for exclusion
Aroclor-1260	5/5		^f	0.037 - 2.800	N^i	0.881	1.961	Y	Positive detection with no reason for exclusion
Arsenic	60/60		20.500	2.700 -32.500	L	6.466	7.141	Y	Sample concentrations exceed background levels
Barium	60/60		815.000	0.096 -1570.0	L	141.14	208.516	Y	Sample concentrations exceed background levels
Benzo(a)anthracene	6/8		^f	0.051 -19.000	L	0.593	2.491	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	6/6		^f	0.046 -24.000	L	0.889	6.607	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	6/8		^f	0.095 -39.000	L	0.596	2.703	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	4/8		^f	0.400 -12.000	L	0.694	2.059	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	6/7		^f	0.081 - 5.000	N^i	1.259	2.642	Y	Positive detection with no reason for exclusion
Benzoic acid	1/11		^f	0.250 - 0.250	N^i	2.205	0.250^j	Y	Positive detection with no reason for exclusion
Beryllium	60/60		2.100	0.002 - 2.400	N	0.874	0.946	Y	Sample concentrations exceed background levels
Cadmium	60/60		11.100	0.003 - 8.000	N	4.877	5.179	N	Sample concentrations are within background levels
Calcium	60/60		41290.0	35.200 -181000	N	76456	86503.1	N	Common dietary element
Carbon disulfide	1/12		^f	0.004 - 0.004	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Chlorobenzene	1/12		^f	0.001 - 0.001	N^i	0.003	0.001^j	Y	Positive detection with no reason for exclusion
Chloroform	2/12		^f	0.009 - 0.014	N	0.004	0.006	Y	Positive detection with no reason for exclusion
Chromium	60/60		102.700	0.024 -75.500	N^i	18.660	21.011	N	Sample concentrations are within background levels

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Chrysene	6/8	^f	0.083 -18.000	L	0.708	2.753	Y	Positive detection with no reason for exclusion
Cobalt	60/60	21.000	0.014 -44.900	N^i	11.757	12.982	Y	Sample concentrations exceed background levels
Copper	60/60	58.600	0.027 -859.00	N^i	34.835	58.257	Y	Sample concentrations exceed background levels
Cyanide	15/59	^f	0.120 -22.800	L	0.112	0.142	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	3/8	^f	0.610 - 6.900	L	0.459	1.116	Y	Positive detection with no reason for exclusion
Dibenzofuran	4/11	^f	0.055 - 2.000	N^i	0.456	0.759	Y	Positive detection with no reason for exclusion
Fluoranthene	9/11	^f	0.043 -33.000	L	4.533	33.000^j	Y	Positive detection with no reason for exclusion
Fluorene	3/11	^f	0.130 - 3.300	N^i	0.705	1.235	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	4/8	^f	0.280 -13.000	L	0.641	1.901	Y	Positive detection with no reason for exclusion
Iron	60/60	46200.0	19.100 - 30300	N	17397	18760.9	N	Common dietary element Sample concentrations are within background levels
Lead	57/59	37.000	6.700 -334.00	L	32.970	48.663	Y	Sample concentrations exceed background levels
Magnesium	60/60	15900.0	9.740 - 46000	N	19447	21675.8	N	Common dietary element
Manganese	59/60	1144.00	0.835 -1130.0	N	501.22	537.457	N	Sample concentrations are within background levels
Mercury	11/60	0.290	0.160 - 1.300	N	0.124	0.166	Y	Sample concentrations exceed background levels
Methylene chloride	12/12	^f	0.006 - 0.028	N	0.018	0.022	Y	Positive detection with no reason for exclusion
Molybdenum	48/60	9.000	2.700 - 5.700	N	3.483	3.784	N	Sample concentrations are within background levels
N-Nitrosodiphenylamine	3/11	^f	0.100 - 0.200	N^i	0.376	0.200^j	Y	Positive detection with no reason for exclusion
Naphthalene	3/11	^f	0.089 - 1.300	N^i	0.397	0.589	Y	Positive detection with no reason for exclusion
Nickel	60/60	39.000	0.040 -67.800	N	30.322	32.744	Y	Sample concentrations exceed background levels
Phenanthrene	9/10	^f	0.079 -22.000	L	3.409	22.000^j	Y	Positive detection with no reason for exclusion
Potassium	60/60	23800.0	434.00 -2470.0	L	1013.9	1106.20	N	Common dietary element Sample concentrations are within background levels
Pyrene	7/11	^f	0.130 -22.000	N^i	3.597	7.317	Y	Positive detection with no reason for exclusion
Selenium	3/60	1.200	0.540 - 0.620	N	0.247	0.263	N	Sample concentrations are within background levels
Silver	55/60	8.000	0.003 -17.200	N	7.268	7.924	Y	Sample concentrations exceed background levels
Sodium	59/59	11400.0	0.150 -2180.0	N^i	281.90	391.307	N	Common dietary element Sample concentrations are within background levels
Tetrachloroethene	4/12	^f	0.001 - 0.010	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Thallium	10/60	10.940	0.330 - 1.100	N	0.279	0.315	N	Sample concentrations are within background levels
Toluene	7/12	^f	0.001 - 0.004	N	0.002	0.003	Y	Positive detection with no reason for exclusion
Tributyl phosphate	1/2	^f	1.200 - 1.200	^h	^h	1.200^j	Y	Positive detection with no reason for exclusion
Trichloroethene	5/12	^f	0.001 - 0.018	N^i	0.004	0.007	Y	Positive detection with no reason for exclusion
Vanadium	60/60	172.000	0.027 -35.800	N	22.174	23.579	N	Sample concentrations are within background levels

Zinc	60/60	113.000	0.061 -431.00	N^i	81.964	100.190	Y	Sample concentrations exceed background levels
beta-BHC	2/60	^f	0.100 - 0.220	N^i	0.015	0.023	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	4/11	^f	0.046 - 0.780	N^i	0.435	0.709	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-30

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-18") FROM RI/FS SAMPLING OF THE ENTIRE SITE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	12/52		^f	0.001 - 1.700	L	0.004	0.005	Y	Positive detection with no reason for exclusion
1,1,2,2-Tetrachloroethane	2/52		^f	0.003 - 0.190	L	0.003	0.004	Y	Positive detection with no reason for exclusion
1,1,2-Trichloroethane	1/52		^f	0.014 - 0.014	N	0.003	0.003	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	2/52		^f	0.012 - 0.022	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	2/52		^f	0.004 - 0.039	N^i	0.004	0.005	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	5/52		^f	0.001 - 0.340	L	0.003	0.004	Y	Positive detection with no reason for exclusion
2-Butanone	31/52		^f	0.001 - 0.049	L	0.006	0.007	Y	Positive detection with no reason for exclusion
2-Hexanone	3/52		^f	0.002 - 0.004	N	0.006	0.004^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	11/44		^f	0.056 - 0.760	L	0.200	0.223	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	14/52		^f	0.001 - 0.014	N^i	0.006	0.006	Y	Positive detection with no reason for exclusion
Acenaphthene	6/52		^f	0.071 - 4.800	L	0.238	0.277	Y	Positive detection with no reason for exclusion
Acetone	45/52		^f	0.003 - 0.095	L	0.014	0.018	Y	Positive detection with no reason for exclusion
Aluminum	101/101		108200	9.530 - 16500	N	7711.2	8301.51	N	Sample concentrations are within background levels
Anthracene	9/52		^f	0.060 - 6.200	L	0.238	0.282	Y	Positive detection with no reason for exclusion
Antimony	72/101		^f	6.600 -35.200	N	16.500	18.303	Y	Positive detection with no reason for exclusion
Aroclor-1254	46/46		^f	0.010 - 3.000	L	0.529	1.071	Y	Positive detection with no reason for exclusion
Aroclor-1260	11/11		^f	0.037 - 2.800	L	0.674	2.800^j	Y	Positive detection with no reason for exclusion
Arsenic	101/101		20.500	0.020 -81.900	N^i	7.027	8.448	Y	Sample concentrations exceed background levels
Barium	101/101		815.000	0.089 -1570.0	N^i	122.43	154.132	Y	Sample concentrations exceed background levels
Benzene	2/52		^f	0.002 - 0.005	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Benzo(a)anthracene	16/45		^f	0.048 -19.000	L	0.246	0.323	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	12/12		^f	0.046 -24.000	L	3.099	24.000^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	13/45		^f	0.045 -39.000	L	0.260	0.344	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	9/45		^f	0.067 -12.000	L	0.256	0.320	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	11/44		^f	0.081 - 5.000	L	0.245	0.302	Y	Positive detection with no reason for exclusion
Benzoic acid	3/52		^f	0.088 - 0.250	N^i	1.321	0.250^j	Y	Positive detection with no reason for exclusion

Beryllium	101/101	2.100	0.002 - 2.400	N	0.929	0.985	Y	Sample concentrations exceed background levels
Cadmium	101/101	11.100	0.003 - 8.000	N	4.474	4.722	N	Sample concentrations are within background levels
Calcium	101/101	41290.0	35.200 -260000	N	79361	88406.9	N	Common dietary element
Carbon disulfide	9/52	^f	0.002 - 0.014	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Chlorobenzene	3/52	^f	0.001 - 0.005	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Chloroform	8/52	^f	0.001 - 0.046	L	0.003	0.004	Y	Positive detection with no reason for exclusion
Chromium	100/101	102.700	0.023 -94.600	N^i	19.615	21.729	N	Sample concentrations are within background levels
Chrysene	14/45	^f	0.070 -18.000	L	0.272	0.355	Y	Positive detection with no reason for exclusion
Cobalt	101/101	21.000	0.014 -59.500	N^i	11.765	12.883	Y	Sample concentrations exceed background levels
Copper	101/101	58.600	0.022 -859.00	N^i	28.995	42.870	Y	Sample concentrations exceed background levels
Cyanide	24/99	^f	0.120 -22.800	L	0.111	0.133	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	2/52	^f	0.046 - 0.049	N^i	0.280	0.049^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	5/45	^f	0.140 - 6.900	L	0.229	0.270	Y	Positive detection with no reason for exclusion
Dibenzofuran	10/52	^f	0.050 - 2.000	L	0.207	0.238	Y	Positive detection with no reason for exclusion
Ethylbenzene	2/52	^f	0.002 - 0.003	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Fluoranthene	21/52	^f	0.043 -33.000	L	0.286	0.384	Y	Positive detection with no reason for exclusion
Fluorene	6/52	^f	0.044 - 3.300	L	0.235	0.272	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	9/45	^f	0.049 -13.000	L	0.247	0.307	Y	Positive detection with no reason for exclusion
Iron	101/101	46200.0	18.100 - 41800	N	17669	18845.4	N	Common dietary element Sample concentrations are within background levels
Lead	98/100	37.000	0.040 -440.00	N^i	31.607	41.499	Y	Sample concentrations exceed background levels
Magnesium	101/101	15900.0	9.740 - 55100	N	19354	21330.1	N	Common dietary element
Manganese	100/101	1144.00	0.614 -1130.0	N	479.44	508.960	N	Sample concentrations are within background levels
Mercury	23/100	0.290	0.160 - 1.900	L	0.084	0.097	Y	Sample concentrations exceed background levels
Methylene chloride	52/52	^f	0.003 - 0.053	L	0.018	0.022	Y	Positive detection with no reason for exclusion
Molybdenum	68/99	9.000	2.500 - 6.200	N	3.091	3.351	N	Sample concentrations are within background levels
N-Nitrosodiphenylamine	6/52	^f	0.043 - 0.200	N^i	0.252	0.200^j	Y	Positive detection with no reason for exclusion
Naphthalene	9/52	^f	0.066 - 1.300	L	0.221	0.251	Y	Positive detection with no reason for exclusion
Nickel	101/101	39.000	0.040 -102.00	N	30.349	32.584	Y	Sample concentrations exceed background levels
Phenanthrene	24/47	^f	0.037 -22.000	L	0.507	0.805	Y	Positive detection with no reason for exclusion
Phenol	2/52	^f	0.069 - 0.200	N^i	0.270	0.200^j	Y	Positive detection with no reason for exclusion
Potassium	100/101	23800.0	206.00 -2470.0	L	1028.4	1152.82	N	Common dietary element Sample concentrations are within background levels
Pyrene	19/52	^f	0.059 -22.000	L	0.296	0.389	Y	Positive detection with no reason for exclusion

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Selenium	10/101	1.200	0.480 - 7.700	L	0.260	0.283	Y	Sample concentrations exceed background levels
Silver	83/101	8.000	0.003 -17.200	N	5.733	6.274	Y	Sample concentrations exceed background levels
Sodium	100/100	11400.0	0.150 -2220.0	N^i	328.74	417.845	N	Common dietary element Sample concentrations are within background levels
Styrene	1/52	^f	0.005 - 0.005	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Tetrachloroethene	12/52	^f	0.001 - 8.300	L	0.004	0.005	Y	Positive detection with no reason for exclusion
Thallium	17/101	10.940	0.260 - 1.100	N^i	0.255	0.279	N	Sample concentrations are within background levels
Toluene	28/52	^f	0.001 - 0.011	L	0.003	0.003	Y	Positive detection with no reason for exclusion
Total xylenes	2/52	^f	0.005 - 0.006	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Tributyl phosphate	2/4	^f	0.170 - 1.200	N^i	0.611	1.140	Y	Positive detection with no reason for exclusion
Trichloroethene	15/52	^f	0.001 - 5.400	L	0.004	0.005	Y	Positive detection with no reason for exclusion
Vanadium	101/101	172.000	0.027 -35.800	N	21.382	22.446	N	Sample concentrations are within background levels
Zinc	101/101	113.000	0.043 -431.00	N^i	84.012	98.118	Y	Sample concentrations exceed background levels
beta-BHC	4/101	^f	0.016 - 0.220	N^i	0.014	0.019	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	17/52	^f	0.041 - 8.400	L	0.250	0.315	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-31

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-6") FROM RI/FS SAMPLING OF THE WASTE STORAGE AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	16/16	108200	2580.0 - 11700	L	5845.6	7359.78	N	Sample concentrations are within background levels
Antimony	16/16	^f	19.600 -32.500	N^i	25.513	27.182	Y	Positive detection with no reason for exclusion
Aroclor-1254	6/6	^f	0.013 - 1.400	N^i	0.260	0.720	Y	Positive detection with no reason for exclusion
Aroclor-1260	1/1	^f	0.037 - 0.037	^h	^h	0.037^j	Y	Positive detection with no reason for exclusion
Arsenic	16/16	20.500	2.800 - 6.400	N	4.463	4.859	N	Sample concentrations are within background levels
Barium	16/16	815.000	22.500 -92.300	L	49.100	59.389	N	Sample concentrations are within background levels
Beryllium	16/16	2.100	0.580 - 1.000	L	0.705	0.750	N	Sample concentrations are within background levels
Cadmium	16/16	11.100	3.200 - 7.700	N	5.206	5.808	N	Sample concentrations are within background levels
Calcium	16/16	41290.0	21000 -155000	N	98081	117459	N	Common dietary element
Chromium	16/16	102.700	5.900 -18.800	N	12.413	14.255	N	Sample concentrations are within background levels
Cobalt	16/16	21.000	6.500 -17.000	L	9.250	10.356	N	Sample concentrations are within background levels
Copper	16/16	58.600	11.400 -20.100	N	15.881	17.025	N	Sample concentrations are within background levels
Cyanide	4/16	^f	0.370 - 0.710	L	0.100	0.155	Y	Positive detection with no reason for exclusion
Iron	16/16	46200.0	6670.0 - 23800	L	13395	16387.3	N	Common dietary element; Sample concentrations are within background levels
Lead	16/16	37.000	6.800 -34.300	L	12.738	16.054	N	Sample concentrations are within background levels
Magnesium	16/16	15900.0	6370.0 - 39000	N	22051	26294.8	N	Common dietary element
Manganese	16/16	1144.00	317.00 -759.00	L	512.50	586.889	N	Sample concentrations are within background levels
Molybdenum	15/16	9.000	3.000 - 5.700	N	3.922	4.344	N	Sample concentrations are within background levels
Nickel	16/16	39.000	19.700 -50.200	L	26.219	29.152	Y	Sample concentrations exceed background levels
Potassium	16/16	23800.0	434.00 -1210.0	N	817.69	919.709	N	Common dietary element; Sample concentrations are within background levels
Selenium	2/16	1.200	0.540 - 0.620	N	0.275	0.328	N	Sample concentrations are within background levels
Silver	16/16	8.000	5.800 -10.300	N^i	8.294	8.897	Y	Sample concentrations exceed background levels
Sodium	15/15	11400.0	54.600 -185.00	N	124.09	139.732	N	Common dietary element; Sample concentrations are within background levels
Thallium	1/16	10.940	0.680 - 0.680	N	0.259	0.308	N	Sample concentrations are within background levels
Vanadium	16/16	172.000	10.900 -26.900	L	17.519	20.057	N	Sample concentrations are within background levels

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Zinc	16/16	113.000	21.900	-79.900	N	40.150	46.656	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.5-32

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-18") FROM RI/FS SAMPLING OF THE WASTE STORAGE AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	16/16	108200	2580.0 - 11700	L	5845.6	7359.78		N	Sample concentrations are within background levels
Antimony	16/16	^f	19.600 -32.500	N	25.513	27.182		Y	Positive detection with no reason for exclusion
Aroclor-1254	6/6	^f	0.013 - 1.400	L	0.050	0.214		Y	Positive detection with no reason for exclusion
Aroclor-1260	1/1	^f	0.037 - 0.037	^h	^h	0.037^j		Y	Positive detection with no reason for exclusion
Arsenic	16/16	20.500	2.800 - 6.400	L	4.463	4.911		N	Sample concentrations are within background levels
Barium	16/16	815.000	22.500 -92.300	L	49.100	59.389		N	Sample concentrations are within background levels
Beryllium	16/16	2.100	0.580 - 1.000	L	0.705	0.750		N	Sample concentrations are within background levels
Cadmium	16/16	11.100	3.200 - 7.700	N	5.206	5.808		N	Sample concentrations are within background levels
Calcium	16/16	41290.0	21000 -155000	N	98081	117459		N	Common dietary element
Chromium	16/16	102.700	5.900 -18.800	N	12.413	14.255		N	Sample concentrations are within background levels
Cobalt	16/16	21.000	6.500 -17.000	L	9.250	10.356		N	Sample concentrations are within background levels
Copper	16/16	58.600	11.400 -20.100	N	15.881	17.025		N	Sample concentrations are within background levels
Cyanide	4/16	^f	0.370 - 0.710	N	0.179	0.279		Y	Positive detection with no reason for exclusion
Iron	16/16	46200.0	6670.0 - 23800	N	13395	15511.6		N	Common dietary element Sample concentrations are within background levels
Lead	16/16	37.000	6.800 -34.300	L	12.738	16.054		N	Sample concentrations are within background levels
Magnesium	16/16	15900.0	6370.0 - 39000	N	22051	26294.8		N	Common dietary element
Manganese	16/16	1144.00	317.00 -759.00	L	512.50	586.889		N	Sample concentrations are within background levels
Molybdenum	15/16	9.000	3.000 - 5.700	L	3.922	4.672		N	Sample concentrations are within background levels
Nickel	16/16	39.000	19.700 -50.200	L	26.219	29.152		Y	Sample concentrations exceed background levels
Potassium	16/16	23800.0	434.00 -1210.0	N	817.69	919.709		N	Common dietary element Sample concentrations are within background levels
Selenium	2/16	1.200	0.540 - 0.620	N	0.275	0.328		N	Sample concentrations are within background levels
Silver	16/16	8.000	5.800 -10.300	N	8.294	8.897		Y	Sample concentrations exceed background levels
Sodium	15/15	11400.0	54.600 -185.00	N	124.09	139.732		N	Common dietary element Sample concentrations are within background levels
Thallium	1/16	10.940	0.680 - 0.680	N	0.259	0.308		N	Sample concentrations are within background levels
Vanadium	16/16	172.000	10.900 -26.900	L	17.519	20.057		N	Sample concentrations are within background levels

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Zinc	16/16	113.000	21.900 -79.900	L	40.150	47.528	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.5-33

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-6") FROM RI/FS SAMPLING OF THE NORTHWEST QUADRANT OF THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	13/13	108200	5860.0 - 16500	N	10827	12278.2	N	Sample concentrations are within background levels
Antimony	13/13	^f	22.000 -35.200	N	29.462	31.119	Y	Positive detection with no reason for exclusion
Aroclor-1254	11/11	^f	0.010 - 1.500	L	0.442	1.500^j	Y	Positive detection with no reason for exclusion
Arsenic	13/13	20.500	4.000 -10.800	N	6.677	7.611	N	Sample concentrations are within background levels
Barium	13/13	815.000	50.600 -1570.0	N^i	203.82	407.118	Y	Sample concentrations exceed background levels
Beryllium	13/13	2.100	0.680 - 1.100	N	0.941	0.998	N	Sample concentrations are within background levels
Cadmium	13/13	11.100	3.600 - 6.700	N^i	5.015	5.460	N	Sample concentrations are within background levels
Calcium	13/13	41290.0	24100 -106000	L	61777	86373.4	N	Common dietary element
Chromium	13/13	102.700	12.400 -26.200	N	20.754	22.858	N	Sample concentrations are within background levels
Cobalt	13/13	21.000	9.400 -44.900	L	16.577	20.875	Y	Sample concentrations exceed background levels
Copper	13/13	58.600	16.400 -859.00	L	91.031	127.971	Y	Sample concentrations exceed background levels
Cyanide	5/13	^f	0.160 - 1.000	L	0.129	0.218	Y	Positive detection with no reason for exclusion
Iron	13/13	46200.0	12800 - 30300	N	21854	24391.0	N	Common dietary element Sample concentrations are within background levels
Lead	13/13	37.000	7.400 -73.500	L	34.723	56.525	Y	Sample concentrations exceed background levels
Magnesium	13/13	15900.0	8580.0 - 37800	L	18468	23587.2	N	Common dietary element
Manganese	13/13	1144.00	412.00 -732.00	N	565.85	615.004	N	Sample concentrations are within background levels
Mercury	2/13	0.290	0.160 - 0.200	N	0.076	0.099	N	Sample concentrations are within background levels
Molybdenum	13/13	9.000	2.900 - 4.900	N	3.862	4.133	N	Sample concentrations are within background levels
Nickel	13/13	39.000	25.100 -57.000	L	33.223	38.158	Y	Sample concentrations exceed background levels
Potassium	13/13	23800.0	714.00 -2300.0	L	1256.6	1566.80	N	Common dietary element Sample concentrations are within background levels
Silver	13/13	8.000	6.700 -10.000	L	8.246	8.872	Y	Sample concentrations exceed background levels
Sodium	13/13	11400.0	73.800 -259.00	N^i	134.72	164.229	N	Common dietary element Sample concentrations are within background levels
Thallium	4/13	10.940	0.520 - 1.100	N	0.382	0.517	N	Sample concentrations are within background levels
Vanadium	13/13	172.000	17.800 -35.800	N	27.492	30.206	N	Sample concentrations are within background levels
Zinc	13/13	113.000	37.200 -180.00	L	74.977	99.679	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.5-34

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-18") FROM RI/FS SAMPLING OF THE NORTHWEST QUADRANT OF THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	2/2	^f		0.003 - 0.008	^h	^h	0.008^j	Y	Positive detection with no reason for exclusion
Acetone	1/2	^f		0.008 - 0.008	^h	^h	0.008^j	Y	Positive detection with no reason for exclusion
Aluminum	15/15	108200		5860.0 - 16500	N	10831	12154.1	N	Sample concentrations are within background levels
Antimony	13/15	^f		22.000 -35.200	N	25.920	30.399	Y	Positive detection with no reason for exclusion
Aroclor-1254	11/11	^f		0.010 - 1.500	L	0.442	1.500^j	Y	Positive detection with no reason for exclusion
Arsenic	15/15	20.500		3.900 -10.800	L	6.433	7.493	N	Sample concentrations are within background levels
Barium	15/15	815.000		50.600 -1570.0	N^i	189.13	363.268	Y	Sample concentrations exceed background levels
Beryllium	15/15	2.100		0.680 - 1.400	L	0.975	1.054	N	Sample concentrations are within background levels
Cadmium	15/15	11.100		3.600 - 6.700	L	4.907	5.358	N	Sample concentrations are within background levels
Calcium	15/15	41290.0		24100 -106000	L	60960	83250.2	N	Common dietary element
Chloroform	1/2	^f		0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Chromium	15/15	102.700		12.400 -26.200	N	20.907	22.738	N	Sample concentrations are within background levels
Cobalt	15/15	21.000		9.400 -44.900	L	16.473	19.984	Y	Sample concentrations exceed background levels
Copper	15/15	58.600		16.400 -859.00	L	81.280	95.317	Y	Sample concentrations exceed background levels
Cyanide	5/15	^f		0.160 - 1.000	L	0.131	0.204	Y	Positive detection with no reason for exclusion
Iron	15/15	46200.0		12800 - 30300	N	21987	24159.7	N	Common dietary element Sample concentrations are within background levels
Lead	15/15	37.000		7.400 -73.500	L	31.860	49.659	Y	Sample concentrations exceed background levels
Magnesium	15/15	15900.0		8330.0 - 37800	L	17967	22673.2	N	Common dietary element
Manganese	15/15	1144.00		412.00 -762.00	L	579.60	633.680	N	Sample concentrations are within background levels
Mercury	3/15	0.290		0.160 - 1.900	L	0.080	0.126	Y	Sample concentrations exceed background levels
Methylene chloride	2/2	^f		0.014 - 0.029	^h	^h	0.029^j	Y	Positive detection with no reason for exclusion
Molybdenum	13/14	9.000		2.900 - 4.900	N	3.664	4.094	N	Sample concentrations are within background levels
Nickel	15/15	39.000		25.100 -57.000	L	34.013	38.258	Y	Sample concentrations exceed background levels
Potassium	15/15	23800.0		714.00 -2300.0	L	1247.0	1518.52	N	Common dietary element Sample concentrations are within background levels
Silver	14/15	8.000		2.900 -10.000	N	7.413	8.541	Y	Sample concentrations exceed background levels
Sodium	15/15	11400.0		73.800 -316.00	L	144.36	185.528	N	Common dietary element; Sample concentrations are within background levels

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Thallium	4/15	10.940	0.520 - 1.100	N	0.351	0.472	N	Sample concentrations are within background levels
Toluene	1/2	^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion
Trichloroethene	1/2	^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Vanadium	15/15	172.000	17.800 -35.800	N	26.733	29.223	N	Sample concentrations are within background levels
Zinc	15/15	113.000	37.200 -180.00	L	72.693	91.057	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-35

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE NORTHEAST QUADRANT OF THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/6		^f	0.007 - 0.007	N^i	0.003	0.005	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	1/6		^f	0.001 - 0.001	N^i	0.002	0.001^j	Y	Positive detection with no reason for exclusion
2-Butanone	6/6		^f	0.002 - 0.026	N^i	0.008	0.016	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	4/5		^f	0.100 - 0.760	N^i	0.303	0.559	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/6		^f	0.003 - 0.003	N^i	0.005	0.003^j	Y	Positive detection with no reason for exclusion
Acenaphthene	1/6		^f	4.800 - 4.800	N^i	1.106	2.602	Y	Positive detection with no reason for exclusion
Acetone	4/6		^f	0.006 - 0.018	N^i	0.011	0.016	Y	Positive detection with no reason for exclusion
Aluminum	6/6		108200	2230.0 - 11900	N^i	6360.0	9979.04	N	Sample concentrations are within background levels
Anthracene	2/6		^f	0.330 - 6.200	N^i	1.278	3.263	Y	Positive detection with no reason for exclusion
Antimony	1/6		^f	9.700 - 9.700	N^i	4.217	6.442	Y	Positive detection with no reason for exclusion
Aroclor-1254	3/3		^f	0.460 - 1.200	N^i	0.783	1.200^j	Y	Positive detection with no reason for exclusion
Aroclor-1260	2/2		^f	0.230 - 2.800	^h	^h	2.800^j	Y	Positive detection with no reason for exclusion
Arsenic	6/6		20.500	4.100 -22.600	N^i	8.800	14.557	Y	Sample concentrations exceed background levels
Barium	6/6		815.000	34.900 -512.00	N^i	240.13	410.586	N	Sample concentrations are within background levels
Benzo(a)anthracene	3/4		^f	0.051 -19.000	N^i	5.309	16.100	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	3/3		^f	0.081 -24.000	N^i	8.794	24.000^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/4		^f	0.095 -39.000	N^i	10.373	32.863	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	2/4		^f	1.900 -12.000	N^i	3.571	10.251	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	3/3		^f	0.081 - 2.600	N^i	0.934	2.600^j	Y	Positive detection with no reason for exclusion
Benzoic acid	1/6		^f	0.250 - 0.250	N^i	2.792	0.250^j	Y	Positive detection with no reason for exclusion
Beryllium	6/6		2.100	0.980 - 1.800	N^i	1.313	1.6031	N	Sample concentrations are within background levels
Cadmium	6/6		11.100	3.500 - 8.000	N^i	5.417	6.895	N	Sample concentrations are within background levels
Calcium	6/6		41290.0	21000 -178000	N^i	105050	157648	N	Common dietary element
Carbon disulfide	1/6		^f	0.004 - 0.004	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Chlorobenzene	1/6		^f	0.001 - 0.001	N^i	0.003	0.001^j	Y	Positive detection with no reason for exclusion
Chloroform	2/6		^f	0.009 - 0.014	N^i	0.006	0.010	Y	Positive detection with no reason for exclusion
Chromium	6/6		102.700	12.700 -50.400	N^i	29.600	42.671	N	Sample concentrations are within background levels

Chrysene	3/4	^f	0.083 -18.000	N^i	5.042	15.254	Y	Positive detection with no reason for exclusion
Cobalt	6/6	21.000	7.800 -15.700	N^i	11.983	14.219	N	Sample concentrations are within background levels
Copper	6/6	58.600	13.800 -65.200	N^i	28.350	43.967	Y	Sample concentrations exceed background levels
Cyanide	2/5	^f	0.590 -22.800	N^i	4.747	14.371	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	2/4	^f	0.610 - 6.900	N^i	1.974	5.845	Y	Positive detection with no reason for exclusion
Dibenzofuran	2/6	^f	0.081 - 2.000	N^i	0.590	1.186	Y	Positive detection with no reason for exclusion
Fluoranthene	5/6	^f	0.081 -33.000	N^i	6.288	17.126	Y	Positive detection with no reason for exclusion
Fluorene	1/6	^f	3.300 - 3.300	N^i	0.856	1.853	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	2/4	^f	1.700 -13.000	N^i	3.771	11.059	Y	Positive detection with no reason for exclusion
Iron	6/6	46200.0	8460.0 - 26900	N^i	17322	23390.9	N	Common dietary element; Sample concentrations are within background levels
Lead	6/6	37.000	11.700 -182.00	N^i	67.550	123.854	Y	Sample concentrations exceed background levels
Magnesium	6/6	15900.0	6710.0 - 46000	N^i	28235	42028.4	N	Common dietary element
Manganese	6/6	1144.00	335.00 -552.00	N^i	447.17	520.265	N	Sample concentrations are within background levels
Mercury	4/6	0.290	0.220 - 0.530	N^i	0.243	0.405	Y	Sample concentrations exceed background levels
Methylene chloride	6/6	^f	0.006 - 0.028	N^i	0.020	0.026	Y	Positive detection with no reason for exclusion
Molybdenum	2/6	9.000	4.700 - 5.700	N^i	2.425	4.215	N	Sample concentrations are within background levels
N-Nitrosodiphenylamine	2/6	^f	0.120 - 0.200	N^i	0.480	0.200^j	Y	Positive detection with no reason for exclusion
Naphthalene	3/6	^f	0.089 - 1.300	N^i	0.473	0.851	Y	Positive detection with no reason for exclusion
Nickel	6/6	39.000	22.300 -67.800	N^i	44.433	58.884	Y	Sample concentrations exceed background levels
Phenanthrene	6/6	^f	0.079 -22.000	N^i	4.005	11.271	Y	Positive detection with no reason for exclusion
Potassium	6/6	23800.0	434.00 -1670.0	N^i	944.17	1376.19	N	Common dietary element; Sample concentrations are within background levels
Pyrene	4/6	^f	0.130 -22.000	N^i	4.570	11.726	Y	Positive detection with no reason for exclusion
Silver	4/6	8.000	2.900 - 4.400	N^i	2.717	3.886	N	Sample concentrations are within background levels
Sodium	6/6	11400.0	182.00 -2000.0	N^i	896.33	1544.77	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	2/6	^f	0.005 - 0.010	N^i	0.004	0.007	Y	Positive detection with no reason for exclusion
Thallium	2/6	10.940	0.420 - 0.570	N^i	0.253	0.416	N	Sample concentrations are within background levels
Toluene	5/6	^f	0.001 - 0.004	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Trichloroethene	3/6	^f	0.001 - 0.018	N^i	0.005	0.011	Y	Positive detection with no reason for exclusion
Vanadium	6/6	172.000	15.200 -29.500	N^i	21.883	25.829	N	Sample concentrations are within background levels
Zinc	6/6	113.000	24.200 -431.00	N^i	220.87	335.156	Y	Sample concentrations exceed background levels
beta-BHC	1/6	^f	0.100 - 0.100	N^i	0.063	0.100^j	Y	Positive detection with no reason for exclusion

bis(2-Ethylhexyl) phthalate	1/6	^f	0.780 - 0.780	N^i	0.619	0.780^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-36

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-18") FROM RI/FS SAMPLING OF NE QUADRANT OF THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	12/38		^f	0.001 - 1.700	L	0.004	0.005	Y	Positive detection with no reason for exclusion
1,1,2,2-Tetrachloroethane	2/38		^f	0.003 - 0.190	N^i	0.008	0.016	Y	Positive detection with no reason for exclusion
1,1,2-Trichloroethane	1/38		^f	0.014 - 0.014	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	2/38		^f	0.012 - 0.022	N^i	0.004	0.004	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1/38		^f	0.039 - 0.039	N^i	0.004	0.005	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	4/38		^f	0.001 - 0.340	L	0.003	0.004	Y	Positive detection with no reason for exclusion
2-Butanone	21/38		^f	0.001 - 0.026	L	0.006	0.007	Y	Positive detection with no reason for exclusion
2-Hexanone	2/38		^f	0.002 - 0.004	N^i	0.006	0.004^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	11/34		^f	0.056 - 0.760	L	0.201	0.232	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	13/38		^f	0.001 - 0.014	N^i	0.006	0.007	Y	Positive detection with no reason for exclusion
Acenaphthene	3/39		^f	0.071 - 4.800	L	0.239	0.285	Y	Positive detection with no reason for exclusion
Acetone	35/38		^f	0.003 - 0.095	L	0.016	0.022	Y	Positive detection with no reason for exclusion
Aluminum	39/39		108200	955.00 - 14800	N	7010.9	8018.45	N	Sample concentrations are within background levels
Anthracene	5/39		^f	0.073 - 6.200	L	0.235	0.283	Y	Positive detection with no reason for exclusion
Antimony	22/39		^f	6.600 -19.200	N	8.368	9.819	Y	Positive detection with no reason for exclusion
Aroclor-1254	19/19		^f	0.027 - 3.000	L	0.583	2.457	Y	Positive detection with no reason for exclusion
Aroclor-1260	7/7		^f	0.120 - 2.800	N^i	0.824	1.654	Y	Positive detection with no reason for exclusion
Arsenic	39/39		20.500	0.020 -81.900	N^i	8.347	11.847	Y	Sample concentrations exceed background levels
Barium	39/39		815.000	11.200 -523.00	L	111.00	154.042	N	Sample concentrations are within background levels
Benzene	1/38		^f	0.002 - 0.002	N	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Benzo(a)anthracene	10/34		^f	0.048 -19.000	L	0.231	0.315	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	6/6		^f	0.079 -24.000	L	0.928	6.003	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	9/34		^f	0.045 -39.000	L	0.256	0.360	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	4/34		^f	0.360 -12.000	L	0.251	0.322	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	5/33		^f	0.081 - 3.100	L	0.224	0.277	Y	Positive detection with no reason for exclusion
Benzoic acid	2/39		^f	0.170 - 0.250	L	1.093	0.250^j	Y	Positive detection with no reason for exclusion

Beryllium	39/39	2.100	0.570 - 1.900	L	1.058	1.144	N	Sample concentrations are within background levels
Cadmium	39/39	11.100	1.900 - 8.000	L	4.241	4.730	N	Sample concentrations are within background levels
Calcium	39/39	41290.0	5040.0 -260000	N	93445	111314	N	Common dietary element
Carbon disulfide	9/38	^f	0.002 - 0.014	L	0.003	0.003	Y	Positive detection with no reason for exclusion
Chlorobenzene	2/38	^f	0.001 - 0.003	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Chloroform	7/38	^f	0.001 - 0.046	N^i	0.004	0.006	Y	Positive detection with no reason for exclusion
Chromium	38/39	102.700	5.500 -94.600	L	23.288	29.458	N	Sample concentrations are within background levels
Chrysene	8/34	^f	0.070 -18.000	L	0.250	0.336	Y	Positive detection with no reason for exclusion
Cobalt	39/39	21.000	6.200 -59.500	L	11.628	12.862	Y	Sample concentrations exceed background levels
Copper	39/39	58.600	7.500 -65.200	L	21.293	23.989	Y	Sample concentrations exceed background levels
Cyanide	11/37	^f	0.120 -22.800	L	0.128	0.192	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	1/39	^f	0.049 - 0.049	L	0.234	0.049^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	3/34	^f	0.610 - 6.900	N	0.416	0.750	Y	Positive detection with no reason for exclusion
Dibenzofuran	7/39	^f	0.050 - 2.000	L	0.209	0.245	Y	Positive detection with no reason for exclusion
Ethylbenzene	2/38	^f	0.002 - 0.003	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Fluoranthene	14/39	^f	0.051 -33.000	L	0.252	0.350	Y	Positive detection with no reason for exclusion
Fluorene	2/39	^f	0.380 - 3.300	L	0.241	0.280	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	4/34	^f	0.330 -13.000	L	0.250	0.321	Y	Positive detection with no reason for exclusion
Iron	39/39	46200.0	3030.0 - 41800	N	18122	20279.9	N	Common dietary element Sample concentrations are within background levels
Lead	39/39	37.000	0.040 -182.00	N^i	29.697	40.813	Y	Sample concentrations exceed background levels
Magnesium	39/39	15900.0	1620.0 - 55100	N	22007	26073.7	N	Common dietary element
Manganese	39/39	1144.00	94.600 -818.00	N	454.89	501.468	N	Sample concentrations are within background levels
Mercury	11/39	0.290	0.170 - 0.530	N	0.116	0.148	Y	Sample concentrations exceed background levels
Methylene chloride	38/38	^f	0.004 - 0.053	L	0.018	0.022	Y	Positive detection with no reason for exclusion
Molybdenum	22/38	9.000	2.500 - 6.200	N	2.767	3.223	N	Sample concentrations are within background levels
N-Nitrosodiphenylamine	4/39	^f	0.043 - 0.200	N^i	0.266	0.200^j	Y	Positive detection with no reason for exclusion
Naphthalene	9/39	^f	0.066 - 1.300	L	0.217	0.255	Y	Positive detection with no reason for exclusion
Nickel	39/39	39.000	16.200 -102.00	L	31.990	36.266	Y	Sample concentrations exceed background levels
Phenanthrene	18/36	^f	0.037 -22.000	L	0.421	0.714	Y	Positive detection with no reason for exclusion
Phenol	1/39	^f	0.200 - 0.200	L	0.233	0.200^j	Y	Positive detection with no reason for exclusion
Potassium	38/39	23800.0	206.00 -1670.0	N	850.61	952.904	N	Common dietary element Sample concentrations are within background levels
Pyrene	13/39	^f	0.059 -22.000	L	0.259	0.353	Y	Positive detection with no reason for exclusion

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Selenium	7/39	1.200	0.480 - 7.700	L	0.299	0.371	Y	Sample concentrations exceed background levels
Silver	26/39	8.000	2.700 - 7.500	N	3.541	4.104	N	Sample concentrations are within background levels
Sodium	39/39	11400.0	69.600 -2000.0	L	347.39	0.000	N	Common dietary element Sample concentrations are within background levels
Styrene	1/38	^f	0.005 - 0.005	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Tetrachloroethene	10/38	^f	0.002 - 8.300	L	0.005	0.007	Y	Positive detection with no reason for exclusion
Thallium	6/39	10.940	0.340 - 0.600	N	0.226	0.260	N	Sample concentrations are within background levels
Toluene	21/38	^f	0.001 - 0.011	L	0.003	0.003	Y	Positive detection with no reason for exclusion
Total xylenes	2/38	^f	0.005 - 0.006	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Trichloroethene	10/38	^f	0.001 - 5.400	L	0.004	0.006	Y	Positive detection with no reason for exclusion
Vanadium	39/39	172.000	8.400 -30.500	N	20.531	21.997	N	Sample concentrations are within background levels
Zinc	39/39	113.000	11.100 -431.00	L	95.252	128.050	Y	Sample concentrations exceed background levels
beta-BHC	2/39	^f	0.016 - 0.100	L	0.011	0.014	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	12/39	^f	0.041 - 8.400	L	0.293	0.387	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-37

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE SOUTHWEST QUADRANT OF THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	4/5		^f	0.001 - 0.010	N^i	0.006	0.009	Y	Positive detection with no reason for exclusion
Acenaphthene	2/5		^f	0.110 - 1.600	N^i	0.499	1.093	Y	Positive detection with no reason for exclusion
Acetone	4/5		^f	0.006 - 0.027	N^i	0.012	0.021	Y	Positive detection with no reason for exclusion
Aluminum	5/5		108200	9.560 - 11900	N^i	6613.9	11152.7	N	Sample concentrations are within background levels
Anthracene	2/5		^f	0.170 - 2.800	N^i	0.751	1.846	Y	Positive detection with no reason for exclusion
Aroclor-1254	4/4		^f	0.120 - 1.000	N^i	0.420	0.890	Y	Positive detection with no reason for exclusion
Aroclor-1260	2/2		^f	0.340 - 1.000	^h	^h	1.000^j	Y	Positive detection with no reason for exclusion
Arsenic	5/5		20.500	5.700 - 8.400	N^i	6.820	7.846	N	Sample concentrations are within background levels
Barium	5/5		815.000	0.096 -561.00	N^i	272.74	496.729	N	Sample concentrations are within background levels
Benzo(a)anthracene	3/4		^f	0.061 - 5.400	N^i	1.579	4.592	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	3/3		^f	0.046 - 5.100	N^i	1.872	5.100^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	2/4		^f	0.110 - 4.700	N^i	1.300	3.968	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	2/4		^f	0.400 - 3.700	N^i	1.129	3.149	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	3/4		^f	0.090 - 5.000	N^i	1.504	4.266	Y	Positive detection with no reason for exclusion
Beryllium	5/5		2.100	0.002 - 2.400	N^i	1.200	2.009	Y	Sample concentrations exceed background levels
Cadmium	5/5		11.100	0.003 - 6.900	N^i	4.101	6.579	N	Sample concentrations are within background levels
Calcium	5/5		41290.0	35.200 -181000	N^i	76295	147415	N	Common dietary element
Chromium	5/5		102.700	0.024 -75.500	N^i	27.165	54.360	N	Sample concentrations are within background levels
Chrysene	3/4		^f	0.100 - 7.200	N^i	2.089	6.118	Y	Positive detection with no reason for exclusion
Cobalt	5/5		21.000	0.014 -17.400	N^i	12.323	17.400^j	N	Sample concentrations are within background levels
Copper	5/5		58.600	0.027 -38.500	N^i	21.145	34.757	N	Sample concentrations are within background levels
Cyanide	1/5		^f	0.520 - 0.520	N^i	0.218	0.379	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	1/4		^f	1.500 - 1.500	N^i	0.528	1.291	Y	Positive detection with no reason for exclusion
Dibenzofuran	2/5		^f	0.055 - 0.640	N^i	0.296	0.508	Y	Positive detection with no reason for exclusion
Fluoranthene	4/5		^f	0.043 -10.000	N^i	2.427	6.499	Y	Positive detection with no reason for exclusion
Fluorene	2/5		^f	0.130 - 1.700	N^i	0.523	1.156	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	2/4		^f	0.280 - 2.900	N^i	0.899	2.469	Y	Positive detection with no reason for exclusion

