U-004-306.13

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REFERENCES TO COMMENTS PERTAINING TO THE OPERABLE UNIT (OU) 2 TREATABILITY STUDY REPORT

11/24/92

DOE-0442-93
DOE-FN/EPA
~~35~~ 31
LETTER

[redacted]

U-004-306.13

Department of Energy
Fernald Environmental Management Project
P.O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 738-6357

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NOV 2 4 1992
DOE-0442-93

Mr. James A. Saric, Remedial Project Director
U.S. Environmental Protection Agency
Region V - 5HR-12
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Graham E. Mitchell, Project Manager
Ohio Environmental Protection Agency
40 South Main Street
Dayton, Ohio 45402

Dear Mr. Saric and Mr. Mitchell:

REFERENCES TO COMMENTS PERTAINING TO THE OPERABLE UNIT (OU) 2 TREATABILITY STUDY REPORT

Reference: Letter, J. A. Saric to J. R. Craig, "OU 2 Treatability Study Report Response to Comment," dated October 23, 1992

Enclosed are the responses to the United States Environmental Protection Agency (U.S. EPA) comments on the Operable Unit (OU) 2 Treatability Study Report that were transmitted in the above reference letter. As agreed upon, after your review and evaluation, the proposed change pages will be generated and submitted as an addendum and attachment to the document.

If you or your staff have any questions, please contact Johnny Reising at FTS/Commercial 513-738-9083.

Sincerely,

Jack R. Craig
Fernald Remedial Action
Project Manager

FN:Reising

Enclosure: As Stated

cc w/enc.:

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AR Coordinator, WEMCO

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3938

Comment Responses on the

U.S. EPA OPERABLE UNIT 2 TREATABILITY STUDY REPORT RESPONSE TO COMMENTS

NOVEMBER 1992

3

CR-FEMP-02TR-4
November 18, 1992

SUMMARY OF COMMENTS/RESPONSES
Treatability Study Report
Operable Unit 2

Date Document Issued July 1992
Date Comments Due November 23, 1992 /Received October 23, 1992
Date Responses Due NA
Date Report Due _____

Codes

M = Major issue that needs to be addressed.

C = Clarification or additional information needed; response may be in Summary of Comment Responses and/or next version of document.

E = Editorial comments will be noted and corrected, but may be dropped from the Summary of Comment Responses.

GENERAL COMMENTS

1 **Commenting Organization:** **Commentor:**
Section #: General Comments **Pg.:#** **Line #:** **Code:**
Original Comment #: EPA General Comment No. 5.

Comment: DOE's response to this comment states that data reported as nondetected were assigned a value of one-half the sample quantitation limit (SQL) in all statistical calculations. The response also presents a procedure for systematically eliminating data reported as nondetected but that have relatively high SQLs from statistical analyses. In many instances, much data is eliminated. For instance, in the example presented in EPA's comment, only one of the 12 samples were used in the statistical analysis. EPA agrees with the approach given in the first paragraph of DOE's response that all data reported as nondetected (regardless of the SQL) should be assigned a value of one-half the SQL in all statistical calculations, but DOE should provide a rationale for eliminating data with high SQLs from the statistical analyses. DOE also refers to a risk-based quantitation limit. This term should be defined.

Response: The data evaluation methods developed for the FEMP RI/FS are unbiased, best-judgment practices for understanding what the data are conveying.

One of these methods is the practice of evaluating quantitation limits (QLs) and detections limits, as required by EPA's data evaluation guidelines (EPA, 1989, see attached). In some cases QLs may exceed reference concentrations. In this situation, EPA suggests two options; 1) eliminate the questionable data from the quantitative analysis, or 2) reanalyze the sample.

The second options is often not feasible because of schedule constraints combined with the costs of resampling and reanalysis, and because the same situation is likely to occur in the reanalysis that forced the elevated QL in the original analysis (e.g., matrix interference).

