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NAS WILLOW GROVE
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Ch stnut Building
Philadelphia, Pennsylvania 19107-4431

REPLY TO ATTENTION OF:

Federal Facilities Branch (3HW50)

VIA TELEFACSIMILE

June 11, 1996

Department of the Navy
Northern Division
Naval Facilities Engineering Command
Industrial Highway, Mail Stop #82
Lester, PA 19113-2090

Attn: James L. Colter (Code 1821/JLC)
Remedial Project Manager

Re: Draft Work Plan - April 1996
Phase II Remedial Investigation/Feasibility Study ("RI/FS")
Naval Air Station Joint Reserve Base ("NAS/JRB").
Willow Grove, PA

Dear Mr. Colter:

Please reference June 5, 1996 correspondence from the U.S. Environmental Protection Agency Region III ("EPA Region III") to Northern Division Naval Facilities Engineering Command regarding the draft Phase II RI/FS work plan. The following information is attached for your use when effecting revisions to the Quality Assurance Project Plan portion of the work plan:

- Quality Assurance Directive Bulletin QAD009, *Field Filtration Policy for Monitoring Well Ground Water Samples Requiring Metals Analysis*, dated April 23, 1990.

- Contract Required Quantitation Limits ("CRQLs") for target compound list ("TCL") organics and Contract Required Detection Limits for target analyte list inorganics based on the most recent Contract Laboratory Program Statements of Work ("SOWs").

- CRQLs for TCL organics under the Low-Concentration SOW.

- Detection limits for polychlorinated dibenzodioxins and polychlorinated dibenzofurans under Method 1613.

EPA Region III's remaining comments on the draft work plan will be based upon discussions during the March 8th RI/FS scoping

meeting at NAS/JRB and observations made during the planned June 13th site visit, which is primarily intended to familiarize our Interagency Biological Technical Assistance Team with environmental conditions at selected portions of NAS/JRB. Consistent with scoping meeting discussions, the site visit will focus on NAS/JRB Installation Restoration Program sites #1, #2, #3, #5 and #11.

If you have any questions, feel free to contact me at (215) 566-3359 or at my e-mail address "lausch.robert@epamail.epa.gov". Your continued cooperation and patience is greatly appreciated.

Sincerely,

Drew Lausch
Remedial Project Manager

Attachments

cc w/attachments:

Hal Dusen (ARS)
David Kennedy (PADEP)

cc w/o attachments:

Jim Edmond (NAS/JRB)

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Volatiles	CAS Number	Quantitation Limits Water ug/L
1. Chloromethane	74-87-3	1
2. Bromomethane	74-83-9	1
3. Vinyl chloride	75-01-4	1
4. Chloroethane	75-00-3	1
5. Methylene chloride	75-09-2	2
6. Acetone	67-64-1	5
7. Carbon disulfide	75-15-0	1
8. 1,1-Dichloroethene	75-35-4	1
9. 1,1-Dichloroethane	75-34-3	1
10. cis-1,2-Dichloroethene	156-59-4	1
11. trans-1,2-Dichloroethene	156-60-5	1
12. Chloroform	67-66-3	1
13. 1,2-Dichloroethane	107-06-2	1
14. 2-Butanone	78-93-3	5
15. Bromochloromethane	74-97-5	1
16. 1,1,1-Trichloroethane	71-55-6	1
17. Carbon Tetrachloride	56-23-5	1
18. Bromodichloromethane	75-27-4	1
19. 1,2-Dichloropropane	78-87-5	1
20. cis-1,3-Dichloropropene	10061-01-5	1
21. Trichloroethene	79-01-6	1
22. Dibromochloromethane	124-48-1	1
23. 1,1,2-Trichloroethane	79-00-5	1
24. Benzene	71-43-2	1
25. trans-1,3-Dichloropropene	10061-02-6	1
26. Bromoform	75-25-2	1
27. 4-Methyl-2-pentanone	108-10-1	5
28. 2-Hexanone	591-78-6	5
29. Tetrachloroethene	127-18-4	1

TARGET COMPOUND LIST (TCL) AND
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
(CONT'D.)

