



DEPARTMENT OF THE NAVY  
CRANE DIVISION  
NAVAL SURFACE WARFARE CENTER  
300 HIGHWAY 361  
CRANE, INDIANA 47522-5001

N00164.AR.000539  
NSWC CRANE  
5090.3a

IN REPLY REFER TO

5090  
Ser 095/0099

08 MAY 2000

U.S. Environmental Protection Agency, Region V  
Waste, Pesticides, & Toxics Division  
Waste Management Branch  
Illinois, Indiana, and Michigan Section  
ATTN: Mr. Peter Ramanauskas (DW-8J)  
77 West Jackson Blvd.  
Chicago, IL 60604

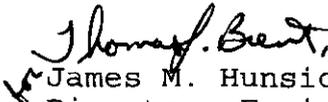
Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NAVSURFWARCENDIV Crane) submits, as enclosure (1) a revised Table 1-3 from the Quality Assurance Project Plan (QAPP) for ground water monitoring at the Subpart X units. The revision replaces the PNA SIM analyses (8270-SIM) with the normal GC/MS method (8270). Although the laboratory reporting limits changed, they are still below the risk based target levels. Note that Method 8270 is already an approved standard operating procedure in the QAPP. The revision affects the following semivolatile compounds: 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. Also note that the laboratory method detection limit for 2-methylnaphthalene is revised from  $0.019 \mu\text{g}/\text{l}$  to  $0.64 \mu\text{g}/\text{l}$ .

Enclosure (2) contains the revised Table 4-10, page 2 of 3 from the Field Sampling Plan (FSP). The new table incorporates changes to the bottles and preservative used for total organic carbon sampling and analysis. The permit required Certification Statement is provided as enclosure (3).

NAVSURFWARCENDIV Crane point of contact is Mr. Thomas J. Brent,  
Code 09510, telephone 812-854-6160.

Sincerely,

  
James M. Hunsicker  
Director, Environmental  
Protection Department  
By direction of  
the Commander

Encl:

- (1) QAPP Table 1-3
- (2) FSP Table 4-10
- (3) Certification Statement

Copy to:

Administrative Record  
IDEM (Doug Griffin)  
TTNUS (Ralph Basinski)  
COMARCO (Steve Mehay)

TABLE 1-3  
 ANALYTICAL METHODS AND LIMITS OF DETECTION  
 NAVAL SURFACE WARFARE CENTER  
 CRANE, INDIANA  
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Chemical	Laboratory MDL/IDL <sup>(1)</sup> (ug/L)	Laboratory RL <sup>(1)</sup> (ug/L)	Risk-Based Target Level <sup>(2)</sup> (ug/L)
<b>ADDITIONAL METALS (SW-846 METHOD 6010B ICP/AES)</b>			
Calcium	112	1000	--
Iron	16	100	300
Magnesium	33	1000	--
Manganese	1.5	15	50
Potassium	147	1000	--
Sodium	28	1000	--
<b>APPENDIX IX VOLATILE ORGANIC COMPOUNDS (SW-846 METHOD 8260B WITH 25 ML PURGE)</b>			
1,1,1-Trichloroethane	0.17	0.5	88
1,1,1,2-Tetrachloroethane	0.13	0.5	5
1,1,2,2-Tetrachloroethane	0.10	0.5	5
1,1,2-Trichloroethane	0.14	0.5	5
1,2,3-Trichloropropane	0.54	1 <sup>(4)</sup>	12.11
1,2,3-Trichlorobenzene	0.08	0.5	--
1,1-Dichloroethane	0.17	0.5	47
1,1-Dichloroethene	0.12	0.5	0.5
1,1-Dichloropropylene	0.15	0.5	--
1,2-Dibromo-3-chloropropane	0.30	1	1
1,2-Dibromoethane	0.13	0.5	1
1,2-Dichloroethane	0.14	0.5	1
1,2-Dichloropropane	0.14	0.5	380
1,3-Dichloropropane	0.15	0.5	--
2,2-Dichloropropane	0.18	0.5	--
2-Butanone	0.86	10	917.72
2-Chloro-1,3-butadiene (chloroprene)	0.40	3	14
2-Hexanone	0.92	10	--
4-Methyl-2-pentanone	0.52	10	1520
Acetone	1.8	10	610
Acrolein	4.6	10*	4
Acrylonitrile	1.3	3	3.7
Allyl chloride (3-chloro-1-propene)	0.22	10	1800
Benzene	0.013	0.5	5
Bromochloromethane	0.18	0.5	--
Bromodichloromethane	0.13	0.5	100
Bromoform	0.18	0.5	8.5
Bromomethane	0.59	1 <sup>(4)</sup>	8.7
Carbon disulfide	0.13	0.5	21
Carbon tetrachloride	0.17	0.3 <sup>(4)</sup>	0.17
Chlorobenzene	0.18	0.5	10
Chloroethane	0.21	0.5	710
Chloroform	0.14	0.3*	0.16
Chloromethane	0.17	0.5	1.5
cis-1,2-Dichloroethene	0.10	0.5	61
cis-1,3-Dichloropropene	0.16	0.3 <sup>(4)</sup>	0.081
Dibromochloromethane	0.10	0.5	1
Dibromomethane	0.19	0.5	370
Dichlorodifluoromethane	0.18	0.5	390
Ethylbenzene	0.076	0.5	17.2