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Iron	5/5	46200.0	19.100 - 27300	N^i	15600	26223.5	N	Common dietary element; Sample concentrations are within background levels
Lead	3/4	37.000	30.300 -334.00	N^i	120.38	297.791	Y	Sample concentrations exceed background levels
Magnesium	5/5	15900.0	9.740 - 38600	N^i	14982	29501.7	N	Common dietary element
Manganese	4/5	1144.00	0.835 -811.00	N^i	307.41	629.908	N	Sample concentrations are within background levels
Mercury	5/5	0.290	0.340 - 1.300	N^i	0.582	0.970	Y	Sample concentrations exceed background levels
Methylene chloride	5/5	^f	0.007 - 0.021	N^i	0.015	0.021^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/5	9.000	2.900 - 2.900	N^i	1.230	2.227	N	Sample concentrations are within background levels
N-Nitrosodiphenylamine	1/5	^f	0.100 - 0.100	N^i	0.252	0.100^j	Y	Positive detection with no reason for exclusion
Nickel	5/5	39.000	0.040 -50.000	N^i	32.148	50.000^j	Y	Sample concentrations exceed background levels
Phenanthrene	3/4	^f	0.120 - 8.800	N^i	2.516	7.465	Y	Positive detection with no reason for exclusion
Potassium	5/5	23800.0	856.00 -2470.0	N^i	1425.0	2038.50	N	Common dietary element; Sample concentrations are within background levels
Pyrene	3/5	^f	0.180 -10.000	N^i	2.429	6.493	Y	Positive detection with no reason for exclusion
Silver	2/5	8.000	0.003 -17.200	N^i	4.091	11.092	Y	Sample concentrations exceed background levels
Sodium	5/5	11400.0	0.150 -2180.0	N^i	1142.0	2115.86	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	2/5	^f	0.001 - 0.002	N^i	0.002	0.002^j	Y	Positive detection with no reason for exclusion
Thallium	2/5	10.940	0.330 - 0.360	N^i	0.224	0.337	N	Sample concentrations are within background levels
Toluene	2/5	^f	0.001 - 0.002	N^i	0.002	0.002^j	Y	Positive detection with no reason for exclusion
Tributyl phosphate	1/1	^f	1.200 - 1.200	^h	^h	1.200^j	Y	Positive detection with no reason for exclusion
Trichloroethene	2/5	^f	0.003 - 0.005	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Vanadium	5/5	172.000	0.027 -35.600	N^i	19.865	32.199	N	Sample concentrations are within background levels
Zinc	5/5	113.000	0.061 -328.00	N^i	200.21	315.980	Y	Sample concentrations exceed background levels
beta-BHC	1/5	^f	0.220 - 0.220	N^i	0.058	0.146	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	3/5	^f	0.046 - 0.180	N^i	0.213	0.180^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value

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will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-38

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-18") FROM RI/FS SAMPLING OF THE SOUTHWEST QUADRANT OF THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1-Dichloroethene	1/9	^f		0.004 - 0.004	N	0.003	0.003	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	1/9	^f		0.002 - 0.002	N	0.003	0.002^j	Y	Positive detection with no reason for exclusion
2-Butanone	8/9	^f		0.001 - 0.049	L	0.010	0.035	Y	Positive detection with no reason for exclusion
Acenaphthene	3/10	^f		0.110 - 1.600	N^i	0.359	0.617	Y	Positive detection with no reason for exclusion
Acetone	7/9	^f		0.005 - 0.027	L	0.010	0.016	Y	Positive detection with no reason for exclusion
Aluminum	10/10	108200		9.530 - 12400	N	6690.9	9255.01	N	Sample concentrations are within background levels
Anthracene	4/10	^f		0.060 - 2.800	L	0.267	0.470	Y	Positive detection with no reason for exclusion
Aroclor-1254	5/5	^f		0.120 - 1.000	N	0.370	0.717	Y	Positive detection with no reason for exclusion
Aroclor-1260	3/3	^f		0.270 - 1.000	N	0.537	1.000^j	Y	Positive detection with no reason for exclusion
Arsenic	10/10	20.500		3.900 - 8.400	N	6.220	6.929	N	Sample concentrations are within background levels
Barium	10/10	815.000		0.089 -587.00	N	273.68	404.387	N	Sample concentrations are within background levels
Benzene	1/9	^f		0.005 - 0.005	N	0.003	0.004	Y	Positive detection with no reason for exclusion
Benzo(a)anthracene	6/8	^f		0.061 - 5.400	L	0.346	0.877	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	6/6	^f		0.046 - 5.100	L	0.336	1.316	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/8	^f		0.110 - 4.700	L	0.304	0.676	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	5/8	^f		0.067 - 3.700	L	0.309	0.670	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	6/8	^f		0.090 - 5.000	L	0.386	0.902	Y	Positive detection with no reason for exclusion
Benzoic acid	1/10	^f		0.088 - 0.088	N^i	1.129	0.088^j	Y	Positive detection with no reason for exclusion
Beryllium	10/10	2.100		0.002 - 2.400	N	1.066	1.481	Y	Sample concentrations exceed background levels
Cadmium	10/10	11.100		0.003 - 6.900	N	3.701	5.008	N	Sample concentrations are within background levels
Calcium	10/10	41290.0		35.200 -181000	N	67883	103617	N	Common dietary element
Chlorobenzene	1/9	^f		0.005 - 0.005	N	0.003	0.004	Y	Positive detection with no reason for exclusion
Chromium	10/10	102.700		0.023 -75.500	N	24.135	36.645	N	Sample concentrations are within background levels
Chrysene	6/8	^f		0.100 - 7.200	L	0.441	1.118	Y	Positive detection with no reason for exclusion
Cobalt	10/10	21.000		0.014 -17.400	N	10.923	14.637	N	Sample concentrations are within background levels
Copper	10/10	58.600		0.022 -69.400	N	22.905	34.718	Y	Sample concentrations exceed background levels
Cyanide	1/10	^f		0.520 - 0.520	N	0.182	0.251	Y	Positive detection with no reason for exclusion

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Di-n-butyl phthalate	1/10	^f	0.046 - 0.046	N^i	0.256	0.046^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	2/8	^f	0.140 - 1.500	N^i	0.355	0.665	Y	Positive detection with no reason for exclusion
Dibenzofuran	3/10	^f	0.055 - 0.640	N	0.253	0.353	Y	Positive detection with no reason for exclusion
Fluoranthene	7/10	^f	0.043 -10.000	L	1.555	10.000^j	Y	Positive detection with no reason for exclusion
Fluorene	4/10	^f	0.044 - 1.700	N^i	0.359	0.639	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	5/8	^f	0.049 - 2.900	N^i	0.541	1.182	Y	Positive detection with no reason for exclusion
Iron	10/10	46200.0	18.100 - 27300	N	14710	20481.6	N	Common dietary element Sample concentrations are within background levels
Lead	8/9	37.000	15.500 -440.00	L	113.55	440.000^j	Y	Sample concentrations exceed background levels
Magnesium	10/10	15900.0	9.740 - 38600	N	14162	21258.3	N	Common dietary element
Manganese	9/10	1144.00	0.614 -811.00	N	299.37	446.898	N	Sample concentrations are within background levels
Mercury	9/9	0.290	0.270 - 1.300	L	0.598	0.977	Y	Sample concentrations exceed background levels
Methylene chloride	9/9	^f	0.005 - 0.021	L	0.014	0.021^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/10	9.000	2.900 - 2.900	N	1.035	1.496	N	Sample concentrations are within background levels
N-Nitrosodiphenylamine	2/10	^f	0.100 - 0.130	N	0.216	0.130^j	Y	Positive detection with no reason for exclusion
Nickel	10/10	39.000	0.040 -50.000	N	31.508	41.799	Y	Sample concentrations exceed background levels
Phenanthrene	6/8	^f	0.110 - 8.800	L	0.476	1.294	Y	Positive detection with no reason for exclusion
Phenol	1/10	^f	0.069 - 0.069	N^i	0.256	0.069^j	Y	Positive detection with no reason for exclusion
Potassium	10/10	23800.0	571.00 -2470.0	L	1249.2	1657.98	N	Common dietary element Sample concentrations are within background levels
Pyrene	6/10	^f	0.180 -10.000	L	0.571	1.195	Y	Positive detection with no reason for exclusion
Silver	6/10	8.000	0.003 -17.200	L	0.632	4.108	Y	Sample concentrations exceed background levels
Sodium	10/10	11400.0	0.150 -2220.0	N	1173.0	1741.63	N	Common dietary element Sample concentrations are within background levels
Tetrachloroethene	2/9	^f	0.001 - 0.002	N	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Thallium	5/10	10.940	0.260 - 0.360	N	0.231	0.287	N	Sample concentrations are within background levels
Toluene	5/9	^f	0.001 - 0.005	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Tributyl phosphate	2/2	^f	0.170 - 1.200	^h	^h	1.200^j	Y	Positive detection with no reason for exclusion
Trichloroethene	4/9	^f	0.003 - 0.005	N	0.003	0.004	Y	Positive detection with no reason for exclusion
Vanadium	10/10	172.000	0.027 -35.600	N	18.955	25.594	N	Sample concentrations are within background levels
Zinc	10/10	113.000	0.043 -383.00	N	192.51	266.361	Y	Sample concentrations exceed background levels
beta-BHC	2/10	^f	0.046 - 0.220	N^i	0.038	0.076	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	5/10	^f	0.046 - 0.180	L	0.145	0.180^j	Y	Positive detection with no reason for exclusion

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^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-39

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-6") FROM RI/FS SAMPLING OF THE SILO AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	3/3		108200	8770.0 - 10900	N^i	9890.0	10900.0^j	N	Sample concentrations are within background levels
Antimony	3/3		^f	20.600 -29.700	N^i	26.300	29.700^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1		^f	0.030 - 0.030	^h	^h	0.030^j	Y	Positive detection with no reason for exclusion
Arsenic	3/3		20.500	2.700 - 9.500	N^i	7.067	9.500^j	N	Sample concentrations are within background levels
Barium	3/3		815.000	67.300 -113.00	N^i	85.167	113.000^j	N	Sample concentrations are within background levels
Beryllium	3/3		2.100	0.700 - 1.000	N^i	0.800	1.000^j	N	Sample concentrations are within background levels
Cadmium	3/3		11.100	3.700 - 4.900	N^i	4.433	4.900^j	N	Sample concentrations are within background levels
Calcium	3/3		41290.0	23300 -131000	N^i	62467	131000^j	N	Common dietary element
Chromium	3/3		102.700	15.800 -22.600	N^i	18.367	22.600^j	N	Sample concentrations are within background levels
Cobalt	3/3		21.000	10.000 -14.800	N^i	12.400	14.800^j	N	Sample concentrations are within background levels
Copper	3/3		58.600	18.200 -23.500	N^i	20.633	23.500^j	N	Sample concentrations are within background levels
Iron	3/3		46200.0	19200 - 26300	N^i	21967	26300.0^j	N	Common dietary element Sample concentrations are within background levels
Lead	3/3		37.000	6.700 -17.000	N^i	11.500	17.000^j	N	Sample concentrations are within background levels
Magnesium	3/3		15900.0	10800 - 15400	N^i	13533	15400.0^j	N	Common dietary element Sample concentrations are within background levels
Manganese	3/3		1144.00	498.00 -1130.0	N^i	716.67	1130.00^j	N	Sample concentrations are within background levels
Molybdenum	3/3		9.000	3.200 - 4.700	N^i	3.833	4.700^j	N	Sample concentrations are within background levels
Nickel	3/3		39.000	23.200 -38.900	N^i	30.700	38.900^j	N	Sample concentrations are within background levels
Potassium	3/3		23800.0	949.00 -1430.0	N^i	1156.3	1430.00^j	N	Common dietary element Sample concentrations are within background levels
Selenium	1/3		1.200	0.540 - 0.540	N^i	0.343	0.540^j	N	Sample concentrations are within background levels
Silver	3/3		8.000	6.600 - 8.400	N^i	7.367	8.400^j	Y	Sample concentrations exceed background levels
Sodium	3/3		11400.0	86.200 -119.00	N^i	101.03	119.000^j	N	Common dietary element Sample concentrations are within background levels
Vanadium	3/3		172.000	23.700 -27.700	N^i	25.133	27.700^j	N	Sample concentrations are within background levels
Zinc	3/3		113.000	45.400 -65.200	N^i	53.300	65.200^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

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^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.5-40

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOIL (0-18") FROM RI/FS SAMPLING OF THE SILO AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	3/3	108200	8770.0 - 10900	N^i	9890.0	10900.0^j	N	Sample concentrations are within background levels
Antimony	3/3	^f	20.600 -29.700	N^i	26.300	29.700^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1	^f	0.030 - 0.030	^h	^h	0.030^j	Y	Positive detection with no reason for exclusion
Arsenic	3/3	20.500	2.700 - 9.500	N^i	7.067	9.500^j	N	Sample concentrations are within background levels
Barium	3/3	815.000	67.300 -113.00	N^i	85.167	113.000^j	N	Sample concentrations are within background levels
Beryllium	3/3	2.100	0.700 - 1.000	N^i	0.800	1.000^j	N	Sample concentrations are within background levels
Cadmium	3/3	11.100	3.700 - 4.900	N^i	4.433	4.900^j	N	Sample concentrations are within background levels
Calcium	3/3	41290.0	23300 -131000	N^i	62467	131000^j	N	Common dietary element
Chromium	3/3	102.700	15.800 -22.600	N^i	18.367	22.600^j	N	Sample concentrations are within background levels
Cobalt	3/3	21.000	10.000 -14.800	N^i	12.400	14.800^j	N	Sample concentrations are within background levels
Copper	3/3	58.600	18.200 -23.500	N^i	20.633	23.500^j	N	Sample concentrations are within background levels
Iron	3/3	46200.0	19200 - 26300	N^i	21967	26300.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	3/3	37.000	6.700 -17.000	N^i	11.500	17.000^j	N	Sample concentrations are within background levels
Magnesium	3/3	15900.0	10800 - 15400	N^i	13533	15400.0^j	N	Common dietary element; Sample concentrations are within background levels
Manganese	3/3	1144.00	498.00 -1130.0	N^i	716.67	1130.00^j	N	Sample concentrations are within background levels
Methylene chloride	1/1	^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Molybdenum	3/3	9.000	3.200 - 4.700	N^i	3.833	4.700^j	N	Sample concentrations are within background levels
Nickel	3/3	39.000	23.200 -38.900	N^i	30.700	38.900^j	N	Sample concentrations are within background levels
Potassium	3/3	23800.0	949.00 -1430.0	N^i	1156.3	1430.00^j	N	Common dietary element; Sample concentrations are within background levels
Selenium	1/3	1.200	0.540 - 0.540	N^i	0.343	0.540^j	N	Sample concentrations are within background levels
Silver	3/3	8.000	6.600 - 8.400	N^i	7.367	8.400^j	Y	Sample concentrations exceed background levels
Sodium	3/3	11400.0	86.200 -119.00	N^i	101.03	119.000^j	N	Common dietary element; Sample concentrations are within background levels
Toluene	1/1	^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Vanadium	3/3	172.000	23.700 -27.700	N^i	25.133	27.700^j	N	Sample concentrations are within background levels

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Zinc	3/3	113.000	45.400 -65.200	N^i	53.300	65.200^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-41

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-6") FROM RI/FS SAMPLING OF THE REMAINDER OF THE SITE (EXCLUDING THE PRODUCTION AREA, THE INCINERATOR/WASTE WATER TREATMENT FACILITY, THE WASTE STORAGE AREA, THE FLYASH/SOUTHFIELD AREA, AND THE SILO AREA)

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	1/1	^f		0.015 - 0.015	^h	^h	0.015^j	Y	Positive detection with no reason for exclusion
Aluminum	17/17		108200	4690.0 - 12900	L	8301.8	9514.69	N	Sample concentrations are within background levels
Antimony	17/17	^f		12.800 -32.300	N	25.200	27.311	Y	Positive detection with no reason for exclusion
Aroclor-1254	4/4	^f		0.014 - 0.120	N	0.047	0.106	Y	Positive detection with no reason for exclusion
Arsenic	17/17		20.500	3.600 -32.500	L	7.665	9.436	Y	Sample concentrations exceed background levels
Barium	17/17		815.000	40.500 -99.200	N	64.324	71.801	N	Sample concentrations are within background levels
Beryllium	17/17		2.100	0.530 - 0.890	L	0.744	0.799	N	Sample concentrations are within background levels
Cadmium	17/17		11.100	2.300 - 6.200	N	4.576	5.107	N	Sample concentrations are within background levels
Calcium	17/17		41290.0	13500 -123000	N	59753	73754.4	N	Common dietary element
Chromium	17/17		102.700	10.200 -21.600	N	16.629	17.910	N	Sample concentrations are within background levels
Cobalt	17/17		21.000	7.500 -13.200	L	10.071	10.834	N	Sample concentrations are within background levels
Copper	17/17		58.600	13.200 -26.900	L	18.524	20.098	N	Sample concentrations are within background levels
Cyanide	3/17	^f		0.120 - 0.260	N	0.082	0.106	Y	Positive detection with no reason for exclusion
Iron	17/17		46200.0	11100 - 25300	L	17506	19724.8	N	Common dietary element Sample concentrations are within background levels
Lead	16/17		37.000	8.700 -29.700	L	14.873	29.700^j	N	Sample concentrations are within background levels
Magnesium	17/17		15900.0	5210.0 - 26800	N	16999	20158.7	N	Common dietary element
Manganese	17/17		1144.00	346.00 -602.00	N	479.24	510.416	N	Sample concentrations are within background levels
Methylene chloride	1/1	^f		0.025 - 0.025	^h	^h	0.025^j	Y	Positive detection with no reason for exclusion
Molybdenum	14/17		9.000	2.700 - 5.200	N	3.753	4.330	N	Sample concentrations are within background levels
Nickel	17/17		39.000	16.300 -41.300	L	26.382	29.189	Y	Sample concentrations exceed background levels
Potassium	17/17		23800.0	530.00 -1110.0	N	894.29	961.280	N	Common dietary element Sample concentrations are within background levels
Silver	17/17		8.000	4.600 -10.400	L	8.076	9.197	Y	Sample concentrations exceed background levels
Sodium	17/17		11400.0	42.700 -145.00	L	95.759	112.460	N	Common dietary element Sample concentrations are within background levels
Thallium	1/17		10.940	0.510 - 0.510	N	0.252	0.281	N	Sample concentrations are within background levels
Vanadium	17/17		172.000	15.900 -29.400	N	22.747	24.380	N	Sample concentrations are within background levels

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Zinc	17/17	113.000	32.900	-79.500	L	47.918	52.938	N Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.5-42

SELECTION OF CONSTITUENTS OF CONCERN FOR SURFACE SOILS (0-18") FROM RI/FS SAMPLING OF THE REMAINDER OF THE SITE (EXCLUDING THE PRODUCTION AREA, THE INCINERATOR/WASTE WATER TREATMENT FACILITY, THE WASTE STORAGE AREA, THE FLYASH/SOUTHFIELD AREA, AND THE SILO AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Hexanone	1/2		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/2		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Acetone	2/2	•	^f	0.011 - 0.015	^h	^h	0.015^j	Y	Positive detection with no reason for exclusion
Aluminum	18/18		108200	4690.0 - 12900	L	8490.6	9714.62	N	Sample concentrations are within background levels
Antimony	18/18		^f	10.300 -32.300	N	24.372	26.823	Y	Positive detection with no reason for exclusion
Aroclor-1254	4/4		^f	0.014 - 0.120	L	0.032	0.102	Y	Positive detection with no reason for exclusion
Arsenic	18/18		20.500	2.600 -32.500	L	7.383	9.183	Y	Sample concentrations exceed background levels
Barium	18/18		815.000	40.500 -105.00	L	66.583	75.817	N	Sample concentrations are within background levels
Beryllium	18/18		2.100	0.530 - 0.900	N	0.753	0.799	N	Sample concentrations are within background levels
Cadmium	18/18		11.100	2.000 - 6.200	N	4.433	4.990	N	Sample concentrations are within background levels
Calcium	18/18		41290.0	5410.0 -123000	N	56734	70896.9	N	Common dietary element
Chromium	18/18		102.700	10.200 -21.600	N	16.683	17.890	N	Sample concentrations are within background levels
Cobalt	18/18		21.000	7.500 -13.200	L	10.044	10.758	N	Sample concentrations are within background levels
Copper	18/18		58.600	13.200 -26.900	L	18.322	19.833	N	Sample concentrations are within background levels
Cyanide	3/18		^f	0.120 - 0.260	N	0.081	0.104	Y	Positive detection with no reason for exclusion
Iron	18/18		46200.0	11100 - 25300	L	17817	20026.0	N	Common dietary element Sample concentrations are within background levels
Lead	17/18		37.000	8.700 -29.700	L	14.685	29.700^j	N	Sample concentrations are within background levels
Magnesium	18/18		15900.0	2970.0 - 26800	N	16219	19482.9	N	Common dietary element
Manganese	18/18		1144.00	346.00 -602.00	N	480.28	509.626	N	Sample concentrations are within background levels
Methylene chloride	2/2	•	^f	0.025 - 0.038	^h	^h	0.038^j	Y	Positive detection with no reason for exclusion
Molybdenum	14/18		9.000	2.700 - 5.200	N	3.608	4.206	N	Sample concentrations are within background levels
Nickel	18/18		39.000	16.300 -41.300	L	25.889	28.699	Y	Sample concentrations exceed background levels
Potassium	18/18		23800.0	530.00 -1110.0	N	888.22	952.030	N	Common dietary element; Sample concentrations are within background levels
Silver	18/18		8.000	2.400 -10.400	N	7.761	8.699	Y	Sample concentrations exceed background levels
Sodium	18/18		11400.0	42.700 -145.00	L	93.128	110.735	N	Common dietary element; Sample concentrations are within background levels

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Thallium	1/18	10.940	0.510 - 0.510	N	0.252	0.279	N	Sample concentrations are within background levels
Vanadium	18/18	172.000	15.900 -29.400	N	22.922	24.486	N	Sample concentrations are within background levels
Zinc	18/18	113.000	32.900 -79.500	L	48.017	52.731	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data are available for these compounds.

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R.6 SUBSURFACE SOIL

Subsurface soil data from waste units (Waste Storage Area, Solid Waste Landfill, Lime Sludge Ponds, Active and Inactive Flyash Piles, the South Field, and the Silo area) are summarized in Tables R.6-1 through R.6-25 for radionuclides and Tables R.6-26 through R.6-50 for chemicals. Subsurface soil data for Plants 2/3, 6, 9, and the Pilot Plant in the former Production Area are presented in Tables R.6-51 through R.6-54 for radionuclides and in Tables R.6-55 through R.6-58 for chemicals. Tables R.6-59 through R.6-66 present data for radionuclides for the following areas at the FEMP: former Production Area (excluding Plants 2/3, 6, 9, and the Pilot Plant), Fire Training Area, K-65 Slurry Line, Surge Lagoon, Retention Basin, Incinerator Area, rubble east of waste pits, and the remainder of the FEMP, respectively. Tables R.6-67 through R.6-71 present data for chemicals for the following areas at the FEMP: former Production Area (excluding Plants 2/3, 6, 9, and the Pilot Plant), Fire Training Area, K-65 Slurry Line, rubble east of the waste pits, and the remainder of the FEMP, respectively. Available CIS and RI/FS data are presented independently and in combined form. CIS data were used to supplement available RI/FS data. Subsurface soil data are used in estimating source terms for groundwater and air modeling for the future exposure scenario. As for perched water, only subsurface soil data that could potentially be a significant source term were used in fate and transport modeling (Discussion of the source term of subsurface soil for fate and transport modeling can be found in Section 2.1.1 of Part II). Subsurface soil data provide potential exposure point concentrations for soil for the future exposure scenario.

TABLE R.6-1

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE BERM OF WASTE PIT 1

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	2 /2		2.230	117.00 -1180.0	^h	^h	1180.00^j	Y	Sample concentrations exceed background levels
RA-228	2 /2		1.475	34.200 -165.00	^h	^h	165.000^j	Y	Sample concentrations exceed background levels
SR-90	2 /2		^f	2.400 - 8.900	^h	^h	8.900^j	Y	Positive detection with no reason for exclusion
TH-228	2 /2		1.475	94.000 -581.00	^h	^h	581.000^j	Y	Sample concentrations exceed background levels
TH-230	2 /2		2.109	24.100 -7597.0	^h	^h	7597.00^j	Y	Sample concentrations exceed background levels
TH-232	2 /2		1.475	93.200 -761.00	^h	^h	761.000^j	Y	Sample concentrations exceed background levels
U-234	2 /2		2.109	269.00 -429.00	^h	^h	429.000^j	Y	Sample concentrations exceed background levels
U-235/236	2 /2		^f	17.600 -144.00	^h	^h	144.000^j	Y	Positive detection with no reason for exclusion
U-238	2 /2		2.109	384.00 -1404.0	^h	^h	1404.00^j	Y	Sample concentrations exceed background levels
Uranium*	1 /1		3.230^g	1960.0-1960.0	^h	^h	1960.00^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-2

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 1

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	1/60		^f	1.100 - 1.100	N	1.709	1.100^j	Y	Positive detection with no reason for exclusion
RA-226	61/63		2.230	1.100 -120.00	L	41.941	65.210	Y	Sample concentrations exceed background levels
RU-106	1/63		^f	9.800 - 9.800	N	12.263	9.800^j	Y	Positive detection with no reason for exclusion
TC-99	1/5		^f	15.000 -15.000	L	1.303	4.993	Y	Positive detection with no reason for exclusion
TH-228	5/5		1.475	6.100 -52.000	L	15.102	33.062	Y	Sample concentrations exceed background levels
TH-230	5/5		2.109	326.00 -3600.0	L	1016.2	2751.16	Y	Sample concentrations exceed background levels
TH-232	54/63		1.475	1.000 -57.000	N	18.746	21.892	Y	Sample concentrations exceed background levels
U-234	5/5		2.109	244.00 -1180.0	L	486.26	834.346	Y	Sample concentrations exceed background levels
U-235	5/5		0.097	16.000 -151.00	L	41.171	91.304	Y	Sample concentrations exceed background levels.
U-238	63/63		2.109	9.100 -7090.0	L	754.19	1138.50	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-3

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 2

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	2 /42		^f	0.700 - 3.600	N	1.876	2.431	Y	Positive detection with no reason for exclusion
PU-238	2 /5		^f	0.100 - 0.100	N	0.070	0.096	Y	Positive detection with no reason for exclusion
PU-239/240	2 /5		^f	0.050 - 0.600	L	0.082	0.237	Y	Positive detection with no reason for exclusion
RA-226	34 /42		2.230	1.000 -613.00	L	128.61	430.423	Y	Sample concentrations exceed background levels
RU-106	1 /42		^f	35.000 -35.000	N	17.539	21.949	Y	Positive detection with no reason for exclusion
TC-99	3 /5		^f	11.000 -722.00	L	8.892	135.468	Y	Positive detection with no reason for exclusion
TH-228	5 /5		1.475	11.000 -164.00	L	42.363	111.694	Y	Sample concentrations exceed background levels
TH-230	5 /5		2.109	41.000 -3980.0	L	552.64	3321.27	Y	Sample concentrations exceed background levels
TH-232	33 /42		1.475	0.800 -563.00	L	41.553	100.060	Y	Sample concentrations exceed background levels
U-234	5 /5		2.109	39.000 - 18200	L	487.07	4176.85	Y	Sample concentrations exceed background levels
U-235	5 /5		0.097	1.000 -8780.0	L	59.548	1394.88	Y	Sample concentrations exceed background levels
U-238	42 /42		2.109	9.300 - 17900	L	1921.5	6104.19	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-4

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE BERM OF WASTE PIT 3

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PU-239/240	1/13	^f		0.800 - 0.800	N^i	0.338	0.407	Y	Positive detection with no reason for exclusion
RA-226	13/13		2.230	0.400 -19.700	L	3.631	8.735	Y	Sample concentrations exceed background levels
RA-228	11/13		1.475	0.600 -18.600	L	3.323	11.633	Y	Sample concentrations exceed background levels
SR-90	2/13	^f		1.300 - 1.500	L	0.326	0.448	Y	Positive detection with no reason for exclusion
TC-99	4/13	^f		1.200 - 6.900	L	0.803	1.324	Y	Positive detection with no reason for exclusion
TH-228	12/13		1.475	0.700 -22.900	L	3.131	6.553	Y	Sample concentrations exceed background levels
TH-230	13/13		2.109	1.100 -710.00	L	61.969	489.035	Y	Sample concentrations exceed background levels
TH-232	12/13		1.475	0.700 -33.100	L	3.846	8.850	Y	Sample concentrations exceed background levels
U-234	12/13		2.109	0.600 -238.00	L	47.746	238.000^j	Y	Sample concentrations exceed background levels
U-235/236	5/13	^f		1.900 -13.200	L	0.933	2.007	Y	Positive detection with no reason for exclusion
U-238	12/13		2.109	0.600 -227.00	L	46.562	227.000^j	Y	Sample concentrations exceed background levels
Uranium	8/8		3.230^g	6.000 - 969.00	L	301.25	969.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-5

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 3

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
AM-241	3 /3		^f	32.000 -49.100	N	39.700	49.100^j	Y	Positive detection with no reason for exclusion
CS-137	3 /117		^f	5.700 -19.000	N	1.336	1.674	Y	Positive detection with no reason for exclusion
NP-237	4 /9		^f	0.300 - 2.100	L	0.209	0.454	Y	Positive detection with no reason for exclusion
PU-238	5 /9		^f	0.100 - 1.000	L	0.110	0.242	Y	Positive detection with no reason for exclusion
PU-239/240	6 /9		^f	0.300 -14.000	L	0.433	1.829	Y	Positive detection with no reason for exclusion
RA-226	103 /113		2.230	0.600 -1668.4	L	194.14	427.596	Y	Sample concentrations exceed background levels
SR-90	2 /9		^f	2.400 -26.000	L	0.775	1.957	Y	Positive detection with no reason for exclusion
TC-99	8 /9		^f	47.000 -2190.0	L	455.39	2190.00^j	Y	Positive detection with no reason for exclusion
TH-228	9 /9		1.475	1.000 -82.000	L	26.656	82.000^j	Y	Sample concentrations exceed background levels
TH-230	9 /9		2.109	15.000 - 30520	N	10452	17284.6	Y	Sample concentrations exceed background levels
TH-232	91 /117		1.475	0.300 -121.00	L	17.043	23.892	Y	Sample concentrations exceed background levels
U-234	9 /9		2.109	27.000 -475.00	N	250.89	355.025	Y	Sample concentrations exceed background levels
U-235	12 /12		0.097	2.500 -138.00	L	29.383	74.836	Y	Sample concentrations exceed background levels
U-238	112 /117		2.109	3.300 -1380.0	L	190.82	242.436	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-6

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 4

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
NP-237	1/4		^f	0.400 - 0.400	N^i	0.188	0.370	Y	Positive detection with no reason for exclusion
PU-238	4/4		^f	0.100 - 0.500	N^i	0.275	0.500^j	Y	Positive detection with no reason for exclusion
PU-239/240	4/4		^f	0.100 - 0.400	N^i	0.200	0.366	Y	Positive detection with no reason for exclusion
RA-226	58/68		2.230	0.700 -76.200	L	19.421	31.318	Y	Sample concentrations exceed background levels
RU-106	1/67		^f	19.400 -19.400	N^i	21.100	19.400^j	Y	Positive detection with no reason for exclusion
TC-99	4/4		^f	6.800 -225.00	L	40.900	225.000^j	Y	Positive detection with no reason for exclusion
TH-228	4/4		1.475	18.000 -395.00	L	44.018	247.582	Y	Sample concentrations exceed background levels
TH-230	4/4		2.109	225.00 -566.00	N^i	428.25	566.000^j	Y	Sample concentrations exceed background levels
TH-232	59/68		1.475	0.600 -467.00	L	32.757	55.669	Y	Sample concentrations exceed background levels
U-234	4/4		2.109	149.00 -2320.0	L	440.65	1750.37	Y	Sample concentrations exceed background levels
U-235	4/4		0.097	35.000 -426.00	L	94.620	332.352	Y	Sample concentrations exceed background levels
U-238	68/68		2.109	3.300 - 16100	L	2344.4	4597.81	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-7

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 5

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	15/73		^f	2.000 -76.000	L	1.937	2.335	Y	Positive detection with no reason for exclusion
NP-237	6/6		^f	0.300 -23.000	L	5.113	19.376	Y	Positive detection with no reason for exclusion
PU-238	5/6		^f	0.400 - 4.400	N^i	1.992	3.642	Y	Positive detection with no reason for exclusion
PU-239/240	5/6		^f	0.400 -13.000	N^i	5.025	9.715	Y	Positive detection with no reason for exclusion
RA-226	68/68		2.230	2.000 -382.68	N	103.08	118.996	Y	Sample concentrations exceed background levels
SR-90	5/6		^f	0.800 -23.000	L	3.834	10.009	Y	Positive detection with no reason for exclusion
TC-99	6/6		^f	576.00 -2990.0	L	1095.4	1838.04	Y	Positive detection with no reason for exclusion
TH-228	6/6		1.475	41.000 -191.00	L	76.818	119.837	Y	Sample concentrations exceed background levels
TH-230	6/6		2.109	3080.0 - 20200	N^i	9878.3	14975.2	Y	Sample concentrations exceed background levels.
TH-232	72/73		1.475	6.800 -580.00	L	36.300	45.675	Y	Sample concentrations exceed background levels
U-234	6/6		2.109	310.00 -1250.0	L	566.69	874.586	Y	Sample concentrations exceed background levels
U-235	68/73		0.097	9.500 -79.000	L	28.943	32.204	Y	Sample concentrations exceed background levels
U-238	55/7		2.109	18.200 -1230.0	L	194.56	247.688	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-8

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE FROM RI/FS SAMPLING OF BERM OF WASTE PIT 6

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
TH-228	1 /1		1.475	0.700 - 0.700	^h	^h	0.700^j	N	Sample concentrations are within background levels
TH-230	1 /1		2.109	1.600 - 1.600	^h	^h	1.600^j	N	Sample concentrations are within background levels
TH-232	1 /1		1.475	0.600 - 0.600	^h	^h	0.600^j	N	Sample concentrations are within background levels
U-234	1 /1		2.109	6.200 - 6.200	^h	^h	6.200^j	Y	Sample concentrations exceed background levels
U-235/236	1 /1		0.097	0.900 - 0.900	^h	^h	0.900^j	Y	Sample concentrations exceed background levels
U-238	1 /1		2.109	32.000 -32.000	^h	^h	32.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-9

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 6

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	9/28		^f	3.100 -31.000	N^i	5.638	7.709	Y	Positive detection with no reason for exclusion
NP-237	4/4		^f	0.900 - 4.500	N	2.475	4.263	Y	Positive detection with no reason for exclusion
PU-238	4/4		^f	0.400 - 1.400	L	0.696	1.287	Y	Positive detection with no reason for exclusion
PU-239/240	4/4		^f	4.000 -15.000	N	8.700	14.310	Y	Positive detection with no reason for exclusion
RA-226	1/24		2.230	8.000 - 8.000	N^i	6.515	7.931	Y	Sample concentrations exceed background levels
SR-90	3/4		^f	1.300 - 4.000	N	1.838	3.696	Y	Positive detection with no reason for exclusion
TC-99	4/4		^f	106.00 -164.00	N	132.50	162.167	Y	Positive detection with no reason for exclusion
TH-228	4/4		1.475	0.200 - 2.000	N^i	0.950	1.918	Y	Sample concentrations exceed background levels
TH-230	4/4		2.109	14.000 -41.000	N	26.500	39.550	Y	Sample concentrations exceed background levels
TH-232	4/28		1.475	0.200 - 1.200	L	6.310	1.200^j	N	Sample concentrations are within background levels
U-234	4/4		2.109	2000.0 -5330.0	N	3417.5	5064.53	Y	Sample concentrations exceed background levels
U-235	4/4		0.097	350.00 -1750.0	N^i	1042.5	1750.00^j	Y	Sample concentrations exceed background levels
U-238	28/28		2.109	290.00 - 18700	L	6984.6	10622.1	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-10

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE BURN PIT

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
NP-237	2/6		^f	0.700 - 0.700	L	0.182	0.451	Y	Positive detection with no reason for exclusion
PU-238	4/6		^f	0.100 - 0.500	L	0.104	0.207	Y	Positive detection with no reason for exclusion
PU-239/240	4/6		^f	0.100 - 0.400	L	0.100	0.187	Y	Positive detection with no reason for exclusion
RA-226	59/67		2.230	0.400 -24.800	L	2.121	2.607	Y	Sample concentrations exceed background levels
TC-99	4/6		^f	18.000 -83.000	L	7.046	71.132	Y	Positive detection with no reason for exclusion
TH-228	6/6		1.475	1.500 -18.000	N^i	7.467	12.478	Y	Sample concentrations exceed background levels
TH-230	6/6		2.109	5.700 -224.00	L	30.696	89.014	Y	Sample concentrations exceed background levels
TH-232	57/67		1.475	0.700 -69.400	L	4.132	5.584	Y	Sample concentrations exceed background levels
U-234	6/6		2.109	9.900 -415.00	N^i	135.15	252.490	Y	Sample concentrations exceed background levels
U-235	6/6		0.097	0.500 -27.000	N^i	8.367	16.114	Y	Sample concentrations exceed background levels
U-238	59/67		2.109	2.700 -454.00	L	105.81	179.521	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-11

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM CIS SAMPLING OF THE CLEAR WELL

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	4/4		^f	18.000 -450.00	N	189.50	405.705	Y	Positive detection with no reason for exclusion
NP-237	3/4		^f	0.800 - 2.700	N	1.275	2.533	Y	Positive detection with no reason for exclusion
PU-238	1/4		^f	0.100 - 0.100	N	0.063	0.092	Y	Positive detection with no reason for exclusion
RA-226	3/3		2.230	20.510 -438.22	N^i	159.77	438.220^j	Y	Sample concentrations exceed background levels
SR-90	4/4		^f	1.300 -26.000	L	4.355	19.495	Y	Positive detection with no reason for exclusion
TC-99	3/4		^f	94.000 -322.00	N	133.30	292.817	Y	Positive detection with no reason for exclusion
TH-228	3/4		1.475	20.000 -56.000	L	28.809	50.702	Y	Sample concentrations exceed background levels
TH-230	4/4		2.109	105.00 -5600.0	L	618.29	4292.81	Y	Sample concentrations exceed background levels
TH-232	3/4		1.475	15.000 -39.000	N	18.850	37.163	Y	Sample concentrations exceed background levels
U-234	4/4		2.109	242.00 -376.00	L	284.85	364.798	Y	Sample concentrations exceed background levels
U-235	4/4		0.097	24.000 -49.000	N	35.000	48.278	Y	Sample concentrations exceed background levels
U-238	4/4		2.109	548.00 -670.00	N	621.50	670.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-12

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE LANDFILL

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	7/7		2.230	0.890 - 1.550	L	1.133	1.340	N	Sample concentrations are within background levels
RA-228	7/7		1.475	0.670 - 3.150	L	1.311	2.409	Y	Sample concentrations exceed background levels
SR-90	6/7		^f	0.720 - 3.090	L	0.896	1.580	Y	Positive detection with no reason for exclusion
TH-228	7/7		1.475	0.960 - 3.390	L	1.801	2.689	Y	Sample concentrations exceed background levels
TH-230	7/7		2.109	0.690 - 3.460	N	1.994	2.643	Y	Sample concentrations exceed background levels
TH-232	6/7		1.475	0.711 - 2.220	L	0.902	1.426	Y	Sample concentrations exceed background levels
Thorium*	7/7		^f	3.960 - 20.000	L	9.673	16.624	Y	Sample concentrations exceed background levels
U-234	7/7		2.109	0.890 - 23.300	L	6.919	23.300^j	Y	Sample concentrations exceed background levels
U-235/236	3/7		^f	0.126 - 1.650	L	0.416	0.812	Y	Positive detection with no reason for exclusion
U-238	7/7		2.109	1.110 - 45.200	L	11.386	45.200^j	Y	Sample concentrations exceed background levels
Uranium*	7/7		3.230^j	3.050 -150.00	L	36.711	150.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-13

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE LANDFILL

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PU-238	1/6		^f	0.100 - 0.100	N	0.058	0.075	Y	Positive detection with no reason for exclusion
RA-226	50/79		2.230	0.400 - 4.600	L	0.814	0.931	Y	Sample concentrations exceed background levels
TH-228	5/6		1.475	0.700 - 2.900	L	0.995	1.849	Y	Sample concentrations exceed background levels
TH-230	6/6		2.109	1.700 - 7.800	L	3.192	4.953	Y	Sample concentrations exceed background levels
TH-232	52/79		1.475	0.500 -79.700	L	1.869	2.481	Y	Sample concentrations exceed background levels
U-234	6/6		2.109	4.900 -28.000	N^i	10.917	17.928	Y	Sample concentrations exceed background levels
U-235	6/6		0.097	0.400 - 1.400	L	0.547	0.818	Y	Sample concentrations exceed background levels
U-238	43/79		2.109	2.200 -338.00	L	11.254	14.384	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-14

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF THE LANDFILL

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PU-238	1/13		^f	0.100 - 0.100	N	0.188	0.100^j	Y	Positive detection with no reason for exclusion
RA-226	57/86		2.230	0.400 - 4.600	L	0.844	0.958	Y	Sample concentrations exceed background levels
RA-228	7/7		1.475	0.670 - 3.150	L	1.311	2.409	Y	Sample concentrations exceed background levels
SR-90	6/13		^f	0.720 - 3.090	N^i	0.721	1.129	Y	Positive detection with no reason for exclusion
TH-228	12/13		1.475	0.700 - 3.390	L	1.551	2.404	Y	Sample concentrations exceed background levels
TH-230	13/13		2.109	0.690 - 7.800	L	2.751	4.055	Y	Sample concentrations exceed background levels
TH-232	58/86		1.475	0.500 -79.700	L	1.786	2.320	Y	Sample concentrations exceed background levels
Thorium*	7/7		^f	3.960 -20.000	L	9.673	16.624	Y	Positive detection with no reason for exclusion
U-234	13/13		2.109	0.890 -28.000	L	8.764	28.000^j	Y	Sample concentrations exceed background levels
U-235/236	9/13		0.097^g	0.126 - 1.650	L	0.611	1.020	Y	Sample concentrations exceed background levels
U-238	50/86		2.109	1.110 -338.00	L	11.272	14.359	Y	Sample concentrations exceed background levels
Uranium*	7/7		3.230^g	3.050 -150.00	L	36.711	150.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/kg.