Volatiles	CAS Number	Quantitation Limits Water ug/L
30. 1,1,2,2-Tetrachloroethane	79-34-5	1
31. 1,2-Dibromoethane	106-93-4	1
32. Toluene	108-88-3	1
33. Chlorobenzene	108-90-7	1
34. Ethylbenzene	100-41-4	1
35. Styrene	100-42-5	1
36. Xylenes (total)	1330-20-7	1
37. 1,3-Dichlorobenzene	541-73-1	1
38. 1,4-Dichlorobenzene	106-46-7	1
39. 1,2-Dichlorobenzene	95-50-1	1
40. 1,2-Dibromo-3-chloropropane	96-12-8	1

NOTE: Except for Methylene chloride, the quantitation limits in this table are set at the concentrations in the sample equivalent to the concentration of the lowest calibration standard analyzed for each analyte.

In the case of Methylene chloride, the CRQL value in this table is based on the lowest level of detection in samples contaminated with this common laboratory solvent that can be achieved by reasonable means in a production laboratory.

TARGET COMPOUND LIST (TCL) AND
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
(CONT'D.)

Semivolatiles	CAS Number	Quantitation Limits Water ug/L
1. Phenol	108-95-2	5
2. bis-(2-Chloroethyl)ether	111-44-4	5
3. 2-Chlorophenol	95-57-8	5
4. 2-Methylphenol	95-48-7	5
5. 2,2'-oxybis(1-Chloropropane)	108-60-1	5
6. 4-Methylphenol	106-44-5	5
7. N-Nitroso-di-n-propylamine	621-64-7	5
8. Hexachloroethane	67-72-1	5
9. Nitrobenzene	98-95-3	5
10. Isophorone	78-59-1	5
11. 2-Nitrophenol	88-75-5	5
12. 2,4-Dimethylphenol	105-67-9	5
13. bis-(2-Chloroethoxy)methane	11-91-1	5
14. 2,4-Dichlorophenol	120-83-2	5
15. 1,2,4-Trichlorobenzene	120-82-1	5
16. Naphthalene	91-20-3	5
17. 4-Chloroaniline	106-47-8	5
18. Hexachlorobutadiene	87-68-3	5
19. 4-Chloro-3-methylphenol	59-50-7	5
20. 2-Methylnaphthalene	91-57-6	5
21. Hexachlorocyclopentadiene	77-47-4	5
22. 2,4,6-Trichlorophenol	88-06-2	5
23. 2,4,5-Trichlorophenol	95-95-4	20
24. 2-Chloronaphthalene	91-58-7	5
25. 2-Nitroaniline	88-74-4	20
26. Dimethylphthalate	131-11-3	5
27. Acenaphthylene	208-96-8	5
28. 2,6-Dinitrotoluene	606-20-2	5
29. 3-Nitroaniline	99-09-2	20
30. Acenaphthene	83-32-9	5
31. 2,4-Dinitrophenol	51-28-5	20
32. 4-Nitrophenol	100-02-7	20
33. Dibenzofuran	132-64-9	5

TARGET COMPOUND LIST (TCL) AND
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
(CONT'D.)

Semivolatiles	CAS Number	Quantitation Limits Water ug/L
34. 2,4-Dinitrotoluene	121-14-2	5
35. Diethylphthalate	84-66-2	5
36. 4-Chlorophenyl-phenylether	7005-72-3	5
37. Fluorene	86-73-7	5
38. 4-Nitroaniline	100-01-6	20
39. 4,6-Dinitro-2-methylphenol	534-52-1	20
40. N-Nitrosodiphenylamine	86-30-6	5
41. 4-Bromophenyl-phenylether	101-55-3	5
42. Hexachlorobenzene	118-74-1	5
43. Pentachlorophenol	87-86-5	20
44. Phenanthrene	85-01-8	5
45. Anthracene	120-12-7	5
46. Di-n-butylphthalate	84-74-2	5
47. Fluoranthene	206-44-0	5
48. Pyrene	129-00-0	5
49. Butylbenzylphthalate	85-68-7	5
50. 3,3'-Dichlorobenzidine	91-94-1	5
51. Benzo(a)anthracene	56-55-3	5
52. Chrysene	218-01-9	5
53. bis-(2-Ethylhexyl)phthalate	117-81-7	5
54. Di-n-octylphthalate	117-84-0	5
55. Benzo(b)fluoranthene	205-99-2	5
56. Benzo(k)fluoranthene	207-08-9	5
57. Benzo(a)pyrene	50-32-8	5
58. Indeno(1,2,3-cd)pyrene	193-39-5	5
59. Dibenz(a,h)anthracene	53-70-3	5
60. Benzo(g,h,i)perylene	191-24-2	5

