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WORK PLAN ADDENDUM FOR THE OPERABLE UNIT 5 OUTFALL LINE INVESTIGATION GROUNDWATER SAMPLING PROGRAM OCTOBER 1992

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WORK PLAN ADDENDUM

FOR THE

OPERABLE UNIT 5

OUTFALL LINE INVESTIGATION

GROUNDWATER SAMPLING PROGRAM

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

OCTOBER 1992

1.0 Introduction

This work plan presents a program to investigate potential leakage from the Outfall Pipeline. The proposed well installation and sampling program are based on data from water samples collected from Well 2067 and the identification of numerous dislocated joints in the Outfall Line between Manholes 179 and 180. The dislocated joints were identified during the 1990 investigation of the pipeline that was conducted by the FEMP pursuant to the Ohio Consent Decree, Order 14 of the Director's Findings and Orders, issued and effective June 26, 1987. The results of the 1990 investigation can be found in the WEMCO report entitled "FMPC Outfall Pipeline Investigation" dated September 18, 1990.

If groundwater contamination has occurred due to a potential leak, a previously unidentified occurrence of contamination in groundwater may exist beyond the FEMP eastern boundary. The total uranium concentration at Well 2067 has been as high as 19.9 µg/l and as low as <1 µg/l. Treating non-detects as zero, the average of 13 readings is 4.23 µg/l. The proposed work may determine if there is groundwater contamination associated with the potential pipeline leak between Manholes 179 and 180. If an off-site plume is identified, then additional investigation may be required to determine the vertical and lateral extent of the plume.

2.0 Outfall Line

The Outfall Line extends from Manhole 175, located in the southwest corner of the sewage treatment area, to the Great Miami River, as shown in Figure 1. Manhole 175, is the point where samples are collected for the NPDES permit. From Manhole 175 the Outfall Line extends southeast to the site boundary at Manhole 176, then east-southeast in an almost straight line to the Great Miami River. The Outfall Line is a gravity flow system.

From Manhole 175 to 177, the Outfall Line is installed in the glacial overburden above the Great Miami Aquifer and has a grade of approximately 0.5 percent over a distance of 750 feet. A river terrace has been cut into the glacial overburden east of Manhole 177; therefore, the Outfall Line is on a 6.7 percent grade over a distance of 250 feet between Manhole 177 and 178. Between Manhole 178 and 179, the line has a 0.5 percent grade as it extends across the width of the relatively flat terrace. There have not been any RI/FS wells installed through this terrace; however, well records from domestic wells installed through the terrace suggest that there is little or no glacial overburden present. There is a veneer of fluvial silt and

gravel overlying the Great Miami Aquifer and it is only on the order of seven to eight feet thick. It is therefore most likely that all of the Outfall Line east of Manhole 177 is installed in either Great Miami River flood plain deposits or the Great Miami Aquifer.

From Manhole 179 to 180, the topography drops from the river terrace to the current floodplain of the Great Miami River. From Manhole 180, the pipe is on a grade of approximately 0.15 percent. Manhole 179 is located at an elevation of 570 feet. The highest recorded flood level in the area was at an elevation of 557 feet in 1913. Under the existing flood control conditions, the highest anticipated flood stage at the time the Outfall was designed is 546 feet. The discharge to the river is at an elevation of about 520 feet. The section of the Outfall from Manhole 179 to the river is designed as a pressure line because, when the river rises, the back pressure from the river causes the effluent to rise to a level above Manhole 180. Therefore Manholes 180 and 181 have bolted covers to prevent the discharge of effluent at points other than the end of the line.