TABLE 1-3

ANALYTICAL METHODS AND LIMITS OF DETECTION  
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Chemical	Laboratory MDL/IDL <sup>(1)</sup> (ug/L)	Laboratory RL <sup>(1)</sup> (ug/L)	Risk-Based Target Level <sup>(2)</sup> (ug/L)
Ethyl methacrylate	0.31	1	550
Methacrylonitrile	0.15	1	1
Methylene chloride	0.19	3	4.3
Methyl iodide	0.28	0.5	--
Methyl methacrylate	0.29	2	2800
Styrene	0.10	0.5	56
Tetrachloroethene	0.16	0.5	1.1
Toluene	0.04	0.5	253
trans-1,2-Dichloroethene	0.10	0.5	100
trans-1,3-Dichloropropene	0.10	0.5	0.5
trans-1,4-Dichloro-2-butene	0.34	10	10
Trichloroethene	0.12	0.5	1.6
Trichlorofluoromethane	0.14	0.5	1300
Vinyl acetate	0.21	0.5	248.03
Vinyl chloride	0.20	0.5	2
Total Xylenes	0.18	1	1.8
<b>APPENDIX IX VOLATILE ORGANIC COMPOUNDS (SW-846 METHOD 8015B WITH 10 ML PURGE)</b>			
1,4-Dioxane (SW-846 Method 8015B)	66	500*	2
Acetonitrile (SW-846 Method 8015B)	7.6	40	220
Isobutyl alcohol (SW-846 Method 8015B)	3.4	40	11000
Propionitrile (SW-846 Method 8015B)	2.9	40	6080
<b>APPENDIX IX SEMIVOLATILE ORGANIC COMPOUNDS (SW-846 METHOD 8270C; 8270C SIM WHERE NOTED)</b>			
1,2,4,5-Tetrachlorobenzene	2.7	10	10
1,2,4-Trichlorobenzene	0.43	2	70
1,2-Dichlorobenzene	0.74	2	14
1,3-Dichlorobenzene	0.68	2	71
1,4-Dichlorobenzene	0.65	2	5
1,4-Naphthoquinone	3.7	10	10
1,4-Phenylenediamine	25	100	6900
1-Naphthylamine	18	36*	10
2,3,4,6-Tetrachlorophenol	12	25*	14.06
2,4,5-Trichlorophenol	2.1	5	63
2,4,6-Trichlorophenol	0.89	3*	2
2,4-Dichlorophenol	1.49	3	18
2,4-Dimethylphenol	1.44	5	166.9
2,4-Dinitrophenol	0.12	10	10
2,6-Dichlorophenol	5.4	5	--
2-Acetylaminofluorene	4.2	12	14.86
2-Chloronaphthalene	0.60	2*	1
2-Chlorophenol	1.4	3*	2
2-Methylnaphthalene	0.64	0.2	9.15
2-Methylphenol	0.36	2	1520
2-Naphthylamine	5.2	16	--
2-Nitroaniline	0.60	2	2.2
2-Nitrophenol	1.1	5	13.5
2-Picoline	9.2	20	3790
3,3'-Dichlorobenzidine	0.59	10	10
3,3'-Dimethylbenzidine	25	50*	10

