SAMPLING & ANALYSIS PLAN FMPC WASTE PIT AREA STORMWATER RUNOFF CONTROL PROJECT

DOCUMENT DATE 00/00/00

ATTACHMENT 3

1401

SAMPLING & ANALYSIS PLAN

FMPC Waste Pit Area Stormwater Runoff Control Project

Sampling Objectives

Additional sampling is proposed to be conducted to support the Waste Pit Area Stormwater Runoff Control removal action to achieve the following objectives:

- Characterize the concentration of HSL and radiological constituents in the soils to be excavated to facilitate the removal action.
- Complete a hazardous waste determination on containerized waste materials generated incidental to completing the construction activities associated with the removal action.
- Minimize fugitive dust emissions during excavation and stockpiling operations.
- Ensure, to the maximum extent practical, that soil concentration based buildover criteria are attained during the removal action. Buildover, for purposes of this removal action, refers only to the new collection sump and any hot-spot removals.

To achieve the sampling objectives, samples are proposed to be collected prior to and during the construction phase of the removal action.

Pre-excavation Soil Sampling

To determine the potential presence of HSL and radiological constituents, 44 additional soil samples are being collected from the area to be affected by excavation activities associated with the removal action. The samples will be collected in accordance with the RI/FS QAPP. HSL analysis shall be performed by an FMPC RI/FS approved laboratory. Radiological screening shall be performed at the FMPC laboratory.

Sample Collection/Analytical and Shipping Requirements

The locations of the samples to be collected are shown on WMCO drawing number 75A-5500-G-00168, Revision 0.

The samples will be collected, documented, packaged, and shipped in accordance with the FMPC Remedial Investigation/Feasibility Study (RI/FS) Work Plan, Volume V, Sections 6.4, 7.0, and 6.8, dated March 1988.

The full HSL analyses will be as defined in Revision 1 of the RI Work Plan Addendum, "Production and Additional Suspect Areas Work Plan", Table 3-2, Pages 3-6. A copy of this table is attached.

The following details the field sampling effort:

- Each of the 44 locations will be sampled to a depth of 24 inches in 6-inch increments. Specified samples will be analyzed for components of the full HSL and screened for radiological contamination.

- Field screening for radiological and volatile organic contaminants will be performed on each sample interval. The samples will be field screened for alpha emitters with a hand-held alpha detector, for beta/gamma emitters with a pancake GM meter, and for volatile organics with an HNu photoionization detector. Radiological field screening will occur in an area where the background does not exceed 300 counts per minute beta/gamma and 5 counts per minute alpha. A radiological detection will be defined as any field reading that is 15% above background. A volatile detection will be any reading above background.

- The first 6-inch increment at each location will be screened for Gross Alpha, Beta and Gamma. Ten of the 44 samples collected for radiological screening will be screened at the FMPC site laboratory using ICP Mass Spectrometry. The first 6-inch increment will also be analyzed for HSL inorganics, pesticides and PCBs.

- Sufficient material will be archived from the 6-12, 12-18, and 18-24 inch intervals so that HSL metals analysis may be performed. If elevated levels of HSL metals are found in the 0 to 6-inch sample, additional HSL metals analyses will be performed on the archived material to determine the vertical extent of the elevated HSL metal contaminants.

- The sample increment displaying the highest HNu reading from each location will undergo HSL volatile and semi-volatile analysis. If no above background HNu readings are detected at a location, the 18- to 24-inch sample increment will be analyzed for Volatile Organic Compounds (VOCs) and semi-VOCs.

- When sampling is complete at a location, the open borings will be filled with bentonite pellets. The stakes identifying the locations will be left in place.

If radiological concentrations in excess of the buildover criteria are identified, the location will be identified for excavation using hand-held instruments as a guide to determine the areal extent of contamination. The actual excavation will be conducted as described in the "Construction Related Sampling" section of this plan.