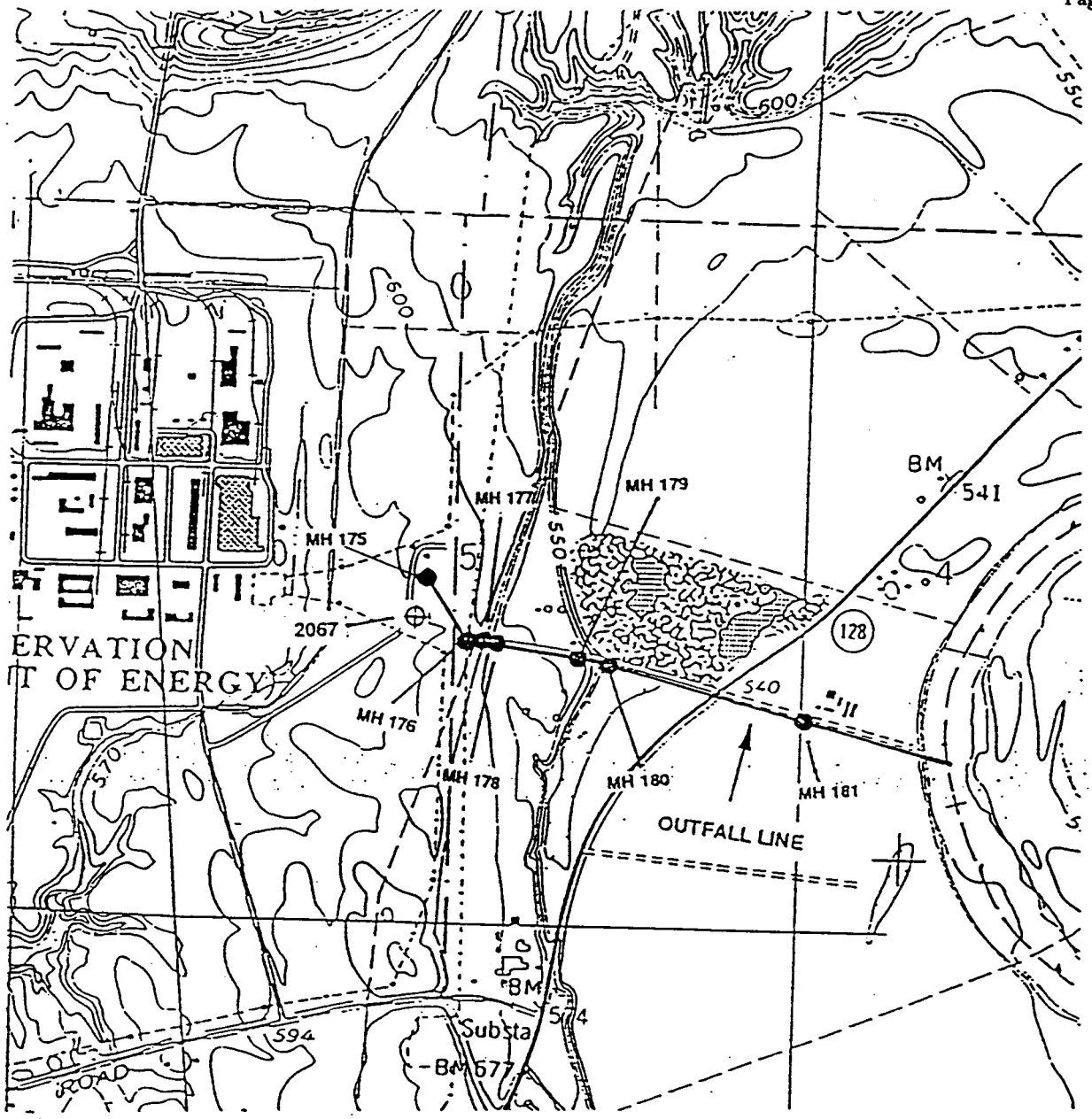
2.1 Manhole 179 to Manhole 180

This section of the pipeline failed to pass pneumatic testing conducted in the summer of 1990. This section of line could not be pressurized. A follow-up video inspection of the line indicated several dislocated joints which appeared to have one-quarter to three-eighth-inch gaps between pipe sections. The evidence clearly indicates that this section of the line potentially has been leaking for an unknown period of time. Additional data are needed to evaluate the environmental impact of any leakage from the pipe between Manholes 179 and 180.

3.0 Water Samples from Well 2067

Quarterly groundwater samples have been collected from Well 2067 located about 150 feet south of Manhole 175. Figure 2 is a hydrograph for Wells 2067 and 3067, showing both water level and total uranium values versus time for the period from January 1988 through September 1990.

The hydrograph shows that total uranium concentrations in 1988 samples were below the analytical detection limit. Samples collected in late 1989 and early 1990 from Well 2067 show an increasing level of uranium.