TABLE 1-3  
 ANALYTICAL METHODS AND LIMITS OF DETECTION  
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Chemical	Laboratory MDL/IDL <sup>(1)</sup> (ug/L)	Laboratory RL <sup>(1)</sup> (ug/L)	Risk-Based Target Level <sup>(2)</sup> (ug/L)
3-Methylcholanthrene	3.9	12	400
3-, 4-Methylphenol <sup>(5)</sup>	0.70	4	1800
3-Nitroaniline	0.54	2	--
4,6-Dinitro-2-methylphenol	0.31	10	10
4-Aminobiphenyl	3.4	12	--
4-Bromophenyl phenyl ether	0.31	2	2
4-Chloro-3-methylphenol	0.66	2	34.79
4-Chloroaniline	0.60	2	121.6
4-Chlorophenyl phenyl ether	0.24	1	1
4-Nitroaniline	0.87	2	--
4-Nitrophenol	0.24	10	35
4-Nitroquinoline-1-oxide	11	100	--
5-Nitro-o-toluidine	8.0	16	--
7,12-Dimethylbenz(a)anthracene	7.0	10 <sup>(4)</sup>	10
Acenaphthene	0.008	0.2	23
Acenaphthylene	0.011	0.2	1
Acetophenone	3.3	20	687.89
Aniline	0.52	5	5
Aramite	4.0	10	10
Anthracene	0.018	0.2	5
Benzo(a)anthracene	0.014	0.2	1
Benzo(a)pyrene	0.015	0.2	1
Benzo(b)fluoranthene	0.016	0.2	1
Benzo(g,h,i)perylene	0.014	0.2	1
Benzo(k)fluoranthene	0.018	0.2	1
Benzyl alcohol	0.62	10	281.24
Bis(2-chloroethoxy)methane	1.0	5	6400
Bis(2-chloroethyl)ether	0.58	1 <sup>(4)</sup>	1
Bis(2-chloroisopropyl)ether	0.29	3	3
Bis(2-ethylhexyl)phthalate	0.46	2	4.8
Butyl benzyl phthalate	0.58	2	19
Chlorobenzilate	3.4	5 <sup>(4)*</sup>	2.5
Chrysene	0.015	0.2	1
Diallate	3.5	10	10
Di-n-butyl phthalate	0.28	2	3
Di-n-octyl phthalate	0.67	2	30
Dibenzo(a,h)anthracene	0.012	0.2	1
Dibenzofuran	0.29	1	13.52
Diethyl phthalate	0.55	2	220
Dimethoate	5.4	10 <sup>(4)</sup>	10
p-(Dimethylamino)azobenzene	3.7	15	--
a,a-Dimethylphenethylamine	17	50	--
Dimethyl phthalate	0.28	2	73
Diphenylamine <sup>(6)</sup>	3.6	10	10
Disulfoton	8.54	16 <sup>(4)*</sup>	0.3
Ethyl methane sulfonate	4.80	16	--
Ethyl parathion	5.23	15	--
Famphur	2.60	10	--