If non-naturally occurring HSLs are identified in a sample, the location will be resampled. Four additional samples will be collected at a distance of ten feet from the location in the four principal compass directions. In addition, the original location will be resampled at 0-6" and 6-12" in depth. Analysis will be limited to contaminates detected at levels above background at the original sample location. Based upon resample results, the problem area will be excavated, with soils containerized and managed as potentially hazardous waste. Identification, in this case, is the laboratory quantification level for the specific analytical parameter as listed in Appendix B..

If naturally occurring HSLs are detected above average background concentrations as listed in Appendix A plus three standard deviations, the location will be resampled. Four additional samples will be collected at a distance of 10 feet from the location in the four principal compass directions. In addition, the original location will be resampled at 0-6" and 6-12" in depth. Analysis will be limited to contaminants detected at levels above background at the original sample location. Based upon resample results, the problem area will be excavated. Excavated soils will be containerized and managed as potentially hazardous waste.

Construction-Related Sampling

Construction Measurements

During excavation, portable instrument measurements will be taken for organic vapors and for radiological contaminants. Any measurable organic vapor concentrations and/or radiological indications of greater than 100 pCi/g of uranium, will be cause for associated soils to be containerized and managed consistent with pertinent ARARs. Soil will continue to be excavated and containerized until there is no indication of organic compounds and radiological measurements are indicative of less than 100 pCi/g.

When the base of the excavation is established, a walkover survey will be performed with a 2 x 2 NaI(Tl) scintillation detector. The probe will be moved in a serpentine manner over the area with the detector close to the surface. Any indications of activity greater than 15 percent above background will be excavated until measurements indicate that the residual soils in the area are at background levels.

Soil Sampling

When the base elevations of the excavation for the new sump collection system are reached, a ten-meter grid will be established across the excavation. Each 100-square meter area will be assigned a letter designation. Letter designations will be assigned sequentially starting with the 100-square meter area in the northwestern corner of the excavation and proceeding west to east and north to south. A two-meter grid will be established in each 100-square meter area. One 0-6" core sample will be collected from each 100-square meter area at the two-meter grid point identified in Figure 1 for that specific 100-square meter area. These soil samples will receive full radiological and HSL analysis by an FMPC RI/FS approved laboratory. Aliquots of each soil sample will receive screening for total uranium and total thorium by the FMPC site laboratory.

During the collection of the soil samples from the base of the excavation, handheld radiological (2" x 2" NaI scintillation detector) and organic vapor (HNu) instrumentation will be employed to scan the removed samples. In the event there are measurable organic vapor concentrations or indications of activities greater than 15% above background from the collected samples, the area will be excavated. Extracted materials will be containerized and managed as potentially hazardous waste. Excavation will continue until the criteria for the hand-held instruments are attained for both the base of the excavation and the collected samples.

Buildover will be initiated when the average total uranium and thorium concentrations, as determined by receipt of the screening analysis from the on-site laboratory, indicate concentrations below the NRC Branch Technical Position (BTP) criteria (46 FR 52061). These are further described in the following paragraph. If necessary, additional soil will be removed and the location resampled for total uranium and thorium until the BTP criteria are indicated. Upon receipt of the analytical results from the RI/FS QAPP laboratory, a complete assessment of the buildover conditions will be made and reported in a removal action completion report.

Buildover Criteria

The Nuclear Regulatory Commission established soil concentrations based upon EPA criteria. Concentrations were modeled so that no member of the public would be expected to receive a radiation dose of one millirad per year to the lung or three millirads per year to the bone due to inhalation or ingestion. The waste storage area is on the FMPC reservation and there is no public contact; however, this goal would be consistent with RI/FS objectives. Soil sample analytical results will be compared to the BTP concentrations which are:

Depleted uranium	35 pCi/g
Enriched uranium	30 pCi/g
Natural thorium	10 pCi/g
Natural uranium ores	10 pCi/g

Depleted uranium has been the principal form of uranium at FMPC and the goal of 35 pCi/g is expected to be appropriate. Upon receipt of complete analytical results, a complete assessment of all radionuclides present will be made.

Available sampling data indicates the average isotopic ratio for the soils in the FMPC waste storage area to be in the depleted range. The 35 pCi/g criteria is considered a conservative interim cleanup level as a result of the existing institutional controls in place in the waste storage area to limit exposure to these materials.