TARGET COMPOUND LIST (TCL) AND
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)
(CONT'D.)

Pesticides/PCBs	CAS Number	Quantitation Limits Water ug/L
1. alpha-BHC	319-84-6	0.01
2. beta-BHC	319-85-7	0.01
3. delta-BHC	319-36-8	0.01
4. gamma-BHC (Lindane)	58-89-9	0.01
5. Heptachlor	76-44-8	0.01
6. Aldrin	309-00-2	0.01
7. Heptachlor epoxide	1024-57-3	0.01
8. Endosulfan I	959-98-8	0.01
9. Dieldrin	60-57-1	0.02
10. 4,4'-DDE	72-55-9	0.02
11. Endrin	72-20-8	0.02
12. Endosulfan II	33213-65-9	0.02
13. 4,4'-DDD	72-54-8	0.02
14. Endosulfan sulfate	1031-07-8	0.02
15. 4,4'-DDT	50-29-3	0.02
16. Methoxychlor	72-43-5	0.10
17. Endrin ketone	53494-70-5	0.02
18. Endrin aldehyde	7421-93-4	0.02
19. alpha-Chlordane	5103-71-9	0.01
20. gamma-Chlordane	5103-74-2	0.01
21. Toxaphene	8001-35-2	1.0
22. Aroclor-1016	12674-11-2	0.20
23. Aroclor-1221	11104-28-2	0.40
24. Aroclor-1232	11141-16-5	0.20
25. Aroclor-1242	53469-21-9	0.20
26. Aroclor-1248	12672-29-6	0.20
27. Aroclor-1254	11097-69-1	0.20
28. Aroclor-1260	11096-82-5	0.20

1.0 VOLATILES TARGET COMPOUND LIST AND CONTRACT REQUIRED QUANTITATION LIMITS

	Volatiles	CAS Number	Quantitation Limits Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
1.	Chloromethane	74-87-3	10	10	1200	(50)
2.	Bromomethane	74-83-9	10	10	1200	(50)
3.	Vinyl Chloride	75-01-4	10	10	1200	(50)
4.	Chloroethane	75-00-3	10	10	1200	(50)
5.	Methylene Chloride	75-09-2	10	10	1200	(50)
6.	Acetone	67-64-1	10	10	1200	(50)
7.	Carbon Disulfide	75-15-0	10	10	1200	(50)
8.	1,1-Dichloroethene	75-35-4	10	10	1200	(50)
9.	1,1-Dichloroethane	75-34-3	10	10	1200	(50)
10.	1,2-Dichloroethene (total)	540-59-0	10	10	1200	(50)
11.	Chloroform	67-66-3	10	10	1200	(50)
12.	1,2-Dichloroethane	107-06-2	10	10	1200	(50)
13.	2-Butanone	78-93-3	10	10	1200	(50)
14.	1,1,1-Trichloroethane	71-55-6	10	10	1200	(50)
15.	Carbon Tetrachloride	56-23-5	10	10	1200	(50)
16.	Bromodichloromethane	75-27-4	10	10	1200	(50)
17.	1,2-Dichloropropane	78-87-5	10	10	1200	(50)
18.	cis-1,3-Dichloropropene	10061-01-5	10	10	1200	(50)
19.	Trichloroethene	79-01-6	10	10	1200	(50)
20.	Dibromochloromethane	124-48-1	10	10	1200	(50)
21.	1,1,2-Trichloroethane	79-00-5	10	10	1200	(50)
22.	Benzene	71-43-2	10	10	1200	(50)
23.	trans-1,3-Dichloropropene	10061-02-6	10	10	1200	(50)
24.	Bromoform	75-25-2	10	10	1200	(50)
25.	4-Methyl-2-pentanone	108-10-1	10	10	1200	(50)
26.	2-Hexanone	591-78-6	10	10	1200	(50)
27.	Tetrachloroethene	127-18-4	10	10	1200	(50)
28.	1,1,2,2-Tetrachloroethane	79-34-5	10	10	1200	(50)
29.	Toluene	108-88-3	10	10	1200	(50)
30.	Chlorobenzene	108-90-7	10	10	1200	(50)
31.	Ethylbenzene	100-41-4	10	10	1200	(50)
32.	Styrene	100-42-5	10	10	1200	(50)
33.	Xylenes (total)	1330-20-7	10	10	1200	(50)