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TABLE R.6-15

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE ACTIVE FLY ASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	9/9		2.230	0.760 - 6.220	N	3.373	4.519	Y	Sample concentrations exceed background levels
RA-228	9/9		1.475	0.560 - 5.320	N	2.698	3.691	Y	Sample concentrations exceed background levels
SR-90	9/9		^f	0.700 - 3.610	L	1.439	1.984	Y	Positive detection with no reason for exclusion
TH-228	9/9		1.475	1.160 - 5.790	N	3.154	4.030	Y	Sample concentrations exceed background levels
TH-230	9/9		2.109	0.850 - 6.080	N	3.063	4.026	Y	Sample concentrations exceed background levels
TH-232	9/9		1.475	0.520 - 5.080	L	2.211	5.055	Y	Sample concentrations exceed background levels
Thorium*	7/7		^f	4.690 -45.800	L	19.560	45.800^j	Y	Positive detection with no reason for exclusion
U-234	9/9		2.109	0.932 - 5.700	N	3.404	4.544	Y	Sample concentrations exceed background levels
U-238	9/9		2.109	1.050 - 7.960	N	4.363	5.989	Y	Sample concentrations exceed background levels.
Uranium*	9/9		3.230^g	2.720 -31.300	N	15.263	21.568	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-16

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE ACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PB-210	1/2		2.230	4.000 - 4.000	^h	^h	4.000^j	Y	Sample concentrations exceed background levels
RA-226	13/25		2.230	0.300 - 4.300	L	0.942	1.321	Y	Sample concentrations exceed background levels
RA-228	2/2		1.475	0.900 - 1.700	^h	^h	1.700^j	Y	Sample concentrations exceed background levels
TH-230	2/2		2.109	0.700 - 5.300	^h	^h	5.300^j	Y	Sample concentrations exceed background levels
TH-232	9/25		1.475	0.100 - 1.100	N^i	0.666	0.867	N	Sample concentrations are within background levels
U-234	2/2		2.109	4.500 - 5.700	^h	^h	5.700^j	Y	Sample concentrations exceed background levels
U-235	2/2		0.097	0.120 - 0.200	^h	^h	0.200^j	Y	Sample concentrations exceed background levels
U-238	9/25		2.109	2.300 -18.200	N^i	4.250	5.423	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-17

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF THE ACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PB-210	1/2		2.230	4.000 - 4.000	^h	^h	4.000^j	Y	Sample concentrations exceed background levels
RA-226	22/34		2.230	0.300 - 6.220	L	1.601	2.442	Y	Sample concentrations exceed background levels
RA-228	11/11		1.475	0.560 - 5.320	N	2.444	3.292	Y	Sample concentrations exceed background levels
SR-90	9/9		^f	0.700 - 3.610	L	1.439	2.004	Y	Positive detection with no reason for exclusion
TH-228	9/11		1.475	1.160 - 5.790	N	2.590	3.563	Y	Sample concentrations exceed background levels
TH-230	11/11		2.109	0.700 - 6.080	N	3.052	3.997	Y	Sample concentrations exceed background levels
TH-232	18/34		1.475	0.100 - 5.080	L	1.159	1.803	Y	Sample concentrations exceed background levels
Thorium*	7/7		^f	4.690 -45.800	L	19.560	45.800^j	Y	Positive detection with no reason for exclusion
U-234	11/11		2.109	0.932 - 5.700	N	3.712	4.697	Y	Sample concentrations exceed background levels
U-235	2/2		0.097	0.120 - 0.200	^h	^h	0.200^j	Y	Sample concentrations exceed background levels
U-238	18/34		2.109	1.050 -18.200	L	4.277	5.339	Y	Sample concentrations exceed background levels
Uranium*	9/9		3.230^g	2.720 -31.300	N	15.263	21.568	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-18

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE INACTIVE FLY ASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	4/4		2.230	1.390 - 3.070	N	2.210	3.070^j	Y	Sample concentrations exceed background levels
RA-228	4/4		1.475	1.030 - 3.130	L	1.715	3.130^j	Y	Sample concentrations exceed background levels
SR-90	2/4		^f	1.230 - 1.250	N^i	0.833	1.250^j	Y	Positive detection with no reason for exclusion
TH-228	4/4		1.475	1.110 - 3.140	N	2.135	3.140^j	Y	Sample concentrations exceed background levels
TH-230	4/4		2.109	1.730 - 2.980	L	2.534	2.980^j	Y	Sample concentrations exceed background levels
TH-232	4/4		1.475	0.950 - 2.420	N	1.588	2.369	Y	Sample concentrations exceed background levels
Thorium*	4/4		^f	8.580 -21.800	N	14.320	21.336	Y	Positive detection with no reason for exclusion
U-234	3/3		2.109	2.880 -20.640	L	6.009	20.640^j	Y	Sample concentrations exceed background levels
U-235/236	1/3		^f	0.687 - 0.687	N^i	0.429	0.687^j	Y	Positive detection with no reason for exclusion.
U-238	3/3		2.109	2.970 -21.940	L	6.356	21.940^j	Y	Sample concentrations exceed background levels
Uranium*	4/4		3.230^g	11.100 -873.00	L	56.665	586.546	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-19

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE INACTIVE FLYASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PB-210	2/2		2.230	3.000 - 5.000	^h	^h	5.000^j	Y	Sample concentrations exceed background levels
RA-226	57/63		2.230	0.800 - 7.900	L	2.214	2.547	Y	Sample concentrations exceed background levels
RA-228	2/2		1.475	1.700 - 2.000	^h	^h	2.000^j	Y	Sample concentrations exceed background levels
TH-228	2/2		1.475	2.100 - 2.300	^h	^h	2.300^j	Y	Sample concentrations exceed background levels
TH-230	2/2		2.109	2.700 -11.000	^h	^h	11.000^j	Y	Sample concentrations exceed background levels
TH-232	53/63		1.475	0.600 - 3.600	N	1.958	2.132	Y	Sample concentrations exceed background levels
U-234	2/2		2.109	3.700 -48.000	^h	^h	48.000^j	Y	Sample concentrations exceed background levels
U-235	2/2		0.097	0.200 - 2.200	^h	^h	2.200^j	Y	Sample concentrations exceed background levels
U-238	29/63		2.109	2.600 -160.00	L	9.465	11.839	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-20

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF THE INACTIVE FLY ASH PILE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PB-210	2/2		2.230	3.000 - 5.000	^h	^h	5.000^j	Y	Sample concentrations exceed background levels
RA-226	61/67		2.230	0.800 - 7.900	L	2.215	2.530	Y	Sample concentrations exceed background levels
RA-228	6/6		1.475	1.030 - 3.130	L	1.757	2.527	Y	Sample concentrations exceed background levels
SR-90	2/4		^f	1.230 - 1.250	N	0.833	1.250^j	Y	Positive detection with no reason for exclusion
TH-228	6/6		1.475	1.110 - 3.140	N	2.157	2.761	Y	Sample concentrations exceed background levels
TH-230	6/6		2.109	1.730 -11.000	N^i	4.012	6.853	Y	Sample concentrations exceed background levels
TH-232	57/67		1.475	0.600 - 3.600	N	1.936	2.103	Y	Sample concentrations exceed background levels
Thorium*	4/4		^f	8.580 -21.800	N	14.320	21.336	Y	Positive detection with no reason for exclusion
U-234	5/5		2.109	2.880 -48.000	L	8.264	27.490	Y	Sample concentrations exceed background levels
U-235/236	3/5		0.097^g	0.200 - 2.200	L	0.486	1.210	Y	Sample concentrations exceed background levels
U-238	32/66		2.109	2.600 -160.00	L	9.296	11.555	Y	Sample concentrations exceed background levels
Uranium*	4/4		3.230^g	11.100 -873.00	L	56.665	586.546	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gValue for U-235.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-21

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE NOTRH LIME SLUDGE POND

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	2/12		2.230	0.700 - 0.900	N^i	0.496	0.638	N	Sample concentrations are within background levels
SR-90	1/3		^f	2.200 - 2.200	L	0.516	2.200^j	Y	Positive detection with no reason for exclusion
TH-228	3/3		1.475	0.200 - 0.200	N	0.200	0.200^j	N	Sample concentrations are within background levels
TH-230	3/3		2.109	0.500 -20.000	L	3.684	20.000^j	Y	Sample concentrations exceed background levels
TH-232	7/15		1.475	0.200 - 0.900	N^i	0.433	0.577	N	Sample concentrations are within background levels
U-234	3/3		2.109	2.100 - 2.500	N^i	2.367	2.500^j	Y	Sample concentrations exceed background levels
U-235	3/3		0.097	0.100 - 0.200	N^i	0.133	0.200^j	Y	Sample concentrations exceed background levels
U-238	9/15		2.109	1.700 - 7.600	L	3.600	4.625	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-22

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE SOUTH LIME SLUDGE POND

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	1/39		^f	0.400 - 0.400	N	0.282	0.343	Y	Positive detection with no reason for exclusion
RA-226	5/36		2.230	0.300 - 2.000	N	0.535	0.651	N	Sample concentrations are within background levels
TH-228	3/3		1.475	0.100 - 0.300	N	0.200	0.300^j	N	Sample concentrations are within background levels
TH-230	3/3		2.109	0.900 - 7.000	N	3.000	7.000^j	Y	Sample concentrations exceed background levels
TH-232	9/39		1.475	0.100 - 1.000	N	0.369	0.462	N	Sample concentrations are within background levels
U-234	3/3		2.109	1.800 - 3.100	N^i	2.300	3.100^j	Y	Sample concentrations exceed background levels
U-235	3/3		0.097	0.100 - 0.300	N^i	0.167	0.300^j	Y	Sample concentrations exceed background levels
U-238	17/39		2.109	1.200 - 6.700	N	3.729	4.178	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-23

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE SOUTHFIELD AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PB-210	10/10		2.230	2.000 -28.000	L	7.600	20.238	Y	Sample concentrations exceed background levels
RA-226	79/100		2.230	0.500 -46.000	L	1.834	2.300	Y	Sample concentrations exceed background levels
RA-228	9/10		1.475	0.600 -10.000	L	3.080	9.175	Y	Sample concentrations exceed background levels
RU-106	1/90		^f	14.600 -14.600	N^i	2.901	3.420	Y	Positive detection with no reason for exclusion
TH-228	9/10		1.475	0.100 -38.000	L	7.475	38.000^j	Y	Sample concentrations exceed background levels
TH-230	10/10		2.109	0.500 -19.000	L	5.700	19.000^j	Y	Sample concentrations exceed background levels
TH-232	70/100		1.475	0.500 -101.00	L	3.148	4.582	Y	Sample concentrations exceed background levels
U-234	10/10		2.109	2.000 -15.000	L	8.220	15.000^j	Y	Sample concentrations exceed background levels
U-235	10/10		0.097	0.090 - 0.800	L	0.399	0.800^j	Y	Sample concentrations exceed background levels
U-238	42/100		2.109	2.700 -42.000	N^i	9.493	10.740	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-24

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE K65 BERMS

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	1/8	^f		0.230 - 0.230	N	0.116	0.147	Y	Positive detection with no reason for exclusion
PA-231	1/19		0.097	25.300 -25.300	L	0.998	1.373	Y	Sample concentrations exceed background levels
PB-210	17/17		2.230	0.620 -417.00	N^i	26.228	68.877	Y	Sample concentrations exceed background levels
RA-224	13/13		1.475	0.550 - 1.680	N	1.031	1.184	Y	Sample concentrations exceed background levels
RA-226	19/19		2.230	0.620 -876.00	N^i	48.476	128.208	Y	Sample concentrations exceed background levels
RA-228	18/19		1.475	0.530 - 1.320	L	0.931	1.041	N	Sample concentrations are within background levels
TH-228	17/17		1.475	1.110 -14.900	N^i	2.202	3.590	Y	Sample concentrations exceed background levels
TH-230	17/17		2.109	0.900 -51.200	N^i	4.848	9.926	Y	Sample concentrations exceed background levels
TH-232	15/17		1.475	0.700 - 1.450	L	0.871	1.086	N	Sample concentrations are within background levels.
Thorium*	16/17		^f	3.570 -13.100	N	7.856	8.916	Y	Positive detection with no reason for exclusion
U-234	17/17		2.109	0.810 -24.200	N^i	2.934	5.275	Y	Sample concentrations exceed background levels
U-235/236	1/17		^f	1.310 - 1.310	N^i	0.359	0.463	Y	Positive detection with no reason for exclusion
U-238	17/17		2.109	0.750 -24.700	N^i	3.148	5.531	Y	Sample concentrations exceed background levels
Uranium*	18/18		3.230^g	1.990 -186.00	L	18.597	24.575	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-25

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE K65 SLANT BORINGS

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PB-210	2/2		2.230	0.520 - 0.710	^h	^h	0.710^j	N	Sample concentrations are within background levels
RA-224	2/2		1.475	0.770 - 0.910	^h	^h	0.910^j	N	Sample concentrations are within background levels
RA-226	10/10		2.230	0.370 - 1.740	L	0.871	1.277	N	Sample concentrations are within background levels
RA-228	6/10		1.475	0.700 - 1.240	N^i	0.654	0.881	N	Sample concentrations are within background levels
SR-90	1/8		^f	0.816 - 0.816	N^i	0.321	0.455	Y	Positive detection with no reason for exclusion
TH-228	9/10		1.475	0.820 - 1.910	N	1.210	1.479	Y	Sample concentrations exceed background levels
TH-230	7/10		2.109	0.930 - 2.590	L	1.001	1.959	Y	Sample concentrations exceed background
TH-232	7/10		1.475	0.620 - 1.000	N	0.673	0.836	N	Sample concentrations are within background levels
Thorium*	10/10		^f	1.180 - 8.980	N	6.028	7.622	Y	Positive detection with no reason for exclusion
U-234	10/10		2.109	0.610 -12.400	L	3.517	11.517	Y	Sample concentrations exceed background levels
U-235/236	1/10		^f	0.620 - 0.620	L	0.323	0.369	Y	Positive detection with no reason for exclusion
U-238	10/10		2.109	0.600 -13.300	L	3.757	12.240	Y	Sample concentrations exceed background levels
Uranium*	10/12		3.23^g	2.070 -37.000	L	10.188	26.347	Y	Sample concentrations exceed background limits

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units reported in mg/kg.

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TABLE R.6-26

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE CONTENTS OF WASTE PIT 1

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	2/4		^f	0.006 - 0.120	L	0.008	0.071	Y	Positive detection with no reason for exclusion
2-Butanone	1/4		^f	0.017 - 0.017	N	0.008	0.015	Y	Positive detection with no reason for exclusion
2-Hexanone	1/4	0.002	^f	0.010 - 0.010	N	0.007	0.009	N	Maximum detection ≤ 5 X highest blank concentration
4-Methyl-2-pentanone	1/4	0.002	^f	0.005 - 0.005	N	0.005	0.005^j	N	Maximum detection ≤ 5 X highest blank concentration
Acetone	3/4	0.012	^f	0.005 - 0.024	L	0.008	0.019	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
Carbon Tetrachloride	1/4		^f	0.002 - 0.002	N	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Chloroform	3/4		^f	0.002 - 0.330	L	0.011	0.177	Y	Positive detection with no reason for exclusion
Ethylbenzene	1/4		^f	0.003 - 0.003	N	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Methylene chloride	2/4	0.002	^f	0.005 - 0.024	L	0.005	0.018	Y	Common laboratory contaminant; maximum detection > 10 X highest blank concentration
Tetrachlorethene	2/4		^f	0.150 - 0.210	L	0.021	0.210^j	Y	Positive detection with no reason for exclusion
Toluene	2/4		^f	0.004 - 0.011	N	0.005	0.010	Y	Positive detection with no reason for exclusion
Total Organic Carbon	3/3		^f	6881.0 - 33600	L	18548	33600.0^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total xylenes	2/4	0.001	^f	0.012 - 0.024	L	0.007	0.024^j	Y	Maximum detection > 5 X highest blank concentration
Trichloroethene	2/4		^f	0.004 - 0.027	L	0.005	0.019	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-27

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 1

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-trichloroethane	1/1		^f	0.120 - 0.120	^h	^h	0.120^j	Y	Positive detection with no reason for exclusion
2-butanone	5/5		^f	1.900 - 3.800	L	2.403	3.107	Y	Positive detection with no reason for exclusion
2-methylnaphthalene	1/1		^f	0.220 - 0.220	^h	^h	0.220^j	Y	Positive detection with no reason for exclusion
3,3'-dichlorobenzidine(3)	1/1		^f	0.130 - 0.130	^h	^h	0.130^j	Y	Positive detection with no reason for exclusion
4,4-ddt	1/1		^f	1.600 - 1.600	^h	^h	1.600^j	Y	Positive detection with no reason for exclusion
Acetone	5/5		^f	0.058 - 0.340	N^i	0.236	0.340^j	Y	Positive detection with no reason for exclusion
Aluminum	5/5		108233	1702.9 - 20223	N^i	9660.1	17546.4	N	Sample concentrations are within background levels
Anthracene	1/1		^f	0.074 - 0.074	^h	^h	0.074^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	1/1		^f	3.500 - 3.500	^h	^h	3.500^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	5/5		^f	0.720 -10.000	N^i	4.588	9.183	Y	Positive detection with no reason for exclusion
Aroclor-1260	1/1		^f	7.000 - 7.000	^h	^h	7.000^j	Y	Positive detection with no reason for exclusion
Arsenic	2/2		20.497	14.460 -15.200	^h	^h	15.200^j	N	Sample concentrations are within background levels
Barium	5/5		814.574	116.48 -365.48	L	232.01	365.480^j	N	Sample concentrations are within background levels
Benzo(a)anthracene	2/2		^f	0.084 - 0.180	^h	^h	0.180^j	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	1/1		^f	0.140 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/4		^f	0.055 - 0.300	L	0.143	0.300^j	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	1/1		^f	0.140 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Beryllium	1/1		2.150	2.200 - 2.200	^h	^h	2.200^j	N	Sample concentrations do not significantly exceed background levels
Bis(2-ethylhexyl)phthalate	2/2		^f	0.330 - 1.700	^h	^h	1.700^j	Y	Positive detection with no reason for exclusion
Cadmium	3/3		11.089	1.460 - 4.960	N	3.090	4.960^j	N	Sample concentrations are within background levels
Calcium	5/5		41294.0	4755.8 -192498	L	28077	132634	N	Common dietary element
Chloroform	3/3		^f	0.067 - 0.210	N	0.142	0.210^j	Y	Positive detection with no reason for exclusion
Chromium	4/4		102.684	6.350 -46.330	N	22.338	43.360	N	Sample concentrations are within background levels
Chrysene	4/4		^f	0.064 - 0.510	N	0.249	0.472	Y	Positive detection with no reason for exclusion
Cobalt	1/1		21.431	27.850 -27.850	^h	^h	27.850^j	Y	Sample concentrations

									exceed background levels
Copper	5/5	58.619	20.090	-160.79	N^i	50.512	109.414	Y	Sample concentrations exceed background levels
Di-n-butyl phthalate	4/4	^f	0.068	- 0.092	L	0.083	0.092^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	4/4	^f	0.150	- 0.830	L	0.284	0.683	Y	Positive detection with no reason for exclusion
Ethylbenzene	2/2	^f	0.040	- 0.055	^h	^h	0.055^j	Y	Positive detection with no reason for exclusion
Fluoranthene	5/5	^f	0.110	- 0.430	L	0.204	0.373	Y	Positive detection with no reason for exclusion
Iron	5/5	46245.7	1832.6	- 19688	N^i	7961.5	15398.6	N	Common Dietary Element; Sample concentrations are within background levels
Lead	5/5	37.337	4.980	-89.920	L	20.813	57.249	Y	Sample concentrations exceed background levels
Magnesium	5/5	15895.7	7613.8	- 36957	N	25333	35607.2	N	Common Dietary Element
Manganese	5/5	1144.01	144.81	-2914.7	N	1362.0	2367.31	Y	Sample concentrations exceed background levels
Mercury	2/2	0.292	0.260	- 0.360	^h	^h	0.360^j	Y	Sample concentrations exceed background levels
Methylene chloride	4/4	^f	0.140	- 0.180	L	0.152	0.174	Y	Positive detection with no reason for exclusion
Naphthalene	1/1	^f	0.054	- 0.054	^h	^h	0.054^j	Y	Positive detection with no reason for exclusion
Nickel	4/4	39.379	9.220	-64.530	N^i	30.173	59.949	Y	Sample concentrations exceed background levels
Phenanthrene	5/5	^f	0.097	- 2.300	L	0.359	1.267	Y	Positive detection with no reason for exclusion.
Potassium	5/5	23804.6	165.48	-2564.1	N^i	1077.5	2163.63	N	Common Dietary Element; Sample concentrations are within background levels
Pyrene	5/5	^f	0.072	- 0.360	N^i	0.166	0.290	Y	Positive detection with no reason for exclusion
Silver	3/3	8.028	2.250	-33.090	L	7.367	33.090^j	Y	Sample concentrations exceed background levels
Sodium	4/4	11359.6	386.12	-3638.6	L	1074.2	3342.76	N	Common Dietary Element; Sample concentrations are within background levels
Tetrachloroethene	1/1	^f	0.075	- 0.075	^h	^h	0.075^j	Y	Positive detection with no reason for exclusion
Toluene	3/3	^f	0.040	- 0.096	L	0.057	0.096^j	Y	Positive detection with no reason for exclusion
Vanadium	4/4	172.171	13.740	-66.740	L	29.811	66.740^j	N	Sample concentrations are within background levels
Zinc	3/3	113.020	10.110	-57.910	N	33.373	57.910^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

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^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-28

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF WASTE PIT 1

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	3/5		^f	0.006 - 0.120	N^i	0.050	0.111	Y	Positive detection with no reason for exclusion
2-Butanone	6/9		^f	0.017 - 3.800	N^i	1.381	2.255	Y	Positive detection with no reason for exclusion
2-Hexanone	1/4	0.002	^f	0.010 - 0.010	N^i	0.007	0.009	N	Maximum concentration ≤ 5 X highest blank concentration reason for exclusion
2-Methylnaphthalene	1/1		^f	0.220 - 0.220	^h	^h	0.220^j	Y	Positive detection with no reason for exclusion
3,3'-Dichlorobenzidine(3)	1/1		^f	0.130 - 0.130	^h	^h	0.130^j	Y	Positive detection with no reason for exclusion
4,4-Ddt	1/1		^f	1.600 - 1.600	^h	^h	1.600^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/4	0.002	^f	0.005 - 0.005	N^i	0.005	0.005^j	N	Maximum detection ≤ 5 X highest blank concentration
Acetone	8/9	0.012	^f	0.005 - 0.340	N	0.135	0.224	Y	Common laboratory contaminant; maximum detection > 10 X highest blank concentration
Aluminum	5/5		108233	1702.9 - 20223	L	6590.6	17840.5	N	Sample concentrations are within background levels
Anthracene	1/1		^f	0.074 - 0.074	^h	^h	0.074^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	1/1		^f	3.500 - 3.500	^h	^h	3.500^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	5/5		^f	0.720 -10.000	N^i	4.588	9.183	Y	Positive detection with no reason for exclusion
Aroclor-1260	1/1		^f	7.000 - 7.000	^h	^h	7.000^j	Y	Positive detection with no reason for exclusion
Arsenic	2/2		20.497	14.460 -15.200	^h	^h	15.200^j	N	Sample concentrations are within background levels
Barium	5/5		814.574	116.48 -365.48	N^i	255.10	362.923	N	Sample concentrations are within background levels
Benzo(a)anthracene	2/2		^f	0.084 - 0.180	^h	^h	0.180^j	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	1/1		^f	0.140 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/4		^f	0.055 - 0.300	L	0.143	0.300^j	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	1/1		^f	0.140 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Beryllium	1/1		2.150	2.200 - 2.200	^h	^h	2.200^j	N	Sample concentration barely exceeds background levels
Bis(2-ethylhexyl)phthalate	2/2		^f	0.330 - 1.700	^h	^h	1.700^j	Y	Positive detection with no reason for exclusion
Cadmium	3/3		11.089	1.460 - 4.960	N	3.090	4.960^j	N	Sample concentrations are within background levels
Calcium	5/5		41294.0	4755.8 -192498	L	28077	132634	N	Common dietary element
Carbon Tetrachloride	1/4		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion

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Chloroform	6/7		^f	0.002 - 0.330	N^i	0.110	0.203	Y	Positive detection with no reason for exclusion
Chromium	4/4		102.684	6.350 -46.330	N^i	22.338	43.360	N	Sample concentrations are within background levels
Chrysene	4/4		^f	0.064 - 0.510	N^i	0.249	0.472	Y	Positive detection with no reason for exclusion
Cobalt	1/1		21.431	27.850 -27.850	^h	^h	27.850^j	Y	Sample concentrations exceed background levels
Copper	5/5		58.619	20.090 -160.79	L	33.485	78.392	Y	Sample concentrations exceed background levels
Di-n-butyl phthalate	4/4		^f	0.068 - 0.092	N^i	0.083	0.092^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	4/4		^f	0.150 - 0.830	N^i	0.360	0.732	Y	Positive detection with no reason for exclusion
Ethylbenzene	3/6		^f	0.003 - 0.055	N^i	0.018	0.037	Y	Positive detection with no reason for exclusion
Fluoranthene	5/5		^f	0.110 - 0.430	N^i	0.240	0.385	Y	Positive detection with no reason for exclusion
Iron	5/5		46245.7	1832.6 - 19688	N	7961.5	15398.6	N	Common dietary element; Sample concentrations are within background levels
Lead	5/5		37.337	4.980 -89.920	L	20.813	57.249	Y	Sample concentrations exceed background levels
Magnesium	5/5		15895.7	7613.8 - 36957	N	25333	35607.2	N	Common dietary element
Manganese	5/5		1144.01	144.81 -2914.7	N	1362.0	2367.31	Y	Sample concentrations exceed background levels
Mercury	2/2		0.292	0.260 - 0.360	^h	^h	0.360^j	Y	Sample concentrations exceed background levels
Methylene chloride	6/8	0.002	^f	0.005 - 0.180	N^i	0.081	0.133	Y	Common laboratory contaminant; maximum detection > 10 X highest blank concentration
Naphthalene	1/1		^f	0.054 - 0.054	^h	^h	0.054^j	Y	Positive detection with no reason for exclusion
Nickel	4/4		39.379	9.220 -64.530	N^i	30.173	59.949	Y	Sample concentrations exceed background levels
Phenanthrene	5/5		^f	0.097 - 2.300	L	0.359	1.267	Y	Positive detection with no reason for exclusion
Potassium	5/5		23804.6	165.48 -2564.1	L	601.37	1984.60	Y	Common dietary element; Sample concentrations are within background levels
Pyrene	5/5		^f	0.072 - 0.360	N^i	0.166	0.290	Y	Positive detection with no reason for exclusion
Silver	3/3		8.028	2.250 -33.090	L	7.367	33.090^j	Y	Sample concentrations exceed background levels
Sodium	4/4		11359.6	386.12 -3638.6	L	1074.2	3342.76	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	3/5		^f	0.075 - 0.210	L	0.027	0.210^j	Y	Positive detection with no reason for exclusion
Toluene	5/7		^f	0.004 - 0.096	N^i	0.029	0.055	Y	Positive detection with no reason for exclusion
Total Organic Carbon	3/3		^f	6881.0 - 33600	L	18548	33600.0^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total xylenes	2/4	0.001	^f	0.012 - 0.024	N^i	0.010	0.022	Y	Maximum detection > 5 X highest blank concentration
Trichloroethene	2/4		^f	0.004 - 0.027	L	0.005	0.019	Y	Positive detection with no reason for exclusion

Vanadium	4/4	172.171	13.740 -66.740	L	29.811	66.740^j	N	Sample concentrations are within background levels
Zinc	3/3	113.020	10.110 -57.910	N	33.373	57.910^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-29

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 2

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-trichloroethane	1/1		^f	0.150 - 0.150	^h	^h	0.150^j	Y	Positive detection with no reason for exclusion
2,4-dimethylphenol	1/1		^f	0.150 - 0.150	^h	^h	0.150^j	Y	Positive detection with no reason for exclusion
2-butanone	2/2		^f	2.600 - 2.700	^h	^h	2.700^j	Y	Positive detection with no reason for exclusion
2-methylnaphthalene	2/2		^f	7.000 - 8.000	^h	^h	8.000^j	Y	Positive detection with no reason for exclusion
4,4-ddt	2/2		^f	0.580 - 1.400	^h	^h	1.400^j	Y	Positive detection with no reason for exclusion
4-chlorophenyl-phenylether	1/1		^f	62.000 -62.000	^h	^h	62.000^j	Y	Positive detection with no reason for exclusion
4-methylphenol	1/1		^f	0.350 - 0.350	^h	^h	0.350^j	Y	Positive detection with no reason for exclusion
Acenaphthene	3/3		^f	0.080 -50.000	N^i	31.027	50.000^j	Y	Positive detection with no reason for exclusion
Acetone	2/2		^f	0.230 - 0.540	^h	^h	0.540^j	Y	Positive detection with no reason for exclusion
Aluminum	4/4		108233	7242.3 - 22422	N^i	16445	22421.8^j	N	Sample concentrations are within background levels
Anthracene	3/3		^f	0.058 -120.00	L	1.292	120.000^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	1/1		^f	0.321 - 0.321	^h	^h	0.321^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1		^f	0.323 - 0.323	^h	^h	0.323^j	Y	Positive detection with no reason for exclusion
Aroclor-1260	2/2		^f	0.740 - 1.800	^h	^h	1.800^j	Y	Positive detection with no reason for exclusion
Arsenic	4/4		20.497	2.750 -10.060	N^i	5.133	9.048	N	Sample concentrations are within background levels
Barium	4/4		814.574	96.700 -208.49	N	137.73	195.582	N	Sample concentrations are within background levels
Benzo(a)anthracene	5/5		^f	0.055 -180.00	L	2.973	103.959	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	4/4		^f	0.110 -140.00	N^i	65.203	140.000^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/4		^f	0.110 -110.00	L	1.134	46.617	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	3/3		^f	0.290 -52.000	N^i	31.430	52.000^j	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	4/4		^f	0.180 -120.00	N^i	48.945	118.369	Y	Positive detection with no reason for exclusion
Beryllium	3/3		2.150	1.870 - 8.920	L	3.887	8.920^j	Y	Sample concentrations exceed background levels
Bis(2-ethylhexyl)phthalate	1/1		^f	0.360 - 0.360	^h	^h	0.360^j	Y	Positive detection with no reason for exclusion
Cadmium	4/4		11.089	3.040 - 9.590	N	5.918	9.118	N	Sample concentrations are within background levels
Calcium	4/4		41294.0	34414 - 80154	N^i	53873	80154.2^j	N	Common Dietary Element

Chromium	4/4	102.684	17.080	-91.260	L	35.270	82.244	N	Sample concentrations are within background levels
Chrysene	4/4	^f	0.074	-180.00	L	1.296	74.815	Y	Positive detection with no reason for exclusion
Cobalt	4/4	21.431	13.630	-450.56	L	60.663	341.166	Y	Sample concentrations exceed background levels
Copper	4/4	58.619	38.380	-329.06	N^i	118.45	283.869	Y	Sample concentrations exceed background levels
Di-n-butyl phthalate	3/3	^f	0.096	- 0.380	L	0.168	0.380^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	4/4	^f	0.096	- 0.570	N^i	0.282	0.520	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	1/1	^f	16.000	-16.000	^h	^h	16.000^j	Y	Positive detection with no reason for exclusion
Dibenzofuran	2/2	^f	0.078	-36.000	^h	^h	36.000^j	Y	Positive detection with no reason for exclusion
Ethylbenzene	1/1	^f	0.048	- 0.048	^h	^h	0.048^j	Y	Positive detection with no reason for exclusion
Fluoranthene	4/4	^f	0.160	-460.00	L	3.161	192.918	Y	Positive detection with no reason for exclusion
Fluorene	2/2	^f	0.150	-62.000	^h	^h	62.000^j	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	3/3	^f	0.340	-52.000	N^i	32.780	52.000^j	Y	Positive detection with no reason for exclusion
Iron	4/4	46245.7	13265	- 24038	N^i	20249	24037.7^j	N	Common Dietary Element; Sample concentrations are within background levels
Lead	4/4	37.337	25.470	-190.29	N^i	83.605	174.191	Y	Sample concentrations exceed background levels
Magnesium	4/4	15895.7	8885.0	- 26677	N^i	19008	26676.8^j	N	Common Dietary Element
Manganese	4/4	1144.01	528.84	-916.57	N	721.35	916.570^j	N	Sample concentrations are within background levels
Mercury	3/3	0.292	0.220	- 0.700	N	0.470	0.700^j	Y	Sample concentrations exceed background levels
Methylene chloride	2/2	^f	0.170	- 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
Naphthalene	2/2	^f	0.190	-16.000	^h	^h	16.000^j	Y	Positive detection with no reason for exclusion
Nickel	4/4	39.379	35.600	-608.90	L	107.09	453.163	Y	Sample concentrations exceed background levels
Phenanthrene	4/4	^f	0.098	-370.00	L	2.228	154.375	Y	Positive detection with no reason for exclusion
Phenol	1/1	^f	0.330	- 0.330	^h	^h	0.330^j	Y	Positive detection with no reason for exclusion
Potassium	4/4	23804.6	795.60	-4318.5	N	2382.1	4215.80	N	Common Dietary Element; Sample concentrations are within background levels
Pyrene	4/4	^f	0.088	-310.00	L	2.069	133.885	Y	Positive detection with no reason for exclusion
Selenium	3/3	1.170	1.590	-10.190	L	3.002	10.190^j	Y	Sample concentrations exceed background levels
Silver	2/2	8.028	11.110	-23.160	^h	^h	23.160^j	Y	Sample concentrations exceed background levels
Sodium	4/4	11359.6	479.75	-2303.2	N^i	1165.2	2100.65	N	Common Dietary Element; Sample concentrations are within background levels
Total xylenes	1/1	^f	0.260	- 0.260	^h	^h	0.260^j	Y	Positive detection with no reason for exclusion
Vanadium	4/4	172.171	38.120	-105.94	L	55.080	93.465	N	Sample concentrations are within background levels

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Vinyl chloride	1/1	^f	0.670 - 0.670	^h	^h	0.670^j	Y	Positive detection with no reason for exclusion
Zinc	4/4	113.020	53.580 -3247.2	L	216.98	1902.82	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-30

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 3

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-butanone	1/1		^f	3.600 - 3.600	^h	^h	3.600^j	Y	Positive detection with no reason for exclusion
Acetone	6/6		^f	0.091 - 0.390	L	0.156	0.243	Y	Positive detection with no reason for exclusion
Aluminum	6/6		108233	10366 - 64100	N^i	24061	40474.5	N	Sample concentrations are within background levels
Aroclor-1254	6/6		^f	0.074 - 0.550	L	0.137	0.250	Y	Positive detection with no reason for exclusion
Arsenic	6/6		20.497	15.410 -3049.1	N^i	1052.1	2011.35	Y	Sample concentrations exceed background levels
Barium	6/6		814.574	251.19 - 14355	L	2015.3	7368.41	Y	Sample concentrations exceed background levels
Benzo(a)anthracene	1/1		^f	0.060 - 0.060	^h	^h	0.060^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	1/1		^f	0.110 - 0.110	^h	^h	0.110^j	Y	Positive detection with no reason for exclusion
Beryllium	5/5		2.150	5.470 -24.010	L	9.865	17.384	Y	Sample concentrations exceed background levels
Bis(2-ethylhexyl)phthalate	6/6		^f	0.110 - 1.100	N	0.480	0.776	Y	Positive detection with no reason for exclusion
Cadmium	6/6		11.089	2.530 -12.650	N^i	5.998	9.309	Y	Sample concentrations exceed background levels
Calcium	6/6		41294.0	53183 -178241	N^i	100949	141651	N	Common dietary element
Chromium	6/6		102.684	20.000 -151.84	L	58.164	117.101	Y	Sample concentrations exceed background levels
Chrysene	1/1		^f	0.075 - 0.075	^h	^h	0.075^j	Y	Positive detection with no reason for exclusion
Copper	6/6		58.619	79.500 -2332.7	N^i	1081.5	1929.43	Y	Sample concentrations exceed background levels
Di-n-butyl phthalate	3/3		^f	0.084 - 0.084	N^i	0.084	0.084	Y	Positive detection with no reason for exclusion
Fluoranthene	1/1		^f	0.230 - 0.230	^h	^h	0.230^j	Y	Positive detection with no reason for exclusion
Iron	6/6		46245.7	10730 - 26919	N^i	18021	23128.3	N	Common dietary element; Sample concentrations are within background levels
Lead	6/6		37.337	51.680 -613.21	N^i	231.69	413.582	Y	Sample concentrations exceed background levels
Magnesium	6/6		15895.7	25156 - 51570	L	30697	38868.3	N	Common dietary element
Manganese	6/6		1144.01	517.71 - 10571	L	1347.6	3625.13	Y	Sample concentrations exceed background levels
Mercury	4/4		0.292	0.450 - 4.010	L	1.173	3.411	Y	Sample concentrations exceed background levels
Methylene chloride	1/1		^f	0.420 - 0.420	^h	^h	0.420^j	Y	Positive detection with no reason for exclusion
N-nitrosodiphenylamine	1/1		^f	0.130 - 0.130	^h	^h	0.130^j	Y	Positive detection with no reason for exclusion
Nickel	6/6		39.379	28.610 -503.97	L	87.843	228.897	Y	Sample concentrations exceed background levels

Pentachlorophenol	2/2	^f	0.630 - 1.300	^h	^h	1.300^j	Y	Positive detection with no reason for exclusion
Phenanthrene	1/1	^f	0.120 - 0.120	^h	^h	0.120^j	Y	Positive detection with no reason for exclusion
Potassium	6/6	23804.6	810.24 -2894.0	N^i	1893.9	2642.41	N	Common dietary element; Sample concentrations are within background levels
Pyrene	1/1	^f	0.190 - 0.190	^h	^h	0.190^j	Y	Positive detection with no reason for exclusion
Selenium	3/3	1.170	3.050 -89.800	N	50.917	89.800^j	Y	Sample concentrations are exceed background levels
Silver	4/4	8.028	3.540 - 8.110	N^i	6.555	8.110^j	N	Sample concentration does not significantly exceed background levels
Sodium	6/6	11359.6	1291.3 -7640.0	L	2807.6	4867.37	N	Common dietary element; Sample concentrations are within background levels
Thallium	2/2	10.940^g	5.890 -12.210	^h	^h	12.210^j	N	Sample concentrations are within background levels
Vanadium	6/6	172.171	50.060 -9695.5	L	870.29	5325.37	Y	Sample concentrations exceed background levels
Zinc	6/6	113.020	44.560 -311.19	N^i	129.93	219.518	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-31

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 4

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-trichloroethane	1 /1		^f	0.120 - 0.120	^h	^h	0.120^j	Y	Positive detection with no reason for exclusion
2-butanone	2 /2		^f	0.100 - 7.900	^h	^h	7.900^j	Y	Positive detection with no reason for exclusion
Acenaphthene	2 /2		^f	0.087 - 0.170	^h	^h	0.170^j	Y	Positive detection with no reason for exclusion
Acetone	3 /3		^f	0.130 - 0.520	N	0.333	0.520^j	Y	Positive detection with no reason for exclusion
Aluminum	4 /4		108233	3645.6 - 10326	N^i	7087.9	10326.0^j	N	Sample concentrations are within background levels
Anthracene	2 /2		^f	0.260 - 0.510	^h	^h	0.510^j	Y	Positive detection with no reason for exclusion
Aroclor-1242	2 /2		^f	0.099 - 1.034	^h	^h	1.034^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	2 /2		^f	0.460 - 0.854	^h	^h	0.854^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	3 /3		^f	0.296 - 1.008	N^i	0.609	1.008^j	Y	Positive detection with no reason for exclusion
Arsenic	1 /1		20.497	4.630 - 4.630	^h	^h	4.630^j	N	Sample concentrations are within background levels
Barium	4 /4		814.574	444.03 -6668.8	N^i	2408.6	5868.35	Y	Sample concentrations exceed background levels
Benzo(a)anthracene	3 /3		^f	0.052 - 0.750	N	0.397	0.750^j	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	2 /2		^f	0.320 - 0.550	^h	^h	0.550^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	2 /2		^f	0.250 - 0.510	^h	^h	0.510^j	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	3 /3		^f	0.065 - 0.170	N^i	0.122	0.170^j	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	2 /2		^f	0.330 - 0.560	^h	^h	0.560^j	Y	Positive detection with no reason for exclusion
Beryllium	1 /1		2.150	13.300 -13.300	^h	^h	13.300^j	Y	Sample concentrations exceed background levels
Bis(2-ethylhexyl)phthalate	2 /2		^f	0.140 - 0.270	^h	^h	0.270^j	Y	Positive detection with no reason for exclusion
Cadmium	3 /3		11.089	1.920 -28.720	N^i	10.890	28.720^j	Y	Sample concentrations exceed background levels
Calcium	4 /4		41294.0	14253 - 61253	N^i	44250	61252.8^j	N	Common dietary element
Chloroform	4 /4		^f	0.040 - 1.300	L	0.209	1.300^j	Y	Positive detection with no reason for exclusion
Chromium	4 /4		102.684	7.920 -93.630	N^i	33.725	80.972	N	Sample concentrations are within background levels
Chrysene	4 /4		^f	0.070 - 0.760	N^i	0.503	0.760^j	Y	Positive detection with no reason for exclusion
Cobalt	1 /1		21.431	84.060 -84.060	^h	^h	84.060^j	Y	Sample concentrations exceed background levels
Copper	4 /4		58.619	22.800 -187.73	N^i	71.985	163.326	Y	Sample concentrations exceed background levels

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Di-n-butyl phthalate	2 /2	^f	0.060 - 0.490	^h	^h	0.490^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	1 /1	^f	0.170 - 0.170	^h	^h	0.170^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	2 /2	^f	0.065 - 0.170	^h	^h	0.170^j	Y	Positive detection with no reason for exclusion
Dibenzofuran	2 /2	^f	0.098 - 0.160	^h	^h	0.160^j	Y	Positive detection with no reason for exclusion
Ethyl parathion	3 /3	^f	0.082 - 0.860	L	0.220	0.860^j	Y	Positive detection with no reason for exclusion
Fluoranthene	4 /4	^f	0.170 - 2.200	N^i	1.393	2.200^j	Y	Positive detection with no reason for exclusion
Fluorene	2 /2	^f	0.160 - 0.310	^h	^h	0.310^j	Y	Positive detection with no reason for exclusion
Fluoride	3 /3	^f	47812 -124576	N^i	96877	124576^j	N	Ubiquitous compound
Indeno(1,2,3-cd)pyrene	3 /3	^f	0.150 - 0.180	N^i	0.170	0.180^j	Y	Positive detection with no reason for exclusion
Iron	4 /4	46245.7	3045.6 - 16128	N	8931.1	15612.5	N	Common dietary element; Sample concentrations are within background levels
Lead	4 /4	37.337	23.550 -62.510	N	42.758	61.675	Y	Sample concentrations exceed background levels
Magnesium	4 /4	15895.7	11424 - 24251	N^i	18806	24251.3^j	N	Common dietary element
Malathion	1 /1	^f	0.670 - 0.670	^h	^h	0.670^j	Y	Sample concentrations exceed background levels
Manganese	4 /4	1144.01	1752.0 -3596.4	N^i	2649.8	3596.38^j	Y	Sample concentrations exceed background levels
Mercury	3 /3	0.292	0.180 - 0.630	N	0.393	0.630^j	Y	Sample concentrations exceed background levels
Methyl parathion	3 /3	^f	0.370 - 2.100	N^i	1.090	2.100^j	Y	Positive detection with no reason for exclusion
Methylene chloride	2 /2	^f	0.170 - 0.230	^h	^h	0.230^j	Y	Positive detection with no reason for exclusion
Naphthalene	3 /3	^f	0.062 - 0.110	N^i	0.094	0.110^j	Y	Positive detection with no reason for exclusion
Nickel	3 /3	39.379	20.670 -49.730	L	28.462	49.730^j	Y	Sample concentrations exceed background levels
Phenanthrene	4 /4	^f	0.110 - 2.100	N^i	1.328	2.100^j	Y	Positive detection with no reason for exclusion
Phenol	2 /2	^f	0.430 - 0.830	^h	^h	0.830^j	Y	Positive detection with no reason for exclusion
Potassium	3 /3	23804.6	892.15 -1920.0	N	1378.1	1920.00^j	N	Common dietary element; Sample concentrations are within background levels
Pyrene	4 /4	^f	0.093 - 1.400	N^i	0.891	1.400^j	Y	Positive detection with no reason for exclusion
Silver	3 /3	8.028	3.820 -443.65	N^i	151.24	443.650^j	Y	Sample concentrations exceed background levels
Sodium	4 /4	11359.6	254.90 -1237.6	N^i	589.28	1107.75	N	Common dietary element: Sample concentrations are within background levels
Sulfide	1 /1	^f	0.500 - 0.500	^h	^h	0.500^j	N	Ubiquitous compound
Tetrachloroethene	2 /2	^f	0.530 -30.000	^h	^h	30.000^j	Y	Positive detection with no reason for exclusion
Toluene	2 /2	^f	0.060 - 0.067	^h	^h	0.067^j	Y	Positive detection with no reason for exclusion
Trans-1,2-dichloroethene	1 /1	^f	0.060 - 0.060	^h	^h	0.060^j	Y	Positive detection with no reason for exclusion
Trichloroethene	1 /1	^f	0.300 - 0.300	^h	^h	0.300^j	Y	Positive detection with no reason for exclusion