An additional objective of the removal is to limit buildover, to the maximum extent practical, of permanent structures, such as the sump, over significant concentrations of HSL constituents. Significant in this case is defined as above the quantification limit for the individual non-naturally occurring constituents. For naturally occurring HSL constituents, significant is defined as above the range of background previously identified. To ensure this objective, to the maximum extent practical in context of this removal action, the FMPC is:

- Collecting additional pre-excavation HSL samples to provide an indication of the presence of these constituents.

- Removing and containerizing soils indicating significant concentrations of HSLs.

- Performing post-excavation measurements of the base of the excavation and during collection of buildover samples with HNu.

The FMPC considers this a reasonable assurance that the HSL buildover criteria will be attained. The FMPC recognizes that additional cleanup actions may be required as part of Operable Unit 1 Remedial Action following final definition of cleanup levels through the RI/FS process.

Construction Rubble Sampling

Excavated soils exhibiting an activity indicative of concentrations in excess of 100 pCi/g of total uranium or where organic vapors are detected, and soils deemed to contain elevated concentration of HSLs will be containerized for storage and/or off-site shipment.

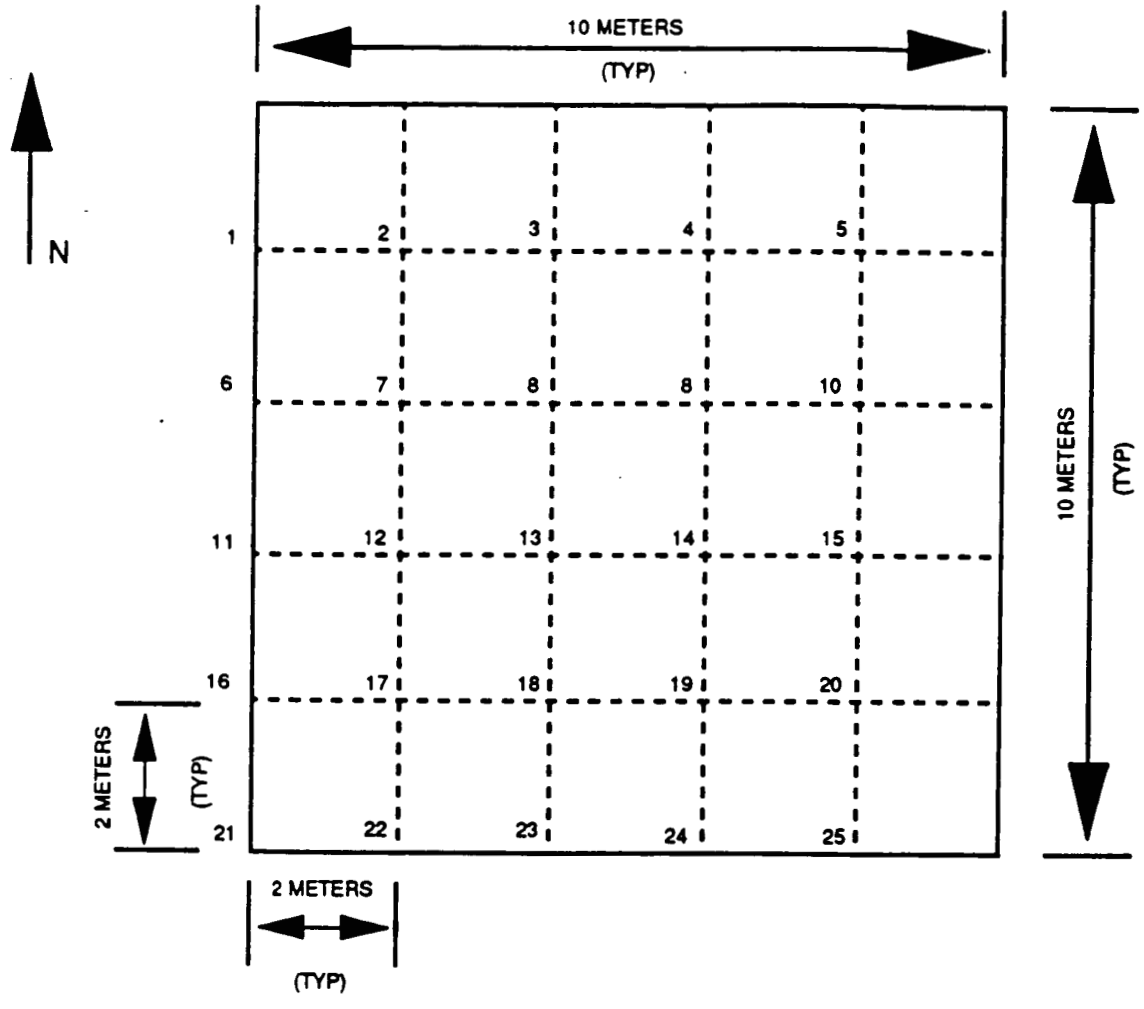
Representative samples will be collected from the containers to characterize the stored waste materials for purposes of determining the radiological properties of the materials and to complete a hazardous waste