1000 0 1000 2000 3000

Feet

FMPC EFFLUENT LINE LOCATION MAP

N

MH177 Manhole Location and Number

Monitoring Well

FIGURE 1

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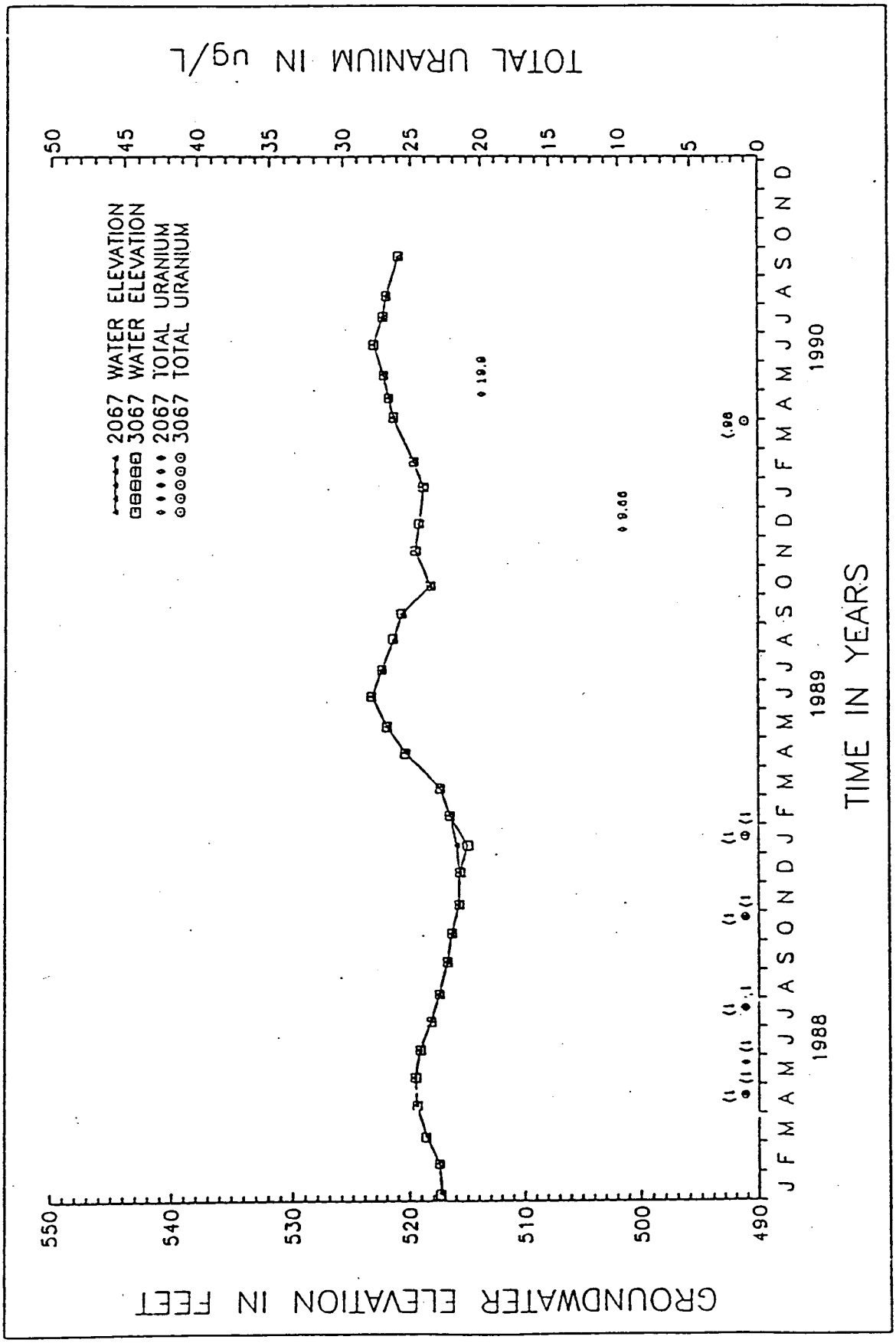

FIGURE 2

HYDROGRAPH AND TOTAL URANIUM FOR WELL CLUSTER AT LOCATION 067

The hydrograph also shows that water levels in 1988 were much lower than in late 1989 and early 1990. There appears to be a potential correlation between the rise in water level and the occurrence of uranium in the well. The precise nature of the correlation is not clear. One possibility could be that Manhole 175 or the Outfall Line in the area have been leaking for a long time; however, because the water table was low the leak was not detected in Well 2067. As the water table rose in 1989, the column of contaminants in the unsaturated zone between the leak and the water table surface could have been desorbed and spread on the rising water table. As the desorbed contaminant materials spread on the water table, it encountered Well 2067 and was collected in the samples.