TABLE 1-3

ANALYTICAL METHODS AND LIMITS OF DETECTION  
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Chemical	Laboratory MDL/IDL <sup>(1)</sup> (ug/L)	Laboratory RL <sup>(1)</sup> (ug/L)	Risk-Based Target Level <sup>(2)</sup> (ug/L)
Fluoranthene	0.014	0.2	8.1
Fluorene	0.015	0.2	10
Hexachlorobenzene	0.30	2	2
Hexachlorobutadiene	0.63	1 <sup>(a)</sup>	1
Hexachlorocyclopentadiene	0.05	2	2
Hexachloroethane	0.71	2	4.8
Hexachloropropene	4.0	20	20
Indeno(1,2,3-cd)pyrene	0.008	0.2	1
Isodrin	3.4	10	10
Isophorone	0.48	1	71
Isosafrole	2.9	20	--
Kepone	6.2	25*	0.7
Methapyrilene	17	40	--
Methyl methane sulfonate	4.1	16	--
Methyl parathion	4.98	10*	9.1
n-Nitrosodi-n-butylamine	4.7	10	10
n-Nitrosodiethylamine	3.3	10	10
n-Nitrosodimethylamine	0.44	10	10
n-Nitrosodi-n-propylamine	0.39	2	2
n-Nitrosomethylethylamine	3.6	10	10
n-Nitrosomorpholine	5.3	10 <sup>(a)</sup>	10
n-Nitrosopiperidine	3.6	10	10
n-Nitrosopyrrolidine	3.0	10	10
Naphthalene	0.014	0.2	24
Pentachlorobenzene	4.7	10	10
Pentachloroethane	4.8	10	14.39
Pentachloronitrobenzene	3.8	10	10
Pentachlorophenol	0.97	10	10
Phenacetin	1.6	10	10
Phenanthrene	0.019	0.2	1
Phenol	1.5	5	100
Phorate	5.06	10 <sup>(a)*</sup>	3.62
Pronamide	3.3	12	160
Pyrene	0.017	0.2	1
Pyridine	1.2	10	37
Safrole	2.7	20	40
Tetraethyl dithiopyrophosphate (Sulfotepp)	3.5	10	10
Thionazin	4.0	100	--
o-Toluidine	5.2	15	--
O,O,O-Triethyl phosphorothioate	4.6	10	10
<b>APPENDIX IX ORGANOCHLORINE PESTICIDES and PCBs (SW-846 METHOD 8081)</b>			
Aldrin	0.0028	0.01	0.01
Alpha-BHC	0.0031	0.01	0.01
Alpha-chlordane	0.0020	0.03	0.03
Beta-BHC	0.0024	0.03	0.037
4,4'-DDD	0.0035	0.05	0.05
4,4'-DDE	0.0029	0.05*	0.01
4,4'-DDT	0.0048	0.05*	0.01