Vanadium	3 /3	172.171	24.040	-235.36	N^i	95.047	235.360^j	Y	Sample concentrations exceed background levels
Zinc	4 /4	113.020	13.920	-84.060	N	44.035	78.608	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-32

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 5

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	2 /2		^f	0.470 - 0.630	^h	^h	0.630^j	Y	Positive detection with no reason for exclusion
Aluminum	6 /6		108233	6373.8 - 15400	N^i	10542	13378.2	N	Sample concentrations are within background levels
Antimony	1 /1		^f	28.000 -28.000	^h	^h	28.000^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	2 /2		^f	0.330 - 0.550	^h	^h	0.550^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	2 /2		^f	0.330 - 0.750	^h	^h	0.750^j	Y	Positive detection with no reason for exclusion
Arsenic	6 /6		20.497	139.00 -2800.0	L	530.05	1458.92	Y	Sample concentrations exceed background levels
Barium	6 /6		814.574	15800 - 36939	L	21266	28664.2	Y	Sample concentrations exceed background levels
Beryllium	6 /6		2.150	2.850 -18.000	N	9.172	13.386	Y	Sample concentrations exceed background levels
Bis(2-ethylhexyl)phthalate	5 /5		^f	0.084 - 2.300	L	0.387	1.240	Y	Positive detection with no reason for exclusion
Cadmium	2 /2		11.089	4.400 -17.000	^h	^h	17.000^j	Y	Sample concentrations exceed background levels
Calcium	6 /6		41294.0	116000 -206144	L	169330	205480	N	Common dietary element
Chromium	6 /6		102.684	25.660 -223.29	N	119.83	179.341	Y	Sample concentrations exceed background levels
Cobalt	3 /3		21.431	16.000 -43.990	N^i	32.647	43.990^j	Y	Sample concentrations exceed background levels
Copper	6 /6		58.619	672.21 -3370.0	N	2255.5	3071.82	Y	Sample concentrations exceed background levels
Di-n-butyl phthalate	3 /3		^f	0.056 - 0.250	N^i	0.169	0.250^j	Y	Positive detection with no reason for exclusion
Iron	6 /6		46245.7	10979 - 17900	N	14790	16707.2	N	Common dietary element; Sample concentrations are within background levels
Lead	6 /6		37.337	59.500 -236.00	N^i	157.52	204.592	Y	Sample concentrations exceed background levels
Magnesium	6 /6		15895.7	25202 - 63200	N^i	48182	58966.7	N	Common dietary element
Manganese	6 /6		1144.01	346.29 -4740.0	N^i	1819.2	3245.97	Y	Sample concentrations exceed background levels
Mercury	6 /6		0.292	0.390 - 1.800	N^i	1.077	1.484	Y	Sample concentrations exceed background levels
Methylene chloride	6 /6		^f	0.042 - 0.420	N^i	0.245	0.388	Y	Positive detection with no reason for exclusion
Nickel	3 /3		39.379	52.550 -202.00	N	130.75	202.000^j	Y	Sample concentrations exceed background levels
Phenol	1 /1		^f	0.200 - 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
Potassium	6 /6		23804.6	611.10 -1490.0	L	1167.9	1490.00^j	N	Common dietary element; Sample concentrations are within background levels
Selenium	3 /3		1.170	2.800 - 7.470	N^i	4.623	7.470^j	Y	Sample concentrations

								exceed background levels
Silver	2 /2	8.028	8.180 - 9.400	^h	^h	9.400^j	Y	Sample concentrations exceed background levels
Sodium	6 /6	11359.6	1425.9 -9980.0	N^i	5416.9	7979.94	N	Common dietary element; Sample concentrations are within background levels
Thalium	1 /1	10.94^g	2.800 - 2.800	^h	^h	2.800^j	N	Sample concentrations are within background levels
Unknown hydrocarbon	1 /1	^f	0.420 - 0.420	^h	^h	0.420^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Unknown-c10 cyclic hydrocarbon	1 /1	^f	0.240 - 0.240	^h	^h	0.240^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Vanadium	6 /6	172.171	791.98 -5380.0	N^i	2698.9	4342.98	Y	Sample concentrations exceed background levels
Zinc	6 /6	113.020	116.92 -212.00	N^i	175.10	204.432	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-33

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF WASTE PIT 6

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,2,2-tetrachloroethane	1 /1		^f	29.000 -29.000	^h	^h	29.000^j	Y	Positive detection with no reason for exclusion
2-butanone	3 /3		^f	0.530 - 1.400	N^i	1.043	1.400^j	Y	Positive detection with no reason for exclusion
Acetone	4 /4		^f	0.760 - 3.200	N^i	1.790	3.005	Y	Positive detection with no reason for exclusion
Aluminum	1 /1		108233	4730.4 -4730.4	^h	^h	4730.37^j	N	Sample concentrations are within background levels
Aroclor-1254	1 /1		^f	0.081 - 0.081	^h	^h	0.081^j	Y	Positive detection with no reason for exclusion
Arsenic	1 /1		20.497	7.610 - 7.610	^h	^h	7.610^j	N	Sample concentrations are within background levels
Barium	1 /1		814.574	95.220 -95.220	^h	^h	95.220^j	N	Sample concentrations are within background levels
Beryllium	2 /2		2.150	2.000 - 5.730	^h	^h	5.730^j	Y	Sample concentrations exceed background levels
Bis(2-ethylhexyl)phthalate	2 /2		^f	0.410 - 0.910	^h	^h	0.910^j	Y	Positive detection with no reason for exclusion
Cadmium	2 /2		11.089	0.600 - 5.730	^h	^h	5.730^j	N	Sample concentrations are within background levels
Calcium	1 /1		41294.0	22190 - 22190	^h	^h	22189.5^j	N	Common dietary element; Sample concentrations are within background levels
Chromium	4 /4		102.684	4.800 -29.740	N^i	18.885	29.740^j	N	Sample concentrations are within background levels
Cobalt	1 /1		21.431	26.090 -26.090	^h	^h	26.090^j	Y	Sample concentrations exceed background levels
Copper	4 /4		58.619	13.000 -222.02	N	112.26	217.792	Y	Sample concentrations exceed background levels
Iron	1 /1		46245.7	2749.9 -2749.9	^h	^h	2749.88^j	N	Common dietary element; Sample concentrations are within background levels
Lead	4 /4		37.337	5.000 -59.620	N^i	29.905	58.946	Y	Sample concentrations exceed background levels
Magnesium	1 /1		15895.7	32101 - 32101	^h	^h	32101.1^j	N	Common dietary element
Manganese	1 /1		1144.01	34.960 -34.960	^h	^h	34.960^j	N	Sample concentrations are within background levels
Mercury	3 /3		0.292	0.030 - 0.070	N^i	0.047	0.070^j	N	Sample concentrations are within background levels
Methylene chloride	2 /2		^f	0.280 - 0.700	^h	^h	0.700^j	Y	Positive detection with no reason for exclusion
Nickel	4 /4		39.379	7.700 -51.390	N^i	21.773	45.964	Y	Sample concentrations exceed background levels
Potassium	1 /1		23804.6	913.15 -913.15	^h	^h	913.150^j	N	Common dietary element; Sample concentrations are within background levels
Silver	1 /1		8.028	158.10 -158.10	^h	^h	158.100^j	Y	Sample concentrations exceed background levels

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Sodium	1 /1	11359.6	600.07 -600.07	^h	^h	600.070^j	N	Common dietary element; Sample concentrations are within background levels
Toluene	1 /1	^f	0.440 - 0.440	^h	^h	0.440^j	Y	Positive detection with no reason for exclusion
Total xylenes	3 /3	^f	0.460 - 0.750	N^i	0.627	0.750^j	Y	Positive detection with no reason for exclusion
Trichloroethene	1 /1	^f	0.170 - 0.170	^h	^h	0.170^j	Y	Positive detection with no reason for exclusion
Vanadium	1 /1	172.171	100.18 -100.18	^h	^h	100.180^j	N	Sample concentrations are within background levels
Zinc	4 /4	113.020	4.800 -51.000	N	33.885	51.000^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-34

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE BURN PIT

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/3		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	1/3		^f	0.110 - 0.110	L	0.012	0.110^j	Y	Positive detection with no reason for exclusion
2-Butanone	3/3	•	^f	0.003 - 0.041	N^i	0.019	0.041^j	Y	Positive detection with no reason for exclusion
2-Hexanone	1/3		^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/3		^f	0.006 - 0.006	N^i	0.007	0.006^j	Y	Positive detection with no reason for exclusion
Acetone	3/3	*	^f	0.023 - 0.100	L	0.043	0.100^j	Y	Positive detection with no reason for exclusion
Aluminum	1/1		108233	8550.0 -8550.0	^h	^h	8550.00^j	N	Sample concentrations are within background levels
Antimony	1/1		^f	13.400 -13.400	^h	^h	13.400^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1		^f	2.300 - 2.300	^h	^h	2.300^j	Y	Positive detection with no reason for exclusion
Arsenic	1/1		20.497	6.900 - 6.900	^h	^h	6.900^j	N	Sample concentrations are within background levels
Barium	1/1		814.574	295.00 -295.00	^h	^h	295.000^j	N	Sample concentrations are within background levels
Beryllium	1/1		2.150	1.500 - 1.500	^h	^h	1.500^j	N	Sample concentrations are within background levels
Boron	1/1		^f	48.200 -48.200	^h	^h	48.200^j	Y	Positive detection with no reason for exclusion
Cadmium	1/1		11.089	5.400 - 5.400	^h	^h	5.400^j	N	Sample concentrations are within background levels
Calcium	1/1		41294.0	88900 - 88900	^h	^h	88900.0^j	N	Common dietary element
Carbon disulfide	1/3		^f	0.001 - 0.001	N^i	0.003	0.001^j	Y	Positive detection with no reason for exclusion
Chlorobenzene	1/3		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Chromium	1/1		102.684	67.000 -67.000	^h	^h	67.000^j	N	Sample concentrations are within background levels
Cobalt	1/1		21.431	39.900 -39.900	^h	^h	39.900^j	Y	Sample concentrations exceed background levels
Copper	1/1		58.619	259.00 -259.00	^h	^h	259.000^j	Y	Sample concentrations exceed background levels
Ethylbenzene	3/3		^f	0.006 - 0.028	L	0.011	0.028^j	Y	Positive detection with no reason for exclusion
Iron	1/1		46245.7	31200 - 31200	^h	^h	31200.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	1/1		37.337	279.00 -279.00	^h	^h	279.000^j	Y	Sample concentrations exceed background levels
Magnesium	1/1		15895.7	24600 - 24600	^h	^h	24600.0^j	N	Common dietary element
Manganese	1/1		1144.01	677.00 -677.00	^h	^h	677.000^j	N	Sample concentrations are within background levels

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Mercury	1/1		0.292	1.200 - 1.200	^h	^h	1.200^j	Y	Sample concentrations exceed background levels
Methylene chloride	3/3	*	^f	0.006 - 0.028	N^i	0.016	0.028^j	Y	Positive detection with no reason for exclusion
Molybdenum	1/1		8.849	19.300 -19.300	^h	^h	19.300^j	Y	Sample concentrations exceed background levels
Nickel	1/1		39.379	83.700 -83.700	^h	^h	83.700^j	Y	Sample concentrations exceed background levels
Potassium	1/1		23804.6	1250.0 -1250.0	^h	^h	1250.00^j	N	Common dietary element; Sample concentrations are within background levels
Selenium	1/1		1.170	0.660 - 0.660	^h	^h	0.660^j	N	Sample concentrations are within background levels
Silicon	1/1		^f	1210.0 -1210.0	^h	^h	1210.00^j	Y	Positive detection with no reason for exclusion
Silver	1/1		8.028	20.400 -20.400	^h	^h	20.400^j	Y	Sample concentrations
Sodium	1/1		11359.6	495.00 -495.00	^h	^h	495.000^j	N	Common dietary element; Sample concentrations are within background levels
Toluene	3/3	*	^f	0.002 - 0.003	N^i	0.002	0.003^j	Y	Positive detection with no reason for exclusion
Total Organic Carbon	1/1		^f	152000 -152000	^h	^h	152000^j	N	General groups of chemicals cannot be evaluated in quantitative risk assessment
Total xylenes	3/3	*	^f	0.038 - 0.190	N^i	0.101	0.190^j	Y	Positive detection with no reason for exclusion
Vanadium	1/1		172.171	36.700 -36.700	^h	^h	36.700^j	N	Sample concentrations are within background levels
Vinyl chloride	1/3		^f	0.003 - 0.003	N^i	0.006	0.003^j	Y	Positive detection with no reason for exclusion
Zinc	1/1		113.020	505.00 -505.00	^h	^h	505.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Blank data are theoretically available but cannot be located at present.

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TABLE R.6-35

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE BURN PIT

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-butanone	1/1		^f	0.070 - 0.070	^h	^h	0.070^j	Y	Positive detection with no reason for exclusion
2-methylnaphthalene	1/1		^f	0.050 - 0.050	^h	^h	0.050^j	Y	Positive detection with no reason for exclusion
Acetone	5/5		^f	0.170 - 0.380	N^i	0.228	0.311	Y	Positive detection with no reason for exclusion
Aluminum	6/6		108233	2911.9 - 11936	N^i	6802.6	9438.16	N	Sample concentrations are within background levels
Aroclor-1016	1/1		^f	0.290 - 0.290	^h	^h	0.290^j	Y	Positive detection with no reason for exclusion
Aroclor-1242	2/2		^f	0.070 - 0.290	^h	^h	0.290^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	1/1		^f	0.200 - 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	3/3		^f	0.077 - 2.700	N^i	1.578	2.700^j	Y	Positive detection with no reason for exclusion
Arsenic	3/3		20.497	4.380 -20.910	L	8.886	20.910^j	N	Sample concentrations do not significantly exceed background levels
Barium	5/5		814.574	56.230 -7097.2	L	271.06	1647.83	Y	Sample concentrations exceed background levels
Benzo(a)anthracene	4/4		^f	0.061 - 0.170	N^i	0.092	0.153	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	1/1		^f	0.160 - 0.160	^h	^h	0.160^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/4		^f	0.069 - 0.170	L	0.099	0.156	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	1/1		^f	0.085 - 0.085	^h	^h	0.085^j	Y	Positive detection with no reason for exclusion
Beryllium	2/2		2.150	1.450 -16.380	^h	^h	16.380^j	Y	Sample concentrations exceed background levels
Bis(2-ethylhexyl)phthalate	4 /4		^f	0.340 - 2.000	L	0.731	1.913	Y	Positive detect with no reason for exclusion
Cadmium	3/3		11.089	1.330 -34.840	L	3.999	34.840^j	Y	Sample concentrations exceed background levels
Calcium	6/6		41294.0	10114 -116322	L	25751	57519.4	N	Common dietary element
Chromium	6/6		102.684	7.870 -87.520	L	14.691	31.058	N	Sample concentrations are within background levels
Chrysene	3/3		^f	0.073 - 0.083	N	0.078	0.083^j	Y	Positive detection with no reason for exclusion
Cobalt	2/2		21.431	22.220 -104.11	^h	^h	104.110^j	Y	Sample concentrations exceed background levels
Copper	6/6		58.619	12.250 -166.54	L	28.273	62.414	Y	Sample concentrations exceed background levels
Di-n-butyl phthalate	3/3		^f	0.054 - 0.210	L	0.092	0.210^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	4/4		^f	0.067 - 0.130	L	0.084	0.120	Y	Positive detection with no reason for exclusion
Ethylbenzene	1/1		^f	0.270 - 0.270	^h	^h	0.270^j	Y	Positive detection with no

Fluoranthene	5/5	^f	0.074 - 0.420	N	0.221	0.340	Y	reason for exclusion Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	1/1	^f	0.078 - 0.078	^h	^h	0.078^j	Y	Positive detection with no reason for exclusion
Iron	6/6	46245.7	3746.9 -17445	^Ni	9576.0	14265.4	N	Common dietary element; Sample concentrations are within background levels
Lead	6/6	37.337	6.680 -52.580	L	16.451	31.945	Y	Sample concentrations exceed background levels
Magnesium	6/6	15895.7	3859.1 - 57079	L	12184	27625.2	N	Common dietary element
Manganese	6/6	1144.01	119.19 -1717.3	L	284.27	635.581	Y	Sample concentrations exceed background levels
Mercury	3/3	0.292	0.140 - 0.240	L	0.179	0.240^j	N	Sample concentrations are within background levels
Methylene chloride	2/2	^f	0.100 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Nickel	4/4	39.379	8.910 -59.730	L	16.947	46.375	Y	Sample concentrations exceed background levels
Pentachlorophenol	2/2	^f	1.200 - 2.600	^h	^h	2.600^j	Y	Positive detection with no reason for exclusion
Phenanthrene	6/6	^f	0.049 - 0.290	N	0.155	0.226	Y	Positive detection with no reason for exclusion
Phenol	2/2	^f	0.140 - 0.650	^h	^h	0.650^j	Y	Positive detection with no reason for exclusion
Potassium	6/6	23804.6	485.94 -1451.8	N^i	876.49	1153.20	N	Common dietary element; Sample concentrations are within background levels
Pyrene	5/5	^f	0.079 - 0.250	N^i	0.144	0.205	Y	Positive detection with no reason for exclusion
Silver	2/2	8.028	6.840 -506.05	^h	^h	506.050^j	Y	Sample concentrations exceed background levels
Sodium	4/4	11359.6	355.52 -1265.1	N^i	851.12	1265.14^j	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	2/2	^f	0.170 - 0.260	^h	^h	0.260^j	Y	Positive detection with no reason for exclusion
Toluene	1/1	^f	0.050 - 0.050	^h	^h	0.050^j	Y	Positive detection with no reason for exclusion
Total xylenes	1/1	^f	0.890 - 0.890	^h	^h	0.890^j	Y	Positive detection with no reason for exclusion
Vanadium	6/6	172.171	15.960 -289.53	L	29.504	74.415	Y	Sample concentrations exceed background levels
Zinc	6/6	113.020	14.530 -74.660	N^i	42.175	62.900	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-36

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF THE BURN PIT

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1/3		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	1/3		^f	0.110 - 0.110	L	0.012	0.110^j	Y	Positive detection with no reason for exclusion
2-Butanone	4/4	•	^f	0.003 - 0.070	N^i	0.032	0.067	Y	Positive detection with no reason for exclusion
2-Hexanone	1/3		^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	1/1		^f	0.050 - 0.050	^h	^h	0.050^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/3		^f	0.006 - 0.006	N^i	0.007	0.006^j	Y	Positive detection with no reason for exclusion
Acetone	8/8	•	^f	0.023 - 0.380	N	0.162	0.239	Y	Positive detection with no reason for exclusion
Aluminum	7/7		108233	2911.9 - 11936	N	7052.2	9254.33	N	Sample concentrations are within background levels
Antimony	1/1		^f	13.400 -13.400	^h	^h	13.400^j	Y	Positive detection with no reason for exclusion
Aroclor-1016	1/1		^f	0.290 - 0.290	^h	^h	0.290^j	Y	Positive detection with no reason for exclusion
Aroclor-1242	2/2		^f	0.070 - 0.290	^h	^h	0.290^j	Y	Positive detection with no reason for exclusion
Aroclor-1248	1/1		^f	0.200 - 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	4/4		^f	0.077 - 2.700	N	1.759	2.700^j	Y	Positive detection with no reason for exclusion
Arsenic	4/4		20.497	4.380 -20.910	L	8.341	18.113	N	Sample concentrations barely exceed background levels
Barium	6/6		814.574	56.230 -7097.2	L	274.91	1107.29	Y	Sample concentrations exceed background levels
Benzo(a)anthracene	4/4		^f	0.061 - 0.170	N^i	0.092	0.153	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	1/1		^f	0.160 - 0.160	^h	^h	0.160^j	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/4		^f	0.069 - 0.170	L	0.099	0.156	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	1/1		^f	0.085 - 0.085	^h	^h	0.085^j	Y	Positive detection with no reason for exclusion
Beryllium	3/3		2.150	1.450 -16.380	L	3.290	16.380^j	Y	Positive detection with no reason for exclusion
Bis(2-ethylhexyl)phthalate	4/4		^f	0.340 - 2.000	L	0.731	1.913	Y	Positive detection with no reason for exclusion
Boron	1/1		^f	48.200 -48.200	^h	^h	48.200^j	Y	Positive detection with no reason for exclusion
Cadmium	4/4		11.089	1.330 -34.840	L	4.311	26.338	Y	Sample concentrations exceed background levels
Calcium	7/7		41294.0	10114 -116322	L	46628	116322^j	N	Common dietary element
Carbon disulfide	1/3		^f	0.001 - 0.001	N^i	0.003	0.001^j	Y	Positive detection with no reason for exclusion

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Chlorobenzene	1/3		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Chromium	7/7		102.684	7.870 -87.520	L	29.660	87.520^j	N	Sample concentrations are within background levels
Chrysene	3/3		^f	0.073 - 0.083	N	0.078	0.083^j	Y	Positive detection with no reason for exclusion
Cobalt	3/3		21.431	22.220 -104.11	L	45.193	104.110^j	Y	Sample concentrations exceed background levels
Copper	7/7		58.619	12.250 -259.00	L	76.227	259.000^j	Y	Sample concentrations exceed background levels
Di-n-butyl phthalate	3/3		^f	0.054 - 0.210	N^i	0.111	0.210^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	4/4		^f	0.067 - 0.130	N^i	0.088	0.122	Y	Positive detection with no reason for exclusion
Ethylbenzene	4/4		^f	0.006 - 0.270	L	0.025	0.189	Y	Positive detection with no reason for exclusion
Fluoranthene	5/5		^f	0.074 - 0.420	N	0.221	0.340	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	1/1		^f	0.078 - 0.078	^h	^h	0.078^j	Y	Positive detection with no reason for exclusion
Iron	7/7		46245.7	3746.9 - 31200	L	12665	31200.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	7/7		37.337	6.680 -279.00	L	58.406	279.000^j	Y	Sample concentrations exceed background levels
Magnesium	7/7		15895.7	3859.1 - 57079	L	19464	57079.0^j	N	Common dietary element
Manganese	7/7		1144.01	119.19 -1717.3	L	496.37	1717.27^j	Y	Sample concentrations exceed background levels
Mercury	4/4		0.292	0.140 - 1.200	L	0.288	0.909	Y	Sample concentrations exceed background levels
Methylene chloride	5/5	•	^f	0.006 - 0.140	N^i	0.058	0.114	Y	Positive detection with no reason for exclusion
Molybdenum	1/1		8.849	19.300 -19.300	^h	^h	19.300^j	Y	Sample concentrations exceed background levels
Nickel	5/5		39.379	8.910 -83.700	N^i	35.454	68.063	Y	Sample concentrations exceed background levels
Pentachlorophenol(2)	2/2		^f	1.200 - 2.600	^h	^h	2.600^j	Y	Positive detection with no reason for exclusion
Phenanthrene	6/6		^f	0.049 - 0.290	N	0.155	0.226	Y	Positive detection with no reason for exclusion
Phenol	2/2		^f	0.140 - 0.650	^h	^h	0.650^j	Y	Positive detection with no reason for exclusion
Potassium	7/7		23804.6	485.94 -1451.8	N	929.85	1178.07	N	Common dietary element; Sample concentrations are within background levels
Pyrene	5/5		^f	0.079 - 0.250	N^i	0.144	0.205	Y	Positive detection with no reason for exclusion
Selenium	1/1		1.170	0.660 - 0.660	^h	^h	0.660^j	N	Sample concentrations are within background levels
Silicon	1/1		^f	1210.0 -1210.0	^h	^h	1210.00^j	Y	Positive detection with no reason for exclusion
Silver	3/3		8.028	6.840 -506.05	L	41.333	506.050^j	Y	Sample concentrations exceed background levels
Sodium	5/5		11359.6	355.52 -1265.1	N^i	779.90	1198.05	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	2/5		^f	0.170 - 0.260	L	0.018	0.154	Y	Positive detection with no reason for exclusion
Toluene	4/4	•	^f	0.002 - 0.050	N^i	0.014	0.042	Y	Positive detection with no reason for exclusion

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Total Organic Carbon	1/1			^f	152000 -152000	^h	^h	152000^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Total xylenes	4/4	*		^f	0.038 - 0.890	L	0.148	0.738	Y	Positive detection with no reason for exclusion
Vanadium	7/7			172.171	15.960 -289.53	N^i	60.037	134.536	Y	Sample concentrations exceed background levels
Vinyl chloride	1/3			^f	0.003 - 0.003	N^i	0.006	0.003^j	Y	Positive detection with no reason for exclusion
Zinc	7/7			113.020	14.530 -505.00	L	108.29	505.000^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically exist, but cannot be located.

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TABLE R.6-37

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE CLEARWELL

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	3/3		^f	0.640 - 1.800	N^i	1.413	1.800^j	Y	Positive detection with no reason for exclusion
Aluminum	3/3		108233	12939 - 23771	N	18512	23770.5^j	N	Sample concentrations are within background levels
Aroclor-1248	1/1		^f	0.308 - 0.308	^h	^h	0.308^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	3/3		^f	0.132 - 0.737	L	0.244	0.737^j	Y	Positive detection with no reason for exclusion
Arsenic	3/3		20.497	9.110 -18.460	N^i	13.220	18.460^j	N	Sample concentrations are within background levels
Barium	3/3		814.574	733.35 -6913.4	L	2297.2	6913.40^j	Y	Sample concentrations exceed background levels
Benzo(a)anthracene	1/1		^f	0.140 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Beryllium	1/1		2.150	9.100 - 9.100	^h	^h	9.100^j	Y	Sample concentrations exceed background levels
Bis(2-ethylhexyl)phthalate	2/2		^f	0.200 - 0.270	^h	^h	0.270^j	Y	Positive detection with no reason for exclusion
Cadmium	2/2		11.089	5.110 - 7.150	^h	^h	7.150^j	N	Sample concentrations are within background levels
Calcium	3/3		41294.0	129305 -183078	N	156323	183078^j	N	Common dietary element
Chromium	3/3		102.684	41.170 -76.050	L	51.729	76.050^j	N	Sample concentrations are within background levels
Chrysene	2/2		^f	0.074 - 0.150	^h	^h	0.150^j	Y	Positive detection with no reason for exclusion
Cobalt	1/1		21.431	18.340 -18.340	^h	^h	18.340^j	N	Sample concentrations are within background levels
Copper	3/3		58.619	194.61 -1119.3	N	642.30	1119.30^j	Y	Sample concentrations exceed background levels
Cyanide	1/1		^f	9.180 - 9.180	^h	^h	9.180^j	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	1/1		^f	0.120 - 0.120	^h	^h	0.120^j	Y	Positive detection with no reason for exclusion
Iron	3/3		46245.7	19618 - 21067	N^i	20163	21066.5^j	N	Common dietary element; Sample concentrations are within background levels
Lead	3/3		37.337	32.260 -83.000	L	46.941	83.000^j	Y	Sample concentrations exceed background levels
Magnesium	3/3		15895.7	16785 - 44629	L	29452	44629.0^j	N	Common dietary element
Manganese	3/3		1144.01	761.15 -1660.4	L	1193.8	1660.41^j	Y	Sample concentrations exceed background levels
Mercury	3/3		0.292	0.420 - 4.380	L	1.174	4.380^j	Y	Sample concentrations exceed background levels
Methylene chloride	2/2		^f	0.380 - 0.640	^h	^h	0.640^j	Y	Positive detection with no reason for exclusion
Nickel	2/2		39.379	46.620 -66.950	^h	^h	66.950^j	Y	Sample concentrations exceed background levels
Phenanthrene	2/2		^f	0.068 - 0.240	^h	^h	0.240^j	Y	Positive detection with no reason for exclusion

Potassium	3/3	23804.6	1690.0 -2707.2	L	2100.6	2707.20^j	N	Common dietary element; Sample concentrations are within background levels
Pyrene	1/1	^f	0.290 - 0.290	^h	^h	0.290^j	Y	Positive detection with no reason for exclusion
Selenium	1/1	1.170	3.720 - 3.720	^h	^h	3.720^j	Y	Sample concentrations exceed background levels
Silver	1/1	8.028	3.300 - 3.300	^h	^h	3.300^j	N	Sample concentrations are within background levels
Sodium	3/3	11359.6	1293.4 -2810.1	L	2131.7	2810.05^j	N	Common dietary element; Sample concentrations are within background levels
Vanadium	3/3	172.171	148.34 -2596.1	L	385.35	2596.10^j	Y	Sample concentrations exceed background levels
Zinc	3/3	113.020	81.810 -194.35	L	111.94	194.350^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-38

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE SANITARY LANDFILL

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1-Dichloroethane	1 /2		^f	0.130 - 0.130	^h	^h	0.130^j	Y	Positive detection with no reason for exclusion
2-Butanone	1 /2		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Acetone	2 /2	•	^f	0.010 - 0.026	^h	^h	0.026^j	Y	Positive detection with no reason for exclusion
Aluminum	2 /2		108233	6400.0 -8420.0	^h	^h	8420.00^j	N	Sample concentrations are within background levels
Arsenic	2 /2		20.497	3.300 - 6.100	^h	^h	6.100^j	N	Sample concentrations are within background levels
Barium	2 /2		814.574	37.300 -90.200	^h	^h	90.200^j	N	Sample concentrations are within background levels
Beryllium	2 /2		2.150	0.590 - 0.630	^h	^h	0.630^j	N	Sample concentrations are within background levels
Boron	1 /1		^f	26.600 -26.600	^h	^h	26.600^j	Y	Positive detection with no reason for exclusion
Cadmium	2 /2		11.089	2.300 - 2.700	^h	^h	2.700^j	N	Sample concentrations are within background levels
Calcium	2 /2		41294.0	79500 -113000	^h	^h	113000^j	N	Common dietary element
Chromium	2 /2		102.684	22.500 -23.400	^h	^h	23.400^j	N	Sample concentrations are within background levels
Cobalt	2 /2		21.431	7.500 -12.700	^h	^h	12.700^j	N	Sample concentrations are within background levels
Copper	2 /2		58.619	18.600 -22.200	^h	^h	22.200^j	N	Sample concentrations are within background levels
Cyanide	2 /2		^f	0.500 - 0.790	^h	^h	0.790^j	Y	Positive detection with no reason for exclusion
Iron	2 /2		46245.7	16000 - 22200	^h	^h	22200.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	2 /2		37.337	10.100 -147.00	^h	^h	147.000^j	Y	Sample concentrations exceed background levels
Magnesium	2 /2		15895.7	27900 - 29600	^h	^h	29600.0^j	N	Comon dietary element
Manganese	2 /2		1144.01	375.00 -826.00	^h	^h	826.000^j	N	Sample concentrations are within background levels
Methylene chloride	2 /2	*	^f	0.004 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Molybdenum	2 /2		8.849	10.200 -11.200	^h	^h	11.200^j	Y	Sample concentrations exceed background levels
Nickel	2 /2		39.379	22.700 -30.200	^h	^h	30.200^j	N	Sample concentrations are within background levels
Potassium	2 /2		23804.6	960.00 -1230.0	^h	^h	1230.00^j	N	Common dietary element; Sample concentrations are within background levels
Silicon	1 /1		^f	701.00 -701.00	^h	^h	701.000^j	Y	Positive detection with no reason for exclusion
Silver	2 /2		8.028	10.200 -12.500	^h	^h	12.500^j	Y	Sample concentrations exceed background levels

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Sodium	2 /2		11359.6	126.00 -342.00	^h	^h	342.000^j	N	Common dietary element; Sample concentrations are within background levels
Toluene	2 /2	*	^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Vanadium	2 /2		172.171	22.200 -26.100	^h	^h	26.100^j	N	Sample concentrations are within background levels
Zinc	2 /2		113.020	36.400 -46.900	^h	^h	46.900^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

* Blank data are theoretically available, but could not be located.

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TABLE R.6-39

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE LANDFILL

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2,4-dimethylphenol	1 /1		^f	0.240 - 0.240	^h	^h	0.240^j	Y	Positive detection with no reason for exclusion
2-butanone	1 /1		^f	0.120 - 0.120	^h	^h	0.120^j	Y	Positive detection with no reason for exclusion
2-methylnaphthalene	3 /3		^f	0.066 -11.000	L	0.928	11.000^j	Y	Positive detection with no reason for exclusion
2-methyphenol	1 /1		^f	0.096 - 0.096	^h	^h	0.096^j	Y	Positive detection with no reason for exclusion
4-methylphenol	1 /1		^f	0.360 - 0.360	^h	^h	0.360^j	Y	Positive detection with no reason for exclusion
Acenaphthene	3 /3		^f	1.300 -28.000	L	4.105	28.000^j	Y	Positive detection with no reason for exclusion
Acetone	6 /6		^f	0.130 - 0.250	N^i	0.173	0.215	Y	Positive detection with no reason for exclusion
Aluminum	6 /6		108233	6367.1 - 17247	N	10513	13468.7	N	Sample concentrations are within background levels
Anthracene	4 /4		^f	0.085 - 2.800	N^i	1.871	2.800^j	Y	Positive detection with no reason for exclusion
Aroclor-1242	5 /5		^f	0.078 - 1.600	L	0.215	0.679	Y	Positive detection with no reason for exclusion
Aroclor-1248	2 /2		^f	0.180 - 0.565	^h	^h	0.565^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1 /1		^f	0.719 - 0.719	^h	^h	0.719^j	Y	Positive detection with no reason for exclusion
Arsenic	5 /5		20.497	3.280 - 6.690	N	5.166	6.368	N	Sample concentrations are within background levels
Barium	5 /5		814.574	67.580 -124.13	N^i	91.590	116.882	N	Sample concentrations are within background levels
Benzo(a)anthracene	4 /4		^f	0.130 - 5.100	L	0.659	5.100^j	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	5 /5		^f	0.100 - 7.000	L	0.948	6.551	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4 /4		^f	0.098 - 6.700	L	0.622	6.700^j	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	5 /5		^f	0.110 - 6.000	N	2.722	4.996	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	5 /5		^f	0.084 - 4.900	N^i	2.199	4.302	Y	Positive detection with no reason for exclusion
Bis(2-ethylhexyl)phthalate	2 /2		^f	0.049 - 0.150	^h	^h	0.150^j	Y	Positive detection with no reason for exclusion
Butyl benzyl phthalate	1 /1		^f	0.320 - 0.320	^h	^h	0.320^j	Y	Positive detection with no reason for exclusion
Cadmium	6 /6		11.089	1.920 - 5.330	N^i	3.098	4.055	N	Sample concentrations are within background levels
Calcium	6 /6		41294.0	15714 -129975	N	63748	97828.9	N	Common dietary element
Chromium	6 /6		102.684	9.230 -21.300	N^i	16.548	20.461	N	Sample concentrations are within background levels

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Chrysene	3 /3	^f	0.170 - 4.600	N^i	2.223	4.600^j	Y	Positive detection with no reason for exclusion
Copper	6 /6	58.619	11.150 -29.630	N^i	17.060	22.743	N	Sample concentrations are within background levels
Di-n-butyl phthalate	3 /3	^f	0.050 - 0.330	N^i	0.145	0.330^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	2 /2	^f	0.300 - 0.350	^h	^h	0.350^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	3 /3	^f	0.560 - 2.100	N^i	1.253	2.100^j	Y	Positive detection with no reason for exclusion
Dibenzofuran	4 /4	^f	0.620 - 1.900	N^i	1.480	1.900^j	Y	Positive detection with no reason for exclusion
Ethylbenzene	1 /1	^f	0.091 - 0.091	^h	^h	0.091^j	Y	Positive detection with no reason for exclusion
Fluoranthene	3 /3	^f	0.330 - 1.900	N^i	0.893	1.900^j	Y	Positive detection with no reason for exclusion
Fluorene	3 /3	^f	1.400 - 2.500	N	1.933	2.500^j	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	4 /4	^f	0.081 - 5.700	N	2.570	5.424	Y	Positive detection with no reason for exclusion
Iron	6 /6	46245.7	13467 - 21845	N	17139	19447.4	N	Common dietary element; Sample concentrations are within background levels
Lead	6 /6	37.337	10.080 -19.040	N^i	14.187	16.712	N	Sample concentrations are within background levels
Magnesium	6 /6	15895.7	7367.2 - 30105	N^i	18853	26477.7	N	Common dietary element
Manganese	6 /6	1144.01	247.58 -716.45	N	494.16	646.808	N	Sample concentrations are within background levels
Mercury	3 /3	0.292	0.140 - 0.200	N^i	0.167	0.200^j	N	Sample concentrations are within background levels
Methylene chloride	5 /5	^f	0.084 - 0.160	N^i	0.123	0.152	Y	Positive detection with no reason for exclusion
N-nitrosodiphenylamine(1)	1 /1	^f	0.067 - 0.067	^h	^h	0.067^j	Y	Positive detection with no reason for exclusion
Naphthalene	2 /2	^f	2.700 -19.000	^h	^h	19.000^j	Y	Positive detection with no reason for exclusion
Nickel	6 /6	39.379	12.730 -42.350	L	19.552	27.924	Y	Sample concentrations exceed background levels
Phenanthrene	3 /3	^f	0.320 - 1.900	N^i	0.850	1.900^j	Y	Positive detection with no reason for exclusion
Phenol	1 /1	^f	0.310 - 0.310	^h	^h	0.310^j	Y	Positive detection with no reason for exclusion
Potassium	6 /6	23804.6	491.92 -1971.2	L	784.48	1165.65	N	Common dietary element; Sample concentrations are within background levels
Pyrene	4 /4	^f	0.240 - 6.300	L	0.964	6.025	Y	Positive detection with no reason for exclusion
Sodium	2 /2	11359.6	162.33 -180.24	^h	^h	180.240^j	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	1 /1	^f	0.097 - 0.097	^h	^h	0.097^j	Y	Positive detection with no reason for exclusion
Toluene	1 /1	^f	0.180 - 0.180	^h	^h	0.180^j	Y	Positive detection with no reason for exclusion
Total xylenes	1 /1	^f	0.320 - 0.320	^h	^h	0.320^j	Y	Positive detection with no reason for exclusion

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Vanadium	6 /6	172.171	12.110 -26.630	N^i	18.295	22.638	N	Sample concentrations are within background levels
Zinc	6 /6	113.020	39.610 -166.72	L	64.480	96.912	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-40

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF THE SANITARY LANDFILL

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1-Dichloroethane	1/2		^f	0.130 - 0.130	^h	^h	0.130^j	Y	Positive detection with no reason for exclusion
2,4-Dimethylphenol	1/3		^f	0.240 - 0.240	N^i	0.213	0.240^j	Y	Positive detection with no reason for exclusion
2-Butanone	2/3		^f	0.003 - 0.120	N^i	0.043	0.120^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	3/5		^f	0.066 -11.000	L	0.502	3.372	Y	Positive detection with no reason for exclusion
2-Methyphenol	1/1		^f	0.096 - 0.096	^h	^h	0.096^j	Y	Positive detection with no reason for exclusion
4-Methylphenol	1/3		^f	0.360 - 0.360	N^i	0.253	0.360^j	Y	Positive detection with no reason for exclusion
Acenaphthene	3/5		^f	1.300 -28.000	L	1.224	8.533	Y	Positive detection with no reason for exclusion
Acetone	8/8	•	^f	0.010 - 0.250	N^i	0.135	0.191	Y	Positive detection with no reason for exclusion
Aluminum	8/8		108233	6367.1 - 17247	L	9736.9	12504.7	N	Sample concentrations are within background levels
Anthracene	4/6		^f	0.085 - 2.800	N^i	1.314	2.385	Y	Positive detection with no reason for exclusion
Aroclor-1242	5/5		^f	0.078 - 1.600	L	0.215	0.679	Y	Positive detection with no reason for exclusion
Aroclor-1248	2/2		^f	0.180 - 0.565	^h	^h	0.565^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1		^f	0.719 - 0.719	^h	^h	0.719^j	Y	Positive detection with no reason for exclusion
Arsenic	7/7		20.497	3.280 - 6.690	N	5.033	6.009	N	Sample concentrations are within background levels
Barium	7/7		814.574	37.300 -124.13	N	83.636	105.509	N	Sample concentrations are within background levels
Benzo(a)anthracene	4/6		^f	0.130 - 5.100	L	0.443	1.587	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	5/5		^f	0.100 - 7.000	L	0.948	6.551	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	4/6		^f	0.098 - 6.700	L	0.426	1.749	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	5/7		^f	0.110 - 6.000	L	0.833	2.730	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	5/7		^f	0.084 - 4.900	L	0.542	1.963	Y	Positive detection with no reason for exclusion
Beryllium	2/2		2.150	0.590 - 0.630	^h	^h	0.630^j	N	Sample concentrations are within background levels
Bis(2-ethylhexyl)phthalate	2/2		^f	0.049 - 0.150	^h	^h	0.150^j	Y	Positive detection with no reason for exclusion
Boron	1/1		^f	26.600 -26.600	^h	^h	26.600^j	Y	Positive detection with no reason for exclusion
Butyl benzyl phthalate	1/3		^f	0.320 - 0.320	N^i	0.240	0.320^j	Y	Positive detection with no reason for exclusion
Cadmium	8/8		11.089	1.920 - 5.330	L	2.949	3.724	N	Sample concentrations are

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									within background levels
Calcium	8/8		41294.0	15714 -129975	N	71874	98095.5	N	Common dietary element
Chromium	8/8		102.684	9.230 -23.400	N	18.149	21.498	N	Sample concentrations are within background levels
Chrysene	3/5		^f	0.170 - 4.600	L	0.568	2.467	Y	Positive detection with no reason for exclusion
Cobalt	2/2		21.431	7.500 -12.700	^h	^h	12.700^j	N	Sample concentrations are within background levels
Copper	8/8		58.619	11.150 -29.630	L	17.895	23.296	N	Sample concentrations are within background levels
Cyanide	2/2		^f	0.500 - 0.790	^h	^h	0.790^j	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	3/5		^f	0.050 - 0.330	N^i	0.167	0.279	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	2/4		^f	0.300 - 0.350	N^i	0.263	0.350^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	3/5		^f	0.560 - 2.100	N^i	0.832	1.594	Y	Positive detection with no reason for exclusion
Dibenzofuran	4/6		^f	0.620 - 1.900	N^i	1.053	1.711	Y	Positive detection with no reason for exclusion
Ethylbenzene	1/3		^f	0.091 - 0.091	N^i	0.032	0.091^j	Y	Positive detection with no reason for exclusion
Fluoranthene	3/5		^f	0.330 - 1.900	N	0.616	1.308	Y	Positive detection with no reason for exclusion
Fluorene	3/5		^f	1.400 - 2.500	N	1.240	2.218	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	4/6		^f	0.081 - 5.700	L	0.656	2.712	Y	Positive detection with no reason for exclusion
Iron	8/8		46245.7	13467 - 22200	L	17629	20008.8	N	Common dietary element; Sample concentrations are within background levels
Lead	8/8		37.337	10.080 -147.00	N^i	30.278	61.931	Y	Sample concentrations exceed background levels
Magnesium	8/8		15895.7	7367.2 - 30105	N	21327	27413.5	N	Common dietary element; Sample concentrations are within background levels
Manganese	8/8		1144.01	247.58 -826.00	N	520.74	657.276	N	Sample concentrations are within background levels
Mercury	3/5		0.292	0.140 - 0.200	N	0.124	0.183	N	Sample concentrations are within background levels
Methylene chloride	7/7	*	^f	0.004 - 0.160	N^i	0.089	0.135	Y	Positive detection with no reason for exclusion
Molybdenum	2/2		8.849	10.200 -11.200	^h	^h	11.200^j	Y	Sample concentrations exceed background levels
N-nitrosodiphenylamine	1/1		^f	0.067 - 0.067	^h	^h	0.067^j	Y	Positive detection with no reason for exclusion
Naphthalene	2/4		^f	2.700 -19.000	L	1.195	16.223	Y	Positive detection with no reason for exclusion
Nickel	8/8		39.379	12.730 -42.350	L	22.606	31.771	Y	Sample concentrations exceed background levels
Phenanthrene	3/5		^f	0.320 - 1.900	N^i	0.590	1.291	Y	Positive detection with no reason for exclusion
Phenol	1/3		^f	0.310 - 0.310	N^i	0.237	0.310^j	Y	Positive detection with no reason for exclusion
Potassium	8/8		23804.6	491.92 -1971.2	L	933.52	1353.95	N	Common dietary element; Sample concentrations are within background levels
Pyrene	4/6		^f	0.240 - 6.300	L	0.570	1.888	Y	Positive detection with no reason for exclusion
Silicon	1/1		^f	701.00 -701.00	^h	^h	701.000^j	Y	Positive detection with no

									reason for exclusion
Silver	2/2		8.028	10.200 -12.500	^h	^h	12.500^j	Y	Sample concentrations exceed background levels
Sodium	4/4		11359.6	126.00 -342.00	N^i	202.64	315.140	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	1/3		^f	0.097 - 0.097	N^i	0.034	0.097^j	Y	Positive detection with no reason for exclusion
Toluene	3/3	*	^f	0.002 - 0.180	N^i	0.061	0.180^j	Y	Positive detection with no reason for exclusion
Total xylenes	1/3		^f	0.320 - 0.320	L	0.013	0.320^j	Y	Positive detection with no reason for exclusion
Vanadium	8/8		172.171	12.110 -26.630	N	19.759	23.324	N	Sample concentrations are within background levels
Zinc	8/8		113.020	36.400 -166.72	L	65.040	98.577	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
* Blank data theoretically available for these chemicals, but it has not been located.