It is also possible that there is a plume moving east from the production area and it did not show up in this area until late 1990. Monthly water table maps from January 1988 through September 1990 indicate that the water-table gradient is generally to the east in the area of Well 2067. It is very likely that the water-table gradient shifts between east-northeast and east-southeast in the area of Well 2067; however, there are no other wells sufficiently close to provide a detailed interpretation of the water-table gradient at Well 2067.

The regional water-level maps for April 1986 and May 1988, which included many wells between the FEMP and Great Miami River in the vicinity of Southwestern Ohio Water Company (SOWC) collector wells, indicate that on average the water table gradient is to the east-northeast at Well 2067 and along the length of the Outfall Line. Thus, any leakage from the line between Manhole 175 and the river would tend to move to the east-northeast.

4.0 Investigation Strategy

A 2000-series well will be installed and sampled. Groundwater samples will be collected from the boring prior to well installation utilizing a Hydropunch II (TM). Monitor Well 2067 is being sampled quarterly by the on-site Environmental Monitoring Group as part of the long term groundwater monitoring program. The results of this monitoring will be incorporated into the Operable Unit 5 RI report.

4.1 Monitor Well Installation/Sampling

Monitoring Well 2119 will be installed at the location shown in Figure 3. Well 2119 will be immediately downgradient of the suspect section of the Outfall Line between Manholes 179 and 180 to determine if

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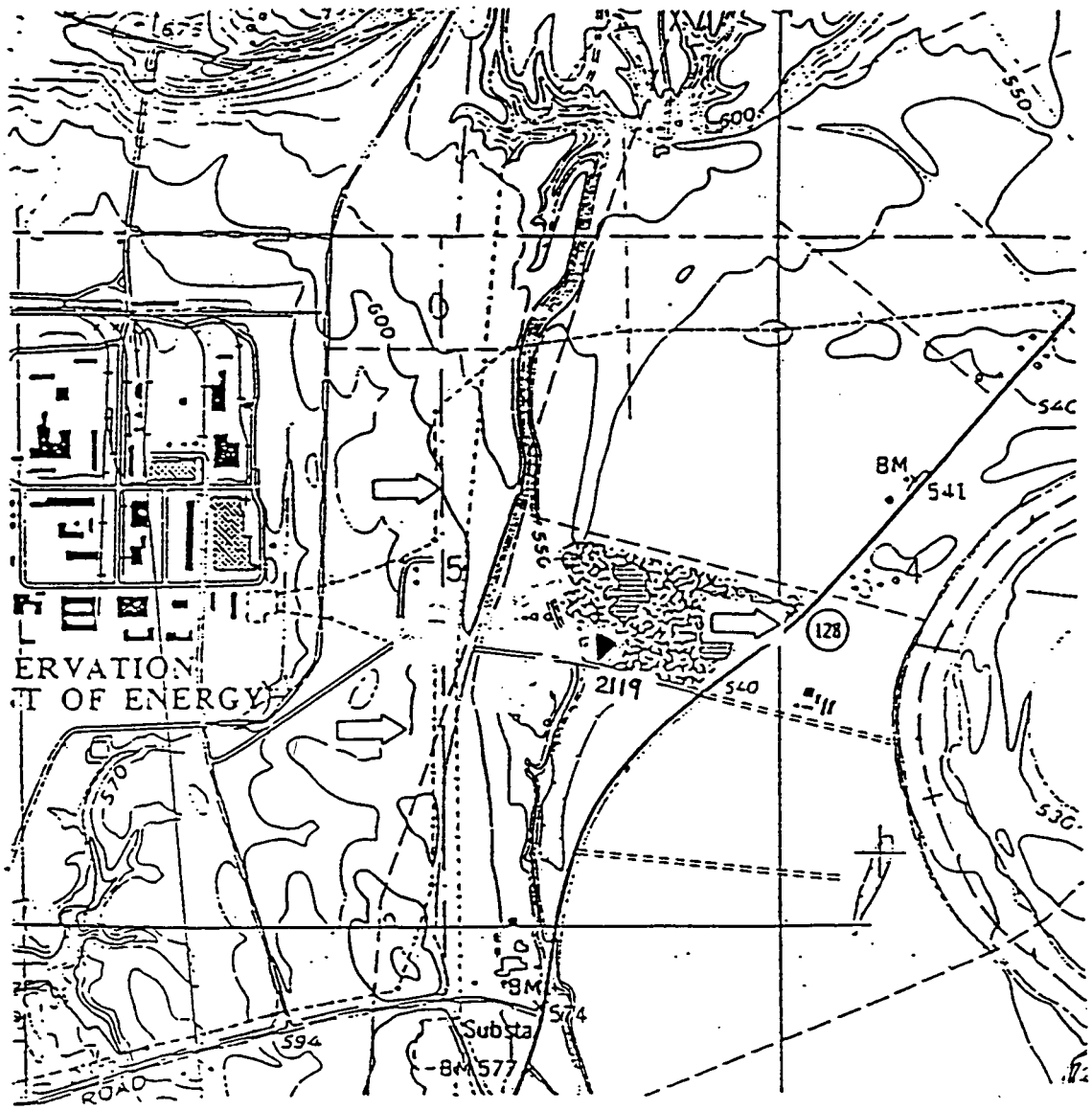