TABLE 1-3  
ANALYTICAL METHODS AND LIMITS OF DETECTION  
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Chemical	Laboratory MDL/IDL <sup>(1)</sup> (ug/L)	Laboratory RL <sup>(1)</sup> (ug/L)	Risk-Based Target Level <sup>(2)</sup> (ug/L)
Delta-BHC	0.0020	0.05	666.67
Dieldrin	0.0060	0.02	0.02
Endosulfan I	0.0033	0.05	0.051
Endosulfan II	0.0052	0.05	0.051
Endosulfan sulfate	0.0061	0.05	0.05
Endrin	0.0084	0.06	0.06
Endrin aldehyde	0.0069	0.05	0.05
Gamma-BHC (Lindane)	0.0037	0.05	0.052
Gamma-chlordane	0.0022	0.03	0.03
Heptachlor	0.0030	0.03	0.03
Heptachlor epoxide	0.0023	0.01	0.01
Methoxychlor	0.0226	0.12*	0.05
Toxaphene	1.1	3.0*	2.4
Aroclor-1016	0.094	0.5	0.5
Aroclor-1221	0.084	0.5	0.5
Aroclor-1232	0.23	0.5	0.5
Aroclor-1242	0.37	0.5 <sup>(a)</sup>	0.5
Aroclor-1248	0.11	0.5	0.5
Aroclor-1254	0.11	0.5	0.5
Aroclor-1260	0.095	0.5	0.5
<b>APPENDIX IX HERBICIDES (SW-846 METHOD 8151A)</b>			
2,4-D	0.021	0.2	70
2,4,5-T	0.011	0.2	370
2,4,5-TP (Silvex)	0.003	0.2	50
Dinoseb	0.035	0.2	0.39
Hexachlorophene	0.034	0.5	11
<b>DIOXINS/FURANS (SW-846 METHOD 8290)</b>			
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	6.1E-6	1E-5*	4.5E-6
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD)	2.24E-5	5E-5*	9E-6 <sup>(r)</sup>
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD)	9.8E-6	5E-5*	4.5E-5 <sup>(r)</sup>
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD)	6.1E-6	5E-5*	4.5E-5 <sup>(r)</sup>
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD)	1.76E-5	5E-5*	4.5E-5 <sup>(r)</sup>
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD)	1.78E-5	5E-5	4.5E-4 <sup>(r)</sup>
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (1,2,3,4,6,7,8,9-OCDD)	2.6E-5	1E-4	4.5E-3 <sup>(r)</sup>
2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF)	6.6E-6	1E-5	4.5E-5 <sup>(r)</sup>
1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF)	1.49E-5	5E-5	9E-5 <sup>(r)</sup>
2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF)	1.62E-5	5E-5*	9E-6 <sup>(r)</sup>
1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF)	1.62E-5	5E-5*	4.5E-5 <sup>(r)</sup>
1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF)	1.42E-5	5E-5*	4.5E-5 <sup>(r)</sup>
1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF)	1.93E-5	5E-5*	4.5E-5 <sup>(r)</sup>
2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF)	2.4E-5	5E-5*	4.5E-5 <sup>(r)</sup>
1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF)	1.88E-5	5E-5	4.5E-4 <sup>(r)</sup>
1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF)	2.84E-5	5E-5	4.5E-4 <sup>(r)</sup>
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (1,2,3,4,6,7,8,9-OCDF)	3.03E-5	1E-4	4.5E-3 <sup>(r)</sup>
Total Tetrachlorodibenzo-p-dioxin (Total TCDD)	NA <sup>(b)</sup>	1E-5	NA
Total Pentachlorodibenzo-p-dioxin (Total PeCDD)	NA	5E-5	NA
Total Hexachlorodibenzo-p-dioxin (Total HxCDD)	NA	5E-5	NA
Total Heptachlorodibenzo-p-dioxin (Total HpCDD)	NA	5E-5	NA

TABLE 1-3

ANALYTICAL METHODS AND LIMITS OF DETECTION  
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Chemical	Laboratory MDL/IDL <sup>(1)</sup> (ug/L)	Laboratory RL <sup>(1)</sup> (ug/L)	Risk-Based Target Level <sup>(2)</sup> (ug/L)
Total Tetrachlorodibenzofuran (Total TCDF)	NA	1E-5	NA
Total Pentachlorodibenzofuran (Total PeCDF)	NA	5E-5	NA
Total Hexachlorodibenzofuran (Total HxCDF)	NA	5E-5	NA
Total Heptachlorodibenzofuran (Total HpCDF)	NA	5E-5	NA
<b>MISCELLANEOUS PARAMETERS</b>			
Ammonia (EPA Method 350.1)	6.4	10	--
Chloride (SW-846 Method 9056)	80	1000	--
Cyanide (SW-846 Method 9012A)	2.4	10	10
Dissolved Ethane (Microseeps, Inc., Method AM18)	0.0008	0.005	100 <sup>(9)</sup>
Dissolved Ethene (Microseeps, Inc., Method AM18)	0.0013	0.005	10 <sup>(9)</sup>
Dissolved Methane (Microseeps, Inc., Method AM18)	0.005	0.015	5 <sup>(9)</sup>
Phosphorus (Total and Dissolved) (EPA Method 365.2)	31.2	100	--
Sulfate (SW-846 Method 9056)	74.2	1000	--
Sulfide (SW-846 Method 9034)	800	1000	--
Total Organic Carbon (TOC) (SW-846 Method 9060)	306	1000	--
Total Organic Halides (TOX) (SW-846 Method 9020B)	8.8	20	--