Exhibit C -- Section 2
Semivolatiles (SVOA)

2.0 SEMIVOLATILES TARGET COMPOUND LIST AND CONTRACT REQUIRED QUANTITATION LIMITS

	Semivolatiles	CAS Number	Quantitation Limits Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
34.	Phenol	108-95-2	10	330	10000	(20)
35.	bis-(2-Chloroethyl) ether	111-44-4	10	330	10000	(20)
36.	2-Chlorophenol	95-57-8	10	330	10000	(20)
37.	1,3-Dichlorobenzene	541-73-1	10	330	10000	(20)
38.	1,4-Dichlorobenzene	106-46-7	10	330	10000	(20)
39.	1,2-Dichlorobenzene	95-50-1	10	330	10000	(20)
40.	2-Methylphenol	95-48-7	10	330	10000	(20)
41.	2,2'-oxybis (1-Chloropropane)[1]	108-60-1	10	330	10000	(20)
42.	4-Methylphenol	106-44-5	10	330	10000	(20)
43.	N-Nitroso-di-n-propylamine	621-64-7	10	330	10000	(20)
44.	Hexachloroethane	67-72-1	10	330	10000	(20)
45.	Nitrobenzene	98-95-3	10	330	10000	(20)
46.	Isophorone	78-59-1	10	330	10000	(20)
47.	2-Nitrophenol	88-75-5	10	330	10000	(20)
48.	2,4-Dimethylphenol	105-67-9	10	330	10000	(20)
49.	bis(2-Chloroethoxy) methane	111-91-1	10	330	10000	(20)
50.	2,4-Dichlorophenol	120-83-2	10	330	10000	(20)
51.	1,2,4-Trichloro-benzene	120-82-1	10	330	10000	(20)
52.	Naphthalene	91-20-3	10	330	10000	(20)
53.	4-Chloroaniline	106-47-8	10	330	10000	(20)
54.	Hexachlorobutadiene	87-68-3	10	330	10000	(20)
55.	4-Chloro-3-methylphenol	59-50-7	10	330	10000	(20)
56.	2-Methylnaphthalene	91-57-6	10	330	10000	(20)
57.	Hexachlorocyclo-pentadiene	77-47-4	10	330	10000	(20)
58.	2,4,6-Trichlorophenol	88-06-2	10	330	10000	(20)
59.	2,4,5-Trichlorophenol	95-95-4	25	830	25000	(50)
60.	2-Chloronaphthalene	91-58-7	10	330	10000	(20)
61.	2-Nitroaniline	88-74-4	25	830	25000	(50)

[1] ...ly known by the name bis(2-Chloroisopropyl) ether.