1000 0 1000 2000 3000

Feet

PROPOSED MONITORING WELL LOCATION

N

▲ Proposed Monitoring Well

⇨ General Groundwater Flow Direction

FIGURE 3

there is contamination in the aquifer in the area of the potential pipeline leak. Monitor Well 2119 will be located on the north side of the line near Manhole 180. All well installation, development, and sampling procedures will be consistent with those outlined in the March 1988 RI/FS Work Plan, Volume V, Quality Assurance Project Plan, unless specifically altered in this addendum.

The well will be developed and sampled twice under the RI/FS. The first sample from Well 2119 will be analyzed for full HSL, general groundwater parameters, and full radiological analysis. A second sample will be collected two months after the first for full radiological and general groundwater analysis and will be analyzed for those portions of the full HSL list where above-background or detectable levels were identified in the initial sample. The data quality objectives (DQOs) for this program are provided in Table 1; the Target Analyte Lists (TALs) are presented in Table 2. The well will also be added to the monthly water level measurement program.

4.1 Hydropunch II (TM) Sampling

The Hydropunch II (TM) will be utilized to collect groundwater samples during drilling of Well 2119. Procedures for the use of the Hydropunch II will be as outlined in Document Change Request No. 68, Revision A dated January 31, 1992. Prior to installation of the well, the boring will be advanced to the blue clay horizon or to bedrock if the blue clay is not encountered. As the boring is advanced, a groundwater sample will be collected at seven feet below the water table to approximate the sample depth of a 2000-series well. Additional samples will be collected at 20 feet below the water table and every 10 feet thereafter until the total depth of the boring is reached. The samples will be analyzed at the on-site laboratory for total uranium. The results of this sampling will be used to document the vertical distribution of uranium concentrations at Location 2119. These total uranium results will be the basis for determining the need for additional investigation. At the completion of sample collection with the Hydropunch II (TM), the temporary casing will be withdrawn and the boring will be allowed to collapse back to the depth where Monitor Well 2119 will be set.

5.0 Summary

The water chemistry and water-level data for Monitor Well 2119 will be evaluated to determine if additional investigation is required to determine the extent of contamination which may be related to the potential Outfall Line leak. If it is determined that additional investigation is not needed for the RI/FS, Well 2119 will be added to the long-term site monitoring program.