ug/L micrograms per liter

- \* Asterisks indicate those chemicals for which the laboratory RL exceeds the risk-based target level for the project.
- 1 Method detection limits (MDLs) (all parameters except metals), instrument detection limits (IDLs) (metals only), and reporting limits (RLs) as provided by Laucks Testing Laboratories, Inc., Triangle Laboratories, Inc. (dioxins/furans only), and Microseeps, Inc. (dissolved methane only). These values may change throughout the course of the ground water monitoring program as laboratory MDLs and IDLs are updated.
- 2 Developed using U.S. EPA Region 5 support. Value is based on human health or ecological risk-based criteria or practical quantitation limits (PQLs) for common laboratory analytical methods.
- 3 Risk-based target level is not provided, since human and ecological risk-based criteria are not available for this chemical.
- 4 Laucks Testing Laboratories is confident that it can reliably report to this PQL, even though this value is less than two times the MDL.
- 5 3-Methylphenol and 4-methylphenol coelute. Therefore, one analytical result for 3-, 4-methylphenol will be reported.
- 6 N-Nitrosodiphenylamine is more toxic than diphenylamine. However, n-nitrosodiphenylamine rapidly degrades to diphenylamine. Therefore, only diphenylamine will be reported, but results for diphenylamine will be treated as n-nitrosodiphenylamine during risk assessment.
- 7 The target level is calculated using the target level for 2,3,7,8-TCDD and the toxicity equivalent factor (TEF) presented in current U.S. EPA guidance (U.S. EPA, March 1989).
- 8 Not applicable.
- 9 The target levels for dissolved ethane, ethene, and methane are not risk-based values, but instead represent the target reporting levels for these dissolved gases based on their use in evaluating the natural attenuation of TCE.

TABLE 4-10

SUMMARY OF SAMPLE ANALYSIS, BOTTLE REQUIREMENTS, PRESERVATION REQUIREMENTS, AND HOLDING TIMES  
 NAVAL SURFACE WARFARE CENTER  
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Parameter	Sample Container	Container Volume	Preservation <sup>(1)</sup>	Maximum Holding Time <sup>(2)</sup>	Analytical Methodology
Appendix IX Organochlorine Pesticides/Polychlorinated biphenyls (PCBs)	Amber glass, Teflon-lined cap	(2) 1000 mL <sup>(3)</sup>	Cool to 4°C, dark	Extraction 7 days; analysis within 40 days of extraction	SW-846 Method 8081
Appendix IX Herbicides	Amber glass, Teflon-lined cap	(2) 1000 mL <sup>(3)</sup>	Cool to 4°C, dark	Extraction 7 days; analysis within 40 days of extraction	SW-846 Method 8151A
Dioxins/Furans	Amber glass, Teflon-lined cap	(2) 1000 mL <sup>(3)</sup>	Cool to 4°C, dark	Extraction 30 days; analysis within 45 days of extraction	SW-846 Method 8290
Ammonia	Polyethylene bottle, plastic cap, plastic liner	500 mL <sup>(14)</sup>	Cool to 4°C, H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days	EPA Method <sup>(15)</sup> 350.1
Chloride	Polyethylene bottle, plastic cap, plastic liner	500 mL <sup>(16)</sup>	Cool to 4°C	28 days	SW-846 Method 9056
Cyanide	Polyethylene bottle, plastic cap, plastic liner	500 mL	Cool to 4°C, NaOH to pH > 12	Within 14 days	SW-846 Method 9012A
Dissolved Methane, Ethene, and Ethane	Amber glass, plastic cap Mylar-faced silicon septum	(2) 40 mL	Cool to 4°C, dark, zero headspace	14 days	Microseeps Method AM18.01 <sup>(17)</sup>
Phosphorus (Total and Dissolved)	Polyethylene bottle, plastic cap, plastic liner	500 mL <sup>(14)</sup>	Cool to 4°C, H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days	EPA Method 365.2
Sulfate	Polyethylene bottle, plastic cap, plastic liner	500 mL <sup>(16)</sup>	Cool to 4°C	28 days	SW-846 Method 9056
Sulfide	Polyethylene bottle, plastic cap, plastic liner	500 mL	Cool to 4°C, zinc acetate, NaOH to pH >9	7 days	SW-846 Method 9030B/9034
Total Organic Carbon (TOC)	Amber glass, septa cap	(2) 40 mL	Cool to 4°C, H <sub>3</sub> PO <sub>4</sub> to pH <2	28 days	SW-846 Method 9060
Total Organic Halides (TOX)	Amber glass, Teflon-lined cap	1000 mL	Cool to 4°C, H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days	SW-846 Method 9020B