Exhibit C -- Section 2
Semivolatiles (SVOA)

Semivolatiles	CAS Number	Quantitation Limits: Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
62. Dimethylphthalate	131-11-3	10	330	10000	(20)
63. Acenaphthylene	208-96-8	10	330	10000	(20)
64. 2,6-Dinitrotoluene	606-20-2	10	330	10000	(20)
65. 3-Nitroaniline	99-09-2	25	830	25000	(50)
66. Acenaphthene	83-32-9	10	330	10000	(20)
67. 2,4-Dinitrophenol	51-28-5	25	830	25000	(50)
68. 4-Nitrophenol	100-02-7	25	830	25000	(50)
69. Dibenzofuran	132-64-9	10	330	10000	(20)
70. 2,4-Dinitrotoluene	121-14-2	10	330	10000	(20)
71. Diethylphthalate	84-66-2	10	330	10000	(20)
72. 4-Chlorophenyl-phenyl ether	7005-72-3	10	330	10000	(20)
73. Fluorene	86-73-7	10	330	10000	(20)
74. 4-Nitroaniline	100-01-6	25	830	25000	(50)
75. 4,6-Dinitro-2-methylphenol	534-52-1	25	830	25000	(50)
76. N-Nitroso-diphenylamine	86-30-6	10	330	10000	(20)
77. 4-Bromophenyl-phenylether	101-55-3	10	330	10000	(20)
78. Hexachlorobenzene	118-74-1	10	330	10000	(20)
79. Pentachlorophenol	87-86-5	25	830	25000	(50)
80. Phenanthrene	85-01-8	10	330	10000	(20)
81. Anthracene	120-12-7	10	330	10000	(20)
82. Carbazole	86-74-8	10	330	10000	(20)
83. Di-n-butylphthalate	84-74-2	10	330	10000	(20)
84. Fluoranthene	206-44-0	10	330	10000	(20)
85. Pyrene	129-00-0	10	330	10000	(20)
86. Butylbenzylphthalate	85-68-7	10	330	10000	(20)
87. 3,3'-Dichlorobenzidine	91-94-1	10	330	10000	(20)
88. Benzo(a)anthracene	56-55-3	10	330	10000	(20)
89. Chrysene	218-01-9	10	330	10000	(20)
90. bis(2-Ethylhexyl) phthalate	117-81-7	10	330	10000	(20)
91. Di-n-octylphthalate	117-84-0	10	330	10000	(20)
92. Benzo(b)fluoranthene	205-99-2	10	330	10000	(20)
93. Benzo(k)fluoranthene	207-08-9	10	330	10000	(20)

Exhibit C -- Section 2
Semivolatiles (SVOA)

Semivolatiles	CAS Number	Quantitation Limits			
		Water	Low Soil	Med. Soil	On Column
		ug/L	ug/Kg	ug/Kg	(ng)
94. Benzo(a)pyrene	50-32-8	10	330	10000	(20)
95. Indeno(1,2,3-cd)-pyrene	193-39-5	10	330	10000	(20)
96. Dibenzo(a,h)-anthracene	53-70-3	10	330	10000	(20)
97. Benzo(g,h,i)perylene	191-24-2	10	330	10000	(20)

3.0 PESTICIDES/AROCLORS TARGET COMPOUND LIST AND CONTRACT REQUIRED QUANTITATION LIMITS[2,3]

	Pesticides/Aroclors	CAS Number	Quantitation Limits Water ug/L	Soil ug/Kg	On Column (pg)
98.	alpha-BHC	319-84-6	0.050	1.7	5
99.	beta-BHC	319-85-7	0.050	1.7	5
100.	delta-BHC	319-86-8	0.050	1.7	5
101.	gamma-BHC (Lindane)	58-89-9	0.050	1.7	5
102.	Heptachlor	76-44-8	0.050	1.7	5
103.	Aldrin	309-00-2	0.050	1.7	5
104.	Heptachlor epoxide[4]	111024-57-3	0.050	1.7	5
105.	Endosulfan I	959-98-8	0.050	1.7	5
106.	Dieldrin	60-57-1	0.10	3.3	10
107.	4,4'-DDE	72-55-9	0.10	3.3	10
108.	Endrin	72-20-8	0.10	3.3	10
109.	Endosulfan II	33213-65-9	0.10	3.3	10
110.	4,4'-DDD	72-54-8	0.10	3.3	10
111.	Endosulfan sulfate	1031-07-8	0.10	3.3	10
112.	4,4'-DDT	50-29-3	0.10	3.3	10
113.	Methoxychlor	72-43-5	0.50	17	50
114.	Endrin ketone	53494-70-5	0.10	3.3	10
115.	Endrin aldehyde	7421-93-4	0.10	3.3	10
116.	alpha-Chlordane	5103-71-9	0.050	1.7	5
117.	gamma-Chlordane	5103-74-2	0.050	1.7	5
118.	Toxaphene	8001-35-2	5.0	170	500
119.	Aroclor-1016	12674-11-2	1.0	33	100
120.	Aroclor-1221	11104-28-2	2.0	67	200
121.	Aroclor-1232	11141-16-5	1.0	33	100
122.	Aroclor-1242	53469-21-9	1.0	33	100
123.	Aroclor-1248	12672-29-6	1.0	33	100
124.	Aroclor-1254	11097-69-1	1.0	33	100
125.	Aroclor-1260	11096-82-5	1.0	33	100