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TABLE R.6-41

Selection of Constituents of Concern for Subsurface Soils from RI/FS Sampling of the Active Fly Ash Pile

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	4/11		^f	0.025 - 1.300	L	0.010	0.031	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1/11		^f	0.002 - 0.002	N	0.003	0.002^j	Y	Positive detection with no reason for exclusion
2-Butanone	2/11	0.003	^f	0.003 - 0.004	N^i	0.006	0.004^j	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
2-Chlorophenol	1/8		^f	0.048 - 0.048	N^i	0.195	0.048^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	1/8		^f	0.160 - 0.160	N^i	0.210	0.160^j	Y	Positive detection with no reason for exclusion
4-Chloro-3-methylphenol	1/8		^f	0.058 - 0.058	N^i	0.197	0.058^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1/11	0.002	^f	0.011 - 0.011	N^i	0.006	0.007	N	Maximum detection approx. 5 X highest blank concentration
4-Nitrophenol	1/1		^f	0.048 - 0.048	^h	^h	0.048^j	Y	Positive detection with no reason for exclusion
Acetone	8/11	0.011	^f	0.002 - 0.019	L	0.009	0.016	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
Aluminum	8/8		108233	2860.0 - 17900	L	6166.3	10610.3	N	Sample concentrations are within background levels
Antimony	2/8		^f	9.000 -31.100	L	5.478	9.156	Y	Positive detection with no reason for exclusion
Arsenic	8/8		20.497	8.400 -66.500	L	36.900	66.500^j	Y	Sample concentrations exceed background levels
Barium	8/8		814.574	31.200 -508.00	L	185.85	508.000^j	N	Sample concentrations are within background levels
Benzoic acid	2/8		^f	0.052 - 0.073	N^i	0.809	0.073^j	Y	Positive detection with no reason for exclusion
Beryllium	8/8		2.150	0.740 - 4.600	N	2.424	3.389	Y	Sample concentrations exceed background levels
Bromodichloromethane	1/11		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Cadmium	2/8		11.089	1.300 - 5.200	L	0.453	0.973	N	Sample concentrations are within background levels
Calcium	8/8		41294.0	1790.0 -155000	L	24564	155000^j	N	Common dietary element
Chloroform	2/11		^f	0.004 - 0.013	N^i	0.004	0.006	Y	Positive detection with no reason for exclusion
Chromium	8/8		102.684	7.200 -26.800	L	16.213	23.897	N	Sample concentrations are within background levels
Cobalt	8/8		21.431	5.000 -18.800	N	12.450	15.515	N	Sample concentrations are within background levels
Copper	8/8		58.619	19.100 -66.100	N	42.575	55.688	Y	Sample concentrations exceed background levels
Cyanide	5/10		^f	0.170 - 0.690	L	0.163	0.281	Y	Positive detection with no reason for exclusion

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Iron	8/8		46245.7	2710.0 - 31100	L	10544	31100.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	8/8		37.337	7.900 -61.700	N	31.363	43.926	Y	Sample concentrations exceed background levels
Magnesium	8/8		15895.7	341.00 - 35500	L	6447.4	35500.0^j	N	Common dietary element
Manganese	8/8		1144.01	16.000 -523.00	L	183.14	523.000^j	N	Sample concentrations are within background levels
Mercury	1/8		0.292	0.160 - 0.160	N	0.074	0.098	N	Sample concentrations are within background levels
Methylene chloride	10/11	0.003	^f	0.001 - 0.073	L	0.015	0.073^j	Y	Maximum detection > 10 X highest blank concentration
Molybdenum	8/8		8.849	7.900 -18.800	L	12.713	16.339	Y	Sample concentrations exceed background levels
Naphthalene	1/8		^f	0.082 - 0.082	N^i	0.200	0.082^j	Y	Positive detection with no reason for exclusion
Nickel	8/8		39.379	9.800 -45.700	N	27.038	33.608	Y	Sample concentrations exceed background levels
Phenanthrene	2/8		^f	0.048 - 0.072	N^i	0.179	0.072^j	Y	Positive detection with no reason for exclusion
Phenol	1/8		^f	0.058 - 0.058	N^i	0.197	0.058^j	Y	Positive detection with no reason for exclusion
Potassium	8/8		23804.6	453.00 -1230.0	N	880.63	1077.99	N	Common dietary element; Sample concentrations are within background levels
Selenium	6/8		1.170	1.600 -10.200	L	1.714	4.330	Y	Sample concentrations exceed background levels
Silver	2/8		8.028	6.600 -18.500	L	2.162	4.357	Y	Sample concentrations exceed background levels
Sodium	8/8		11359.6	109.00 -312.00	L	189.25	264.204	N	Common dietary element; Sample concentrations are within background levels
Sulfide	1/2		^f	2.390 - 2.390	^h	^h	2.390^j	N	Ubiquitous compound
Thallium	5/8 ^g		10.940	0.960 - 2.100	N^i	1.193	1.777	N	Sample concentrations are within background levels
Toluene	1/11		^f	0.013 - 0.013	N^i	0.004	0.006	Y	Positive detection with no reason for exclusion
Vanadium	8/8		172.171	22.900 -40.300	N	31.563	36.240	N	Sample concentrations are within background levels
Zinc	8/8		113.020	18.900 -117.00	L	59.663	107.222	Y	Sample concentrations exceed background levels
bis(2-Ethylhexyl) phthalate	3/8		^f	0.042 - 2.700	L	0.265	0.575	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

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^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-42

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE ACTIVE FLY ASH PILE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	1 /1		^f	0.200 - 0.200	^h	^h	0.200^j	Y	Positive detection with no reason for exclusion
Aluminum	2 /2		108233	3857.1 -7027.4	^h	^h	7027.36^j	N	Sample concentrations are within background levels
Aroclor-1260	1 /1		^f	0.038 - 0.038	^h	^h	0.038^j	Y	Positive detection with no reason for exclusion
Arsenic	2 /2		20.497	4.640 - 5.330	^h	^h	5.330^j	N	Sample concentrations are within background levels
Cadmium	2 /2		11.089	2.360 - 3.250	^h	^h	3.250^j	N	Sample concentrations are within background levels
Calcium	2 /2		41294.0	88166 -140331	^h	^h	140331^j	N	Common dietary element
Chromium	2 /2		102.684	7.950 -12.620	^h	^h	12.620^j	N	Sample concentrations are within background levels
Copper	2 /2		58.619	8.620 - 9.030	^h	^h	9.030^j	N	Sample concentrations are within background levels
Iron	2 /2		46245.7	12238 - 14896	^h	^h	14896.3^j	N	Common dietary element; Sample concentrations are within background levels
Lead	2 /2		37.337	9.290 -12.550	^h	^h	12.550^j	N	Sample concentrations are within background levels
Magnesium	2 /2		15895.7	24919 - 32006	^h	^h	32006.0^j	N	Common dietary element
Manganese	2 /2		1144.01	462.88 -645.00	^h	^h	645.000^j	N	Sample concentrations are within background levels
Mercury	2 /2		0.292	0.160 - 1.780	^h	^h	1.780^j	Y	Sample concentrations exceed background levels
Methylene chloride	1 /1		^f	0.100 - 0.100	^h	^h	0.100^j	Y	Positive detection with no reason for exclusion
Nickel	1 /1		39.379	13.250 -13.250	^h	^h	13.250^j	N	Sample concentrations are within background levels
Potassium	2 /2		23804.6	631.20 -752.50	^h	^h	752.500^j	N	Common dietary element; Sample concentrations are within background levels
Sodium	1 /1		11359.6	129.00 -129.00	^h	^h	129.000^j	N	Common dietary element; Sample concentrations are within background levels
Vanadium	2 /2		172.171	13.110 -20.190	^h	^h	20.190^j	N	Sample concentrations are within background levels
Zinc	2 /2		113.020	30.310 -42.080	^h	^h	42.080^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

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^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-43

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF THE ACTIVE FLY ASH PILE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	4 /11		^f	0.025 - 1.300	L	0.010	0.031	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1 /11		^f	0.002 - 0.002	N	0.003	0.002^j	Y	Positive detection with no reason for exclusion
2-Butanone	2 /11	0.003	^f	0.003 - 0.004	N	0.006	0.004^j	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
2-Chlorophenol	1 /8		^f	0.048 - 0.048	N	0.195	0.048^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	1 /8		^f	0.160 - 0.160	N	0.210	0.160^j	Y	Positive detection with no reason for exclusion
4-Chloro-3-methylphenol	1 /8		^f	0.058 - 0.058	N	0.197	0.058^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1 /11	0.002	^f	0.011 - 0.011	N	0.006	0.007	N	Maximum detection not significantly > 5 X highest blank concentration
4-Nitrophenol	1 /1		^f	0.048 - 0.048	^h	^h	0.048^j	Y	Positive detection with no reason for exclusion
Acetone	9 /12	0.011	^f	0.002 - 0.200	L	0.025	0.061	Y	Common laboratory contaminant; maximum detection > 10 X highest blank concentration
Aluminum	10 /10		108233	2860.0 - 17900	L	6021.4	8747.83	N	Sample concentrations are within background levels
Antimony	2 /8		^f	9.000 -31.100	L	5.478	9.156	Y	Positive detection with no reason for exclusion
Aroclor-1260	1 /1		^f	0.038 - 0.038	^h	^h	0.038^j	Y	Positive detection with no reason for exclusion
Arsenic	10 /10		20.497	4.640 -66.500	L	30.517	66.500^j	Y	Sample concentrations exceed background levels
Barium	8 /8		814.574	31.200 -508.00	L	185.85	508.000^j	N	Sample concentrations are within background levels
Benzoic acid	2 /8		^f	0.052 - 0.073	N	0.809	0.073^j	Y	Positive detection with no reason for exclusion
Beryllium	8 /8		2.150	0.740 - 4.600	N	2.424	3.389	Y	Sample concentrations exceed background levels
Bromodichloromethane	1 /11		^f	0.002 - 0.002	N	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Cadmium	4 /10		11.089	1.300 - 5.200	L	0.650	1.355	N	Sample concentrations are within background levels
Calcium	10 /10		41294.0	1790.0 -155000	L	42501	155000^j	N	Common dietary element
Chloroform	2 /11		^f	0.004 - 0.013	N	0.004	0.006	Y	Positive detection with no reason for exclusion
Chromium	10 /10		102.684	7.200 -26.800	L	15.027	20.608	N	Sample concentrations are within background levels
Cobalt	8 /8		21.431	5.000 -18.800	N	12.450	15.515	N	Sample concentrations are within background levels
Copper	10 /10		58.619	8.620 -66.100	L	35.825	66.100^j	Y	Sample concentrations exceed background levels
Cyanide	5 /10		^f	0.170 - 0.690	L	0.163	0.281	Y	Positive detection with no

									reason for exclusion
Iron	10 /10		46245.7	2710.0 - 31100	L	11148	25068.7	N	Common dietary element; Sample concentrations are within background levels
Lead	10 /10		37.337	7.900 -61.700	L	27.274	52.928	Y	Sample concentrations exceed background levels
Magnesium	10 /10		15895.7	341.00 - 35500	N^i	10850	19140.0	N	Common dietary element
Manganese	10 /10		1144.01	16.000 -645.00	L	257.30	645.000^j	N	Sample concentrations are within background levels
Mercury	3 /10		0.292	0.160 - 1.780	L	0.105	0.195	Y	Sample concentrations exceed background levels
Methylene chloride	11 /12	0.003	^f	0.001 - 0.100	L	0.022	0.100^j	N	Common laboratory contaminant; maximum detection > 10 X highest blank concentration
Molybdenum	8 /8		8.849	7.900 -18.800	L	12.713	16.339	Y	Sample concentrations exceed background levels
Naphthalene	1 /8		^f	0.082 - 0.082	N	0.200	0.082^j	Y	Positive detection with no reason for exclusion
Nickel	9 /9		39.379	9.800 -45.700	N	25.506	31.867	Y	Sample concentrations exceed background levels
Phenanthrene	2 /8		^f	0.048 - 0.072	N	0.179	0.072^j	Y	Positive detection with no reason for exclusion
Phenol	1 /8		^f	0.058 - 0.058	N	0.197	0.058^j	Y	Positive detection with no reason for exclusion
Potassium	10 /10		23804.6	453.00 -1230.0	N	842.87	1001.28	N	Common dietary element; Sample concentrations are within background levels
Selenium	6 /8		1.170	1.600 -10.200	N^i	3.194	5.410	Y	Sample concentrations exceed background levels
Silver	2 /8		8.028	6.600 -18.500	L	2.162	4.357	Y	Sample concentrations exceed background levels
Sodium	9 /9		11359.6	109.00 -312.00	L	182.56	244.766	N	Common dietary element; Sample concentrations are within background levels
Sulfide	1 /2		^f	2.390 - 2.390	^h	^h	2.390^j	N	Ubiquitous compound
Thallium	5 /8		10.940^g	0.960 - 2.100	N^i	1.193	1.777	N	Sample concentrations are within background levels
Toluene	1 /11		^f	0.013 - 0.013	N	0.004	0.006	Y	Positive detection with no reason for exclusion
Vanadium	10 /10		172.171	13.110 -40.300	N	28.580	33.773	N	Sample concentrations are within background levels
Zinc	10 /10		113.020	18.900 -117.00	L	54.969	83.038	Y	Sample concentrations exceed background levels
bis(2-Ethylhexyl) phthalate	3 /8		^f	0.042 - 2.700	L	0.265	0.575	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

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^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-44

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE INACTIVE FLYASH PILE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	3/7		^f	0.004 - 0.096	L	0.008	0.024	Y	Positive detection with no reason for exclusion
2-Butanone	1/7	0.003	^f	0.029 - 0.029	L	0.008	0.012	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
4-Methyl-2-pentanone	1/7		^f	0.002 - 0.002	N^i	0.006	0.002^j	Y	Positive detection with no reason for exclusion
Acetone	5/7	0.003	^f	0.009 - 0.190	L	0.017	0.041	Y	Maximum detection > 10 X highest blank concentration
Aluminum	7/7		108233	3690.0 -9550.0	N	6731.4	8237.39	N	Sample concentrations are within background levels
Antimony	3/7		^f	8.800 -16.300	L	6.256	9.681	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1		^f	0.210 - 0.210	^h	^h	0.210^j	Y	Positive detection with no reason for exclusion
Arsenic	7/7		20.497	1.700 -35.400	L	16.886	35.400^j	Y	Sample concentrations exceed background levels
Barium	7/7		814.574	89.600 -637.00	N	311.51	446.089	N	Sample concentrations are within background levels
Benzo(b)fluoranthene	1/5		^f	0.093 - 0.093	N^i	0.202	0.093^j	Y	Positive detection with no reason for exclusion
Benzoic acid	2/7		^f	0.097 - 0.150	N^i	1.085	0.150^j	Y	Positive detection with no reason for exclusion
Beryllium	7/7		2.150	0.600 - 6.700	L	2.481	6.700^j	Y	Sample concentrations exceed background levels
Cadmium	6/7		11.089	0.660 - 2.000	N	0.934	1.348	N	Sample concentrations are within background levels
Calcium	7/7		41294.0	2510.0 - 36800	L	11906	36800.0^j	N	Common dietary element; Sample concentrations are within background levels
Carbon disulfide	1/7		^f	0.003 - 0.003	N^i	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Chromium	7/7		102.684	6.500 -19.600	N	12.914	16.997	N	Sample concentrations are within background levels
Cobalt	7/7		21.431	5.700 -11.200	N	8.286	9.958	N	Sample concentrations are within background levels
Copper	7/7		58.619	14.600 -44.900	L	27.871	39.719	N	Sample concentrations are within background levels
Cyanide	8/9		^f	0.123 - 1.200	N	0.485	0.704	Y	Positive detection with no reason for exclusion
Iron	7/7		46245.7	5510.0 - 16300	L	10374	15760.7	N	Common dietary element; Sample concentrations are within background levels
Lead	7/7		37.337	7.000 -67.100	L	25.314	67.100^j	Y	Sample concentrations exceed background levels
Magnesium	7/7		15895.7	377.00 - 10100	L	3317.0	10100.0^j	N	Common dietary element; Sample concentrations are within background levels

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Manganese	7/7		1144.01	41.800	-736.00	L	265.54	736.000^j	N	Sample concentrations are within background levels
Mercury	2/7		0.292	0.180	- 0.440	L	0.098	0.172	Y	Sample concentrations exceed background levels
Methylene chloride	7/7	0.003	^f	0.004	- 0.020	L	0.008	0.018	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
Molybdenum	7/7		8.849	3.200	- 9.400	L	6.043	9.400^j	Y	Sample concentrations exceed background levels
Nickel	7/7		39.379	9.700	-19.600	N	15.514	18.283	N	Sample concentrations are within background levels
Phenol	3/7		^f	0.180	- 0.310	N^i	0.315	0.310^j	Y	Positive detection with no reason for exclusion
Potassium	7/7		23804.6	456.00	-1430.0	N	945.29	1168.86	N	Common dietary element; Sample concentrations are within background levels
Selenium	6/7		1.170	0.730	- 2.900	L	1.368	2.647	Y	Sample concentrations exceed background levels
Silver	3/7		8.028	4.400	- 8.300	L	2.555	4.666	Y	Sample concentrations exceed background levels
Sodium	7/7		11359.6	71.900	-294.00	L	170.41	294.000^j	N	Common dietary element; Sample concentrations are within background levels
Thallium	2/7		10.940^g	1.000	- 1.000	N	0.477	0.740	N	Sample concentrations are within background levels
Toluene	1/7		^f	0.003	- 0.003	N^i	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Vanadium	7/7		172.171	17.800	-33.500	N	26.000	29.797	N	Sample concentrations are within background levels
Zinc	7/7		113.020	10.500	-102.00	L	31.800	92.603	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-45

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE INACTIVE FLYASH PILE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Aluminum	2/2		108233	6958.8 -7557.8	^h	^h	7557.77^j	N	Sample concentrations are within background levels
Aroclor-1242	1/1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	1/1		^f	0.290 - 0.290	^h	^h	0.290^j	Y	Positive detection with no reason for exclusion
Arsenic	2/2		20.497	10.760 -31.170	^h	^h	31.170^j	Y	Sample concentrations exceed background levels
Barium	2/2		814.574	205.08 -271.04	^h	^h	271.040^j	N	Sample concentrations are within background levels
Beryllium	1/1		2.150	1.430 - 1.430	^h	^h	1.430^j	N	Sample concentrations are within background levels
Cadmium	2/2		11.089	2.430 - 3.820	^h	^h	3.820^j	N	Sample concentrations are within background levels
Calcium	2/2		41294.0	12070 - 54216	^h	^h	54215.8^j	N	Common dietary element
Chromium	2/2		102.684	12.440 -15.790	^h	^h	15.790^j	N	Sample concentrations are within background levels
Copper	2/2		58.619	22.450 -23.450	^h	^h	23.450^j	N	Sample concentrations are within background levels
Iron	2/2		46245.7	7281.9 - 14808	^h	^h	14807.9^j	N	Common dietary element; Sample concentrations are within background levels
Lead	2/2		37.337	13.780 -55.950	^h	^h	55.950^j	Y	Sample concentrations exceed background levels
Magnesium	2/2		15895.7	3305.5 -8523.9	^h	^h	8523.86^j	N	Common dietary element; Sample concentrations are within background levels
Manganese	2/2		1144.01	238.04 -780.11	^h	^h	780.110^j	N	Sample concentrations are within background levels
Mercury	2/2		0.292	0.150 - 0.260	^h	^h	0.260^j	N	Sample concentrations are within background levels
Nickel	2/2		39.379	12.200 -13.250	^h	^h	13.250^j	N	Sample concentrations are within background levels
Potassium	1/1		23804.6	1076.9 -1076.9	^h	^h	1076.85^j	N	Common dietary element; Sample concentrations are within background levels
Sodium	2/2		11359.6	167.51 -189.35	^h	^h	189.350^j	N	Common dietary element; Sample concentrations are within background levels
Vanadium	2/2		172.171	26.320 -29.480	^h	^h	29.480^j	N	Sample concentrations are within background levels
Zinc	2/2		113.020	36.240 -46.420	^h	^h	46.420^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

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^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-46

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM BOTH CIS AND RI/FS SAMPLING OF THE INACTIVE FLY ASH PILE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	3 /7		^f	0.004 - 0.096	L	0.008	0.024	Y	Positive detection with no reason for exclusion
2-Butanone	1 /7	0.003	^f	0.029 - 0.029	N	0.010	0.016	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
4-Methyl-2-pentanone	1 /7		^f	0.002 - 0.002	N^i	0.006	0.002^j	Y	Positive detection with no reason for exclusion
Acetone	5 /7	0.003	^f	0.009 - 0.190	L	0.017	0.041	Y	Common laboratory contaminant; maximum detection > 10 X highest blank concentration
Aluminum	9 /9		108233	3690.0 -9550.0	N	6848.5	7962.46	N	Sample concentrations are within background levels
Antimony	3 /7		^f	8.800 -16.300	N^i	7.350	10.859	Y	Positive detection with no reason for exclusion
Aroclor-1242	1 /1		^f	0.006 - 0.006	^h	^h	0.006^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	2 /2		^f	0.210 - 0.290	^h	^h	0.290^j	Y	Positive detection with no reason for exclusion
Arsenic	9 /9		20.497	1.700 -35.400	L	17.792	35.400^j	Y	Sample concentrations exceed background levels
Barium	9 /9		814.574	89.600 -637.00	L	295.19	522.344	N	Sample concentrations are within background levels
Benzo(b)fluoranthene	1 /5		^f	0.093 - 0.093	N^i	0.202	0.093^j	Y	Positive detection with no reason for exclusion
Benzoic acid	2 /7		^f	0.097 - 0.150	N^i	1.085	0.150^j	Y	Positive detection with no reason for exclusion
Beryllium	8 /8		2.150	0.600 - 6.700	L	2.350	5.803	Y	Sample concentrations exceed background levels
Cadmium	8 /9		11.089	0.660 - 3.820	L	1.421	3.445	N	Sample concentrations are within background levels
Calcium	9 /9		41294.0	2510.0 - 54216	L	16625	54215.8^j	N	Common dietary element
Carbon disulfide	1 /7		^f	0.003 - 0.003	N^i	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Chromium	9 /9		102.684	6.500 -19.600	N	13.181	16.228	N	Sample concentrations are within background levels
Cobalt	7 /7		21.431	5.700 -11.200	N	8.286	9.958	N	Sample concentrations are within background levels
Copper	9 /9		58.619	14.600 -44.900	L	26.778	33.982	N	Sample concentrations are within background levels
Cyanide	8 /9		^f	0.123 - 1.200	N	0.485	0.704	Y	Positive detection with no reason for exclusion
Iron	9 /9		46245.7	5510.0 - 16300	L	10523	14609.4	N	Common dietary element Sample concentrations are within background levels
Lead	9 /9		37.337	7.000 -67.100	L	27.437	67.100^j	Y	Sample concentrations exceed background levels
Magnesium	9 /9		15895.7	377.00 - 10100	L	3894.3	10100.0^j	N	Common dietary element; Sample concentrations are within background levels

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Manganese	9 /9		1144.01	41.800 -780.11	L	319.66	780.110^j	N	Sample concentrations are within background levels
Mercury	4 /9		0.292	0.150 - 0.440	L	0.114	0.182	Y	Sample concentrations exceed background levels
Methylene chloride	7 /7	0.003	^f	0.004 - 0.020	L	0.008	0.018	N	Common laboratory contaminant; maximum detection ≤ 10 X highest blank concentration
Molybdenum	7 /7		8.849	3.200 - 9.400	L	6.043	9.400^j	Y	Sample concentrations exceed background levels
Nickel	9 /9		39.379	9.700 -19.600	N	14.894	17.063	N	Sample concentrations are within background levels
Phenol	3 /7		^f	0.180 - 0.310	N^i	0.315	0.310^j	Y	Positive detection with no reason for exclusion
Potassium	8 /8		23804.6	456.00 -1430.0	N	961.73	1153.06	N	Common dietary element; Sample concentrations are within background levels
Selenium	6 /7		1.170	0.730 - 2.900	N^i	1.769	2.548	Y	Sample concentrations exceed background levels
Silver	3 /7		8.028	4.400 - 8.300	N^i	3.429	5.508	N	Sample concentrations barely exceed backround levels
Sodium	9 /9		11359.6	71.900 -294.00	N	172.20	216.981	N	Common dietary element; Sample concentrations are within background levels
Thallium	2 /7		10.940^g	1.000 - 1.000	N	0.477	0.740	N	Sample concentrations are within background levels
Toluene	1 /7		^f	0.003 - 0.003	N^i	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Vanadium	9 /9		172.171	17.800 -33.500	N	26.422	29.288	N	Sample concentrations are within background levels
Zinc	9 /9		113.020	10.500 -102.00	L	33.918	75.213	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-47

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE NORTH LIME SLUDGE POND

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,2-trichloro-1,2,2-trifluo	2/2		^f	0.050 - 0.081	^h	^h	0.081^j	Y	Positive detection with no reason for exclusion
1,1-dichloroethane	1/1		^f	0.003 - 0.003	^h	^h	0.003^j	Y	Positive detection with no reason for exclusion
Acetone	4/4		^f	0.020 - 0.150	N^i	0.113	0.150^j	Y	Positive detection with no reason for exclusion
Aluminum	3/3		108233	9630.0 - 18600	N	13843	18600.0^j	N	Sample concentrations are within background levels
Aroclor-1248	1/1		^f	1.200 - 1.200	^h	^h	1.200^j	Y	Positive detection with no reason for exclusion
Arsenic	3/3		20.497	6.300 -16.000	N	11.433	16.000^j	N	Sample concentrations are within background levels
Bis(2-ethylhexyl)phthalate	3/3		^f	0.150 - 0.310	L	0.203	0.310^j	Y	Positive detection with no reason for exclusion
Butyl benzyl phthalate	2/2		^f	0.370 - 2.800	^h	^h	2.800^j	Y	Positive detection with no reason for exclusion
Calcium	3/3		41294.0	252000 -262000	N	258000	262000^j	N	Common dietary element
Carbon disulfide	3/3		^f	0.007 - 0.009	N^i	0.008	0.009^j	Y	Positive detection with no reason for exclusion
Chlordane	1/1		^f	1.200 - 1.200	^h	^h	1.200^j	Y	Positive detection with no reason for exclusion
Chromium	3/3		102.684	9.400 -22.000	N	15.133	22.000^j	N	Sample concentrations are within background levels
Copper	3/3		58.619	15.000 -24.000	N	19.667	24.000^j	N	Sample concentrations are within background levels
Di-n-butyl phthalate	3/3		^f	0.089 - 0.120	N^i	0.101	0.120^j	Y	Positive detection with no reason for exclusion
Iron	3/3		46245.7	8990.0 - 20600	N	14730	20600.0^j	N	Common dietary element; Sample concentrations are within background levels
Magnesium	3/3		15895.7	19100 - 21200	N^i	20000	21200.0^j	N	Common dietary element
Manganese	3/3		1144.01	546.00 -638.00	N^i	600.33	638.000^j	N	Sample concentrations are within background levels
Mercury	2/2		0.292	0.300 - 0.300	^h	^h	0.300^j	Y	Sample concentrations exceed background levels
Methylene chloride	4/4		^f	0.021 - 0.026	N^i	0.024	0.026^j	Y	Positive detection with no reason for exclusion
Phenol	1/1		^f	0.610 - 0.610	^h	^h	0.610^j	Y	Positive detection with no reason for exclusion
Potassium	3/3		23804.6	695.00 -1670.0	N	1145.0	1670.00^j	N	Common dietary element; Sample concentrations are within background levels
Sodium	3/3		11359.6	304.00 -1530.0	L	593.73	1530.00^j	N	Common dietary element: Sample concentrations are within background levels
Toluene	2/2		^f	0.020 - 0.020	^h	^h	0.020^j	Y	Positive detection with no reason for exclusion

Unknown hydrocarbon	1/1	^f	0.130 - 0.130	^h	^h	0.130^j	N	General classes of compounds cannot be evaluated in a quantitative risk assessment
Zinc	3/3	113.020	38.000 -75.000	L	50.430	75.000^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-48

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE SOUTH LIME SLUDGE POND

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-butanone	1/1		^f	1.800 - 1.800	^h	^h	1.800^j	Y	Positive detection with no reason for exclusion
Acetone	2/2		^f	0.090 - 0.140	^h	^h	0.140^j	Y	Positive detection with no reason for exclusion
Aluminum	3/3		108233	4348.6 -6015.6	N	5170.8	6015.60^j	N	Sample concentrations are within background levels
Barium	1/1		814.574	73.340 -73.340	^h	^h	73.340^j	N	Sample concentrations are within background levels
Benzoic acid(2)	1/1		^f	0.160 - 0.160	^h	^h	0.160^j	Y	Positive detection with no reason for exclusion
Bis(2-ethylhexyl)phthalate	3/3		^f	0.230 - 0.310	N^i	0.260	0.310^j	Y	Positive detection with no reason for exclusion
Calcium	3/3		41294.0	298312 -333762	N^i	311551	333762^j	N	Common dietary element
Chromium	3/3		102.684	5.040 - 6.860	N	5.957	6.860^j	N	Sample concentrations are within background levels
Copper	1/1		58.619	12.010 -12.010	^h	^h	12.010^j	N	Sample concentrations are within background levels
Di-n-butyl phthalate	2/2		^f	0.047 - 0.073	^h	^h	0.073^j	Y	Positive detection with no reason for exclusion
Iron	3/3		46245.7	5041.6 -6936.1	N	6051.7	6936.07^j	N	Common dietary element; Sample concentrations are within background levels
Lead	1/1		37.337	2.140 - 2.140	^h	^h	2.140^j	N	Sample concentrations are within background levels
Magnesium	3/3		15895.7	15141 - 17982	L	16884	17981.6^j	N	Common dietary element
Manganese	3/3		1144.01	694.80 -746.77	N	719.62	746.770^j	N	Sample concentrations are within background levels
Methylene chloride	3/3		^f	0.110 - 0.240	N^i	0.180	0.240^j	Y	Positive detection with no reason for exclusion
Phenol	1/1		^f	0.089 - 0.089	^h	^h	0.089^j	Y	Positive detection with no reason for exclusion
Potassium	2/2		23804.6	216.00 -343.20	^h	^h	343.200^j	N	Common dietary element; Sample concentrations are within background levels
Zinc	3/3		113.020	14.400 -16.590	N^i	15.820	16.590^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

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^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

TABLE R.6-49

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM CIS SAMPLING OF THE SOUTHFIELD AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Acetone	3/3		^f	0.230 - 0.250	N^i	0.240	0.250^j	Y	Positive detection with no reason for exclusion
Aluminum	10/10		108233	6673.4 - 14636	L	10200	12268.3	N	Sample concentrations are within background levels
Aroclor-1242	4/4		^f	0.002 - 0.093	N^i	0.053	0.093^j	Y	Positive detection with no reason for exclusion
Aroclor-1254	7/7		^f	0.039 - 0.880	N	0.391	0.620	Y	Positive detection with no reason for exclusion
Aroclor-1260	3/3		^f	0.028 - 0.420	N^i	0.233	0.420^j	Y	Positive detection with no reason for exclusion
Arsenic	10/10		20.497	3.700 - 7.060	L	5.144	5.824	N	Sample concentrations are within background levels
Barium	9/9		814.574	48.370 -118.92	L	74.804	92.966	N	Sample concentrations are within background levels
Beryllium	1/1		2.150	1.500 - 1.500	^h	^h	1.500^j	N	Sample concentrations are within background levels
Cadmium	10/10		11.089	2.120 - 5.150	L	3.547	4.246	N	Sample concentrations are within background levels
Calcium	10/10		41294.0	3622.2 -187187	N	68916	98751.0	N	Common dietary element
Chromium	10/10		102.684	9.360 -21.690	N	15.552	17.709	N	Sample concentrations are within background levels
Cobalt	5/5		21.431	9.760 -27.730	L	14.293	20.900	Y	Sample concentrations exceed background levels
Copper	10/10		58.619	9.570 -23.240	L	14.624	18.176	N	Sample concentrations are within background levels
Iron	10/10		46245.7	12798 - 23843	L	17866	20143.5	N	Common dietary element; Sample concentrations are within background levels
Lead	10/10		37.337	10.350 -32.980	L	17.326	22.583	N	Sample concentrations are within background levels
Magnesium	10/10		15895.7	2828.9 - 30281	N	18597	23089.9	N	Common dietary element
Manganese	10/10		1144.01	319.16 -1165.7	L	603.19	823.797	Y	Sample concentrations exceed background levels
Mercury	8/8		0.292	0.120 - 1.220	L	0.336	0.851	Y	Sample concentrations exceed background levels
Methylene chloride	2/2		^f	0.100 - 0.110	^h	^h	0.110^j	Y	Positive detection with no reason for exclusion
Nickel	10/10		39.379	10.220 -48.320	L	23.416	33.727	T	Sample concentrations exceed background levels
Potassium	10/10		23804.6	348.48 -1503.6	L	876.40	1303.86	N	Common dietary element; Sample concentrations are within background levels
Sodium	2/2		11359.6	135.72 -138.78	^h	^h	138.780^j	N	Common dietary element; Sample concentrations are within background levels
Vanadium	10/10		172.171	15.080 -31.910	L	21.243	25.201	N	Sample concentrations are within background levels

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Zinc	10/10	113.020	34.260	-67.010	L	47.678	53.854	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-50

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE K65 BERMS

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	4 /10	*	^f	0.004 - 0.011	N^i	0.006	0.007	Y	Positive detection with no reason for exclusion
2-Hexanone	1 /10	*	^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1 /10		^f	0.004 - 0.004	N^i	0.006	0.004^j	Y	Positive detection with no reason for exclusion
Acetone	9 /10	*	^f	0.011 - 0.064	L	0.026	0.050	Y	Positive detection with no reason for exclusion
Aluminum	9 /9		108233	4530.0 - 12100	N	9510.0	10797.2	N	Sample concentrations are within background levels
Antimony	8 /8		^f	18.000 -27.400	L	22.325	25.350	Y	Positive detection with no reason for exclusion
Arsenic	9 /9		20.497	3.600 - 8.300	N	6.233	7.333	N	Sample concentrations are within background levels
Barium	9 /9		814.574	30.500 -97.300	N	69.278	82.371	N	Sample concentrations are within background levels
Beryllium	8 /8		2.150	0.670 - 1.100	L	0.835	0.920	N	Sample concentrations are within background levels
Cadmium	9 /9		11.089	2.500 - 7.500	L	4.244	5.470	N	Sample concentrations are within background levels
Calcium	9 /9		41294.0	11600 -161000	L	63567	146034	N	Common dietary element
Carbon disulfide	1 /10		^f	0.006 - 0.006	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Chloroform	1 /10		^f	0.004 - 0.004	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Chromium	9 /9		102.684	15.700 -28.400	L	19.133	21.637	N	Sample concentrations are within background levels
Cobalt	8 /9		21.431	10.500 -14.900	L	11.489	14.227	N	Sample concentrations are within background levels
Copper	9 /9		58.619	19.300 -27.000	L	21.922	23.583	N	Sample concentrations are within background levels
Cyanide	4 /9		^f	0.120 - 1.600	L	0.143	0.327	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	1 /7		^f	0.048 - 0.048	N^i	0.178	0.048^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	2 /7		^f	0.082 - 0.097	N^i	0.169	0.097^j	Y	Positive detection with no reason for exclusion
Diethyl phthalate	1 /7		^f	0.120 - 0.120	N^i	0.189	0.120^j	Y	Positive detection with no reason for exclusion
Iron	9 /9		46245.7	11200 - 27500	N	21478	24498.8	N	Common dietary element; Sample concentrations are within background levels
Lead	9 /9		37.337	6.100 -12.200	N^i	10.411	11.685	N	Sample concentrations are within background levels
Magnesium	9 /9		15895.7	5070.0 - 40700	L	17884	34349.4	N	Common dietary element
Manganese	9 /9		1144.01	228.00 -880.00	L	497.33	678.485	N	Sample concentrations are within background levels
Methylene chloride	10 /10	*	^f	0.002 - 0.022	L	0.005	0.009	Y	Positive detection with no reason for exclusion

Molybdenum	8 /9		8.849	2.400 -13.300	L	4.678	6.966	Y	Sample concentrations exceed background levels
Nickel	9 /9		39.379	21.700 -33.700	N	27.900	30.691	N	Sample concentrations are within background levels
Phenol	3 /7	*	^f	0.110 - 0.200	N^i	0.187	0.200^j	Y	Positive detection with no reason for exclusion
Potassium	9 /9		23804.6	546.00 -1230.0	N	924.33	1066.73	N	Common dietary element; Sample concentrations are within background levels
Silver	9 /9		8.028	3.600 -19.200	L	8.789	13.218	Y	Sample concentrations exceed background levels
Sodium	9 /9		11359.6	47.800 -237.00	L	117.23	178.805	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	2 /10	*	^f	0.001 - 0.004	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Thallium	3 /9		10.940^g	0.630 - 0.970	N	0.413	0.588	N	Sample concentrations are within background levels
Toluene	8 /10		^f	0.001 - 0.200	L	0.026	0.163	Y	Positive detection with no reason for exclusion
Total xylenes	1 /10		^f	0.069 - 0.069	L	0.004	0.007	Y	Positive detection with no reason for exclusion
Vanadium	9 /9		172.171	21.800 -28.400	N	26.067	27.342	N	Sample concentrations are within background levels
Zinc	9 /9		113.020	30.700 -61.000	N	50.356	56.243	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	1 /7		^f	1.000 - 1.000	N^i	0.314	0.536	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically exist, but cannot be located.