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TABLE 1

DATA QUALITY OBJECTIVES FOR THE OUTFALL LINE INVESTIGATION GROUNDWATER SAMPLING PROGRAM

Activity	Drill and install Monitoring Well 2119 immediately downgradient of the pipeline section between Manholes 179 and 180, where leakage is suspected to have occurred. Collect groundwater samples at Location 0119 with a Hydropunch II (TM) from the top of the aquifer to bedrock or to the top of the "blue clay." Well 2119 will be sampled and analyzed for full HSL, general groundwater, and full radiological analysis. A second sample will be collected two months later for full radiological, general groundwater analysis, and those portions of the HSL analysis where levels of concern are detected in the initial sampling. Collect monthly water table measurements from Well 2119.
Objectives	To determine if leakage has occurred from the section of the outfall line between Manholes 179 and 180 and has had an impact on the underlying groundwater quality. Provide additional water levels for determination of groundwater flow in the vicinity of the Outfall Line.
Prioritized data uses	The priority data use is site characterization. Site characterization data is used for risk assessment and the evaluation of alternatives.
Appropriate analytical level	Full HSL: Level IV Radiological: Level V General Groundwater Chemistry: Level III Total Uranium analyses derived from samples collected from the Hydropunch II (TM): Level II
Constituents of concern	Uranium, full HSL, full radiological, and general chemistry. Reference attached Target Analyte List (TAL 3.46A), Table 2.
Level of concern	The level of concern will be dependent on the preliminary remediation goals now being developed based on Risk Assessment Guidance for Superfund (RAGS), December 1991.
Required detection limits	Specified in the RI/FS QAPP, Section 4.0, dated March 1988.
Critical samples	The groundwater samples are considered critical to support the selection of alternatives. Analytical validation levels will be as defined above.

OUTFALL LINE INVESTIGATION: GROUNDWATER SAMPLING PROGRAM 3848

GROUNDWATER SAMPLES WELL 2119 AND WELL 2067

TAL 3.46 A

FEMP RI/FS - FULL HSL - ANALYTICAL PARAMETERS

INORGANICS

1	Aluminum
2	Antimony
3	Arsenic
4	Barium
5	Beryllium
6	Cadmium
7	Calcium
8	Chromium (Total)
9	Cobalt
10	Copper
11	Cyanide
12	Iron
13	Lead
14	Magnesium
15	Manganese
16	Mercury
17	Molybdenum
18	Nickel
19	Potassium
20	Selenium
21	Silicon
22	Silver
23	Sodium
24	Thallium
25	Vanadium
26	Zinc

VOLATILE ORGANICS

1	1,1-Dichloroethane
2	1,1-Dichloroethene
3	1,1,1-Trichloroethane
4	1,1,2-Trichloroethane
5	1,1,2,2-Tetrachloroethane
6	1,2-Dichloroethane
7	1,2-Dichloroethene (total)
8	1,2-Dichloroethylene
9	1,2-Dichloropropane
10	2-Butanone
11	2-Hexanone
12	4-Methyl-2-pentanone
13	Acetone
14	Benzene
15	Bromodichloromethane
16	Bromoform
17	Bromomethane
18	Carbon disulfide
19	Carbon tetrachloride
20	Chlorobenzene
21	Chloroethane
22	Chloroform
23	Chloromethane
24	cis-1,3-Dichloropropene
25	Dibromochloromethane
26	Ethylbenzene
27	Methylene chloride
28	Styrene
29	Tetrachloroethene
30	Toluene
31	Total xylenes
32	trans-1,3-Dichloropropene
33	Trichloroethene
34	Vinyl acetate
35	Vinyl chloride

SEMIVOLATILE ORGANICS

1	1,2-Dichlorobenzene
2	1,2,4-Trichlorobenzene
3	1,3-Dichlorobenzene
4	1,4-Dichlorobenzene
5	2-Chloronaphthalene
6	2-Chlorophenol
7	2-Methylnaphthalene
8	2-Methylphenol
9	2-Nitroaniline
10	2-Nitrophenol
11	2,4-Dichlorophenol
12	2,4-Dimethylphenol
13	2,4-Dinitrophenol
14	2,4-Dinitrotoluene
15	2,4,5-Trichlorophenol
16	2,4,6-Trichlorophenol
17	2,6-Dinitrotoluene
18	3-Nitroaniline
19	3,3'-Dichlorobenzidine
20	4-Bromophenyl phenylether
21	4-Chloro-3-methylphenol
22	4-Chloroaniline
23	4-Chlorophenyl-phenyl ether
24	4-Methylphenol
25	4-Nitroaniline
26	4-Nitrophenol
27	4,6-Dinitro-2-methylphenol
28	Acenaphthene
29	Acenaphthylene
30	Anthracene
31	Benzoic acid
32	Benzo(a)anthracene
33	Benzo(a)pyrene
34	Benzo(b)fluoranthene
35	Benzo(g,h,i)perylene
36	Benzo(k)fluoranthene
37	Benzyl alcohol
38	bis(2-Chloroethoxy)methane
39	bis(2-Chloroethyl)ether
40	bis(2-Chloroisopropyl) ether
41	bis(2-Ethylhexyl)phthalate
42	Butyl benzyl phthalate
43	Carbazole
44	Chrysene
45	Dibenzofuran
46	Dibenzo(a,h)anthracene
47	Diethylphthalate
48	Dimethylphthalate
49	Di-n-butyl phthalate
50	Di-n-octyl phthalate
51	Fluoranthene
52	Fluorene
53	Hexachlorobenzene
54	Hexachlorobutadiene
55	Hexachlorocyclopentadiene
56	Hexachloroethane
57	Indeno(1,2,3-cd)pyrene
58	Isophorone
59	Naphthalene
60	Nitrobenzene
61	N-Nitroso-di-n-propylamine
62	N-Nitrosodiphenylamine
63	Pentachlorophenol
64	Phenanthrene
65	Phenol
66	Pyrene