determination. Samples shall be collected and analyzed in a manner consistent with the protocols defined in the RI/FS QAPP and as supplemented by Part III of SW-846, third edition, Test Methods for Evaluating Solid Waste pertaining to the sampling of containerized materials.

Collected samples shall be analyzed for full TCLP and full radiological parameters at the RI/FS QAPP laboratory. TCLP analysis shall be completed pursuant to the method specified in 55 FR 26986.

Monitoring for Fugitive Dust Emissions

Portable air samplers will be placed at the perimeter of the open excavation and the soil stockpile to measure airborne particulate concentrations. Samples will be collected weekly and analyzed for gross alpha and gross beta concentrations at the FMPC laboratory. Engineering controls and additional health and safety measures will be instituted if elevated concentrations are detected.



GRID	SAMPLE POINT	GRID	SAMPLE POINT
A	14	E	5
B	23	F	7
C	7	G	22
D	5	H	15

FIGURE 1

NOTE: THE ABOVE SAMPLE LOCATIONS WERE CHOSED BASED UPON COMPUTER GENERATED RANDOM NUMBERS RANGING FROM 1 TO 25.

APPENDIX A

MANHOLE 180 HSL RESULTS
INORGANIC ANALYSIS
(IN PPM)

COMPOUND	SAMPLES TAKEN TO DETERMINE BACKGROUND				SAMPLES TAKEN TO VERIFY CLEANUP				
	SAMPLE LOCATION					SAMPLE LOCATION			
	V	VI	VII	AVERAGE	AVERAGE	I	II	III	IV
Aluminum	7430.00	10400.00	11900.00	9910.00	6627.50	8750.00	9100.00	4520.00	4140.00
Antimony	< 5.50	< 6.40	< 5.50	5.80	5.58	< 6.80	< 5.20	< 5.60	< 4.70
Arsenic	5.20	< 0.40	9.30	4.97	7.48	7.40	9.30	4.90	8.30
Barium	72.70	85.00	111.00	89.57	54.48	75.80	71.10	30.90	40.10
Beryllium	0.77	1.00	1.30	1.02	1.09	1.20	1.20	1.00	0.95
Cadium	1.90	3.80	4.20	3.30	3.75	4.00	3.70	3.80	3.50
Calcium	2890.00	16500.00	26000.00	15130.00	51250.00	34500.00	25700.00	105000.00	39800.00
Chromium	10.50	17.90	23.70	17.37	19.80	22.90	20.20	19.90	16.20
Cobalt	12.90	14.90	15.50	14.43	10.85	13.70	13.60	7.70	8.40
Copper	20.40	22.20	27.20	23.27	15.13	19.20	19.70	9.50	12.10
Iron	19400.00	25000.00	26800.00	23733.33	15787.50	20800.00	21300.00	9250.00	11800.00
Lead	16.70	16.30	< 0.37	11.12	15.25	16.10	19.00	11.80	14.10
Magnesium	2240.00	10300.00	13800.00	8780.00	17475.00	14700.00	10900.00	26600.00	17700.00
Manganese	691.00	803.00	739.00	744.33	489.50	622.00	638.00	335.00	363.00
Mercury	< 0.10	0.11	< 0.10	0.10	0.10	< 0.10	< 0.10	< 0.11	< 0.09
Nickel	32.40	48.90	40.80	40.70	32.20	38.80	35.20	26.10	28.70
Potassium	906.00	1430.00	1710.00	1348.67	782.00	1000.00	1140.00	527.00	461.00
Selenium	< 0.40	< 0.40	< 0.37	0.39	0.42	< 0.41	< 0.44	< 0.38	< 0.46
Silver	< 1.80	< 2.10	1.80	1.90	2.15	2.70	2.20	< 1.90	1.80
Sodium	37.30	65.60	67.30	56.73	110.90	102.00	152.00	112.00	77.60
Thallium	< 0.40	< 0.40	< 0.37	0.39	0.42	< 0.41	< 0.44	< 0.38	< 0.46
Vanadium	13.20	20.60	23.80	19.20	19.35	21.20	19.70	20.90	15.60
Zinc	69.10	79.30	96.50	81.63	61.18	69.40	90.40	43.10	41.80
Cyanide	< 0.58	< 0.61	< 0.63	0.61	0.58	< 0.58	< 0.59	< 0.57	< 0.57
Molybdenum	< 1.80	< 2.10	< 1.80	1.90	2.40	3.10	< 1.70	< 1.90	2.90