[2]There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of pesticides/Aroclors.

[3]The lower reporting limit for pesticide instrument blanks shall be one-half the CRQL values for water samples.

[4]Only the exo-epoxy isomer (isomer B) of heptachlor epoxide is reported on the data reporting forms (Exhibit B).

INORGANIC TARGET ANALYTE LIST (TAL)

Analyte	Contract Required Detection Limit (1,2) (ug/L)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	3
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

(1) Subject to the restrictions specified in the first page of Part G, Section IV of Exhibit D (Alternate Methods - Catastrophic Failure) any analytical method specified in SOW Exhibit D may be utilized as long as the documented instrument or method detection limits meet the Contract Required Detection Limit (CRDL) requirements. Higher detection limits may only be used in the following circumstance:

If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the Contract Required Detection Limit. This is illustrated in the example below:

For lead:

Method in use - ICP
Instrument Detection Limit (IDL) - 40
Sample concentration - 220
Contract Required Detection Limit (CRDL) - 3

The value of 220 may be rep rted ev n though the instrument detecti n limit is gr ater than CRDL. The instrum nt r method detection limit must be documented as described in Exhibits B and E.

(2) The CRDLs are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The detection limits for samples may be considerably higher depending on the sample matrix.

Table 2: R tention Time References, Quantitation References, Relative Retention Tim s, and Minimum Levels for CDDs and CDFs