PESTICIDES / PCBs

1	4,4'-DDD
2	4,4'-DDE
3	4,4'-DDT
4	Aldrin
5	alpha-BHC
6	alpha-Chlordane
7	Aroclor 1016
8	Aroclor 1221
9	Aroclor 1232
10	Aroclor 1242
11	Aroclor 1248
12	Aroclor 1254
13	Aroclor 1260
14	beta-BHC
15	delta-BHC
16	Dieldrin
17	Endosulfan sulfate
18	Endosulfan-I
19	Endosulfan-II
20	Endrin
21	Endrin aldehyde
22	Endrin ketone
23	gamma-BHC
24	gamma-Chlordane
25	Heptachlor
26	Heptachlor epoxide
27	Methoxychlor
28	Toxaphene

FEMP RI/FS - FULL RADIOLOGICAL - ANALYTICAL PARAMETERS

1	Cesium 137
2	Gross alpha
3	Gross beta
4	Neptunium 237
5	Plutonium 238
6	Plutonium 239/240
7	Radium 226
8	Radium 228
9	Ruthenium 106
10	Strontium 90
11	Technetium 99
12	Thorium 228
13	Thorium 230
14	Thorium 232
15	Total Thorium
16	Total Uranium
17	Uranium 234
18	Uranium 235/236
19	Uranium 238

FEMP RI/FS - GENERAL GROUNDWATER QUALITY ANALYTICAL PARAMETERS

MISCELLANEOUS

1	Ammonia
2	Chloride
3	Fluoride
4	Nitrate
5	Phenols
6	Phosphorus (total)
7	Sulfate
8	Sulfide
9	Total Organic Carbon (TOC)
10	Total Organic Halogens (TOX)
11	Total Organic Nitrogen (TON)

10

Table 2

OUTFALL LINE INVESTIGATION: GROUNDWATER SAMPLING PROGRAM

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GROUNDWATER SAMPLES WELL 2119

TAL 50.03.10 A

FEMP RI/FS – FULL HSL – ANALYTICAL PARAMETERS

INORGANICS

1	Aluminum
2	Antimony
3	Arsenic
4	Barium
5	Beryllium
6	Cadmium
7	Calcium
8	Chromium (Total)
9	Cobalt
10	Copper
11	Cyanide
12	Iron
13	Lead
14	Magnesium
15	Manganese
16	Mercury
17	Molybdenum
18	Nickel
19	Potassium
20	Selenium
21	Silicon
22	Silver
23	Sodium
24	Thallium
25	Vanadium
26	Zinc

VOLATILE ORGANICS

1	1,1–Dichloroethane
2	1,1–Dichloroethene
3	1,1,1–Trichloroethane
4	1,1,2–Trichloroethane
5	1,1,2,2–Tetrachloroethane
6	1,2–Dichloroethane
7	1,2–Dichloroethene (total)
8	1,2–Dichloroethylene
9	1,2–Dichloropropane
10	2–Butanone
11	2–Hexanone
12	4–Methyl–2–pentanone
13	Acetone
14	Benzene
15	Bromodichloromethane
16	Bromoform
17	Bromomethane
18	Carbon disulfide
19	Carbon tetrachloride
20	Chlorobenzene
21	Chloroethane
22	Chloroform
23	Chloromethane
24	cis–1,3–Dichloropropene
25	Dibromochloromethane
26	Ethylbenzene
27	Methylene chloride
28	Styrene
29	Tetrachloroethene
30	Toluene
31	Total xylenes
32	trans–1,3–Dichloropropene
33	Trichloroethene
34	Vinyl acetate
35	Vinyl chloride