Note: "<" Denotes the Compound was undetected.

ALH, 06/28/90

WASTE PIT AREA STORMWATER RUNOFF CONTROL REMOVAL ACTION

DATE: 5-7-91

	AVE	STD DEV	AVE + 3 STD DEV
ALUMINUM	9910.00	1857.47	15482.41
ANTIMONY	5.80	0.42	7.07
ARSENIC	4.97	3.64	15.88
BARIUM	89.57	15.97	137.46
BERYLLIUM	1.02	0.22	1.67
CADIUM	3.30	1.00	6.31
CALCIUM	15130.00	9484.22	43582.67
CHROMIUM	17.37	5.40	33.57
COBALT	14.43	1.11	17.77
COPPER	23.27	2.88	31.90
IRON	23733.33	3151.01	33186.38
LEAD	11.12	7.61	33.94
MAGNESIUM	8780.00	4840.19	23300.58
MANGANESE	744.33	45.88	881.97
MERCURY	0.10	0.00	0.12
NICKEL	40.70	6.74	60.91
POTASSIUM	1348.67	333.23	2348.36
SELENIUM	0.39	0.01	0.43
SILVER	1.90	0.14	2.32
SODIUM	56.73	13.76	98.01
THALLIUM	0.39	0.01	0.43
VANADIUM	19.20	4.44	32.52
ZINC	81.63	11.31	115.55
CYANIDE	0.61	0.02	0.67
MOLYBDENUM	1.90	0.14	2.32