The data evaluation process at the FEMP defaults to the first option. The systematic method for determining if data should be eliminated is to compare the QL to health-based reference concentrations. The reference concentrations for the FEMP RI/FS work have been presented to EPA in the Site-Wide Characterization Report, Appendix N "Criterion to Exclude Unusually High Sample Quantitation Limits for Chemical Constituents." EPA's comment on this appendix states: "The methodology for calculating and using risk-based quantitation limits for chemicals should be extended to radionuclides." The appendix is attached and should clarify the use of contract required quantitation limits (CRQLs) and risk-based quantitation limits (RBQLs).

In a situation where a large portion of a data set must be excluded based on the Appendix N criterion, two things may occur. A decision may be made to reanalyze samples, or a decision may be made that the chemical in question is likely not of concern and reanalysis is not necessary.

Action: None required.

2 **Commenting Organization:** **Commentor:**
Section #: General Comments **Pg. #:** **Line #:** **Code:**
Original Comment #: EPA Specific Comment No. 6.

Comment: DOE does not address this comment satisfactorily. The treatability study report seems to conclude that sulfate does not detrimentally affect the long-term unconfined compressive strength of the stabilized waste. However, the report does not indicate why DOE believes that the 90-day study period is long enough to assess long-term detrimental effects of sulfate. If longer periods of time are required to study the long-term detrimental effects of sulfate, DOE should provide the results of the 90-day study and indicate that the results are inconclusive.

Response: Agree, DOE will provide the results of the 90-day study and indicate that the results are inconclusive.

Action: Text will be revised.

3 **Commenting Organization:** **Commentor:**
Section #: General Comments **Pg.:#** **Line #:** **Code:**
Original Comment #: EPA Specific Comment No. 14.

Comment: As stated in EPA specific comment no. 14, much of the data for silver is apparently reported in the wrong units. This error is the most likely reason for outliers, which resulted from the fact that data reported with the corrects units

appear much higher than data reported with the wrong units. The revised 95 percent upper confidence limit (UCL) for silver should be recalculated and reported in the treatability study report, and this value should be compared with the leachate action levels.

Response: Agree. All the data has been reviewed and errors in units in the database have been corrected.

Action: New statistical analyses and new comparisons will be made. Text will be revised.

3938 [redacted]

EPA/540/1-89/002
December 1989

Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)