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TABLE 4-10

SUMMARY OF SAMPLE ANALYSIS, BOTTLE REQUIREMENTS, PRESERVATION REQUIREMENTS, AND HOLDING TIMES  
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- 1 HCl = Hydrochloric acid, H<sub>2</sub>SO<sub>4</sub> = Sulfuric Acid, NaOH = Sodium Hydroxide, HNO<sub>3</sub> = Nitric Acid.
- 2 All holding times are from date of collection.
- 3 Two additional 1,000-mL bottles are required for samples designated for matrix spike/matrix spike duplicate analysis (minimum 1 in 20 samples).
- 4 U.S. EPA, 1986. Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. SW-846, 3rd ed, including updates.
- 5 Based on Indiana Army Ammunition Plant Contamination Survey. "Nitrocellulose in Water". Aqualab, Inc., 1983.
- 6 Laucks SOP LTL-8308, included in Appendix B of the QAPP.
- 7 One 1,000-mL bottle of unfiltered ground water will provide sufficient sample volume for the analysis for Appendix IX metals (total) and/or any additional total metals analyses. Likewise, one 1,000-mL bottle of filtered ground water will provide sufficient sample volume for the analysis for Appendix IX metals (dissolved) and/or any additional dissolved metals analyses.
- 8 One additional 1,000-mL bottle is required for samples designated for matrix spike/duplicate analysis (minimum 1 in 20 samples).
- 9 Eight additional 40-mL vials are required for samples designated for matrix spike/matrix spike duplicate analysis (minimum 1 in 20 samples).
- 10 Analysis will be performed using a 25-mL sample volume in order to achieve lower quantitation limits for ground water samples.
- 11 Three 40-mL vials will provide sufficient sample volume for the analysis of trichloroethene and its degradation products (volatile subset B) and aromatic and chlorinated hydrocarbons (volatile subset C). In addition, when samples are collected for analysis of the Appendix IX volatile list (six 40-mL vials), it is not necessary to collect any additional vials for volatile subsets B and C because the analytes included in volatile subsets B and C are completely contained within the Appendix IX volatile list.
- 12 Four additional 40-mL vials are required for samples designated for matrix spike/matrix spike duplicate analysis (minimum 1 in 20 samples).
- 13 Four additional 1,000-mL bottles are required for samples designated for matrix spike/matrix spike duplicate analysis (minimum 1 in 20 samples).
- 14 Ammonia and total phosphorus samples will be provided for analysis in the same 500-mL bottle.
- 15 U.S. EPA, 1983. Methods for Chemical Analysis of Water and Wastes.
- 16 Chloride and sulfate samples will be provided for analysis in the same 500-mL bottle.
- 17 Microseeps Method AM18.01, included in Appendix B of the QAPP.

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I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Thomas J. Brent, acting  
SIGNATURE

Environmental Protection Specialist  
TITLE

08 MAY 2000  
DATE