APPENDIX B

WASTE PIT AREA STORMWATER RUNOFF CONTROL
REMOVAL ACTION

MAY 7, 1991

QUANTIFICATION LIMITS

VOLATILE INORGANICS	
CHLOROMETHANE	10 ug/kg
BROMOMETHANE	10 ug/kg
VINYL CHLORIDE	10 ug/kg
CHLOROETHANE	10 ug/kg
METHYLENE CHLORIDE	5 ug/kg
ACETONE	10 ug/kg
CARBON DISULFIDE	5 ug/kg
1,1-DICHLOROETHANE	5 ug/kg
1,1-DICHLOROETHENE	5 ug/kg
1,2-DICHLOROETHANE	5 ug/kg
CHLOROFORM	5 ug/kg
trans-1,2-DICHLOROETHENE	5 ug/kg
2-BUTANONE	10 ug/kg
1,1,1-TRICHLOROETHANE	5 ug/kg
CARBON TETRACHLORIDE	5 ug/kg
VINYL ACETONE	10 ug/kg
BROMODICHLOROMETHANE	5 ug/kg
1,2-DICHLOROPROPANE	5 ug/kg
trans-1,3-DICHLOROPROPENE	5 ug/kg
TRICHLOROETHENE	5 ug/kg
DIBROMOCHLOROMETHANE	5 ug/kg
1,1,2-TRICHLOROETHANE	5 ug/kg
BENZENE	5 ug/kg
cis-1,3-DICHLOROPROPENE	5 ug/kg
BROMOFORM	5 ug/kg
4-METHYL-2-PENTANONE	10 ug/kg
2-HEXANONE	10 ug/kg
TETRACHLOROETHENE	5 ug/kg
1,1,2,2-TETRACHLOETHANE	5 ug/kg
TOULUENE	5 ug/kg
CHLOROBENZENE	5 ug/kg
ETHYLBENZENE	5 ug/kg
STYRENE	5 ug/kg
TOTAL XYLENES	5 ug/kg

WASTE PIT AREA STORMWATER RUNOFF CONTROL REMOVAL ACTION

MAY 7, 1991

QUANTIFICATION LIMITS

SEMI-VOLATILE ORGANICS	
PHENOL	660 ug/kg
bis-(2-CHLOROETHYL) ETHER	660 ug/kg
2-CHLOROPHENAL	660 ug/kg
1,3-DICHLOROBENZENE	660 ug/kg
1,4-DICHLOROBENZENE	660 ug/kg
BENZYL ALCOHOL	1300 ug/kg
1,2-DICHLORBENZENE	660 ug/kg
2-METHYLPHENOL	660 ug/kg
bis-(2-CHLOROISOPROPYL) ETHER	660 ug/kg
4-METHLYPHENOL	660 ug/kg
N—NITROSO-DI-N-PHOPYLAMINE	660 ug/kg
HEXACHLOROETHANE	660 ug/kg
NITROBENZENE	660 ug/kg
ISOPHORONE	660 ug/kg
2-NITROPHENOL	660 ug/kg
2,4-DIMETHYLPHENOL	660 ug/kg
BENZOIC ACID	3300 ug/kg
bis-(2-CHLOROETHOXY) METHANE	660 ug/kg
2,4-DICHLOROPHENOL	660 ug/kg
1,2,4-TRICHLOROPHENOL	660 ug/kg
NAPHTHALENE	660 ug/kg
4-CHLOROANILINE	1300 ug/kg
HEXACHLOROBUTADIENE	660 ug/kg
4-CHLORO-3-METHYLPHENOL	1300 ug/kg
2-METHYLANAPHTHALENE	660 ug/kg
HEXACHLOROCYCLOPENTADIENE	660 ug/kg
2,4,6-TRICHLOROPHENOL	660 ug/kg
2,4,5-TRICHLOROPHENOL	660 ug/kg
2-NITROANILINE	3300 ug/kg
2-CHLORONAPHTHALENE	660 ug/kg
DIMETHYL PHTHALATE	660 ug/kg
ACENAPHTHYLENE	660 ug/kg
2,6-DINITROLUENE	660 ug/kg
3-NITROANILINE	3300 ug/kg