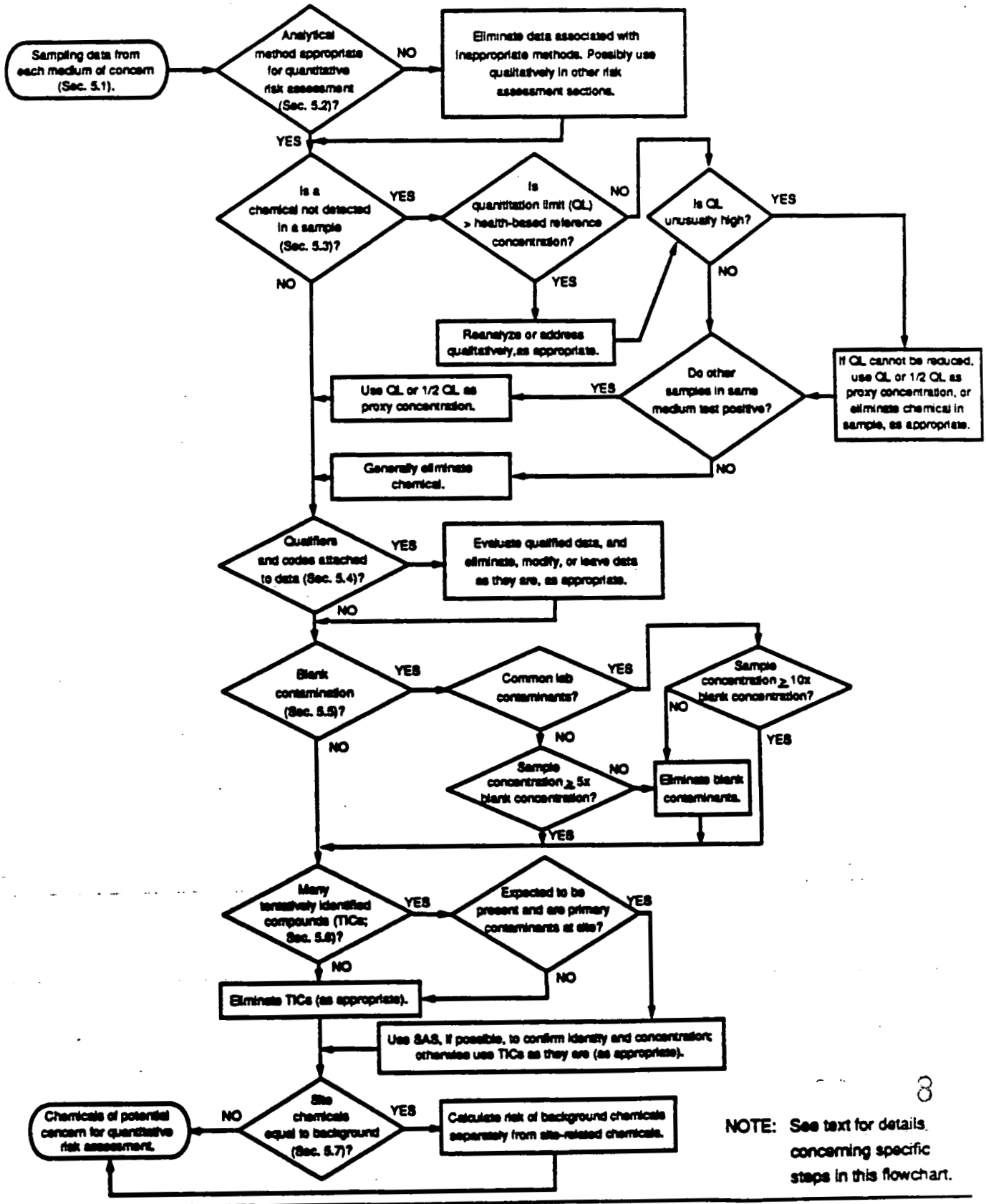
Interim Final

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20450

7 [redacted]

EXHIBIT 5-1

DATA EVALUATION



8

NOTE: See text for details concerning specific steps in this flowchart.

APPENDIX N

CRITERION TO EXCLUDE UNUSUALLY HIGH SAMPLE QUANTITATION LIMITS FOR CHEMICAL CONSTITUENTS

TABLE OF CONTENTS

		Page
N.1.0	Introduction	N-1-1
N.2.0	Criterion to Exclude an Unusually High SQL	N-2-1
N.3.0	Calculation of RBQLs	N-3-1
References		N-R-1

3938 [redacted]

LIST OF TABLES

N.2-1 CRQL/RBQL Values for Chemicals in Soil/Sediment N-2-2
N.2-2 CRQL/RBQL Values for Chemicals in Water N-2-9
N.3-1 Rules for Accepting U-Qualified Sample Data in Statistical Analyses N-3-3

11 [redacted]

3938 [redacted]

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.

12 [redacted]

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.

3938 [redacted]

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	--

TABLE N.2-1
(Continued)

3938 [redacted]

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

TABLE N.2-1
(Continued)

3938 [redacted]

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

17

[redacted]

TABLE N.2-1
(Continued)

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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[redacted]

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

19

[redacted]

TABLE N.2-1
(Continued)

3938

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)

3938 [redacted]

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

3938 [redacted]

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		

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

3938 [redacted]

TABLE N.2-2
(Continued)

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

24 [redacted]

TABLE N.2-2
(Continued)

3938 [redacted]

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)

3938 [redacted]

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

TABLE N.2-2
(Continued)

3938 [redacted]

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

27 [redacted]

3938

N.3.0 CALCULATION OF RBQLs

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.

3938

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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.

30 [redacted]

3938 [redacted]

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