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TABLE R.6-51

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF PLANTS 2 AND 3 IN THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	6/35	^f		0.200 - 0.480	N	0.135	0.161	Y	Positive detection with no reason for exclusion
NP-237	2/34	^f		0.970 - 2.630	N	0.543	0.696	Y	Positive detection with no reason for exclusion
PU-238	2/35	^f		0.718 - 0.755	N	0.325	0.354	Y	Positive detection with no reason for exclusion
PU-239/240	3/35	^f		0.713 - 0.926	N	0.346	0.391	Y	Positive detection with no reason for exclusion
RA-226	34/35		2.230	0.400 -26.500	L	2.957	4.597	Y	Sample concentrations exceed background levels
RA-228	28/35		1.475	0.667 - 2.300	L	1.070	1.370	Y	Sample concentrations exceed background levels
SR-90	8/35	^f		0.660 - 6.900	N^i	0.752	1.126	Y	Positive detection with no reason for exclusion
TC-99	13/35	^f		0.800 - 3.000	N	0.937	1.163	Y	Positive detection with no reason for exclusion
TH-228	24/32		1.475	0.655 - 2.850	L	1.069	1.394	Y	Sample concentrations exceed background levels
TH-230	37/44		2.109	0.600 -127.00	L	12.997	30.711	Y	Sample concentrations exceed background levels
TH-232	33/44		1.475	0.607 - 3.070	L	1.033	1.290	Y	Sample concentrations exceed background levels
Thorium*	107/116	^f		2.040 -62.200	L	8.586	9.691	Y	Positive detection with no reason for exclusion
U-234	34/35		2.109	0.700 -2039.0	L	350.09	1335.01	Y	Sample concentrations exceed background levels
U-235/236	29/35		0.097^g	1.010 -398.00	L	23.842	68.668	Y	Sample concentrations exceed background levels
U-238	35/35		2.109	0.600 -2014.0	L	345.79	1303.78	Y	Sample concentrations exceed background levels
Uranium*	158/164		3.230^g	2.250 -3880.0	L	164.64	254.150	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gFor U-235.
^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-52

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF PLANT 6 OF THE PRODUCTION AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PU-238	5/68		^f	0.852 -158.00	L	0.369	0.440	Y	Positive detection with no reason for exclusion
PU-239/240	1/68		^f	1.410 - 1.410	N	0.335	0.375	Y	Positive detection with no reason for exclusion
RA-226	57/68		2.230	0.370 - 1.430	N	0.752	0.821	N	Sample concentrations are within background levels
RA-228	40/68		1.475	0.320 - 1.490	N	0.669	0.750	Y	Sample concentrations exceed background levels
SR-90	23/68		^f	0.510 -47.600	L	0.495	0.621	Y	Positive detection with no reason for exclusion
TC-99	18/68		^f	0.999 -210.00	L	0.838	1.085	Y	Positive detection with no reason for exclusion
TH-228	45/60		1.475	0.656 -22.100	N^i	1.372	1.970	Y	Sample concentrations exceed background levels
TH-230	52/68		2.109	0.634 - 9.730	L	1.803	2.314	Y	Sample concentrations exceed background levels
TH-232	36/68		1.475	0.625 - 2.760	L	0.783	0.932	Y	Sample concentrations exceed background levels
Thorium*	56/66		^f	1.180 -92.100	L	7.795	9.587	Y	Positive detection with no reason for exclusion
U-234	66/67		2.109	0.610 -18093	L	304.03	1113.99	Y	Sample concentrations exceed background levels
U-235/236	32/67		0.097^g	0.620 - 1021.0	L	1.469	2.195	Y	Sample concentrations exceed background levels
U-238	66/67		2.109	0.600 -19067	L	351.40	1308.99	Y	Sample concentrations exceed background levels
Uranium*	81/84		3.230^g	1.740 -40,570	L	784.132	386.56	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gFor U-235.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-53

SELECTION OF CONSTITUENTS OF CONCERN FOR UNDERGROUND SOIL FROM RI/FS SAMPLING OF PLANT 9

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	2/34		^f	0.242 - 0.469	N	0.115	0.135	Y	Positive detection with no reason for exclusion
NP-237	1/10		^f	0.710 - 0.710	N	0.341	0.416	Y	Positive detection with no reason for exclusion
RA-226	32/34		2.230	0.478 - 1.130	N	0.739	0.798	N	Sample concentrations are within background levels
RA-228	26/34		1.475	0.480 -27.900	N^i	1.479	2.837	Y	Sample concentrations exceed background levels
SR-90	4/10		^f	0.682 - 2.540	L	0.467	0.773	Y	Positive detection with no reason for exclusion
TC-99	3/10		^f	1.250 -10.900	L	0.784	1.442	Y	Positive detection with no reason for exclusion
TH-228	15/18		1.475	0.644 - 5.220	N^i	1.144	1.588	Y	Sample concentrations exceed background levels
TH-230	19/20		2.109	0.850 -82.100	N^i	5.349	12.335	Y	Sample concentrations exceed background levels
TH-232	17/20		1.475	0.606 -84.900	N^i	5.026	12.296	Y	Sample concentrations exceed background levels
Thorium*	42/46		^f	3.230 -766.00	N^i	26.408	54.145	Y	Positive detection with no reason for exclusion
U-234	10/10		2.109	1.110 -118.00	N	58.686	85.028	Y	Sample concentrations exceed background levels
U-235/236	8/10		0.097^g	1.980 -36.200	L	9.617	36.200^j	Y	Sample concentrations exceed background levels
U-238	10/10		2.109	1.090 -115.00	N	52.080	76.250	Y	Sample concentrations exceed background levels
Uranium*	78/82		3.230^g	1.550 -3504.0	L	54.653	98.691	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gFor U-235.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-54

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE PILOT PLANT

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	6/20		^f	0.302 -13.800	L	0.219	0.365	Y	Positive detection with no reason for exclusion
PU-238	2/20		^f	6.100 -19.800	L	0.430	0.664	Y	Positive detection with no reason for exclusion
PU-239/240	1/20		^f	1.650 - 1.650	N^i	0.367	0.484	Y	Positive detection with no reason for exclusion
RA-226	20/20		2.230	0.500 -32.100	L	5.258	10:991	Y	Sample concentrations exceed background levels
RA-228	18/20		1.475	0.710 -170.00	L	15.558	59.272	Y	Sample concentrations exceed background levels
SR-90	4/20		^f	0.650 - 1.070	N	0.409	0.515	Y	Positive detection with no reason for exclusion
TC-99	8/20		^f	1.240 -55.300	L	1.372	2.479	Y	Positive detection with no reason for exclusion
TH-228	19/24		1.475	0.600 -26.100	L	2.957	4.986	Y	Sample concentrations exceed background levels
TH-230	23/25		2.109	0.610 -55.600	L	4.928	7.555	Y	Sample concentrations exceed background levels
TH-232	14/25		1.475	0.350 -20.400	L	1.901	2.797	Y	Sample concentrations exceed background levels
Thorium*	27/27		^f	1.230 -184.00	L	18.693	25.758	Y	Positive detection with no reason for exclusion
U-234	18/18		2.109	1.050 -290.00	N^i	99.058	136.877	Y	Sample concentrations exceed background levels
U-235/236	16/18		0.097^g	1.640 - 17.30	L	6.012	17.300^j	Y	Sample concentrations exceed background levels
U-238	18/18		2.109	1.160 -270.00	L	92.571	270.000^j	Y	Sample concentrations exceed background levels
Uranium*	47/48		3.230^g	2.190 -756.00	L	269.81	697.826	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gFor U-235.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

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^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-55

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF PLANTS 2 AND 3 IN THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1 /6		^f	0.006 - 0.006	N	0.003	0.004	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	2 /6		^f	0.014 - 0.046	L	0.006	0.016	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1 /6		^f	0.002 - 0.002	N^i	0.004	0.002^j	Y	Positive detection with no reason for exclusion
2-Butanone	5 /6	*	^f	0.004 - 0.120	L	0.015	0.056	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1 /5		^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
Acetone	6 /6	*	^f	0.005 - 0.190	L	0.026	0.084	Y	Positive detection with no reason for exclusion
Aluminum	3 /3		108233	4740.0 - 14100	N	9013.3	14100.0^j	N	Sample concentrations are within background levels
Aroclor-1254	1 /1		^f	0.360 - 0.360	^h	^h	0.360^j	Y	Positive detection with no reason for exclusion
Arsenic	3 /3		20.497	5.900 -26.500	L	10.951	26.500^j	Y	Sample concentrations exceed background levels
Barium	3 /3		814.574	63.000 -78.900	N	69.167	78.900^j	N	Sample concentrations are within background levels
Benzoic acid	1 /3	*	^f	0.088 - 0.088	N^i	1.213	0.088^j	Y	Positive detection with no reason for exclusion
Beryllium	3 /3		2.150	1.000 - 2.400	N	1.700	2.400^j	Y	Sample concentrations exceed background levels
Cadmium	3 /3		11.089	4.100 - 6.900	N	5.400	6.900^j	N	Sample concentrations are within background levels
Calcium	3 /3		41294.0	48200 -115000	L	83492	115000^j	N	Common dietary element
Chromium	3 /3		102.684	30.500 -75.500	L	44.122	75.500^j	N	Sample concentrations are within background levels
Cobalt	3 /3		21.431	12.800 -17.400	N	14.833	17.400^j	N	Sample concentrations are within background levels
Copper	3 /3		58.619	16.800 -38.500	L	23.514	38.500^j	N	Sample concentrations are within background levels
Ethylbenzene	1 /6		^f	0.003 - 0.003	N^i	0.005	0.003^j	Y	Positive detection with no reason for exclusion
Fluoranthene	1 /3		^f	0.081 - 0.081	N^i	0.280	0.081^j	Y	Positive detection with no reason for exclusion
Iron	3 /3		46245.7	8880.0 - 23300	N	17127	23300.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	3 /3		37.337	161.00 -440.00	N	311.67	440.000^j	Y	Sample concentrations exceed background levels
Magnesium	3 /3		15895.7	17500 - 38600	N	25833	38600.0^j	N	Common dietary element
Manganese	3 /3		1144.01	293.00 -465.00	N	382.00	465.000^j	N	Sample concentrations are within background levels
Mercury	2 /3		0.292	0.730 - 1.300	N	0.693	1.300^j	Y	Sample concentrations exceed background levels

Methylene chloride	6 /6	*	^f	0.005 - 0.078	L	0.017	0.037	Y	Positive detection with no reason for exclusion
Molybdenum	1 /3		8.849	2.900 - 2.900	N	1.650	2.900^j	N	Sample concentrations are within background levels
N-Nitroso-di-n-propylamine	1 /1		^f	0.630 - 0.630	^h	^h	0.630^j	Y	Positive detection with no reason for exclusion
N-Nitrosodiphenylamine	2 /3	*	^f	0.100 - 0.130	N^i	0.197	0.130^j	Y	Positive detection with no reason for exclusion
Nickel	3 /3		39.379	38.000 -50.000	N	43.433	50.000^j	Y	Sample concentrations exceed background levels
Phenanthrene	1 /1		^f	0.088 - 0.088	^h	^h	0.088^j	Y	Positive detection with no reason for exclusion
Potassium	3 /3		23804.6	856.00 -1960.0	L	1170.6	1960.00^j	N	Common dietary element; Sample concentrations are within background levels
Silver	3 /3		8.028	3.900 -17.200	L	7.342	17.200^j	Y	Sample concentrations exceed background levels
Sodium	3 /3		11359.6	155.00 -160.00	N	158.33	160.000^j	N	Common dietary element; Sample concentrations are within background levels
Toluene	4 /6	*	^f	0.002 - 0.021	N^i	0.007	0.014	Y	Positive detection with no reason for exclusion
Total xylenes	1 /6		^f	0.017 - 0.017	N^i	0.007	0.012	Y	Positive detection with no reason for exclusion
Tributyl phosphate	2 /2		^f	0.170 - 1.200	^h	^h	1.200^j	Y	Positive detection with no reason for exclusion
Vanadium	3 /3		172.171	25.400 -35.600	N	30.400	35.600^j	N	Sample concentrations are within background levels
Zinc	3 /3		113.020	65.500 -247.00	L	112.92	247.000^j	Y	Sample concentrations exceed background levels
bis(2-Ethylhexyl) phthalate	1 /3		^f	0.180 - 0.180	N^i	0.310	0.180^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically available, but has not yet been located.

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TABLE R.6-56

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF PLANT 6 IN THE PRODUCTION AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1 /12		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	3 /12		^f	0.001 - 0.025	N^i	0.005	0.009	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	5 /12		^f	0.003 - 0.055	N^i	0.011	0.019	Y	Positive detection with no reason for exclusion
2-Butanone	10 /12	*	^f	0.002 - 0.029	L	0.008	0.014	Y	Positive detection with no reason for exclusion
2-Hexanone	1 /12	*	^f	0.003 - 0.003	N^i	0.006	0.003^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	2 /12	*	^f	0.001 - 0.003	N^i	0.005	0.003^j	Y	Positive detection with no reason for exclusion
Acetone	12 /12	*	^f	0.011 - 0.130	L	0.047	0.079	Y	Positive detection with no reason for exclusion
Aluminum	9 /9		108233	1520.0 - 14600	L	6284.4	14600.0^j	N	Sample concentrations are within background levels
Antimony	7 /9		^f	13.000 -21.400	N	14.406	19.024	Y	Positive detection with no reason for exclusion
Aroclor-1221	1 /3		^f	0.083 - 0.083	N^i	0.056	0.083^j	Y	Positive detection with no reason for exclusion
Arsenic	9 /9		20.497	2.000 - 4.600	L	2.933	3.451	N	Sample concentrations are within background levels
Barium	9 /9		814.574	12.300 -130.00	N^i	58.000	89.345	N	Sample concentrations are within background levels
Beryllium	9 /9		2.150	0.290 - 0.980	N	0.614	0.736	N	Sample concentrations are within background levels
Cadmium	8 /9		11.089	0.920 - 7.000	N	3.928	5.396	N	Sample concentrations are within background levels
Calcium	9 /9		41294.0	4630.0 -142000	N^i	64770	100641	N	Common dietary element
Chloroform	2 /12		^f	0.003 - 0.004	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Chromium	9 /9		102.684	4.700 -18.900	L	11.800	17.599	N	Sample concentrations are within background levels
Cobalt	9 /9		21.431	5.900 -13.300	L	8.744	11.075	N	Sample concentrations are within background levels
Copper	9 /9		58.619	7.600 -26.500	L	16.167	21.951	N	Sample concentrations are within background levels
Cyanide	3 /9		^f	0.150 - 0.650	N^i	0.279	0.454	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	1 /11		^f	0.280 - 0.280	N^i	0.212	0.231	Y	Positive detection with no reason for exclusion
Ethylbenzene	1 /12		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Iron	9 /9		46245.7	4680.0 - 23400	N^i	11037	16042.6	N	Common dietary element; Sample concentrations are within background levels
Lead	9 /9		37.337	2.900 -31.800	L	10.978	31.800^j	N	Sample concentrations are within background levels
Magnesium	9 /9		15895.7	3670.0 - 39700	N^i	19499	29059.5	N	Common dietary element

Manganese	9 /9		1144.01	188.00 -892.00	L	307.22	447.283	N	Sample concentrations are within background levels
Mercury	2 /9		0.292	0.050 - 0.070	N^i	0.057	0.062	N	Sample concentrations are within background levels
Methylene chloride	10 /12	*	^f	0.004 - 0.027	N	0.013	0.017	Y	Positive detection with no reason for exclusion
Molybdenum	6 /9		8.849	3.500 - 4.500	N^i	2.928	3.894	N	Sample concentrations are within background levels
Nickel	9 /9		39.379	17.000 -26.600	L	20.222	22.851	N	Sample concentrations are within background levels
Potassium	9 /9		23804.6	204.00 -943.00	N^i	521.33	743.308	N	Common dietary element; Sample concentrations are within background levels
Silver	6 /9		8.028	1.300 - 7.800	N	3.943	5.660	N	Sample concentrations are within background levels
Sodium	9 /9		11359.6	80.200 -171.00	L	113.14	138.145	N	Common dietary element; Sample concentrations are within background levels
Tetrachloroethene	2 /12		^f	0.002 - 0.003	N^i	0.003	0.003^j	Y	Positive detection with no reason for exclusion
Thallium	1 /9		10.940	0.570 - 0.570	N^i	0.238	0.320	N	Sample concentrations are within background levels
Toluene	3 /12		^f	0.002 - 0.007	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Total xylenes	2 /12	*	^f	0.003 - 0.008	N^i	0.004	0.004	Y	Positive detection with no reason for exclusion
Trichloroethene	1 /12		^f	0.200 - 0.200	L	0.004	0.008	Y	Positive detection with no reason for exclusion
Vanadium	9 /9		172.171	4.700 -32.300	L	15.344	26.194	N	Sample concentrations are within background levels
Vinyl chloride	1 /12		^f	0.003 - 0.003	N^i	0.006	0.003^j	Y	Positive detection with no reason for exclusion
Zinc	9 /9		113.020	17.300 -82.100	N^i	46.900	65.204	N	Sample concentrations are within background levels
beta-BHC	3 /3		^f	0.021 - 0.250	L	0.058	0.250^j	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	3 /11	*	^f	0.130 - 0.380	N^i	0.208	0.245	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically available, but they have not yet been located.

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TABLE R.6-57

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF PLANT 9

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	3 /26		^f	0.001 - 0.068	N^i	0.005	0.010	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	1 /26		^f	0.013 - 0.013	N	0.003	0.004	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	3 /26		^f	0.007 - 0.025	N^i	0.005	0.006	Y	Positive detection with no reason for exclusion
2-Butanone	16 /26	*	^f	0.003 - 0.017	N^i	0.006	0.007	Y	Positive detection with no reason for exclusion
2-Hexanone	1 /26		^f	0.001 - 0.001	N^i	0.005	0.001^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	3 /26		^f	0.005 - 0.017	N	0.006	0.007	Y	Positive detection with no reason for exclusion
Acetone	23 /26	*	^f	0.003 - 0.049	L	0.012	0.016	Y	Positive detection with no reason for exclusion
Aluminum	1 /1		108233	2810.0 -2810.0	^h	^h	2810.00^j	N	Sample concentrations are within background levels
Antimony	1 /1		^f	19.200 -19.200	^h	^h	19.200^j	Y	Positive detection with no reason for exclusion
Arsenic	1 /1		20.497	5.400 - 5.400	^h	^h	5.400^j	N	Sample concentrations are within background levels
Barium	1 /1		814.574	21.600 -21.600	^h	^h	21.600^j	N	Sample concentrations are within background levels
Beryllium	1 /1		2.150	0.570 - 0.570	^h	^h	0.570^j	N	Sample concentrations are within background levels
Bromodichloromethane	2 /26		^f	0.007 - 0.013	N	0.004	0.004	Y	Positive detection with no reason for exclusion
Cadmium	1 /1		11.089	6.300 - 6.300	^h	^h	6.300^j	N	Sample concentrations are within background levels
Calcium	1 /1		41294.0	112000 -112000	^h	^h	112000^j	N	Common dietary elements
Carbon disulfide	12 /26		^f	0.001 - 0.013	N	0.003	0.004	Y	Positive detection with no reason for exclusion
Chloroform	4 /26		^f	0.005 - 0.130	L	0.004	0.006	Y	Positive detection with no reason for exclusion
Chromium	1 /1		102.684	11.400 -11.400	^h	^h	11.400^j	N	Sample concentrations within backround levels
Cobalt	1 /1		21.431	7.100 - 7.100	^h	^h	7.100^j	N	Sample concentrations are within background levels
Copper	1 /1		58.619	15.100 -15.100	^h	^h	15.100^j	N	Sample concentrations are within background levels
Iron	1 /1		46245.7	7780.0 -7780.0	^h	^h	7780.00^j	N	Common dietary element Sample concentrations are within backround levels
Lead	1 /1		37.337	7.100 - 7.100	^h	^h	7.100^j	N	Sample concentrations are within backround levels
Magnesium	1 /1		15895.7	39200 - 39200	^h	^h	39200.0^j	N	Common dietary element
Manganese	1 /1		1144.01	262.00 -262.00	^h	^h	262.000^j	N	Sample concentrations are within background levels

Methylene chloride	26 /26	•	^f	0.004 - 0.025	N	0.015	0.017	Y	Positive detection with no reason for exclusion
Molybdenum	1 /1		8.849	3.800 - 3.800	^h	^h	3.800^j	N	Sample concentrations are within background levels
Nickel	1 /1		39.379	20.100 -20.100	^h	^h	20.100^j	N	Sample concentrations are within background levels
Potassium	1 /1		23804.6	490.00 -490.00	^h	^h	490.000^j	N	Common dietary elements Sample concentrations are within background levels
Silver	1 /1		8.028	6.900 - 6.900	^h	^h	6.900^j	N	Sample concentrations are within background levels
Sodium	1 /1		11359.6	142.00 -142.00	^h	^h	142.000^j	N	Common dietary element Sample concentrations are within background levels
Tetrachloroethene	1 /26		^f	0.220 - 0.220	L	0.004	0.005	Y	Positive detection with no reason for exclusion
Toluene	2 /26		^f	0.001 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Trichloroethene	5 /26		^f	0.004 -10.000	L	0.006	0.011	Y	Positive detection with no reason for exclusion
Vanadium	1 /1		172.171	13.200 -13.200	^h	^h	13.200^j	N	Sample concentrations are within background levels
Zinc	1 /1		113.020	30.100 -30.100	^h	^h	30.100^j	N	Sample concentrations are within background levels
bis(2-Ethylhexyl) phthalate	1 /1		^f	0.320 - 0.320	^h	^h	0.320^j	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-58

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE PILOT PLANT

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	1 /10		^f	0.450 - 0.450	L	0.008	0.031	Y	Positive detection with no reason for exclusion
1,1,2,2-Tetrachloroethane	2 /10	*	^f	0.047 - 0.350	L	0.006	0.016	Y	Positive detection with no reason for exclusion
1,1,2-Trichloroethane	1 /10		^f	0.002 - 0.002	N^i	0.083	0.002^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	1 /10		^f	0.027 - 0.027	N	0.085	0.027^j	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	2 /9		^f	0.004 - 0.044	L	0.004	0.007	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1 /10		^f	0.002 - 0.002	N^i	0.083	0.002^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	3 /10		^f	0.002 - 1.600	L	0.006	0.020	Y	Positive detection with no reason for exclusion
2-Butanone	8 /10		^f	0.001 - 2.400	L	0.251	2.400^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	2 /10	*	^f	0.003 - 0.330	L	0.008	0.017	Y	Positive detection with no reason for exclusion
Acenaphthene	3 /12		^f	0.110 - 1.600	N	0.322	0.535	Y	Positive detection with no reason for exclusion
Acetone	7 /10	*	^f	0.006 - 0.061	L	0.186	0.061^j	Y	Positive detection with no reason for exclusion
Aluminum	12 /12		108233	9.530 - 12400	N	6999.9	9098.56	N	Sample concentrations are within background levels
Anthracene	4 /12		^f	0.060 - 2.800	L	0.244	0.387	Y	Positive detection with no reason for exclusion
Antimony	4 /12		^f	13.800 -29.100	L	1.812	9.296	Y	Positive detection with no reason for exclusion
Aroclor-1254	5 /5		^f	0.035 - 1.000	N^i	0.305	0.680	Y	Positive detection with no reason for exclusion
Aroclor-1260	6 /6		^f	0.035 - 1.100	N^i	0.596	0.956	Y	Positive detection with no reason for exclusion
Arsenic	12 /12		20.497	2.200 -10.200	L	5.408	7.039	N	Sample concentrations are within background levels
Barium	12 /12		814.574	0.089 -3610.0	L	472.13	3610.00^j	Y	Sample concentrations exceed background levels
Benzene	1 /10		^f	0.005 - 0.005	N^i	0.083	0.005^j	Y	Positive detection with no reason for exclusion
Benzo(a)anthracene	4 /11		^f	0.430 - 5.400	L	0.354	0.618	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	4 /4		^f	0.320 - 5.100	L	0.795	3.487	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	3 /12		^f	0.090 - 4.700	L	0.264	0.440	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	4 /11		^f	0.230 - 3.700	L	0.301	0.487	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	4 /11		^f	0.510 - 5.000	L	0.358	0.622	Y	Positive detection with no reason for exclusion

Benzoic acid	1 /12		^f	0.059 - 0.059	N^i	1.122	0.059^j	Y	Positive detection with no reason for exclusion
Beryllium	11 /12		2.150	0.002 - 1.200	N	0.707	0.924	N	Sample concentrations are within background levels
Cadmium	12 /12		11.089	0.003 - 5.900	N	3.442	4.447	N	Sample concentrations are within background levels
Calcium	12 /12		41294.0	35.200 -181000	N	67157	99141.1	N	Common dietary element
Carbon disulfide	2 /10		^f	0.001 - 0.004	N^i	0.083	0.004^j	Y	Positive detection with no reason for exclusion
Chlorobenzene	1 /10		^f	0.005 - 0.005	N^i	0.083	0.005^j	Y	Positive detection with no reason for exclusion
Chloroform	1 /10		^f	0.002 - 0.002	N^i	0.083	0.002^j	Y	Positive detection with no reason for exclusion
Chromium	12 /12		102.684	0.023 -24.400	N	14.804	18.834	N	Sample concentrations are within background levels
Chrysene	4 /11		^f	0.550 - 7.200	L	0.391	0.728	Y	Positive detection with no reason for exclusion
Cobalt	12 /12		21.431	0.014 -14.000	N	9.128	11.581	N	Sample concentrations are within background levels
Copper	12 /12		58.619	0.022 -28.900	N	14.746	19.361	N	Sample concentrations are within background levels
Di-n-butyl phthalate	3 /12		^f	0.046 - 1.400	N^i	0.415	0.661	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	2 /11		^f	0.140 - 1.500	N^i	0.312	0.528	Y	Positive detection with no reason for exclusion
Dibenzofuran	3 /12		^f	0.055 - 0.640	N^i	0.234	0.316	Y	Positive detection with no reason for exclusion
Ethylbenzene	1 /10		^f	0.001 - 0.001	N^i	0.082	0.001^j	Y	Positive detection with no reason for exclusion
Fluoranthene	7 /12		^f	0.043 -10.000	L	1.279	6.519	Y	Positive detection with no reason for exclusion
Fluorene	4 /12		^f	0.044 - 1.700	N^i	0.322	0.552	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	4 /11		^f	0.160 - 2.900	N^i	0.460	0.903	Y	Positive detection with no reason for exclusion
Iron	12 /12		46245.7	18.100 - 30100	N	15585	20483.0	N	Common dietary element Sample concentrations are within background levels
Lead	11 /11		37.337	7.700 -117.00	L	25.136	44.430	Y	Sample concentrations exceed background levels
Magnesium	12 /12		15895.7	9.740 - 27900	N	13677	19117.3	N	Common dietary element
Manganese	11 /12		1144.01	0.614 -1500.0	N	395.47	600.707	Y	Sample concentrations exceed background levels
Mercury	8 /12		0.292	0.220 - 1.100	L	0.308	0.845	Y	Sample concentrations exceed background levels
Methylene chloride	10 /10	*	^f	0.007 - 6.700	N^i	0.683	1.909	Y	Positive detection with no reason for exclusion
Molybdenum	3 /12		8.849	2.600 - 3.300	N	1.350	1.901	N	Sample concentrations are within background levels
Nickel	12 /12		39.379	0.040 -40.500	N	23.432	29.940	Y	Sample concentrations exceed background levels
Phenanthrene	6 /12		^f	0.140 - 8.800	L	0.384	0.718	Y	Positive detection with no reason for exclusion
Phenol	1 /12		^f	0.069 - 0.069	N^i	0.236	0.069^j	Y	Positive detection with no reason for exclusion
Potassium	12 /12		23804.6	571.00 -2470.0	L	1103.7	1416.54	N	Common dietary element Sample concentrations are within background levels
Pyrene	6 /12		^f	0.083 -10.000	L	0.387	0.783	Y	Positive detection with no reason for exclusion

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Silver	8 /12		8.028	0.003 - 8.900	N^i	2.829	4.332	Y	Sample concentrations exceed background levels
Sodium	12 /12		11359.6	0.150 -2220.0	N	933.63	1387.51	N	Common dietary element Sample concentrations are within background levels
Tetrachloroethene	4 /10	*	^f	0.001 -17.000	L	0.012	0.084	Y	Positive detection with no reason for exclusion
Thallium	5 /12		10.940	0.260 - 0.460	N	0.265	0.314	N	Sample concentrations are within background levels
Toluene	4 /10	*	^f	0.001 - 0.010	N^i	0.083	0.010^j	Y	Positive detection with no reason for exclusion
Total xylenes	2 /10	*	^f	0.008 -31.000	L	0.008	0.044	Y	Positive detection with no reason for exclusion
Trichloroethene	6 /10		^f	0.003 - 2.000	L	0.008	0.028	Y	Positive detection with no reason for exclusion
Vanadium	12 /12		172.171	0.027 -29.400	N	17.621	22.275	N	Sample concentrations are within background levels
Vinyl chloride	1 /9		^f	0.007 - 0.007	N^i	0.006	0.006	Y	Positive detection with no reason for exclusion
Zinc	12 /12		113.020	0.043 -242.00	N^i	122.29	174.163	Y	Sample concentrations exceed background levels
beta-BHC	2 /12		^f	0.046 - 0.220	L	0.012	0.023	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	5 /12		^f	0.046 - 1.100	N	0.316	0.488	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-59

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE PRODUCTION AREA (EXCLUDING THE PLANT 2/3, 6, 9, AND THE PILOT PLANT)

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	22 /118	^f		0.213 - 2.940	N^i	0.188	0.234	Y	Positive detection with no reason for exclusion
PU-238	5 /113	^f		0.649 - 2.770	N^i	0.341	0.380	Y	Positive detection with no reason for exclusion
PU-239/240	4 /113	^f		0.622 - 2.440	N^i	0.335	0.372	Y	Positive detection with no reason for exclusion
RA-226	99 /118	2.230		0.300 -29.000	N^i	1.046	1.447	Y	Sample concentrations exceed background levels
RA-228	88 /118	1.475		0.500 -105.00	L	1.770	2.204	Y	Sample concentrations exceed background levels
SR-90	49 /113	^f		0.560 - 6.650	L	0.610	0.714	Y	Positive detection with no reason for exclusion
TC-99	31 /113	^f		0.950 -205.00	N^i	3.993	7.240	Y	Positive detection with no reason for exclusion
TH-228	90 /124	1.475		0.600 -40.900	L	1.623	1.992	Y	Sample concentrations exceed background levels
TH-230	107 /128	2.109		0.700 -59.500	L	3.505	4.527	Y	Sample concentrations exceed background levels
TH-232	87 /128	1.475		0.609 -39.500	L	1.432	1.747	Y	Sample concentrations exceed background levels
Thorium*	207 /247	^f		1.650 -356.00	L	9.712	10.973	Y	Positive detection with no reason for exclusion
U-234	110 /113	2.109		0.700 -384.00	L	72.187	121.166	Y	Sample concentrations exceed background levels
U-235/236	71 /113	0.097		0.600 -31.400	L	3.638	5.216	Y	Sample concentrations exceed background levels
U-238	109 /113	2.109		0.719 -348.00	L	72.828	122.222	Y	Sample concentrations exceed background levels
Uranium*	287 /305	3.23^g		1.970 -1637.0	L	64.804	86.530	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-60

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE FIRE TRAINING AREA

Radionuclide	Frequency of Detection	Highest Blank^a (MG/KG)	Upper 95% TL for BKG^b (MG/KG)	Range of Detection	Dist^c	Mean^d (MG/KG)	Upper 95% CI on Mean^e (MG/KG)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
Thorium*	8 /8		^f	5.000 -82.000	L	32.500	82.000^j	Y	Positive detection with no reason for exclusion
Uranium*	13 /14		3.230^g	1.725 -108.00	L	26.130	63.082	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

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TABLE R.6-61

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE K65 SLURRY LINE

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
PA-231	1 /9		0.097	25.300 -25.300	L	1.186	2.432	Y	Sample concentrations exceed background levels
PB-210	9 /9		2.230	0.620 -417.00	N^i	47.416	133.323	Y	Sample concentrations exceed background levels
PO-210	5 /5		2.230	1.030 -943.00	L	6.177	94.026	Y	Sample concentrations exceed background levels
PU-239/240	2 /10		^f	0.750 - 1.040	N	0.419	0.570	Y	Positive detection with no reason for exclusion
RA-224	8 /8		1.475	0.550 - 1.680	N	1.010	1.256	Y	Sample concentrations exceed background levels
RA-226	14 /18		2.230	0.530 -876.00	N^i	49.613	134.178	Y	Sample concentrations exceed background levels
RA-228	11 /18		1.475	0.530 - 1.320	N	0.691	0.852	N	Sample concentrations are within background levels
SR-90	6 /10		^f	0.500 - 5.970	L	0.777	1.577	Y	Positive detection with no reason for exclusion
TH-228	15 /18		1.475	0.616 -14.900	L	1.959	3.051	Y	Sample concentrations exceed background levels
TH-230	18 /18		2.109	0.852 -51.200	N^i	5.730	10.996	Y	Sample concentrations exceed background levels
TH-232	11 /18		1.475	0.700 - 1.900	L	0.756	1.079	Y	Sample concentrations exceed background levels
Thorium*	17 /18		^f	2.170 -17.100	L	6.592	9.215	Y	Positive detection with no reason for exclusion
U-234	15 /18		2.109	0.763 -24.200	N^i	2.445	4.687	Y	Sample concentrations exceed background levels
U-235/236	1 /18		0.097	1.310 - 1.310	N	0.356	0.454	Y	Sample concentrations exceed background levels
U-238	15 /18		2.109	0.717 -24.700	N^i	2.523	4.814	Y	Sample concentrations exceed background levels
Uranium*	16 /19		3.230^g	1.990 -186.00	L	15.591	25.411	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

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^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-62

SELECTION OF CONSTITUENTS OF CONCERN OF SUBSURFACE SOIL FROM RI/FS SAMPLING OF SURGE LAGOON

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1 /1		2.230	1.400 - 1.400	^h	^h	1.400^j	N	Sample concentrations are within background levels
RA-228	1 /1		1.475	0.900 - 0.900	^h	^h	0.900^j	N	Sample concentrations are within background levels
TH-228	1 /1		1.475	1.000 - 1.000	^h	^h	1.000^j	N	Sample concentrations are within background levels
TH-230	1 /1		2.109	1.600 - 1.600	^h	^h	1.600^j	N	Sample concentrations are within background levels
TH-232	1 /1		1.475	0.900 - 0.900	^h	^h	0.900^j	N	Sample concentrations are within background levels
U-234	1 /1		2.109	1.400 - 1.400	^h	^h	1.400^j	N	Sample concentrations are within background levels
U-238	1 /1		2.109	3.200 - 3.200	^h	^h	3.200^j	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-63

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE RETENTION BASIN

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
RA-226	1 /1		2.230	1.220 - 1.220	^h	^h	1.220^j	N	Sample concentrations are within background levels
RA-228	1 /1		1.475	1.080 - 1.080	^h	^h	1.080^j	N	Sample concentrations are within background levels
TH-228	1 /1		1.475	0.989 - 0.989	^h	^h	0.989^j	N	Sample concentrations are within background levels
TH-230	1 /1		2.109	1.210 - 1.210	^h	^h	1.210^j	N	Sample concentrations are within background levels
Thorium^*	1 /1		^f	5.130 - 5.130	^h	^h	5.130^j	Y	Positive detection with no reason for exclusion
U-234	1 /1		2.109	2.030 - 2.030	^h	^h	2.030^j	N	Sample concentrations are within background levels
U-238	1 /1		2.109	2.130 - 2.130	^h	^h	2.130^j	N	Sample concentrations do not significantly exceed background levels
Uranium^*	8 /9		3.230^g	2.600 - 9.900	L	5.067	9.664	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
^*Units are reported in mg/kg.

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TABLE R.6-64

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE INCINERATOR AREA

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	4 /26		^f	0.200 - 0.490	N	0.140	0.175	Y	Positive detection with no reason for exclusion
PU-239/240	1 /26		^f	0.879 - 0.879	N	0.322	0.360	Y	Positive detection with no reason for exclusion
RA-226	21 /26		2.230	0.465 - 5.100	L	1.239	2.245	Y	Sample concentrations exceed background levels
RA-228	20 /26		1.475	0.676 - 2.900	L	1.011	1.449	Y	Sample concentrations exceed background levels
SR-90	24 /26		^f	0.568 -10.100	N	4.117	5.169	Y	Positive detection with no reason for exclusion
TC-99	13 /26		^f	1.790 -43.200	L	4.812	11.327	Y	Positive detection with no reason for exclusion
TH-228	26 /26		1.475	0.846 - 2.960	L	1.335	1.482	Y	Sample concentrations exceed background levels
TH-230	26 /26		2.109	0.874 -13.900	L	2.827	3.636	Y	Sample concentrations exceed background levels
TH-232	26 /26		1.475	0.611 - 3.210	L	1.087	1.239	Y	Sample concentrations exceed background levels
Thorium*	26 /26		^f	5.510 -29.000	L	9.807	11.178	Y	Positive detection with no reason for exclusion
U-234	26 /26		2.109	0.922 -32.700	L	9.815	23.009	Y	Sample concentrations exceed background levels
U-235/236	10 /26		0.097	0.675 - 4.360	N^i	0.942	1.317	Y	Sample concentrations exceed background levels
U-238	26 /26		2.109	0.928 -32.700	L	10.158	24.456	Y	Sample concentrations exceed background levels
Uranium*	50 /50		3.230^g	2.320 -322.00	L	37.491	60.511	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-65

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF RUBBLE EAST OF PITS

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	1 /6		^f	0.366 - 0.366	N	0.144	0.234	Y	Positive detection with no reason for exclusion
PU-238	1 /6		^f	0.937 - 0.937	N	0.406	0.620	Y	Positive detection with no reason for exclusion
PU-239/240	1 /6		^f	2.440 - 2.440	L	0.425	0.860	Y	Positive detection with no reason for exclusion
RA-226	5 /6		2.230	0.694 - 1.240	N	0.918	1.185	N	Sample concentrations are within background levels
RA-228	4 /6		1.475	0.993 - 1.230	N^i	0.872	1.230^j	N	Sample concentrations are within background levels
SR-90	4 /6		^f	0.560 - 2.990	N^i	1.277	2.262	Y	Positive detection with no reason for exclusion
TH-228	5 /6		1.475	0.679 - 1.500	N	0.967	1.301	Y	Sample concentrations exceed background levels
TH-230	5 /6		2.109	0.850 - 2.750	N^i	1.505	2.180	Y	Sample concentrations exceed background levels
TH-232	4 /6		1.475	0.854 - 1.390	N^i	0.831	1.198	N	Sample concentrations are within background levels
Thorium*	5 /6		^f	4.640 -12.500	N	7.774	10.793	Y	Positive detection with no reason for exclusion
U-234	5 /6		2.109	0.809 - 5.650	L	1.648	3.646	Y	Sample concentrations exceed background levels
U-235/236	2 /6		0.097	0.819 - 0.875	N	0.482	0.715	Y	Sample concentrations exceed background levels
U-238	5 /6		2.109	0.774 - 7.780	L	1.924	4.401	Y	Sample concentrations exceed background levels
Uranium*	4 /6		3.230^g	4.390 -24.600	L	5.179	14.069	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-66

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE REMAINDER OF THE FEMP AREA (EXCLUDING THE PRODUCTION AREA, THE FIRE TRAINING AREA, THE K65 SLURRY LINE, THE SURGE LAGOON, THE RETENTION BASIN, THE INCINERATOR AREA, THE RUBBLE EAST OF THE WASTE PITS, AND THE RUBBLE WEST OF THE SILOS

Radionuclide	Frequency of Detection	Highest Blank^a (pCi/g)	Upper 95% TL for BKG^b (pCi/g)	Range of Detection	Dist^c	Mean^d (pCi/g)	Upper 95% CI on Mean^e (pCi/g)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
CS-137	6/176	^f		0.225 - 0.800	L	0.105	0.108	Y	Positive detection with no reason for exclusion
RA-226	153/176		2.230	0.300 - 9.800	L	0.690	0.757	Y	Sample concentrations exceed background levels
RA-228	82/175		1.475	0.280 - 3.500	L	0.453	0.493	Y	Sample concentrations exceed background levels
SR-90	41/177		^f	0.500 -653.00	L	0.398	0.451	Y	Positive detection with no reason for exclusion
TC-99	7/175		^f	0.900 -43.600	L	0.547	0.583	Y	Positive detection with no reason for exclusion
TH-228	97/176		1.475	0.470 -19.500	L	0.792	0.885	Y	Sample concentrations exceed background levels
TH-230	141/176		2.109	0.600 -153.00	L	1.380	1.567	Y	Sample concentrations exceed background levels
TH-232	72/176		1.475	0.600 - 4.240	L	0.479	0.518	Y	Sample concentrations exceed background levels
Thorium*	56/65		^f	1.010 -38.300	L	6.497	8.252	Y	Positive detection with no reason for exclusion
U-234	118/176		2.109	0.600 -203.00	L	1.126	1.303	Y	Sample concentrations exceed background levels
U-235/236	4/176		0.097	0.700 - 8.900	L	0.312	0.324	Y	Sample concentrations exceed background levels
U-238	122/176		2.109	0.600 -216.00	L	1.218	1.415	Y	Sample concentrations exceed background levels
Uranium*	136/178		3.230	1.000 -662.00	L	4.638	5.471	Y	Sample concentrations exceed background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Units are reported in mg/kg.

TABLE R.6-67

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE REMAINDER OF THE PRODUCTION AREA (EXCLUDING PLANTS 2, 3, 6, 9, AND THE PILOT PLANT)

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	32 /111		^f	0.001 - 6.600	L	0.005	0.006	Y	Positive detection with no reason for exclusion
1,1,2,2-Tetrachloroethane	5 /111	*	^f	0.003 - 0.190	L	0.003	0.003	Y	Positive detection with no reason for exclusion
1,1,2-Trichloroethane	2 /111		^f	0.002 - 0.014	N	0.003	0.003	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	13 /111		^f	0.001 - 0.290	L	0.003	0.004	Y	Positive detection with no reason for exclusion
1,1-Dichloroethene	9 /111		^f	0.001 - 0.460	L	0.003	0.004	Y	Positive detection with no reason for exclusion
1,2-Dichloroethane	1 /111		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	17 /111		^f	0.001 - 0.400	L	0.004	0.004	Y	Positive detection with no reason for exclusion
2-Butanone	60 /111	*	^f	0.001 - 0.087	L	0.006	0.007	Y	Positive detection with no reason for exclusion
2-Hexanone	11 /111	*	^f	0.001 - 0.004	N^i	0.005	0.004^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	14 /103		^f	0.050 - 0.760	N	0.203	0.218	Y	Positive detection with no reason for exclusion
4-Chloro-3-methylphenol	1 /100		^f	0.052 - 0.052	N^i	0.192	0.052^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	39 /111	*	^f	0.001 - 0.060	N^i	0.007	0.009	Y	Positive detection with no reason for exclusion
Acenaphthene	3 /108		^f	0.071 - 4.800	N^i	0.255	0.327	Y	Positive detection with no reason for exclusion
Acenaphthylene	1 /100		^f	0.780 - 0.780	N	0.199	0.209	Y	Positive detection with no reason for exclusion
Acetone	104 /111	*	^f	0.002 - 0.110	L	0.022	0.027	Y	Positive detection with no reason for exclusion
Aluminum	111 /111		108233	955.00 - 17000	N	7491.9	8043.63	N	Sample concentrations are within background levels
Anthracene	7 /108		^f	0.073 - 6.200	N^i	0.277	0.372	Y	Positive detection with no reason for exclusion
Antimony	71 /111		^f	6.500 -29.700	L	9.742	11.074	Y	Positive detection with no reason for exclusion
Aroclor-1248	1 /16		^f	0.110 - 0.110	N^i	0.048	0.055	Y	Positive detection with no reason for exclusion
Aroclor-1254	27 /27		^f	0.027 - 3.000	L	0.445	1.140	Y	Positive detection with no reason for exclusion
Aroclor-1260	8 /8		^f	0.120 - 2.800	N^i	0.748	1.463	Y	Positive detection with no reason for exclusion
Arsenic	113 /113		20.497	0.010 -81.900	N^i	5.816	7.064	Y	Sample concentrations exceed background levels
Barium	111 /111		814.574	11.200 -587.00	L	85.295	97.722	N	Sample concentrations are within background levels

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Benzene	3 /111	^f	0.001 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no no reason for exclusion
Benzo(a)anthracene	16 /103	^f	0.038 -19.000	L	0.204	0.230	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	10 /12	^f	0.046 -24.000	L	2.894	24.000^g	Y	Positive detection with no reason for exclusion
Benzo(b)fluoranthene	13 /103	^f	0.039 -39.000	L	0.215	0.245	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	6 /103	^f	0.067 -12.000	L	0.214	0.235	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	8 /102	^f	0.081 - 3.100	N^i	0.246	0.308	Y	Positive detection with no reason for exclusion
Benzoic acid	4 /108	^f	0.150 - 0.250	N^i	1.093	0.250^j	Y	Positive detection with no reason for exclusion
Beryllium	109 /109	2.150	0.470 - 2.200	L	0.970	1.016	Y	Sample concentrations exceed background levels
Butyl benzyl phthalate	1 /108	^f	0.046 - 0.046	N^i	0.230	0.046^j	Y	Positive detection with no reason for exclusion
Cadmium	111 /111	11.089	1.900 - 8.000	L	4.236	4.477	N	Sample concentrations are within background levels
Calcium	111 /111	41294.0	4360.0 -260000	N	92055	100997	N	Common dietaary element
Carbon Tetrachloride	1 /111	^f	0.012 - 0.012	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Carbon disulfide	31 /111	^f	0.001 - 0.048	L	0.004	0.004	Y	Positive detection with no reason for exclusion
Chlorobenzene	3 /111	^f	0.001 - 0.003	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Chloroethane	1 /111	^f	0.210 - 0.210	N^i	0.007	0.011	Y	Positive detection with no reason for exclusion
Chloroform	11 /111	^f	0.001 - 0.046	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Chromium	110 /111	102.684	5.500 -94.600	L	19.857	21.647	N	Sample concentrations are within background levels
Chrysene	13 /103	^f	0.047 -18.000	L	0.214	0.240	Y	Positive detection with no reason for exclusion
Cobalt	109 /111	21.431	3.700 -59.500	L	11.291	11.997	Y	Sample concentrations exceed background levels
Copper	110 /111	58.619	7.500 -69.400	L	20.579	22.157	Y	Sample concentrations exceed background levels
Cyanide	28 /112	^f	0.120 -22.800	L	0.107	0.129	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	3 /108	^f	0.037 - 0.071	N^i	0.227	0.071^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	4 /103	^f	0.610 - 6.900	N^i	0.276	0.385	Y	Positive detection with no reason for exclusion
Dibenzofuran	9 /108	^f	0.036 - 2.000	N^i	0.219	0.249	Y	Positive detection with no reason for exclusion
Diethyl phthalate	3 /108	^f	0.043 - 0.250	N^i	0.230	0.250^j	Y	Positive detection with no reason for exclusion
Ethylbenzene	4 /111	^f	0.002 - 0.018	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Fluoranthene	20 /108	^f	0.051 -33.000	L	0.222	0.255	Y	Positive detection with no reason for exclusion
Fluorene	3 /108	^f	0.370 - 3.300	N^i	0.242	0.291	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	7 /103	^f	0.049 -13.000	L	0.212	0.233	Y	Positive detection with no reason for exclusion
Iron	111 /111	46245.7	3030.0 - 66600	L	18971	20655.3	N	Common dietary element
Lead	111 /112	37.337	0.030 -182.00	N^i	16.430	20.560	Y	Sample concentrations

									exceed background levels
Magnesium	111 /111		15895.7	1620.0 - 61800	N	22215	24274.9	N	Common dietary element
Manganese	111 /111		1144.01	94.600 -4200.0	L	519.03	570.654	Y	Sample concentrations exceed background levels
Mercury	13 /113		0.292	0.170 - 1.900	N^i	0.094	0.123	Y	Sample concentrations exceed background levels
Methylene chloride	110 /111	*	^f	0.003 - 0.053	L	0.016	0.018	Y	Positive detection with no reason for exclusion
Molybdenum	71 /107		8.849	2.300 - 7.100	N	3.089	3.359	N	Sample concentrations are within background levels
N-Nitrosodiphenylamine	5 /108	*	^f	0.043 - 0.200	N^i	0.218	0.200^j	Y	Positive detection with no reason for exclusion
Naphthalene	10 /108		^f	0.066 - 1.300	N^i	0.221	0.244	Y	Positive detection with no reason for exclusion
Nickel	111 /111		39.379	16.200 -102.00	L	30.048	31.713	Y	Sample concentrations exceed background levels
Phenanthrene	25 /105		^f	0.037 -22.000	L	0.202	0.230	Y	Positive detection with no reason for exclusion
Phenol	2 /108		^f	0.048 - 0.200	N^i	0.224	0.200^j	Y	Positive detection with no reason for exclusion
Potassium	112 /114		23804.6	206.00 -2020.0	N	924.55	983.416	N	Common dietary element Sample concentrations are within background levels
Pyrene	19 /108		^f	0.055 -22.000	L	0.221	0.252	Y	Positive detection with no reason for exclusion
Selenium	10 /113		1.170	0.480 - 7.700	L	0.255	0.279	Y	Sample concentrations exceed background levels
Silver	86 /111		8.028	2.300 -30.500	N^i	4.287	4.880	Y	Sample concentrations exceed background levels.
Sodium	111 /111		11359.6	45.000 -2180.0	L	246.70	285.520	N	Common dietary element Sample concentrations are within background levels
Styrene	1 /111	*	^f	0.005 - 0.005	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Tetrachloroethene	26 /111	*	^f	0.001 -13.000	N^i	0.215	0.445	Y	Positive detection with no reason for exclusion
Thallium	10 /113		10.940	0.270 - 0.840	N^i	0.224	0.240	N	Sample concentrations are within background levels
Toluene	54 /111	*	^f	0.001 - 0.066	N^i	0.003	0.004	Y	Positive detection with no reason for exclusion
Total xylenes	5 /111	*	^f	0.002 - 0.082	L	0.003	0.003	Y	Positive detection with no reason for exclusion
Trichloroethene	24 /111		^f	0.001 -10.000	L	0.004	0.006	Y	Positive detection with no reason for exclusion
Vanadium	111 /111		172.171	8.400 -30.500	N	20.450	21.210	N	Sample concentrations are within background levels
Vinyl chloride	1 /111		^f	0.002 - 0.002	N^i	0.006	0.002^j	Y	Positive detection with no reason for exclusion
Zinc	111 /111		113.020	11.100 -431.00	L	64.035	72.732	Y	Sample concentrations exceed background levels
beta-BHC	2 /114		^f	0.016 - 0.100	N^i	0.012	0.016	Y	Positive detection with no reason for exclusion
bis(2-Ethylhexyl) phthalate	32 /108	*	^f	0.038 -13.000	L	0.276	0.333	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.