WASTE PIT AREA STORMWATER RUNOFF CONTROL
REMOVAL ACTION

MAY 7, 1991

QUANTIFICATION LIMITS

ACENAPHTHENE	660 ug/kg
2,4-DINITROPHENOL	3300 ug/kg
4-NITROPHENOL	3300 ug/kg
DIBENZOFURAN	660 ug/kg
2,4-DINITROTOLUENE	660 ug/kg
DIETHYLPHTHALATE	660 ug/kg
4-CHLOROPHENYL-PHENYLETHER	660 ug/kg
FLUORENE	660 ug/kg
4-NITROANILINE	3300 ug/kg
4,6-DINITRO-2-METHYLPHENOL	3300 ug/kg
N-NITROSODIPHENYLAMINE	660 ug/kg
4-BROMOPHENYL-PHENYLETHER	660 ug/kg
HEXACHLOROBENZENE	660 ug/kg
PENTACHLOROPHENOL	3300 ug/kg
PHENANTHRENE	660 ug/kg
ANTHRACENE	660 ug/kg
DI-N-BUTYLPHTHALATE	660 ug/kg
FLUORANTHENE	660 ug/kg
PYRENE	660 ug/kg
BUTYLBENZYLPHTHALATE	660 ug/kg
3,3-DICHLOROBENZIDINE	1300 ug/kg
BENZO(a)ANTHRACENE	660 ug/kg
CHRYSENE	660 ug/kg
bis(2-ETHYLHEXYL) PHTHALATE	660 ug/kg
DI-N-OCTYL PHTHLATE	660 ug/kg
BENZO (b) FLUORANTHENE	660 ug/kg
BENZO (k) FLUORANTHENE	660 ug/kg
BENZO (a) PYRENE	660 ug/kg
INDENO (1,2,3-CD) PHRENE	660 ug/kg
DIBENZ (a,h) ANTHANCENE	660 ug/kg
BENZO (g,h,i) PERYLENE	660 ug/kg

WASTE PIT AREA STORMWATER RUNOFF CONTROL REMOVAL ACTION

MAY 7, 1991

QUANTIFICATION LIMITS

PESTICIDES/PCBs	
ALPHA-BHC	8 ug/kg
BETA-BHC	8 ug/kg
DELTA-BHC	8 ug/kg
GAMMA-BHC	8 ug/kg
HEPTACHLOR	8 ug/kg
ALDRIN	8 ug/kg
HEPTACHLOR EPOXIDE	8 ug/kg
ENDOSULFAN I	8 ug/kg
DIELDRIN	16 ug/kg
4,4'-DDE	16 ug/kg
ENDRIN	16 ug/kg
ENDOSULFAN II	16 ug/kg
4,4'-DDD	16 ug/kg
ENDOSULFAN SULFATE	16 ug/kg
4,4'-DDT	16 ug/kg
METHOXYCHLOR	80 ug/kg
ENDRIN KETONE	16 ug/kg
CHLORDANE	80 ug/kg
TOXAPHENE	160 ug/kg
AROCLOR 1016	80 ug/kg
AROCLOR 1221	80 ug/kg
AROCLOR 1232	80 ug/kg
AROCLOR 1242	80 ug/kg
AROCLOR 1248	80 ug/kg
AROCLOR 1254	160 ug/kg
AROCLOR 1260	160 ug/kg

NOTE: Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

TABLE 3-2
ANALYTICAL PARAMETERS 1401

ANALC'L GROUP	ANALYTICAL PARAMETERS	VOLUME, CONTAINER	PRESERVATION
WATER	HSL		
	• HSL Organics		
	- Volatiles	2-40 ml vial (with teflon septum cap)	Cool 4° C
	• Semivolaties	4 liter, amber glass (with teflon-lined cap)	Cool 4° C
	• HSL Inorganics		
	- Metals (plus Molybdenm)	2-1 liter, plastic	HNO_3, pH<2 filtered
	- Mercury	500 ml, glass	HNO_3, pH<2
	- Cyanide	1 liter, plastic	Cool 4° C NaOH, pH>12
	Full HSL is the above and:		
	• HSL Pesti-cides/PCB	4 liter, amber glass (with teflon-lined cap)	Cool 4° C None
	HSL+ is all the above and:		
	• Organophosphorus Pesticides		
	• Dioxin, Furans		
SOIL	Same as for Water	500 ml, glass wide-mouth jar with teflon lid liner	None
WATER	Full Radiological		
	• Total Uranium	4 liter plastic	HNO_3, pH<2
	• Isotopic Uranium		
	• Isotopic Plutonium		
	• Radium-226		
	• Radium-228		
	• Neptunium-237		
	• Total Thorium		
	• Isotopic Thorium		
	• Technetium-99		
	• Cesium-137		
	• Strontium-90		
	• Ruthenium-106		
SOIL	Same as Water	500 ml, glass or plastic container	None