CDD/CDF	Retention time and quantitation reference	Relative retention time	Minimum lev l[1] Water (pg/L; ppq)	Solid (ng/kg; ppt)	Extract (pg/µL; ppb)
Compounds using $^{13}C_{12}$-1,2,3,4-TCDD as the injection internal standard					
2,3,7,8-TCDF	$^{13}C_{12}$-2,3,7,8-TCDF	0.999–1.003	10	1	0.5
2,3,7,8-TCDD	$^{13}C_{12}$-2,3,7,8-TCDD	0.999–1.002	10	1	0.5
1,2,3,7,8-PeCDF	$^{13}C_{12}$-1,2,3,7,8-PeCDF	0.999–1.002	50	5	2.5
2,3,4,7,8-PeCDF	$^{13}C_{12}$-2,3,4,7,8-PeCDF	0.999–1.002	50	5	2.5
1,2,3,7,8-PeCDD	$^{13}C_{12}$-1,2,3,7,8-PeCDD	0.999–1.002	50	5	2.5
$^{13}C_{12}$-2,3,7,8-TCDF	$^{13}C_{12}$-1,2,3,4-TCDD	0.923–1.103			
$^{13}C_{12}$-2,3,7,8-TCDD	$^{13}C_{12}$-1,2,3,4-TCDD	0.976–1.043			
$^{37}Cl_4$-2,3,7,8-TCDD	$^{13}C_{12}$-1,2,3,4-TCDD	0.989–1.052			
$^{13}C_{12}$-1,2,3,7,8-PeCDF	$^{13}C_{12}$-1,2,3,4-TCDD	1.000–1.425			
$^{13}C_{12}$-2,3,4,7,8-PeCDF	$^{13}C_{12}$-1,2,3,4-TCDD	1.011–1.526			
$^{13}C_{12}$-1,2,3,7,8-PeCDD	$^{13}C_{12}$-1,2,3,4-TCDD	1.000–1.567			
Compounds using $^{13}C_{12}$-1,2,3,7,8,9-HxCDD as the injection internal standard					
1,2,3,4,7,8-HxCDF	$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	0.999–1.001	50	5	2.5
1,2,3,6,7,8-HxCDF	$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	0.997–1.005	50	5	2.5
1,2,3,7,8,9-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	0.999–1.001	50	5	2.5
2,3,4,6,7,8-HxCDF	$^{13}C_{12}$-2,3,4,6,7,8,-HxCDF	0.999–1.001	50	5	2.5
1,2,3,4,7,8-HxCDD	$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	0.999–1.001	50	5	2.5
1,2,3,6,7,8-HxCDD	$^{13}C_{12}$-1,2,3,6,7,8,-HxCDD	0.998–1.004	50	5	2.5
1,2,3,7,8,9-HxCDD	—[2]	1.000–1.019	50	5	2.5
1,2,3,4,6,7,8-HpCDF	$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	0.999–1.001	50	5	2.5
1,2,3,4,7,8,9-HpCDF	$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	0.999–1.001	50	5	2.5
1,2,3,4,6,7,8-HpCDD	$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	0.999–1.001	50	5	2.5
OCDF	$^{13}C_{12}$-OCDD	0.999–1.008	100	10	5.0
OCDD	$^{13}C_{12}$-OCDD	0.999–1.001	100	10	5.0
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.944–0.970			
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.949–0.975			
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.977–1.047			
$^{13}C_{12}$-2,3,4,6,7,8,-HxCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.959–1.021			
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.977–1.000			
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	0.981–1.003			
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.043–1.085			
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.057–1.151			
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.086–1.110			
$^{13}C_{12}$-OCDD	$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.032–1.311			

1. The Minimum Level (ML) for each analyte is defined as the level at which the entire analytical system must give a recognizable signal and acceptable calibration point. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.
2. The retention time reference for 1,2,3,7,8,9-HxCDD is $^{13}C_{12}$-1,2,3,6,7,8-HxCDD, and 1,2,3,7,8,9-HxCDD is quantified using the averaged responses for $^{13}C_{12}$-1,2,3,4,7,8-HxCDD and $^{13}C_{12}$-1,2,3,6,7,8-HxCDD.

ESD

EPA
REGION III
QA DIRECTIVES

HWMD

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FIELD FILTRATION POLICY FOR MONITORING WELL GROUNDWATER SAMPLES REQUIRING METALS ANALYSIS

The objectives of this directive are: (1) to formally state Region III RCRA and CERCLA policy which requires both filtered and unfiltered groundwater samples for metal analyses; (2) to outline appropriate exceptions to the stated policy; and (3) to provide technical direction for the field filtration procedure.

REMINDER: A single copy of this directive is provided to the individual designated to represent the contractor. It is the responsibility of that individual to distribute the directive within the contractor organization to appropriate project managers and field personnel.

Concentrations of metal contaminants measured in unfiltered groundwater represent the total metals present in the sample. Filtered samples represent dissolved metals concentration and are often more representative of mobile contamination (see exceptions below). Monitoring wells sometimes produce turbid water (water containing suspended solids). The turbidity can be due to disruption of the adjacent geologic formations during well purging or poor design and initial development of the well. When particles containing metal species are suspended into the groundwater and are not removed, they dissolve when the sample is preserved to a pH <2. High levels of aluminum, manganese, and iron in unfiltered samples often indicate the presence of these particles. Without filtration, concentrations of this mobile metal contamination in the groundwater are often over estimated. Therefore, it is necessary to take both filtered and unfiltered samples to fully characterize the distribution of metals at a given site. Since acid (low pH) may distort the distribution of metals between particulate and dissolved species, preservation for dissolved metals samples must be performed after filtration. Because the oxidation state affects the solubility of metals, filtration must occur immediately after sampling.