SEMIVOLATILE ORGANICS

1	1,2–Dichlorobenzene
2	1,2,4–Trichlorobenzene
3	1,3–Dichlorobenzene
4	1,4–Dichlorobenzene
5	2–Chloronaphthalene
6	2–Chlorophenol
7	2–Methylnaphthalene
8	2–Methylphenol
9	2–Nitroaniline
10	2–Nitrophenol
11	2,4–Dichlorophenol
12	2,4–Dimethylphenol
13	2,4–Dinitrophenol
14	2,4–Dinitrotoluene
15	2,4,5–Trichlorophenol
16	2,4,6–Trichlorophenol
17	2,6–Dinitrotoluene
18	3–Nitroaniline
19	3,3'–Dichlorobenzidine
20	4–Bromophenyl phenylether
21	4–Chloro–3–methylphenol
22	4–Chloroaniline
23	4–Chlorophenyl–phenyl ether
24	4–Methylphenol
25	4–Nitroaniline
26	4–Nitrophenol
27	4,6–Dinitro–2–methylphenol
28	Acenaphthene
29	Acenaphthylene
30	Anthracene
31	Benzoic acid
32	Benzo(a)anthracene
33	Benzo(a)pyrene
34	Benzo(b)fluoranthene
35	Benzo(g,h,i)perylene
36	Benzo(k)fluoranthene
37	Benzyl alcohol
38	bis(2–Chloroethoxy)methane
39	bis(2–Chloroethyl)ether
40	bis(2–Chloroisopropyl) ether
41	bis(2–Ethylhexyl)phthalate
42	Butyl benzyl phthalate
43	Carbazole
44	Chrysene
45	Dibenzofuran
46	Dibenzo(a,h)anthracene
47	Diethylphthalate
48	Dimethylphthalate
49	Di–n–butyl phthalate
50	Di–n–octyl phthalate
51	Fluoranthene
52	Fluorene
53	Hexachlorobenzene
54	Hexachlorobutadiene
55	Hexachlorocyclopentadiene
56	Hexachloroethane
57	Indeno(1,2,3–cd)pyrene
58	Isophorone
59	Naphthalene
60	Nitrobenzene
61	N–Nitroso–di–n–propylamine
62	N–Nitrosodiphenylamine
63	Pentachlorophenol
64	Phenanthrene
65	Phenol
66	Pyrene

PESTICIDES / PCBs

1	4,4'–DDD
2	4,4'–DDE
3	4,4'–DDT
4	Aldrin
5	alpha–BHC
6	alpha–Chlordane
7	Aroclor 1016
8	Aroclor 1221
9	Aroclor 1232
10	Aroclor 1242
11	Aroclor 1248
12	Aroclor 1254
13	Aroclor 1260
14	beta–BHC
15	delta–BHC
16	Dieldrin
17	Endosulfan sulfate
18	Endosulfan–I
19	Endosulfan–II
20	Endrin
21	Endrin aldehyde
22	Endrin ketone
23	gamma–BHC
24	gamma–Chlordane
25	Heptachlor
26	Heptachlor epoxide
27	Methoxychlor
28	Toxaphene

FEMP RI/FS – FULL RADIOLOGICAL – ANALYTICAL PARAMETERS

RADIOLOGICAL

1		Cesium 137
2		Neptunium 237
3		Plutonium 238
4		Plutonium 239/240
5		Radium 226
6		Radium 228
7		Ruthenium 106
8		Strontium 90
9		Technetium 99
10		Thorium 228
11		Thorium 230
12		Thorium 232
13	*	Total Uranium
14		Uranium 234
15		Uranium 235/236
16		Uranium 238

MISC. RADIOLOGICAL

1	Gross alpha
2	Gross beta
3	Total Thorium

FEMP RI/FS – GENERAL GROUNDWATER QUALITY – ANALYTICAL PARAMETERS

GENERAL CHEMISTRY

1	Ammonia
2	Chloride
3	Fluoride
4	Nitrate
5	Phenols
6	Phosphorus (total)
7	Sulfate
8	Sulfide
9	Total Organic Carbon (TOC)
10	Total Organic Halogens (TOX)
11	Total Organic Nitrogen (TON)

MISC. GENERAL CHEMISTRY

1	Alkalinity

* Total Uranium from Hydropunch sampling to be analyzed at the WEMCO Laboratory.

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