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^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.

^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.

^hNot applicable if sample size ≤ 2.

^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.

^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

*Blank data are available but have not yet been located.

TABLE R.6-68

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOILS FROM RI/FS SAMPLING OF THE FIRE TRAINING AREA

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	2 /2	*	^f	0.059 - 0.076	^h	^h	0.076^j	Y	Positive detection with no reason for exclusion
Acetone	1 /2	•	^f	0.016 - 0.016	^h	^h	0.016^j	Y	Positive detection with no reason for exclusion
Aluminum	2 /2		108233	10600 - 14300	^h	^h	14300.0^j	N	Sample concentrations are within background levels
Aroclor-1260	1 /1		^f	0.240 - 0.240	^h	^h	0.240^j	Y	Positive detection with no reason for exclusion
Arsenic	2 /2		20.497	4.800 - 7.600	^h	^h	7.600^j	N	Sample concentrations are within background levels
Barium	2 /2		814.574	95.000 -119.00	^h	^h	119.000^j	N	Sample concentrations are within background levels
Beryllium	2 /2		2.150	1.400 - 1.500	^h	^h	1.500^j	N	Sample concentrations are within background levels
Cadmium	2 /2		11.089	2.600 - 3.900	^h	^h	3.900^j	N	Sample concentrations are within background levels
Calcium	2 /2		41294.0	28600 - 44900	^h	^h	44900.0^j	N	Common dietary element
Chromium	2 /2		102.684	20.700 -23.600	^h	^h	23.600^j	N	Sample concentrations are within background levels
Cobalt	2 /2		21.431	12.300 -18.600	^h	^h	18.600^j	N	Sample concentrations are within background levels
Copper	2 /2		58.619	15.300 -18.100	^h	^h	18.100^j	N	Sample concentrations are within background levels
Iron	2 /2		46245.7	19900 - 26500	^h	^h	26500.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	2 /2		37.337	14.800 -21.000	^h	^h	21.000^j	N	Sample concentrations are within background levels
Magnesium	2 /2		15895.7	6190.0 - 12100	^h	^h	12100.0^j	N	Common dietary element; Sample concentrations are within background levels
Manganese	2 /2		1144.01	436.00 -833.00	^h	^h	833.000^j	N	Sample concentrations are within background levels
Mercury	1 /2		0.292	0.110 - 0.110	^h	^h	0.110^j	N	Sample concentrations are within background levels
Methylene chloride	2 /2	*	^f	0.004 - 0.005	^h	^h	0.005^j	Y	Positive detection with no reason for exclusion
Nickel	2 /2		39.379	34.100 -43.200	^h	^h	43.200^j	Y	Sample concentrations exceed background levels
Potassium	2 /2		23804.6	827.00 -1020.0	^h	^h	1020.00^j	N	Common dietary element; Sample concentrations are within background levels
Silver	2 /2		8.028	2.800 - 2.900	^h	^h	2.900^j	N	Sample concentrations are within background levels
Sodium	2 /2		11359.6	87.600 -102.00	^h	^h	102.000^j	N	Common dietary element; Sample concentrations are within background levels

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Vanadium	2 /2	172.171	24.600 -24.900	^h	^h	24.900^j	N	Sample concentrations are within background levels
Zinc	2 /2	113.020	52.200 -64.800	^h	^h	64.800^j	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically exist, but have not yet been located.

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TABLE R.6-69
SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSKURFACE SOIL FROM RI/FS SAMPLING OF K65 SLURRY LINE

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	2 /7	*	^f	0.004 - 0.011	N^i	0.006	0.008	Y	Positive detection with no reason for exclusion
2-Hexanone	1 /7	*	^f	0.002 - 0.002	N^i	0.005	0.002^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	1 /7		^f	0.004 - 0.004	N^i	0.006	0.004^j	Y	Positive detection with no reason for exclusion
Acetone	6 /7	*	^f	0.011 - 0.027	N^i	0.016	0.022	Y	Positive detection with no reason for exclusion
Aluminum	7 /7		108233	4530.0 - 12100	N	9557.1	11314.3	N	Sample concentrations are within background levels
Antimony	5 /6		^f	18.600 -27.400	N^i	19.417	26.367	Y	Positive detection with no reason for exclusion
Arsenic	7 /7		20.497	2.700 - 8.300	N	6.300	7.920	N	Sample concentrations are within background levels
Barium	7 /7		814.574	30.500 -97.300	N	72.029	88.392	N	Sample concentrations are within background levels
Beryllium	6 /6		2.150	0.670 - 1.200	N^i	0.912	1.075	N	Sample concentrations are within background levels.
Cadmium	7 /7		11.089	2.500 - 7.500	L	4.371	6.332	N	Sample concentrations are within background levels
Calcium	7 /7		41294.0	11600 -161000	L	67114	161000^j	N	Common dietary element
Chromium	7 /7		102.684	15.700 -26.600	L	19.229	22.353	N	Sample concentrations are within background levels
Cobalt	6 /7		21.431	11.300 -14.900	N	12.029	14.350	N	Sample concentrations are within background levels
Copper	7 /7		58.619	19.000 -27.000	L	21.857	24.306	N	Sample concentrations are within background levels
Cyanide	3 /7		^f	0.120 - 1.600	L	0.185	0.527	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	1 /6		^f	0.048 - 0.048	N^i	0.176	0.048^j	Y	Positive detection with no reason for exclusion
Di-n-octyl phthalate	2 /6		^f	0.082 - 0.097	N^i	0.165	0.097^j	Y	Positive detection with no reason for exclusion
Diethyl phthalate	1 /6		^f	0.120 - 0.120	N^i	0.188	0.120^j	Y	Positive detection with no reason for exclusion
Iron	7 /7		46245.7	11200 - 27500	N	22043	26041.6	N	Common dietary element Sample concentrations are within background levels
Lead	7 /7		37.337	6.100 -12.200	N	10.314	11.944	N	Sample concentrations are within background levels
Magnesium	7 /7		15895.7	5070.0 - 40700	L	17694	40700.0^j	N	Common dietary element
Manganese	7 /7		1144.01	228.00 -880.00	L	472.86	721.988	N	Sample concentrations are within background levels
Methylene chloride	7 /7	*	^f	0.003 - 0.027	N^i	0.009	0.017	Y	Positive detection with no reason for exclusion
Molybdenum	5 /6		8.849	2.400 - 4.600	N	3.650	4.600^j	N	Sample concentrations are within background levels
Nickel	7 /7		39.379	21.700 -37.600	N	29.986	34.333	N	Sample concentrations are within background levels

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Phenol	3 /6	*	^f	0.110 - 0.200	N^i	0.186	0.200^j	Y	Positive detection with no reason for exclusion
Potassium	7 /7		23804.6	546.00 -1360.0	L	907.43	1194.36	N	Common dietary element Sample concentrations are within background levels
Silver	7 /7		8.028	2.700 -19.200	L	7.671	15.540	Y	Sample concentrations exceed background levels
Sodium	7 /7		11359.6	47.800 -237.00	L	115.60	200.557	N	Common dietary element Sample concentrations are within background levels
Thallium	3 /7		10.940	0.630 - 0.970	N	0.447	0.683	N	Sample concentrations are within background levels
Toluene	6 /7		^f	0.001 - 0.006	N	0.003	0.004	Y	Positive detection with no reason for exclusion
Trichloroethene	1 /7		^f	0.018 - 0.018	N^i	0.005	0.009	Y	Positive detection with no reason for exclusion
Vanadium	7 /7		172.171	21.800 -28.400	N	25.729	27.419	N	Sample concentrations are within background levels
Zinc	7 /7		113.020	30.700 -60.400	N^i	51.300	59.026	N	Sample concentrations are within background levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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TABLE R.6-70

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF RUBBLE EAST OF PITS

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
2-Butanone	1 /1	*	^f	0.087 - 0.087	^h	^h	0.087^j	Y	Positive detection with no reason for exclusion
Aluminum	1 /1		108233	7640.0 -7640.0	^h	^h	7640.00^j	N	Sample concentrations are within background levels
Arsenic	1 /1		20.497	5.600 - 5.600	^h	^h	5.600^j	N	Sample concentrations are within background levels
Barium	1 /1		814.574	56.700 -56.700	^h	^h	56.700^j	N	Sample concentrations are within background levels
Beryllium	1 /1		2.150	1.000 - 1.000	^h	^h	1.000^j	N	Sample concentrations are within background levels
Cadmium	1 /1		11.089	4.800 - 4.800	^h	^h	4.800^j	N	Sample concentrations are within background levels
Calcium	1 /1		41294.0	102000 -102000	^h	^h	102000^j	N	Common dietary element
Chloroform	1 /1		^f	0.002 - 0.002	^h	^h	0.002^j	Y	Positive detection with no reason for exclusion
Chromium	1 /1		102.684	23.500 -23.500	^h	^h	23.500^j	N	Sample concentrations are within background levels
Cobalt	1 /1		21.431	11.000 -11.000	^h	^h	11.000^j	N	Sample concentrations are within background levels
Copper	1 /1		58.619	14.700 -14.700	^h	^h	14.700^j	N	Sample concentrations are within background levels
Iron	1 /1		46245.7	18000 - 18000	^h	^h	18000.0^j	N	Common dietary element; Sample concentrations are within background levels
Lead	1 /1		37.337	10.200 -10.200	^h	^h	10.200^j	N	Sample concentrations are within background levels
Magnesium	1 /1		15895.7	28700 - 28700	^h	^h	28700.0^j	N	Common dietary element
Manganese	1 /1		1144.01	476.00 -476.00	^h	^h	476.000^j	N	Sample concentrations are within background levels
Methylene chloride	1 /1	*	^f	0.009 - 0.009	^h	^h	0.009^j	Y	Positive detection with no reason for exclusion
Nickel	1 /1		39.379	29.800 -29.800	^h	^h	29.800^j	N	Sample concentrations are within backround levels
Potassium	1 /1		23804.6	1040.0 -1040.0	^h	^h	1040.00^j	N	Common dietary element Sample concentrations are within background levels
Silver	1 /1		8.028	2.400 - 2.400	^h	^h	2.400^j	N	Sample concentrations are within background levels
Sodium	1 /1		11359.6	165.00 -165.00	^h	^h	165.000^j	N	Common dietary element; Sample concentration are within backround levels
Toluene	1 /1		^f	0.004 - 0.004	^h	^h	0.004^j	Y	Positive detection with no reason for exclusion
Trichloroethene	1 /1		^f	0.007 - 0.007	^h	^h	0.007^j	Y	Positive detection with no reason for exclusion

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Vanadium	1 /1	172.171	23.400 -23.400	^h	^h	23.400^j	N	Sample concentrations are within background levels
Zinc	1 /1	113.020	44.400 -44.400	^h	^h	44.400^j	N	Sample concentrations are within backround levels

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.
^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.
*Blank data theoretically available, but not yet located.

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TABLE R.6-71

SELECTION OF CONSTITUENTS OF CONCERN FOR SUBSURFACE SOIL FROM RI/FS SAMPLING OF THE REMAINDER OF THE FEMP AREA (EXCLUDING THE PRODUCTION AREA, THE FIRE TRAINING AREA, K65 SLURRY LINE, RETENTION BASIN, INCINERATOR AREA, RUBBLE EAST OF THE WASTE PITS, AND THE RUBBLE WEST OF THE SILOS

Chemical	Frequency of Detection	Highest Blank^a (mg/kg)	Upper 95% TL for BKG^b (mg/kg)	Range of Detection	Dist^c	Mean^d (mg/kg)	Upper 95% CI on Mean^e (mg/kg)	Include? Y - Yes N - No	Reason for Inclusion/ Exclusion
1,1,1-Trichloroethane	10 /86		^f	0.001 - 0.098	N^i	0.008	0.011	Y	Positive detection with no reason for exclusion
1,1-Dichloroethane	2 /86		^f	0.006 - 0.110	L	0.003	0.003	Y	Positive detection with no reason for exclusion
1,2-Dichloroethylene	1 /86		^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
1,4-Dioxane	1 /2		^f	0.078 - 0.078	^h	^h	0.078^j	Y	Positive detection with no reason for exclusion
2-Butanone	30 /93		^f	0.002 - 0.086	L	0.006	0.007	Y	Positive detection with no reason for exclusion
2-Chlorophenol	2 /71		^f	0.044 - 0.048	N^i	0.205	0.048^j	Y	Positive detection with no reason for exclusion
2-Hexanone	12 /86		^f	0.001 - 0.005	N^i	0.005	0.005^j	Y	Positive detection with no reason for exclusion
2-Methylnaphthalene	1 /70		^f	0.045 - 0.045	N^i	0.198	0.045^j	Y	Positive detection with no reason for exclusion
4-Chloro-3-methylphenol	1 /70		^f	0.058 - 0.058	N^i	0.198	0.058^j	Y	Positive detection with no reason for exclusion
4-Methyl-2-pentanone	12 /86		^f	0.001 - 0.024	N^i	0.006	0.006	Y	Positive detection with no reason for exclusion
4-Nitrophenol	1 /1		^f	0.048 - 0.048	^h	^h	0.048^j	Y	Positive detection with no reason for exclusion
Acenaphthene	1 /71		^f	0.077 - 0.077	N^i	0.208	0.077^j	Y	Positive detection with no reason for exclusion
Acenaphthylene	1 /71		^f	1.300 - 1.300	N^i	0.216	0.242	Y	Positive detection with no reason for exclusion
Acetone	74 /86		^f	0.003 - 0.079	L	0.016	0.019	Y	Positive detection with no reason for exclusion
Aluminum	79 /79		108233	752.00 - 17900	N	8415.3	9146.01	N	Sample concentrations are within background levels
Anthracene	3 /71		^f	0.066 - 0.780	N^i	0.207	0.221	Y	Positive detection with no reason for exclusion
Antimony	66 /79		^f	8.800 -35.200	N	21.057	22.847	Y	Positive detection with no reason for exclusion
Aroclor-1254	25 /25		^f	0.010 - 5.000	L	0.566	2.863	Y	Positive detection with no reason for exclusion
Aroclor-1260	3 /3		^f	0.037 - 2.200	L	0.314	2.200^j	Y	Positive detection with no reason for exclusion
Arsenic	81 /81		20.497	2.200 -74.800	L	8.838	10.531	Y	Sample concentrations exceed background levels
Barium	79 /79		814.574	13.100 -8040.0	N^i	314.63	546.225	Y	Sample concentrations exceed background levels
Benzo(a)anthracene	8 /71		^f	0.062 - 4.700	L	0.206	0.226	Y	Positive detection with no reason for exclusion
Benzo(a)pyrene	5 /5		^f	0.042 - 5.200	N	1.258	3.369	Y	Positive detection with no reason for exclusion

Benzo(b)fluoranthene	8 /71	^f	0.059 - 9.700	L	0.217	0.243	Y	Positive detection with no reason for exclusion
Benzo(g,h,i)perylene	3 /71	^f	0.230 - 5.300	L	0.213	0.231	Y	Positive detection with no reason for exclusion
Benzo(k)fluoranthene	1 /70	^f	0.046 - 0.046	N^i	0.198	0.046^j	Y	Positive detection with no reason for exclusion
Benzoic acid	7 /71	^f	0.045 - 0.150	N^i	0.932	0.150^j	Y	Positive detection with no reason for exclusion
Beryllium	78 /79	2.150	0.530 - 4.300	L	1.038	1.147	Y	Sample concentrations exceed background levels
Boron	3 /4	^f	48.200 -57.700	N	42.850	57.700^j	Y	Positive detection with no reason for exclusion
Bromodichloromethane	1 /86	^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Cadmium	74 /79	11.089	0.660 - 7.700	N	4.177	4.510	N	Sample concentrations are within background levels
Calcium	79 /79	41294.0	1790.0 -155000	L	83594	120745	N	Common dietary element
Carbon disulfide	7 /86	^f	0.001 - 0.093	L	0.003	0.004	Y	Positive detection with no reason for exclusion
Chloroform	5 /93	^f	0.002 - 0.020	L	0.003	0.003	Y	Positive detection with no reason for exclusion
Chromium	79 /79	102.684	5.100 -73.300	L	18.469	20.481	N	Sample concentrations are within background levels
Chrysene	8 /71	^f	0.062 - 3.500	L	0.208	0.227	Y	Positive detection with no reason for exclusion
Cobalt	79 /79	21.431	5.200 -1030.0	N^i	35.084	62.231	Y	Sample concentrations exceed background levels
Copper	79 /79	58.619	11.400 -859.00	N^i	42.034	62.187	Y	Sample concentrations exceed background levels
Cyanide	27 /83	^f	0.120 - 7.100	L	0.127	0.156	Y	Positive detection with no reason for exclusion
Di-n-butyl phthalate	4 /71	^f	0.055 - 0.190	N^i	0.197	0.190^j	Y	Positive detection with no reason for exclusion
Dibenzo(a,h)anthracene	2 /71	^f	0.100 - 0.900	N^i	0.209	0.226	Y	Positive detection with no reason for exclusion
Dibenzofuran	1 /71	^f	0.067 - 0.067	N^i	0.208	0.067^j	Y	Positive detection with no reason for exclusion
Dibromochloromethane	1 /86	^f	0.001 - 0.001	N^i	0.003	0.001^j	Y	Positive detection with no reason for exclusion
Diethyl phthalate	3 /71	^f	0.064 - 0.190	N^i	0.206	0.190^j	Y	Positive detection with no reason for exclusion
Ethylbenzene	1 /86	^f	0.009 - 0.009	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Fluoranthene	11 /71	^f	0.040 - 6.700	L	0.205	0.230	Y	Positive detection with no reason for exclusion
Fluorene	1 /71	^f	0.077 - 0.077	N^i	0.208	0.077^j	Y	Positive detection with no reason for exclusion
Indeno(1,2,3-cd)pyrene	3 /71	^f	0.170 - 4.200	N	0.259	0.353	Y	Positive detection with no reason for exclusion
Iron	79 /79	46245.7	4610.0 - 32200	N	17962	19293.2	N	Common dietary element Sample concentrations are within background levels
Lead	80 /81	37.337	4.600 - 34100	N^i	840.12	1798.47	Y	Sample concentrations exceed background levels
Magnesium	79 /79	15895.7	377.00 - 41600	N	16347	18373.6	N	Common dietary element
Manganese	79 /79	1144.01	22.700 -1130.0	N	481.12	518.922	N	Sample concentrations are within background levels
Mercury	9 /81	0.292	0.160 - 1.200	N	0.104	0.138	Y	Sample concentrations exceed background levels
Methylene chloride	85 /86	^f	0.001 - 0.073	L	0.016	0.019	Y	Positive detection with no

								reason for exclusion
Molybdenum	66 /79	8.849	2.700 -449.00	N^i	12.704	22.893	Y	Sample concentrations exceed background levels
Naphthalene	1 /71	^f	0.054 - 0.054	N^i	0.208	0.054^j	Y	Positive detection with no reason for exclusion
Nickel	79 /79	39.379	9.700 -1740.0	L	38.976	46.012	Y	Sample concentrations exceed background levels
Phenanthrene	8 /71	^f	0.048 - 2.600	N	0.238	0.297	Y	Positive detection with no reason for exclusion
Phenol	21 /71	^f	0.038 - 0.310	N^i	0.182	0.202	Y	Positive detection with no reason for exclusion
Potassium	81 /81	23804.6	209.00 -2300.0	N	939.02	1000.61	N	Common dietary element Sample concentrations are within background levels
Pyrene	13 /71	^f	0.041 - 8.200	N	0.323	0.513	Y	Positive detection with no reason for exclusion
Pyridine	1 /4	^f	0.045 - 0.045	N	0.022	0.043	Y	Positive detection with no reason for exclusion
Selenium	13 /81	1.170	0.540 -125.00	L	0.342	0.423	Y	Sample concentrations exceed background levels
Silicon	4 /4	^f	514.00 -1210.0	N	802.25	1146.93	N	Ubiquitous Compound
Silver	63 /79	8.028	2.400 -20.400	N	7.234	8.025	Y	Sample concentrations exceed background levels
Sodium	78 /78	11359.6	32.300 -2840.0	N^i	194.07	266.491	N	Common dietary element Sample concentrations are within background levels
Sulfide	1 /3	^f	2.390 - 2.390	L	3.025	2.390^j	N	Ubiquitous Compound
Tetrachloroethene	1 /93	^f	0.002 - 0.002	N^i	0.003	0.002^j	Y	Positive detection with no reason for exclusion
Thallium	14 /81	10.940	0.210 - 1.900	N	0.332	0.382	N	Sample concentrations are within background levels
Toluene	15 /86	^f	0.001 - 0.013	N	0.003	0.003	Y	Positive detection with no reason for exclusion
Total xylenes	2 /86	^f	0.009 - 0.074	N	0.004	0.005	Y	Positive detection with no reason for exclusion
Trichloroethene	3 /93	^f	0.001 - 0.003	N^i	0.003	0.003	Y	Positive detection with no reason for exclusion
Vanadium	79 /79	172.171	10.700 -325.00	N^i	30.572	38.790	Y	Sample concentrations exceed background levels
Vinyl Acetate	1 /86	^f	0.002 - 0.002	N^i	0.006	0.002^j	Y	Positive detection with no reason for exclusion
Vinyl chloride	1 /93	^f	0.003 - 0.003	N^i	0.006	0.003^j	Y	Positive detection with no reason for exclusion
Zinc	79 /79	113.020	9.400 -505.00	L	56.086	63.598	Y	Sample concentrations exceed background levels
bis(2-Ethylhexyl) phthalate	30 /71	^f	0.045 - 3.600	L	0.253	0.306	Y	Positive detection with no reason for exclusion

^aIf blank data are available.
^bUpper 95% tolerance level for background data with a 95% level of confidence.
^cDistribution: N = Normal; L = Lognormal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.
^dIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

^eIf the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.
^fBackground data are either not available or are inappropriate if the constituent is not naturally-occuring.
^gWhen backgound sample size is one, this concentration is given instead of a UTL. The mean site-related value will be compared with the single background value.
^hNot applicable if sample size ≤ 2.
^iDistribution could not be determined from available data; therefore, a normal distribution was assumed.
^jIf the upper 95% CI on the mean exceeds the maximum detected concentration or if the sample size ≤ 2, the maximum detected concentration is substituted.

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APPENDIX S

APPENDIX S

UNIT RISK FACTORS

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INTRODUCTION

In CERCLA risk assessment methodology, a linear relationship is assumed between the exposure point concentration of a constituent in a medium and the calculated health risk from exposure to the constituent in the medium. The relationship between the constituent concentration in the medium and the calculated health risk depends on the exposure assessment models parameters. The models and parameters for risk assessments at the FEMP are presented in the RI/FS Risk Assessment Work Plan Addendum (DOE 1992) and Section 3.0 of Part II. The risk characterization information (e.g., slope factors) are presented in Section 4.0 of Part II. The risk characterization methodology is provided in Section 5.0 of Part II. This appendix presents the ratios of calculated health risk to constituent concentrations in environmental media that have been calculated with the specified pathways, models, and parameters. These ratios are referred to as "unit risk factors."

CALCULATION METHODS

Unit risk factors are calculated for each constituent, scenario, and environmental medium using the specified models, parameters, and the risk characterization factors. For example, the incremental lifetime cancer risk (ILCR) from ingestion of U-238 in drinking water is calculated as follows:

$$ILCR = (I_w)(SF) \qquad \text{(S-1)}$$

where $I_w = (Cw)(IR)(ED)(EF)$ (S-2)

and SF = cancer slope factor (see Section 5.0)

Equation 5.2-1 can be expressed as:

$$ILCR = (Cw)(IR)(ED)(EF)(SF) \qquad \text{(S-3)}$$

or

$$ILCR = (Cw)(\text{unit risk factor}) \qquad \text{(S-4)}$$

The unit risk factor for U-238 for the drinking water ingestion pathway is therefore given by:

$$\text{Unit risk factor} = (IR)(ED)(EF)(SF) \qquad \text{(S-5)}$$

where

IR	=	2 ℓ/d
ED	=	70 yr
EF	=	350 d/yr
SF	=	1.6×10^{-11} (1/pCi) (HEAST)

or unit risk factor = 7.8×10^{-7} $(pCi/\ell)^{-1}$

Unit risk factors for specific radionuclides presented in Exhibits S-1 through S-6 for air pathways, water pathways, and surface soil/sediment pathways for current and future potential exposure scenarios. Unit risk factors for non-radioactive chemicals are presented in Exhibits 5-7 through 5-14. The specific pathways that are included in the current or future potential exposure scenarios are noted at the top of each Exhibit. Unit risk factors are calculated for the specified combinations of these pathways.

SUMMARY

Unit risk factors are used in Section 5.0 of Part II as factors that are multiplied by the concentration of the specific constituent in the specific medium to yield the ILCR for that constituent, pathway, and medium. For example, a concentration of U-238 in drinking water of 6.7 pCi/ℓ (20 μg/ℓ) yields a calculated ILCR of 5×10^{-6} [$6.7 \times (7.8 \times 10^{-7})$].

Incorporation of unit risk factors into the risk assessment methodology greatly improves the speed of calculating risks. It is also easily noted from the tables of unit risk factors which exposure pathways are significant and which pathways are insignificant contributors to the overall calculated risk for a specific constituent and medium.

REFERENCES

United States Dept. of Energy, 1992, "Risk Assessment Work Plan Addendum," prepared for Remedial Investigation and Feasibility Study, Fernald Environmental Management Project, U.S. Department of Energy, Fernald Office, Fernald, OH.

EXHIBIT S-1
Unit Risks Factors for Radionuclides in Air for Current Potential Scenarios (ILCR-m3/pCi)

	Receptors Whose Exposure Factors Are Uniquely Defined by Existing Access Controls		Receptors whose Exposure Factors Are Unaffected by the Presence or Absence of Access Controls			Receptors Whose Exposure Factors Are Uniquely Defined by a Lack of Access Controls
	Visitor Age 19+	Trespassing Child Access Controls Age 7-18	Off-Property Farmer Age 1-70	Off-property User of Meat & Milk Grown On-site Age 1-70	Off-Property User of GM River Water Age 1-70	Trespassing Child w/o Access Controls Age 7-18
Inhalation	•		•			
URANIUM SERIES						
U-238 + 2 dtrs	5.4E-04	na	6.0E-03	na	na	na
U-238	2.5E-04	na	2.8E-03	na	na	na
U-234	2.7E-04	na	3.0E-03	na	na	na
Th-230	3.0E-04	na	3.4E-03	na	na	na
Ra-226 + 8 dtrs	7.3E-05	na	8.1E-04	na	na	na
Ra-226 + 5 dtrs	3.1E-05	na	3.5E-04	na	na	na
Ra-226	3.1E-05	na	3.5E-04	na	na	na
Rn-222 + 4 dtrs	8.0E-08	na	8.9E-07	na	na	na
Rn-222	7.6E-09	na	8.5E-08	na	na	na
Pb-210 + 2 dtrs	4.2E-05	na	4.6E-04	na	na	na
Pb-210	1.3E-05	na	1.5E-04	na	na	na
ACTINIUM SERIES						
U-235 + 1 dtr	2.6E-04	na	2.9E-03	na	na	na
U-235	2.6E-04	na	2.9E-03	na	na	na
Pa-231+ 8 dtrs	1.3E-03	na	1.4E-02	na	na	na
Pa-231	3.7E-04	na	4.2E-03	na	na	na
Ac-227 + 7 dtrs	9.1E-04	na	1.0E-02	na	na	na
Ac-227	8.3E-04	na	9.3E-03	na	na	na
THORIUM SERIES						
Th-232 + 10 dtrs	1.1E-03	na	1.2E-02	na	na	na
Th-232	2.9E-04	na	3.2E-03	na	na	na
Ra-228 + 1 dtr	7.2E-06	na	8.0E-05	na	na	na
Ra-228	6.8E-06	na	7.7E-05	na	na	na
Th-228 + 7 dtrs	8.1E-04	na	9.0E-03	na	na	na
Th-228	8.0E-04	na	8.9E-03	na	na	na
Rn-220 + dtrs	1.2E-09	na	1.4E-08	na	na	na
TRANSURANICS AND FISSION PRODUCTS						
Am-241	3.3E-04	na	3.7E-03	na	na	na
Sr-90 + dtr	6.4E-07	na	7.2E-06	na	na	na
Sr-90	5.8E-07	na	6.5E-06	na	na	na
Tc-99	8.6E-08	na	9.6E-07	na	na	na
Cs-137 + dtr	2.0E-07	na	2.2E-06	na	na	na
Cs-137	2.0E-07	na	2.2E-06	na	na	na
Np-237 + dtr	3.0E-04	na	3.4E-03	na	na	na
Np-237	3.0E-04	na	3.4E-03	na	na	na
Pu-238	4.0E-04	na	4.5E-03	na	na	na
Pu-239	3.9E-04	na	4.4E-03	na	na	na
Pu-240	3.9E-04	na	4.4E-03	na	na	na
Pu-239/240	3.9E-04	na	4.4E-03	na	na	na
Ru-106	4.6E-06	na	5.1E-05	na	na	na
U-233	2.8E-04	na	3.1E-03	na	na	na

• This exposure pathway is included when calculating unit risks for this scenario.
na Not evaluated for air. Impacts from exposures to water and soil for this receptor are presented water and soil URFs, respectively.

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EXHIBIT S-2
Unit Risks Factors for Radionuclides in Air for Future Potential Scenarios (ILCR-m3/pCi)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Inhalation		•	•	•	•
Ingestion of vegetables		•	•	•	
Ingestion of meat		•	•	•	
Ingestion of milk		•	•	•	
URANIUM SERIES					
U-238 + 2 dtrs	na	7.8E-04	6.1E-03	1.9E-04	1.1E-05
U-238	na	3.6E-04	2.8E-03	8.7E-05	5.0E-06
U-234	na	3.9E-04	3.0E-03	9.4E-05	5.5E-06
Th-230	na	4.3E-04	3.4E-03	1.0E-04	6.1E-06
Ra-226 + 8 dtrs	na	2.9E-04	2.3E-03	1.6E-04	4.0E-06
Ra-226 + 5 dtrs	na	7.3E-05	5.7E-04	3.2E-05	1.0E-06
Ra-226	na	7.3E-05	5.7E-04	3.2E-05	1.0E-06
Rn-222 + 4 dtrs	na	1.1E-07	8.9E-07	2.7E-08	1.6E-09
Rn-222	na	1.1E-08	8.5E-08	2.5E-09	1.5E-10
Pb-210 + 2 dtrs	na	2.2E-04	1.7E-03	1.2E-04	3.2E-06
Pb-210	na	1.5E-04	1.1E-03	8.6E-05	2.1E-06
ACTINIUM SERIES					
U-235 + 1 dtr	na	3.8E-04	2.9E-03	9.0E-05	5.2E-06
U-235	na	3.8E-04	2.9E-03	9.0E-05	5.2E-06
Pa-231+ 8 dtrs	na	1.9E-03	1.5E-02	4.8E-04	2.7E-05
Pa-231	na	5.5E-04	4.3E-03	1.4E-04	7.7E-06
Ac-227 + 7 dtrs	na	1.4E-03	1.1E-02	3.4E-04	1.9E-05
Ac-227	na	1.2E-03	9.7E-03	3.1E-04	1.7E-05
THORIUM SERIES					
Th-232 + 10 dtrs	na	1.6E-03	1.3E-02	3.9E-04	2.3E-05
Th-232	na	4.2E-04	3.3E-03	9.9E-05	5.8E-06
Ra-228 + 1 dtr	na	3.1E-05	2.4E-04	1.7E-05	4.4E-07
Ra-228	na	3.1E-05	2.4E-04	1.7E-05	4.3E-07
Th-228 + 7 dtrs	na	1.2E-03	9.1E-03	2.8E-04	1.6E-05
Th-228	na	1.1E-03	8.9E-03	2.7E-04	1.6E-05
Rn-220 + dtrs	na	1.8E-09	1.4E-08	4.2E-10	2.5E-11
TRANSURANICS AND FISSION PRODUCTS					
Am-241	na	5.2E-04	4.1E-03	1.4E-04	7.4E-06
Sr-90 + dtr	na	1.4E-04	1.1E-03	2.0E-04	8.2E-07
Sr-90	na	1.3E-04	9.9E-04	1.8E-04	7.5E-07
Tc-99	na	2.1E-04	1.6E-03	3.3E-04	3.2E-07
Cs-137 + dtr	na	4.2E-05	3.3E-04	4.8E-05	1.5E-07
Cs-137	na	4.2E-05	3.3E-04	4.8E-05	1.5E-07
Np-237 + dtr	na	5.0E-04	3.9E-03	1.4E-04	7.0E-06
Np-237	na	5.0E-04	3.9E-03	1.4E-04	7.0E-06
Pu-238	na	6.2E-04	4.8E-03	1.6E-04	8.7E-06
Pu-239	na	6.1E-04	4.7E-03	1.6E-04	8.6E-06
Pu-240	na	6.1E-04	4.7E-03	1.6E-04	8.6E-06
Pu-239/240	na	6.1E-04	4.7E-03	1.6E-04	8.6E-06
Ru-106	na	8.4E-06	6.6E-05	2.5E-06	1.2E-07
U-233	na	4.1E-04	3.2E-03	9.7E-05	5.7E-06

• This exposure pathway is included when calculating unit risks for this scenario.
na Not evaluated for air. Impacts from exposures to soil and water for this receptor are presented soil and water URFs, respectively.

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EXHIBIT S-3
Unit Risk Factors for Radionuclides in Water for Current Potential Scenarios (ILCR-L/pCi)

	Receptors Whose Exposure Factors Are Uniquely Defined by Existing Access Controls		Receptors whose Exposure Factors Are Unaffected by the Presence or Absence of Access Controls			Receptors Whose Exposure Factors Are Uniquely Defined by a Lack of Access Controls
	Visitor Age 19+	Trespassing Child w/ Access Controls Age 7-18	Off-Property Farmer Age 1-70	Off-property User of Meat & Milk Grown On-site Age 1-70	Off-Property User of GM River Water Age 1-70	Trespassing Child w/o Access Controls Age 7-18
Drinking water			•		•	
Inhalation of volitalized radon			•		•	
Ingestion while swimming					•	
Ingestion of vegetables			•		•	
Ingestion of meat			•	•	•	
Ingestion of milk			•	•	•	
Ingestion of fish					•	
URANIUM SERIES						
U-238 + 2 dtrs	na	na	1.9E-06	7.9E-09	2.0E-06	na
U-238	na	na	1.1E-06	4.5E-09	1.1E-06	na
U-234	na	na	1.1E-06	4.5E-09	1.1E-06	na
Th-230	na	na	8.3E-07	3.6E-11	1.0E-06	na
Ra-226 + 8 dtrs	na	na	5.4E-05	1.2E-07	7.4E-05	na
Ra-226 + 5 dtrs	na	na	8.8E-06	2.7E-08	1.2E-05	na
Ra-226	na	na	8.0E-06	2.7E-08	1.1E-05	na
Rn-222 + 4 dtrs	na	na	8.5E-07	0.0E+00	8.5E-07	na
Rn-222	na	na	6.9E-08	0.0E+00	6.9E-08	na
Pb-210 + 2 dtrs	na	na	4.5E-05	9.1E-08	8.3E-05	na
Pb-210	na	na	3.5E-05	7.0E-08	6.4E-05	na
ACTINIUM SERIES						
U-235 + 1 dtr	na	na	1.1E-06	4.5E-09	1.1E-06	na
U-235	na	na	1.1E-06	4.5E-09	1.1E-06	na
Pa-231+ 8 dtrs	na	na	2.8E-05	1.4E-09	3.1E-05	na
Pa-231	na	na	5.9E-06	2.9E-10	6.5E-06	na
Ac-227 + 7 dtrs	na	na	2.2E-05	3.9E-09	2.7E-05	na
Ac-227	na	na	1.8E-05	3.1E-09	2.2E-05	na
THORIUM SERIES						
Th-232 + 10 dtrs	na	na	1.1E-05	4.6E-10	1.3E-05	na
Th-232	na	na	7.6E-07	3.3E-11	9.7E-07	na
Ra-228 + 1 dtr	na	na	6.5E-06	2.2E-08	9.3E-06	na
Ra-228	na	na	6.5E-06	2.2E-08	9.3E-06	na
Th-228 + 7 dtrs	na	na	3.5E-06	1.5E-10	4.4E-06	na
Th-228	na	na	7.0E-07	3.0E-11	8.2E-07	na
Rn-220 + dtrs	na	na	2.9E-07	0.0E+00	2.9E-07	na
TRANSURANICS AND FISSION PRODUCTS						
Am-241	na	na	1.6E-05	1.2E-10	5.0E-05	na
Sr-90 + dtr	na	na	1.1E-05	2.5E-08	1.1E-05	na
Sr-90	na	na	9.9E-06	2.3E-08	1.1E-05	na
Tc-99	na	na	1.1E-05	6.7E-09	1.1E-05	na
Cs-137 + dtr	na	na	3.7E-06	1.4E-07	3.5E-05	na
Cs-137	na	na	3.7E-06	1.4E-07	3.5E-05	na
Np-237 + dtr	na	na	1.6E-05	1.6E-09	1.7E-05	na
Np-237	na	na	1.6E-05	1.6E-09	1.7E-05	na
Pu-238	na	na	1.4E-05	2.0E-11	1.7E-05	na
Pu-239	na	na	1.5E-05	2.1E-11	1.8E-05	na
Pu-240	na	na	1.5E-05	2.1E-11	1.8E-05	na
Pu-239/240	na	na	1.5E-05	2.1E-11	1.8E-05	na
Ru-106	na	na	6.5E-07	1.7E-09	7.1E-07	na
U-233	na	na	1.8E-06	4.5E-09	1.8E-06	na

• This exposure pathway is included when calculating unit risks for this scenario.

na Not evaluated for water. Impacts of exposures from air and soil to this receptor are presented air and soil URFs, respectively.

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EXHIBIT S-4
Unit Risks Factors for Radionuclides in Water for Future Potential Scenarios (ILCR-L/pCi)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Drinking water	•	•	•	•	
Inhalation of volatilized radon	•	•	•	•	
Ingestion while swimming	•				
Ingestion of vegetables	•	•	•	•	
Ingestion of meat	•	•	•	•	
Ingestion of milk	•	•	•	•	
Ingestion of fish	•				
URANIUM SERIES					
U-238 + 2 dtrs	2.0E-06	2.5E-07	1.9E-06	6.9E-07	na
U-238	1.1E-06	1.4E-07	1.1E-06	3.9E-07	na
U-234	1.1E-06	1.4E-07	1.1E-06	3.9E-07	na
Th-230	1.0E-06	1.1E-07	8.3E-07	2.6E-07	na
Ra-226 + 8 dtrs	7.4E-05	6.9E-06	5.4E-05	1.9E-05	na
Ra-226 + 5 dtrs	1.2E-05	1.1E-06	8.8E-06	2.7E-06	na
Ra-226	1.1E-05	1.0E-06	8.0E-06	2.6E-06	na
Rn-222 + 4 dtrs	8.5E-07	1.1E-07	8.5E-07	7.2E-08	na
Rn-222	6.9E-08	8.8E-09	6.9E-08	5.9E-09	na
Pb-210 + 2 dtrs	8.3E-05	5.8E-06	4.5E-05	1.6E-05	na
Pb-210	6.4E-05	4.5E-06	3.5E-05	1.2E-05	na
ACTINIUM SERIES					
U-235 + 1 dtr	1.1E-06	1.4E-07	1.1E-06	3.9E-07	na
U-235	1.1E-06	1.4E-07	1.1E-06	3.9E-07	na
Pa-231+ 8 dtrs	3.1E-05	3.6E-06	2.8E-05	8.9E-06	na
Pa-231	6.5E-06	7.6E-07	5.9E-06	1.9E-06	na
Ac-227 + 7 dtrs	2.7E-05	2.9E-06	2.2E-05	7.0E-06	na
Ac-227	2.2E-05	2.3E-06	1.8E-05	5.6E-06	na
THORIUM SERIES					
Th-232 + 10 dtrs	1.3E-05	1.4E-06	1.1E-05	3.3E-06	na
Th-232	9.7E-07	9.8E-08	7.6E-07	2.4E-07	na
Ra-228 + 1 dtr	9.3E-06	8.3E-07	6.5E-06	2.0E-06	na
Ra-228	9.3E-06	8.3E-07	6.5E-06	2.0E-06	na
Th-228 + 7 dtrs	4.4E-06	4.5E-07	3.5E-06	1.1E-06	na
Th-228	8.2E-07	8.9E-08	7.0E-07	2.1E-07	na
Rn-220 + dtrs	2.9E-07	3.7E-08	2.9E-07	2.4E-08	na
TRANSURANICS AND FISSION PRODUCTS					
Am-241	5.0E-05	2.0E-06	1.6E-05	5.5E-06	na
Sr-90 + dtr	1.1E-05	1.4E-06	1.1E-05	6.4E-06	na
Sr-90	1.1E-05	1.3E-06	9.9E-06	5.9E-06	na
Tc-99	1.1E-05	1.4E-06	1.1E-05	4.7E-06	na
Cs-137 + dtr	3.5E-05	4.8E-07	3.7E-06	1.5E-06	na
Cs-137	3.5E-05	4.8E-07	3.7E-06	1.5E-06	na
Np-237 + dtr	1.7E-05	2.1E-06	1.6E-05	6.7E-06	na
Np-237	1.7E-05	2.1E-06	1.6E-05	6.7E-06	na
Pu-238	1.7E-05	1.8E-06	1.4E-05	4.5E-06	na
Pu-239	1.8E-05	1.9E-06	1.5E-05	4.7E-06	na
Pu-240	1.8E-05	1.9E-06	1.5E-05	4.7E-06	na
Pu-239/240	1.8E-05	1.9E-06	1.5E-05	4.7E-06	na
Ru-106	7.1E-07	8.4E-08	6.5E-07	2.3E-07	na
U-233	1.8E-06	2.4E-07	1.8E-06	1.2E-06	na

• This exposure pathway is included when calculating unit risks for this scenario.
na Not evaluated for water. Impacts from exposures to air and soil for this receptor are presented air and soil URFs, respectively.