The exceptions to the policy requiring both filtered and unfiltered samples are:

1. Site specific geologic conditions where groundwater may transport large particulates and only unfiltered samples are representative of mobile groundwater quality (for example, karst terrain or clean gravel facies). These site conditions must be fully discussed and documented in the Quality Assurance Project Plan (QAPjP).

2. When there is sufficient historical data (a minimum of four consecutive quarters) from the same monitoring wells that are to be sampled, then these wells may fall into one of the following exception categories:

   a. If the historical information shows that the purging and sampling methods are the same as the methods to be used at future sampling events, then either filtered or unfiltered samples as appropriate to the historical data are acceptable for future sampling in these wells.

   b. If the historical information shows inconsistency between the filtered and unfiltered data, and high levels of aluminum are present in the unfiltered data, only filtered samples are needed.

NOTE: Extrapolation of historical data from a limited number of wells to all the wells at the site is not acceptable without a clearly justified rationale. All deviations from taking BOTH filtered and unfiltered groundwater samples for metals must be fully described and justified in the QAPjP.

TECHNICAL GUIDANCE FOR FILTRATION OF MONITORING WELL SAMPLES FOR METALS ANALYSIS

1. Designate an area in which the filtration process is to take place. This area must have an element and dust-free environment. When filtration apparatus is not in use, keep it covered to protect from airborne particles. Use either a glass or plastic filtering apparatus. Stainless steel is unacceptable since it can contaminate the samples.

(over)

2. Filtration must be initiated immediately after sample collection. Record both the time of sample collection and time of filtration in the field notebook. Filtration must be completed before preservation to a pH <2.

3. A 0.45 micron filter is the required pore size for filtration. Other pore-size filters may be appropriate for site specific conditions. However, deviations from the 0.45 micron pore size must be justified and documented in the QAPjP and field notebook. The polycarbonate membrane type is recommended. For highly turbid water, a clean glass fiber filter may be used as a "pre-filter". When a pre-filter is used, place it on top of the 0.45 micron filter, then filter the sample using the normal procedure. Dispose of the pre-filter and record a general description of the turbidity of the sample in the field notebook.

4. Each filter and filtration apparatus must be prepared before use since they often contain trace amounts of metals. Filtration with approximately 20 ml of a 25% nitric acid (HNO_3) solution (3 parts water and 1 part acid) followed by three 20 ml rinses of trace metal free deionized (DI) water is required to remove any trace amounts of metals. The filtered liquid is then discarded before filtering each sample. Use the same DI water and dilute nitric acid solution (i.e., prepared from the same source, lot number and/or batch) to prepare the filters for all samples and the field blanks.

5. Both a filtered and an unfiltered blank must accompany samples to the lab(s) for analysis unless only unfiltered samples are collected and submitted for analysis. A duplicate filtered and unfiltered sample is also recommended.

6. All water samples, including surface water, filtered and unfiltered groundwater, and blanks must be preserved to a pH <2 with HNO_3. Use a high quality acid such as Baker Instra-Analyzed or equivalent. NOTE: Reagent grade acid is not acceptable. Verify that the pH of each sample is <2 with narrow range (0 to 2) pH paper.

7. Document the lot number and manufacturer of the acid, the deionized water, and the filters in the field notebook. This documentation will facilitate tracing the source of contamination when the data indicates the possibility of a contamination problem.

8. Monitoring wells with a very high concentration of solids (evidenced by a slow filtration rate) should be noted in the field notebook. This may indicate an improperly installed monitoring well.

DATA INTERPRETATION

The concentration of a dissolved metal (filtered sample) should not exceed its concentration as a total metal (unfiltered sample). If the dissolved fraction exceeds the total fraction by a small amount, it may be attributable to analytical variability. Typical problems and their possible causes are listed below:

1. The dissolved concentration is higher than the total:

   - When dissolved iron, zinc, aluminum, and copper are higher, then the filters may be a source of contamination. Investigate the rinsing procedure used for filters.

   - When nearly all dissolved metals are higher, then sample mislabeling is a possible source of error. Investigate the sample labeling procedure.

2. If the sample results are erratic, investigate the time lapse from sampling to filtration.