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EXHIBIT S-5
Unit Risk Factors for Radionuclides in Soil/Sediment for Current Potential Scenarios (ILCR-g/pCi)

	Receptors Whose Exposure Factors Are Uniquely Defined by Existing Access Controls		Receptors whose Exposure Factors Are Unaffected by the Presence or Absence of Access Controls			Receptors Whose Exposure Factors Are Uniquely Defined by a Lack of Access Controls
	Visitor Age 19+	Trespassing Child Access Controls Age 7-18	Off-Property Farmer Age 1-70	Off-property User of Meat & Milk Grown On-site Age 1-70	Off-Property User of GM River Water Age 1-70	Trespassing Child w/o Access Controls Age 7-18
Ingestion of soil/sediment		•				•
External radiation exposure	•	•				•
Ingestion of meat				•		
Ingestion of milk				•		
URANIUM SERIES						
U-238 + 2 dtrs	5.1E-08	4.1E-10	na	5.7E-08	na	1.2E-08
U-238	3.0E-11	7.9E-12	na	3.2E-08	na	2.4E-10
U-234	4.3E-11	8.0E-12	na	3.2E-08	na	2.4E-10
Th-230	7.7E-11	6.8E-12	na	2.6E-11	na	2.0E-10
Ra-226 + 8 dtrs	8.6E-06	6.6E-08	na	2.2E-06	na	2.0E-06
Ra-226 + 5 dtrs	8.6E-06	6.6E-08	na	3.4E-07	na	2.0E-06
Ra-226	1.7E-08	1.9E-10	na	3.4E-07	na	5.7E-09
Rn-222 + 4 dtrs	8.4E-06	6.5E-08	na	0.0E+00	na	1.9E-06
Rn-222	1.7E-09	1.3E-11	na	0.0E+00	na	3.9E-10
Pb-210 + 2 dtrs	2.3E-10	3.2E-10	na	3.5E-06	na	9.6E-09
Pb-210	1.9E-10	2.5E-10	na	2.7E-06	na	7.4E-09
ACTINIUM SERIES						
U-235 + 1 dtr	3.4E-07	2.6E-09	na	3.2E-08	na	7.9E-08
U-235	3.4E-07	2.6E-09	na	3.2E-08	na	7.9E-08
Pa-231+ 8 dtrs	1.3E-06	9.8E-09	na	3.0E-09	na	2.9E-07
Pa-231	3.7E-08	3.3E-10	na	6.3E-10	na	9.9E-09
Ac-227 + 7 dtrs	1.2E-06	9.5E-09	na	1.2E-08	na	2.8E-07
Ac-227	3.7E-11	1.3E-10	na	9.3E-09	na	4.0E-09
THORIUM SERIES						
Th-232 + 10 dtrs	1.2E-05	9.3E-08	na	3.4E-10	na	2.8E-06
Th-232	3.7E-11	6.0E-12	na	2.4E-11	na	1.8E-10
Ra-228 + 1 dtr	4.1E-06	3.2E-08	na	2.7E-07	na	9.5E-07
Ra-228	0.0E+00	4.8E-11	na	2.7E-07	na	1.4E-09
Th-228 + 7 dtrs	8.0E-06	6.1E-08	na	9.3E-11	na	1.8E-06
Th-228	7.8E-10	1.1E-11	na	1.9E-11	na	3.4E-10
Rn-220 + dtrs	7.7E-06	5.9E-08	na	0.0E+00	na	1.8E-06
TRANSURANICS AND FISSION PRODUCTS						
Am-241	7.0E-09	1.7E-10	na	6.2E-10	na	5.1E-09
Sr-90 + dtr	0.0E+00	1.7E-11	na	5.1E-05	na	5.2E-10
Sr-90	0.0E+00	1.6E-11	na	4.7E-05	na	4.8E-10
Tc-99	8.6E-13	6.3E-13	na	5.5E-05	na	1.9E-11
Cs-137 + dtr	2.9E-06	2.2E-08	na	9.8E-06	na	6.6E-07
Cs-137	0.0E+00	1.3E-11	na	9.8E-06	na	4.0E-10
Np-237 + dtr	6.1E-07	4.8E-09	na	1.5E-07	na	1.4E-07
Np-237	1.1E-08	1.9E-10	na	1.5E-07	na	5.7E-09
Pu-238	4.0E-11	1.1E-10	na	8.2E-12	na	3.2E-09
Pu-239	2.4E-11	1.1E-10	na	8.6E-12	na	3.3E-09
Pu-240	3.9E-11	1.1E-10	na	8.6E-12	na	3.3E-09
Pu-239/240	3.9E-11	1.1E-10	na	8.6E-12	na	3.3E-09
Ru-106	0.0E+00	4.6E-12	na	9.0E-08	na	1.4E-10
U-233	6.0E-11	8.1E-12	na	3.2E-08	na	2.4E-10

• This exposure pathway is included when calculating unit risks for this scenario.
na Not evaluated for soil. Impacts of exposures from air and water to this receptor are presented air and water URFs, respectively.

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EXHIBIT S-6
Unit Risk Factors for Radionulcides in Soil/Sediment for Future Potential Scenarios (ILCR-g/pCi)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Ingestion of soil/sediment		•	•	•	•
External radiation exposure		•	•	•	•
Ingestion of vegetables		•	•	•	
Ingestion of meat		•	•	•	
Ingestion of milk		•	•	•	
URANIUM SERIES					
U-238 + 2 dtrs	na	2.5E-07	2.0E-06	1.8E-07	1.7E-09
U-238	na	3.4E-08	3.1E-07	3.7E-08	8.1E-11
U-234	na	3.4E-08	3.1E-07	3.7E-08	8.1E-11
Th-230	na	1.2E-09	4.1E-08	5.9E-09	6.7E-11
Ra-226 + 8 dtrs	na	3.3E-05	2.6E-04	2.0E-05	2.6E-07
Ra-226 + 5 dtrs	na	3.2E-05	2.5E-04	1.9E-05	2.6E-07
Ra-226	na	2.1E-07	1.9E-06	2.6E-07	1.1E-09
Rn-222 + 4 dtrs	na	3.2E-05	2.5E-04	1.8E-05	2.5E-07
Rn-222	na	6.4E-09	5.0E-08	3.7E-09	5.1E-11
Pb-210 + 2 dtrs	na	2.8E-06	2.4E-05	2.4E-06	3.3E-09
Pb-210	na	2.2E-06	1.8E-05	1.9E-06	2.6E-09
ACTINIUM SERIES					
U-235 + 1 dtr	na	1.3E-06	1.0E-05	7.9E-07	1.0E-08
U-235	na	1.3E-06	1.0E-05	7.9E-07	1.0E-08
Pa-231+ 8 dtrs	na	4.7E-06	3.8E-05	2.9E-06	4.0E-08
Pa-231	na	1.5E-07	1.4E-06	1.3E-07	1.6E-09
Ac-227 + 7 dtrs	na	4.6E-06	3.7E-05	2.8E-06	3.8E-08
Ac-227	na	5.1E-08	1.1E-06	1.5E-07	1.4E-09
THORIUM SERIES					
Th-232 + 10 dtrs	na	4.5E-05	3.5E-04	2.7E-05	3.6E-07
Th-232	na	9.5E-10	3.6E-08	5.4E-09	6.1E-11
Ra-228 + 1 dtr	na	1.6E-05	1.2E-04	9.2E-06	1.2E-07
Ra-228	na	1.2E-07	1.2E-06	1.8E-07	5.0E-10
Th-228 + 7 dtrs	na	3.0E-05	2.3E-04	1.7E-05	2.4E-07
Th-228	na	3.7E-09	5.5E-08	6.6E-09	7.9E-11
Rn-220 + dtrs	na	2.9E-05	2.3E-04	1.7E-05	2.3E-07
TRANSURANICS AND FISSION PRODUCTS					
Am-241	na	5.6E-08	1.0E-06	1.3E-07	1.4E-09
Sr-90 + dtr	na	1.0E-05	7.9E-05	1.5E-05	1.8E-10
Sr-90	na	9.2E-06	7.2E-05	1.3E-05	1.7E-10
Tc-99	na	7.8E-06	6.1E-05	1.3E-05	6.5E-12
Cs-137 + dtr	na	1.2E-05	9.7E-05	8.3E-06	8.6E-08
Cs-137	na	1.7E-06	1.4E-05	2.0E-06	1.4E-10
Np-237 + dtr	na	3.2E-06	2.5E-05	1.9E-06	2.0E-08
Np-237	na	9.2E-07	7.7E-06	6.0E-07	1.4E-09
Pu-238	na	1.1E-08	6.2E-07	9.5E-08	1.1E-09
Pu-239	na	1.1E-08	6.5E-07	9.9E-08	1.2E-09
Pu-240	na	1.1E-08	6.5E-07	9.9E-08	1.2E-09
Pu-239/240	na	1.1E-08	6.5E-07	9.9E-08	1.2E-09
Ru-106	na	7.8E-08	6.3E-07	4.4E-08	4.8E-11
U-233	na	3.4E-08	3.1E-07	3.7E-08	8.2E-11

• This exposure pathway is included when calculating unit risks for this scenario.

na Not evaluated for soil. Impacts of exposures from air and water to this receptor are presented air and water URFs, respectively.

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EXHIBIT S-7
Unit Risk Factors for Chemicals in Water for Current Potential Scenarios (ILCR-l/mg)

	Receptors Whose Exposure Factors Are Uniquely Defined by Existing Access Controls		Receptors whose Exposure Factors Are Unaffected by the Presence or Absence of Access Controls			Receptors Whose Exposure Factors Are Uniquely Defined by a Lack of Access Controls
	Visitor Age 19+	Tresspassing Child Access Controls Age 7-18	Off-Property Farmer Age 1-70	Off-Property User Of Meat & Milk Grown On-site Age 1-70	Off-Property User Of GM River Water Age 1-70	Trespassing Child w/o Access Controls Age 7-18
Drinking water			•		•	
Inhalation of VOCs			•		•	
Ingestion while swimming					•	
Ingestion of vegetables			•		•	
Ingestion of meat			•	•	•	
Ingestion of milk			•	•	•	
Ingestion of fish					•	
Dermal contact: bathing			•		•	
Dermal contact: swimming					•	
Beryllium			1.6E-01	1.7E-03	1.8E-01	
Benzene			7.8E-03	4.6E-06	NA	
Bis(2-ethylhexyl) phthalate			6.5E-04	9.3E-05	4.5E-03	
Chloroform			1.9E-03	8.3E-07	NA	
Methylene chloride			5.7E-03	5.1E-07	5.7E-03	
Trichloroethene			2.4E-03	2.9E-06	NA	
N-nitrosodiephenylamine			NA	NA	1.1E-03	

NA = not applicable to this scenario or toxicity value not available

EXHIBIT S-8
Unit Toxicity Factors for Chemicals in Water for Current Potential Scenarios (Hazard Index-l/mg)

	Receptors Whose Exposure Factors Are Uniquely Defined by Existing Access Controls		Receptors whose Exposure Factors Are Unaffected by the Presence or Absence of Access Controls			Receptors Whose Exposure Factors Are Uniquely Defined by a Lack of Access Controls
	Visitor Age 19+	Tresspassing Child Access Controls Age 7-18	Off-Property Farmer Age 1-70	Off-Property User Of Meat & Milk Grown On-site Age 1-70	Off-Property User Of GM River Water Age 1-70	Trespassing Child w/o Access Controls Age 7-18
Drinking water			•		•	
Inhalation of VOCs			•		•	
Ingestion while swimming					•	
Ingestion of vegetables			•		•	
Ingestion of meat			•	•	•	
Ingestion of milk			•	•	•	
Ingestion of fish					•	
Dermal contact: bathing			•		•	
Dermal contact: swimming					•	
Antimony			3.6E+02	1.1E+00	3.6E+02	
Arsenic			1.3E+02	4.9E+00	2.3E+02	
Barium			5.9E-01	3.7E-02	5.5E-01	
Beryllium			7.2E+00	7.8E-02	1.0E+01	
Cadmium			5.5E+01	2.4E+01	2.3E+02	
Chromium			8.1E+00	8.6E-01	9.7E+00	
Cobalt			NA	NA	1.5E+01	
Lead			5.5E+01	1.3E+00	1.1E+02	
Manganese			4.7E-01	4.6E-02	4.3E-01	
Mercury			7.3E+03	7.1E+03	1.4E+04	
Nickel			2.5E+00	4.2E-01	3.8E+00	
Selenium			1.1E+01	3.3E+00	1.0E+01	
Silver			1.4E+01	5.1E+00	4.7E+02	
Thallium			7.4E+02	2.3E+02	NA	
Vanadium			5.3E+00	1.3E-01	5.1E+00	
Zinc			1.0E+01	9.7E+00	8.7E-01	
1,1,1-Trichloroethane			2.0E+00	2.6E-03	NA	
2-Butanone			5.2E+01	5.1E-04	NA	
Acetone			5.3E+01	1.6E-04	5.3E+01	
Bis(2-ethylhexyl) phthalate			2.3E+00	3.3E-01	3.3E+01	
Carbon disulfide			6.8E+00	1.7E-03	NA	
Chloroform			3.1E+01	1.4E-02	NA	
Di-n-butyl phthalate			4.9E-01	6.1E-02	7.9E+01	
Ethylbenzene			9.5E+00	4.5E-02	NA	
Methylene chloride			1.3E+01	1.1E-03	1.3E+01	
Toluene			7.0E-01	1.4E-03	NA	
Total Xylenes			4.7E-02	2.0E-04	NA	
Molybdenum			8.5E+00	3.9E-01	8.2E+00	
Uranium			1.2E+01	3.3E-01	1.2E+01	

NA = not applicable to this scenario or toxicity value not available

EXHIBIT S-9
Unit Risk Factors for Chemicals in Water for for Future Potential Scenarios (ILCR-l/mg)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Drinking water	•	•	•	•	
Inhalation of VOCs	•	•	•		
Ingestion while swimming	•				
Ingestion of vegetables	•	•	•	•	
Ingestion of meat	•	•	•	•	
Ingestion of milk	•	•	•	•	
Ingestion of fish	•				
Dermal contact: bathing	•	•	•		
Deraml contact: swimming	•				
Beryllium	1.8E-01	NA	NA	NA	
Aroclor-1254	2.4E+02	NA	NA	NA	
Aroclor-1260	4.7E+02	NA	NA	NA	
Benzene	7.9E-03	NA	NA	NA	
Benzo(a)pyrene	5.6E+01	NA	NA	NA	
Bis(2-ethylhexyl) phthalate	4.4E-03	NA	NA	NA	
Chloroform	1.9E-03	NA	NA	NA	
Methylene chloride	5.7E-03	NA	NA	NA	
N-nitrosodiphenylamine	7.9E-04	NA	NA	NA	
Tetrachloroethene	4.0E-03	NA	NA	NA	
Trichloroethene	3.1E-04	NA	NA	NA	
Vinyl chloride	NA	1.6E-01	1.2E+00	4.0E-01	

NA = not applicable to this scenario or toxicity value not available

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EXHIBIT S-10
Unit Toxicity Factors for Chemicals in Water for Future Potential Scenarios (Hazard Index-l/mg)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Drinking water	•	•	•	•	
Inhalation of VOCs	•	•	•		
Ingestion while swimming	•				
Ingestion of vegetables	•	•	•	•	
Ingestion of meat	•	•	•	•	
Ingestion of milk	•	•	•	•	
Ingestion of fish	•				
Dermal contact: bathing	•	•	•		
Dermal contact: swimming	•				
Antimony	3.6E+02	NA	NA	NA	
Arsenic	2.4E+02	NA	NA	NA	
Barium	5.9E-01	NA	NA	NA	
Beryllium	1.0E+01	NA	NA	NA	
Boron	NA	5.6E+00	5.6E+00	4.5E+01	
Cobalt	1.9E+01	NA	NA	NA	
Cyanide	1.2E+02	NA	NA	NA	
Lead	1.1E+02	NA	NA	NA	
Manganese	4.7E-01	NA	NA	NA	
Mercury	2.1E+04	NA	NA	NA	
Molybdenum	NA	8.5E+00	8.5E+00	3.3E+01	
Nickel	4.2E+00	NA	NA	NA	
Silver	4.7E+02	NA	NA	NA	
Zinc	1.1E+01	NA	NA	NA	
Uranium	1.2E+01	1.2E+01	1.2E+01	4.5E+01	
1,1,1-Trichloroethane	2.1E+00	NA	NA	NA	
2-Butanone	5.2E+01	NA	NA	NA	
Acenaphthene	4.6E-01	NA	NA	NA	
Acetone	5.3E+01	NA	NA	NA	
Anthracene	3.7E+00	NA	NA	NA	
Benzoic acid	1.4E-01	NA	NA	NA	
Bis(2-ethylhexyl) phthalate	3.4E+01	NA	NA	NA	
Carbon disulfide	6.8E+00	NA	NA	NA	
Chloroform	3.2E+01	NA	NA	NA	
Chlorobenzene	3.9E+00	NA	NA	NA	
Di-n-butyl phthalate	7.9E+01	NA	NA	NA	
Dibenzofuran	6.4E+01	NA	NA	NA	
Fluoranthene	2.2E+00	NA	NA	NA	
Methylene chloride	1.3E+01	NA	NA	NA	
Pyrene	1.5E+00	NA	NA	NA	

NA = not applicable to this scenario or toxicity value not available

EXHIBIT S-11
Unit Risk Factors for Chemicals in Soil/Sediment for Current Potential Scenarios (ILCR-kg/mg)

	Receptors Whose Exposure Factors Are Uniquely Defined by Existing Access Controls		Receptors whose Exposure Factors Are Unaffected by the Presence or Absence of Access Controls			Receptors Whose Exposure Factors Are Uniquely Defined by a Lack of Access Controls
	Visitor Age 19+	Tresspassing Child Access Controls Age 7-18	Off-Property Farmer Age 1-70	Off-Property User Of Meat & Milk Grown On-site Age 1-70	Off-Property User Of GM River Water Age 1-70	Trespassing Child w/o Access Controls Age 7-18
Incidental soil ingestion		•				•
Dermal contact: soil		•				•
Ingestion of meat				•		
Ingestion of milk				•		
Beryllium		7.3E-09		3.3E-06		2.2E-07
Aroclor-1248		9.8E-07		2.3E-04		2.9E-05
Aroclor-1254		9.8E-07		6.4E-04		2.9E-05
Aroclor-1260		9.8E-07		4.5E-04		2.9E-05
Benzene		3.7E-09		1.3E-08		1.1E-07
Benzo(a)pyrene		7.4E-07		2.8E-04		2.2E-05
Bis(2-ethylhexyl)phthalate		1.8E-09		2.2E-07		5.5E-08
Chloroform		7.8E-10		2.3E-09		2.3E-08
Methylene chloride		9.5E-10		1.4E-09		2.7E-08
N-nitrosodiphenylamine		6.2E-10		8.5E-09		1.9E-08
Tetrachloroethene		6.5E-09		6.4E-08		2.0E-07
Trichloroethene		1.4E-09		8.3E-09		4.2E-08

NA = not applicable to this scenario or toxicity value not available

EXHIBIT S-12
Unit Toxicity Factors for Chemicals in Soil/Sediment for Current Potential Scenarios (Hazard Index-kg/mg)

	Receptors Whose Exposure Factors Are Uniquely Defined by Existing Access Controls		Receptors whose Exposure Factors Are Unaffected by the Presence or Absence of Access Controls			Receptors Whose Exposure Factors Are Uniquely Defined by a Lack of Access Controls
	Visitor Age 19+	Tresspassing Child Access Controls Age 7-18	Off-Property Farmer Age 1-70	Off-Property User Of Meat & Milk Grown On-site Age 1-70	Off-Property User Of GM River Water Age 1-70	Trespassing Child w/o Access Controls Age 7-18
Incidental soil ingestion		•				•
Dermal contact: soil		•				•
Ingestion of meat				•		
Ingestion of milk				•		
2-Butanone		1.5E-05		1.4E-06		4.4E-04
Acetone		7.4E-06		4.5E-07		2.2E-04
Antimony		2.5E-05		1.8E-03		7.5E-04
Arsenic		3.3E-05		1.2E-02		9.9E-04
Barium		1.4E-07		9.7E-05		4.3E-06
Beryllium		2.0E-06		1.5E-04		6.0E-05
Cadmium		9.9E-06		6.7E-02		3.0E-04
Chromium		2.0E-06		1.6E-03		6.0E-05
Cobalt		3.8E-06		1.1E-02		1.1E-04
Lead		1.4E-05		3.1E-03		4.3E-04
Manganese		9.9E-08		1.2E-04		3.0E-06
Mercury		3.3E-05		2.0E+01		1.0E-03
Nickel		5.0E-07		1.0E-03		1.5E-05
Selenium		2.0E-06		7.2E-03		6.0E-05
Silver		2.0E-06		8.5E-03		6.0E-05
Vanadium		1.4E-06		2.4E-04		4.3E-05
Zinc		5.0E-08		2.7E-02		1.5E-06
1,1,1-Trichloroethane		8.2E-06		7.3E-06		2.5E-04
Acenaphthene		4.2E-08		NA		1.3E-06
Anthracene		2.5E-06		1.7E-05		7.4E-05
Benzoic acid		1.9E-07		8.8E-08		5.6E-06
Bis(2-ethylhexyl)phthalate		3.7E-05		7.7E-04		1.1E-03
Carbon disulfide		7.4E-06		4.7E-06		2.2E-04
Chlorobenzene		3.7E-06		4.5E-06		1.1E-04
Chloroform		7.4E-05		3.8E-05		2.2E-03
Cyanide		5.0E-07		4.0E-06		1.5E-05
Di-n-butyl phthalate		7.4E-06		1.5E-04		2.2E-04
Dibenzofuran		7.4E-05		3.5E-04		2.2E-03
Fluoranthene		1.9E-05		4.1E-04		5.6E-04
Fluorene		1.9E-05		9.5E-05		5.6E-04
Methylene chloride		1.2E-05		3.2E-06		3.7E-04
Naphthalene		1.9E-05		2.9E-04		5.6E-04
Phenol		1.2E-06		3.9E-07		3.7E-05
Pyrene		2.5E-05		4.5E-04		7.4E-04
Tetrachloroethene		7.4E-05		1.3E-04		2.2E-03
Toluene		3.7E-06		4.0E-06		1.1E-04
Uranium		8.5E-07		6.3E-04		2.2E-05

NA = not applicable to this scenario or toxicity value not available

EXHIBIT S-13
Unit Risks Factors for Chemicals in Soil for Future Potential Scenarios (ILCR-kg/mg)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Ingestion of soil/sediment		•	•	•	•
Dermal contact: soil		•	•	•	•
Ingestion of vegetables		•	•	•	
Ingestion of meat		•	•	•	
Ingestion of milk		•	•	•	
1,1,2,2-Tetrachloroethane		1.9E-05	8.2E-06	5.0E-05	1.7E-08
Beryllium		3.1E-06	3.0E-05	1.2E-05	1.6E-08
1,1-Dichloroethene		7.0E-04	5.4E-03	1.8E-03	5.0E-08
DDT		5.5E-06	4.3E-05	2.5E-05	2.9E-08
Aroclor-1248		1.1E-04	8.3E-04	4.2E-04	6.5E-07
Aroclor-1254		1.3E-04	1.0E-03	5.1E-04	6.5E-07
Aroclor-1260		1.2E-04	9.1E-04	5.1E-04	6.5E-07
Benzene		1.4E-05	1.1E-04	3.7E-05	2.4E-09
Benzo(a)pyrene		8.3E-05	6.5E-04	3.4E-04	4.9E-07
Bis(2-ethylhexyl) phthalate		2.3E-07	1.8E-06	7.6E-07	1.2E-09
Bromodichloromethane		8.9E-05	6.9E-04	2.3E-04	1.1E-08
Chlordane		1.4E-05	1.1E-04	3.6E-05	1.1E-07
Chloroform		3.7E-06	2.9E-05	9.7E-06	5.1E-10
Aroclor-1242		NA	NA	NA	6.5E-07
Methylene chloride		1.2E-05	9.2E-05	3.1E-05	6.3E-10
Pentachlorophenol		2.0E-06	1.5E-05	6.0E-06	1.0E-08
Tetrachloroethene		4.9E-06	3.8E-05	1.3E-05	4.3E-09
Trichloroethene		4.4E-06	3.4E-05	1.1E-05	9.2E-10
Vinyl chloride		2.5E-03	2.0E-02	6.6E-03	1.6E-07
N-nitrosodiphenylamine		8.6E-11	7.3E-09	NA	4.1E-10

NA = not applicable to this scenario or toxicity value not available

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EXHIBIT S-14
Unit Toxicity Factors for Chemicals in Soil for Future Potential Scenarios (Hazard Index-kg/mg)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Ingestion of soil/sediment		•	•	•	•
Dermal contact: soil		•	•	•	•
Ingestion of vegetables		•	•	•	
Ingestion of meat		•	•	•	
Ingestion of milk		•	•	•	
Antimony		3.8E+00	3.8E+00	1.5E+01	6.3E-04
Arsenic		7.0E-02	7.4E-02	3.0E-01	8.4E-04
Barium		8.5E-04	8.7E-04	4.3E-03	3.6E-06
Beryllium		1.1E-03	1.4E-03	6.5E-03	5.0E-05
Boron		4.9E-02	4.9E-02	2.6E-01	2.8E-06
Cadmium (food)		4.0E-01	1.9E-03	2.1E+00	2.5E-04
Chromium		3.4E-03	3.6E-03	2.3E-02	5.0E-05
Cobalt		1.7E-02	1.7E-02	8.6E-02	9.7E-05
Cyanide		2.0E+00	2.0E+00	7.9E+00	1.3E-05
Lead		3.6E-02	3.8E-02	1.8E-01	3.7E-04
Manganese		1.4E-03	1.4E-03	6.4E-03	2.5E-06
Mercury		2.1E+01	2.1E+01	4.4E+01	8.4E-04
Molybdenum		1.8E-02	1.9E-02	8.0E-02	5.0E-05
Nickel		6.1E-03	6.1E-03	2.7E-02	1.3E-05
Selenium		1.6E-02	1.6E-02	9.3E-02	5.0E-05
Silver		3.8E-02	3.8E-02	2.3E-01	5.0E-05
Thallium		4.5E-01	4.7E-01	1.9E+00	3.6E-03
Uranium		3.2E-03	3.7E-03	2.2E-02	6.5E-05
Vanadium		1.1E-03	1.3E-03	5.7E-03	3.6E-05
Zinc		3.5E-02	3.5E-02	1.8E-01	1.3E-06
1,1,2-Trichloro-1,2,2-trifluoroethane		NA	NA	1.0E+00	NA
1,1,1-Trichloroethane		2.7E-02	2.7E-02	1.0E-01	6.5E-05
1,1-Dichloroethane		6.0E-02	6.0E-02	2.3E-01	5.9E-05
1,1-Dichloroethene		1.0E+00	1.0E+00	3.9E+00	6.5E-04
2,4-Dimethylphenol		1.2E-01	1.2E-01	4.6E-01	2.9E-04
2-Butanone		8.8E-01	8.8E-01	3.4E+00	1.2E-04
2-Chlorophenol		7.5E-01	7.5E-01	2.9E+00	1.2E-03
DDT		2.5E-01	2.6E-01	1.7E+00	1.2E-02
Acenaphthene		2.3E-06	2.5E-05	2.1E-04	3.3E-06
Acetone		8.9E-01	8.9E-01	3.5E+00	5.9E-05
Anthracene		7.3E-04	7.3E-04	3.1E-03	2.0E-05
Benzoic acid		1.4E-03	1.4E-03	5.3E-03	1.5E-06
Bis(2-ethylhexyl) phthalate		6.4E-03	6.4E-03	3.2E-02	2.9E-04
Bromodichloromethane		2.7E-01	2.7E-01	1.0E+00	2.9E-04
Butyl benzyl phthalate		6.9E-04	7.0E-04	2.9E-03	2.9E-05
Carbon disulfide		4.6E-02	4.6E-02	1.8E-01	5.9E-05
Chlordane		1.4E+00	1.4E+00	5.4E+00	9.8E-02
Chlorobenzene		7.6E-03	7.6E-03	3.0E-02	2.9E-05
Chloroform		4.7E-01	4.7E-01	1.8E+00	5.9E-04
Di-n-butyl phthalate		1.8E-03	1.8E-03	8.4E-03	5.9E-05
Dibenzofuran		3.1E-02	3.1E-02	1.3E-01	5.9E-04
Ethylbenzene		1.0E-01	1.0E-01	4.0E-01	5.9E-04
Fluoranthene		2.7E-03	2.8E-03	1.4E-02	1.5E-04
Fluorene		7.3E-03	7.4E-03	3.0E-02	1.5E-04
Methyl parathion		1.7E+00	1.7E+00	6.7E+00	2.3E-03
Methylene chloride		2.1E-01	2.1E-01	8.0E-01	9.8E-05
Naphthalene		1.0E-03	1.0E-03	5.0E-03	1.5E-04

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EXHIBIT S-14
Unit Toxicity Factors for Chemicals in Soil for Future Potential Scenarios (Hazard Index-kg/mg)

	Farmer Using GM River Age 1-70	Typical On-property Resident Age 1-70	RME On-property Farmer Age 1-70	On-property Resident Child Age 1-6	On-property Home Builder Age 19+
Ingestion of soil/sediment		•	•	•	•
Dermal contact: soil		•	•	•	•
Ingestion of vegetables		•	•	•	
Ingestion of meat		•	•	•	
Ingestion of milk		•	•	•	
Pentachlorophenol		4.2E-03	4.3E-03	1.9E-02	2.0E-04
Phenol		1.6E-02	1.6E-02	6.0E-02	9.8E-06
Pyrene		3.6E-03	3.7E-03	1.7E-02	2.0E-04
Tetrachloroethene		7.4E-02	7.5E-02	2.9E-01	5.9E-04
Toluene		8.8E-03	8.8E-03	3.4E-02	2.9E-05
Total Xylenes		5.1E-04	5.1E-04	1.0E-04	2.9E-06
Trans-1,2-Dichloroethene		4.5E-01	4.5E-01	1.8E+00	2.9E-04

APPENDIX T

APPENDIX T

UPPER TOLERANCE LIMITS
FOR BACKGROUND RADIONUCLIDES AND CHEMICALS AT THE FEMP

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INTRODUCTION

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In the process of selecting constituents of potential concern (see Appendix R), measured concentrations of a given constituent in a medium at the site are compared with the upper 95 percent tolerance limit (UTL) or the 95th quantile for the background concentrations for the same constituent in the same medium. This appendix provides the UTLs constructed for background concentrations for many constituents in various media. If there is an insufficient number of samples available for a constituent in a given medium to construct the UTL or if an insufficient percentage of the data are above the Sample Quantitation Limit (SQL), the UTL is not calculated for that constituent and a default value for the background concentration is used.

RADON IN AIR

Background radon data were taken from Westinghouse Environmental Management Company of Ohio (WEMCO) Radon Monitoring Program measurement results. Background radon sampling was performed at two locations greater than 15 miles (25 km) from the Fernald Environmental Management Project (FEMP). Background radon concentrations in air measured for two time periods (October and December 1991) are presented in Table T-1.

TABLE T-1

BACKGROUND CONCENTRATIONS OF RADON IN AIR

Radionuclide	Date	Frequency of Detection	UTL for Bkgnd[a] (pCi/ℓ)	Range of Detection (pCi/ℓ)	Distribution[b]	Mean[c] (pCi/ℓ)	Upper 95% CI on Mean[d] (pCi/ℓ)	Standard Deviation (pCi/ℓ)	Variance
Rn-222	10/91	741/741	1.837	0.100 - 2.700	L	0.866	0.899	0.512	0.262
Rn-222	12/91	741/741	1.160	0.200 - 2.400	L	0.611	0.630	0.295	0.087

[a] Upper 95% tolerance level for background data with a 95% level of confidence (UTL).

[b] Distribution: N = Normal; L = Log-normal.
If the number of detects ≥ 7 and the frequency of detection ≥ 50%, a probability plot that handles censored data is used in determining the distribution. Otherwise, the distribution is estimated by visual inspection of the raw data, a histogram, and a standard probability plot.

[c] If the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and frequency of detection ≥ 50%, an arithmetic mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric mean is given.

[d] If the distribution is normal or if the distribution is log-normal, the number of detects ≥ 7, and the frequency of detection ≥ 50%, an arithmetic upper 95% confidence interval (CI) on the mean is given. If the distribution is log-normal and either the number of detects < 7 or the frequency of detection is < 50%, a geometric upper 95% CI on the mean is given.

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SURFACE WATER

Background surface water concentrations were determined for samples from the Great Miami River upstream from the FEMP. Samples collected each week in 1990 (a total of 51 measurements) show that the concentrations of all constituents except uranium are below the SQL for each constituent (OEPA 1989). The UTL, therefore, could be constructed only for uranium. Analytical results and the calculated UTL for background uranium in the Great Miami River upstream from the FEMP are presented in Table T-2.

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TABLE T-2

ANALYTICAL RESULTS AND UTL FOR BACKGROUND URANIUM IN THE GREAT MIAMI RIVER UPSTREAM FROM THE FEMP

1990
Uranium Concentration Great Miami River
Venice (W1) Jan 1 - Mar 14
Venice (W1) Dec 19 - Dec 26
Hamilton (W1) Mar 21 - Dec 12

Week	Date-1990	mg/ℓ	pCi/ℓ	ℓn	$(y-\bar{y})^2$
1	02 - Jan	0.0016	1.1	-6.4378	0.0129
2	09 - Jan	0.0020	1.4	-6.2146	0.0120
3	16 - Jan	0.0020	1.4	-6.2146	0.0120
4	23 - Jan	0.0020	1.4	-6.2146	0.0120
5	30 - Jan	0.0020	1.4	-6.2146	0.0120
6	08 - Feb	0.0021	1.4	-6.1658	0.0251
7	15 - Feb	0.0023	1.6	-6.0748	0.0622
8	19 - Feb	0.0015	1.0	-6.5023	0.0317
9	26 - Feb	0.0029	2.0	-5.8430	0.2315
10	07 - Mar	0.0023	1.6	-6.0748	0.0622
11	14 - Mar	0.0018	1.2	-6.3200	0.0000
12	21 - Mar	0.0020	1.4	-6.2146	0.0120
13	28 - Mar	0.0026	1.8	-5.9522	0.1384
14	04 - Apr	0.0020	1.4	-6.2146	0.0120
15	11 - Apr	0.0019	1.3	-6.2659	0.0034
16	18 - Apr	0.0019	1.3	-6.2659	0.0034
17	25 - Apr	0.0018	1.2	-6.3200	0.0000
18	02 - May	0.0019	1.3	-6.2659	0.0034
19	09 - May	0.0017	1.1	-6.3771	0.0028
20	16 - May	0.0015	1.0	-6.5023	0.0317
21	23 - May	0.0019	1.3	-6.2659	0.0034
22	30 - May	0.0015	1.0	-6.5023	0.0317
23	06 - Jun	0.0018	1.2	-6.3200	0.0000
24	13 - Jun	0.0018	1.2	-6.3200	0.0000
25	20 - Jun	0.0019	1.3	-6.2659	0.0034
26	27 - Jun	0.0017	1.1	-6.3771	0.0028

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TABLE T-2
(Continued)

Week	Date-1990	mg/ℓ	pCi/ℓ	ℓn	$(y-\bar{y})^2$
27	04 - Jul	0.0018	1.2	-6.3200	0.0000
28	11 - Jul	0.0018	1.2	-6.3200	0.0000
29	18 - Jul	0.0016	1.1	-6.4378	0.0129
30	25 - Jul	0.0016	1.1	-6.4378	0.0129
31	01 - Aug	0.0018	1.2	-6.3200	0.0000
32	08 - Aug	0.0017	1.1	-6.3771	0.0028
33	15 - Aug				
34	22 - Aug	0.0012	0.8	-6.7254	0.1610
35	29 - Aug	0.0015	1.0	-6.5023	0.0317
36	05 - Sep	0.0019	1.3	-6.2659	0.0034
37	12 - Sep	0.0018	1.2	-6.3200	0.0000
38	19 - Sep	0.0014	0.9	-6.5713	0.0610
39	26 Sep	0.0017	1.1	-6.3771	0.0028
40	03 - Oct	0.0017	1.1	-6.3771	0.0028
41	10 - Oct	0.0014	0.9	-6.5713	0.0610
42	17 - Oct	0.0022	1.5	-6.1193	0.0420
43	24 - Oct	0.0016	1.1	-6.4378	0.0129
44	31 - Oct	0.0021	1.4	-6.1658	0.0251
45	07 - Nov	0.0018	1.2	-6.3200	0.0000
46	14 - Nov	0.0018	1.2	-6.3200	0.0000
47	21 - Nov	0.0018	1.2	-6.3200	0.0000
48	28 - Nov	0.0019	1.3	-6.2659	0.0034
49	05 - Dec	0.0013	0.9	-6.6454	0.1032
50	12 - Dec	0.0019	1.3	-6.2659	0.0034
51	19 - Dec	0.0012	0.8	-6.7254	0.1610
52	26 - Dec	0.0018	1.2	-6.3200	0.0000

$\bar{y}$	-6.3242 mg/ℓ
z	1.6450
Sy	0.1689
UTL	0.002366 mg/ℓ

GROUNDWATER

Background groundwater data were taken from the FEMP database for the wells identified in Table T-3. Summaries of all background values for radionuclides and chemicals used for the perched water and all flows through the aquifer are given in Table T-4 and Table T-5, respectively. The number of measurements above the SQL for naturally-occurring radionuclides was insufficient for constructing UTLs; therefore, the SQL of each radionuclide is presented as upper limits for background. Anthropogenic radionuclides are assumed to have a background groundwater concentration of zero.

TABLE T-3

BACKGROUND WELLS AT THE FEMP

Perched Water (1000-Series)	Dry Fork Trough (Aquifer - Southwest of Former Production Area)
1024	2036
1052	2057
1059	2123
1060	
1065	
Shandon Trough (Aquifer - Underlying Former Production Area)	**Ross Trough (Aquifer - Northeast of FEMP)**
2043	2026
2050	2121
2056	2122
2066	3063
2105	3099
	3100

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TABLE T-4

BACKGROUND UPPER LIMIT CONCENTRATION FOR RADIONUCLIDES IN GROUNDWATER

RADIONUCLIDE	
NATURALLY-OCCURRING	BACKGROUND UPPER LIMIT (pCi/ℓ)
Ra-226	< 1
Ra-228	< 3
Th-228	< 1
Th-230	< 1
Th-232	< 1
U-234	< 1
U-235	< 1
U-238	< 1
FISSION PRODUCTS	BACKGROUND UPPER LIMIT (pCi/ℓ)
Cs-137	0
Np-237	0
Pu-238	0
Pu-239/240	0
Ru-106	0
Sr-90	0
Tc-99	0

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TABLE T-5
BACKGROUND CONCENTRATIONS OF CHEMICALS IN GROUNDWATER AT FEMP

Chemical	Background Concentration in Groundwater (mg/ℓ)				
	Perched Water	Shandon Flow	Dry Fork Flow	Ross Flow	Dry Fork/ Shandon Divide
Aluminum	0.18	0.14	NA[a]	NA	NA
Arsenic	NA	0.39	0.05	NA	0.43
Ammonia	0.36	7.1	NA	0.18	6.3
Barium	0.13	1.0	0.051	0.079	1.1
Beryllium	0.001	0.001	NA	NA	NA
Cadmium	0.003	0.003	NA	NA	NA
Calcium	130	140	100	112	123
Chloride	40	110	30	105	178
Chromium	0.076	0.039	NA	0.013	0.03
Cobalt	NA	NA	NA	NA	NA
Copper	0.046	NA	0.09	0.15	0.032
Fluoride	1.6	1.3	0.47	0.37	1.6
Iron	1.8	4.1	0.6	0.13	4.1
Lead	0.005	0.051	NA	0.016	0.042
Magnesium	57	47	28	38	36
Manganese	0.2	0.27	0.011	0.035	0.52
Mercury	NA	NA	NA	NA	NA
Molybdenum	NA	0.014	NA	0.055	0.024
Nickel	0.10	NA	NA	NA	NA
Nitrate	0.34	0.25	19.4	22	13
Phenols	0.049	0.061	0.034	0.032	0.026
Total Phosphorus	0.49	0.73	0.16	0.13	0.37
Potassium	26	5.1	2	3	6.8
Selenium	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	0.01
Sodium	60	100	4.8	29	148
Sulfate	211	130	60	130	135
Vanadium	0.023	0.02	NA	NA	NA
Zinc	0.039	0.045	NA	NA	NA

[a]NA = Not available

SOIL/SEDIMENT

Regional data for Indiana and Ohio have been used as background data for radionuclides (Myrick 1983) and chemicals (Shacklette 1984) in surface soil. The UTLs constructed for these regional data are also used for subsurface soil and sediment. A sampling and analysis program is currently underway to determine site-specific UTLs to replace regional values (DOE 1992). Tables T-6 and T-7 present the UTL values for radionuclides and chemicals, respectively. It is assumed that the radioactive progeny of the radionuclides listed in Table T-6 are in secular equilibrium. The parent radionuclides, the UTLs for the progeny are also presented in Table T-8.

TABLE T-6

BACKGROUND DATA FOR RADIONUCLIDES IN SURFACE SOIL

Radionuclide	Frequency of Detection	Range of Values (pCi/g)	Arithmetic Mean (pCi/g)	Distribution Type	UTL (pCi/g)
Ra-226	14/14	0.81 - 2.5	1.41	Log-normal	2.23
Th-232	14/14	0.71 - 1.5	1.05	Log-normal	1.48
U-238	14/14	0.76 - 2.2	1.36	Log-normal	2.11

TABLE T-7

BACKGROUND DATA FOR CHEMICALS IN SURFACE SOIL

Chemical	Frequency of Detection[a]	Range of Values (mg/kg)	Arithmetic Mean[b] (mg/kg)	Distribution Type	UTL (mg/kg)
Aluminum	24/24	15000-100000	52500	Normal	108200
Arsenic	24/24	3.6-27.00	9.98	Log-normal	20.5
Barium	24/24	300-700	483	Normal	815
Beryllium	8/24	<1.00-2.00	1.56	Normal	2.15
Cadmium	15/15	1.00-11.00	2.67	Normal	11.1
Calcium	24/24	1100-160800	15700	Log-normal	41300
Chromium	24/24	15.0-100	51.3	Normal	103
Cobalt	24/24	3.00-20.0	11.7	Normal	21.4
Copper	24/24	7.00-70.0	27.6	Log-normal	58.6
Iron	24/24	10000-50000	24600	Log-normal	46200
Lead	23/24	<15.0-30.0	21.5	Normal	37.3
Magnesium	24/24	1500-30000	6460	Log-normal	15900
Manganese	24/24	150-1000	535	Log-normal	1140
Mercury	24/24	0.030-0.590	0.13	Log-normal	0.292
Molybdenum	11/24	<3.00-7.00	5.55	Normal	8.85
Nickel	24/24	7.00-50.0	21.8	Log-normal	33.4
Potassium	24/24	11800-25100	17100	Log-normal	23800
Selenium	21/24	<0.100-1.20	0.52	Normal	1.17
Silver	6/6	0.700-5.00	2.78	Normal	8.03
Sodium	23/23	5000-10000	7520	Normal	11400
Vanadium	24/24	20.0-150	81.3	Normal	172
Zinc	24/24	25.0-113	62.7	Log-normal	113

[a] Regional data for Ohio and Indiana except for cadmium and silver, which are national data.
[b] Arithmetic mean of the detected values.

TABLE T-8

UTLs FOR PROGENY IN SURFACE SOIL

	Radionuclide	UTL (pCi/g)
Thorium Series[a]	Ra-228	1.48
	Ac-228	1.48
	Th-228	1.48
	Ra-224	1.48
Uranium Series[b]	Th-234	2.11
	Pa-234	2.11
	U-234	2.11
	Th-230	2.11
Uranium Series below Rn-222	Po-218	2.23
	Pb-214	2.23
	Bi-214	2.23
	Po-214	2.23
	Pb-210	2.23
	Bi-210	2.23
	Po-210	2.23

a The UTL for thorium in mass units is calculated from the isotopic thorium values to be 13.4 mg/kg.

b It is also assumed that U-235 occurs at its natural isotopic abundance (0.72% by mass) in background soil. The UTL for U-235 and each selected progeny (Th-231, Pa-231, Ac-227) is equal to 0.097 pCi/g. The UTL for uranium in mass units is calculated from the isotopic uranium values to be 6.32 mg/kg.

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