ARCADIS
Infrastructure · Water · Environment · Buildings

Rolling Knolls Landfill Superfund SITE

FIELD CHANGE REQUEST (FCR) FORM

Contract No.:

REQUEST NO: 09 DATE: 06/10/2015

FCR TITLE: Existing Monitoring Well Analyses

DESCRIPTION:

The Data Gaps Sampling and Analysis Plan (Data Gaps SAP) proposed three rounds of groundwater sampling. The first groundwater sampling event consists of sampling all existing permanent wells (MW-1 through MW-10 and X-1 through X-7) for full TCL/TAL parameters. The second groundwater sampling event includes sampling of all new monitoring wells (MW-11 through MW-20) for full TCL/TAL parameters, and resampling at selected existing monitoring wells as necessary depending on the results of the prior groundwater sampling events. The third groundwater sampling event consists of sampling all the new monitoring wells for full TCL/TAL, providing a second complete round of samples at these wells. The USEPA approved the Data Gaps SAP on November 18, 2014.

The first groundwater event was conducted December 8 through 12, 2014. Preliminary results were provided to USEPA in an Interim Tech Memo on February 17, 2015, and final validated results were provided on April 22, 2015. The second groundwater sampling event is currently scheduled for June 22 through 26, 2015, and as planned, will include all the newly-installed wells (MW-11 through MW-20) and selected other wells that have previously been sampled. This FCR identifies the previously-sampled wells that will be sampled again in the second round of Data Gaps SAP groundwater sampling, and the analytical parameters for each of these wells.

REASON FOR DEVIATION:

The selection of analyses at existing wells is required as part of the second groundwater sampling event. No official deviation from the Data Gaps SAP has been made. This FCR is being submitted as a form of documentation for the analysis selection process.

Groundwater analytical results from the previous sampling events were evaluated for all permanent monitoring wells (MW-1 through MW-10 and X-1 through X-7). Based on these data, certain monitoring wells were identified for sampling during the second sampling event.

RECOMMENDED MODIFICATIONS:

Groundwater sampling results from the three previous sampling events were presented in the Interim Tech Memo (submitted February 17, 2015). Figure 1 from the Interim Tech Memo is attached for reference. Monitoring wells MW-3 and MW-7 are selected for sampling during the second groundwater sampling event, as described below:

- MW-3: Confirmation of VOCs and pesticides
- MW-7: Confirmation of metals (filtered and unfiltered) and cyanide

A table summarizing the monitoring wells, the proposed analyte list, and additional rationale for sampling is attached to this FCR (Table 1).

Monitoring wells MW-1, MW-2, MW-4, MW-5, MW-6, MW-8, MW-9, MW-10, and X-1 through X-7 were not

Contract No.:

selected for additional sampling. The concentrations of certain metals in some wells in the landfill are above their NJDEP Groundwater Quality Criteria (GWQC). However, the concentrations are generally consistent in the previous three rounds of sampling, and no further sampling is needed at this time to characterize these constituents in groundwater. No additional constituents were identified in these wells that exceed the NJDEP GWQC.

IMPACT ON PROJECT OBJECTIVES:

The selected wells meet the project objective of collecting groundwater samples to characterize constituent concentrations in groundwater at the landfill.

Dated Signatures: Andrew Dutthey 6/10/2015

(Field Team Leader)

John Pension 6/10/2015

(Project Manager)

Distribution:

T. Mitchell, EPA Remedial Project Manager

Quality Assurance Coordinator

RI Task Leader

Project File

Table 1
Monitoring Well Analyses FCR-09
Rolling Knolls Landfill Superfund Site
Chatham, New Jersey

Well Number	Laboratory Analyses	Rationale
MW-1	No additional sampling proposed.	Previous sampling results are adequate.
MW-2	No additional sampling proposed.	Previous sampling results are adequate.
MW-3	VOC, pesticides	Confirm concentrations of VOCs (benzene and 1,4-dioxane) and pesticides (alpha-, beta-, and delta-BHC).
MW-4	No additional sampling proposed.	Previous sampling results are adequate.
MW-5	No additional sampling proposed.	Previous sampling results are adequate.
MW-6	No additional sampling proposed.	Previous sampling results are adequate.
MW-7	TAL metals and cyanide (filtered and unfiltered)	Confirm concentrations of antimony, cadmium, lead, thallium, and zinc; evaluate whether they are dissolved or associated with turbidity.
MW-8	No additional sampling proposed.	Previous sampling results are adequate.
MW-9	No additional sampling proposed.	Previous sampling results are adequate.
MW-10	No additional sampling proposed.	Previous sampling results are adequate.
MW-11	TCL/TAL parameters	No sampling has been conducted at this well.
MW-12	TCL/TAL parameters	No sampling has been conducted at this well.
MW-13	TCL/TAL parameters	No sampling has been conducted at this well.
MW-14	TCL/TAL parameters	No sampling has been conducted at this well.
MW-15	TCL/TAL parameters	No sampling has been conducted at this well.
MW-16	TCL/TAL parameters	No sampling has been conducted at this well.
MW-17	TCL/TAL parameters	No sampling has been conducted at this well.
MW-18	TCL/TAL parameters	No sampling has been conducted at this well.
MW-19	TCL/TAL parameters	No sampling has been conducted at this well.
MW-20	TCL/TAL parameters	No sampling has been conducted at this well.
X-1	No additional sampling proposed.	Previous sampling results are adequate.
X-2	No additional sampling proposed.	Previous sampling results are adequate.
X-3	No additional sampling proposed.	Previous sampling results are adequate.
X-4	No additional sampling proposed.	Previous sampling results are adequate.
X-5	No additional sampling proposed.	Previous sampling results are adequate.
X-6	No additional sampling proposed.	Previous sampling results are adequate.
X-7	No additional sampling proposed.	Previous sampling results are adequate.

TCL/TAL – target compound list/target analyte list
VOCs – volatile organic compound.

CITY:CRANBURY-NJ DIV/GROUP:ENVCAD DB:T.FATTO LD:T.FATTO PIC: PM:L.MARTINEAU TM:S.WALLS LYR:ON=*;OFF=*REF*
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B0033203X15
B0033203XPD

TWP-3	
Date	12/3/2014
VOCs	
Methylene Chloride	3.2 J B
SVOCs	
Bis(2-ethyl hexyl) phthalate	4.5 J B
SVOCs SIM	
Benzo(a)anthracene	0.97
Benzo(a)pyrene	1.1
Benzo(b)fluoranthene	1.1
Benzo(k)fluoranthene	0.93
Indeno(1,2,3-cd)pyrene	0.59
PCBs (Aroclors)	
Aroclor-1254	0.65 J
Total PCBs (Aroclors)	0.8 J P
Pesticides	
Dieldrin	0.087 J
Metals	
Aluminum	10,100 E
Beryllium	2.6 J
Cadmium	8.6 E
Iron	31,200 E
Lead	1,220
Manganese	1,230 E
Vanadium	107 E N
Zinc	3,100 E
Metals-Dissolved	
Iron	4,380 E
Manganese	423 E
Thallium	2.6 J

TWP-1	
Date	12/2/2014
VOCs	
Dichlorodifluoromethane	1,400 B
Methylene Chloride	31 J B
SVOCs SIM	
Benzo(a)anthracene	0.25
Benzo(a)pyrene	0.33
Benzo(b)fluoranthene	0.35
Metals	
Aluminum	15,800 E
Arsenic	8.8 J N
Beryllium	3.5 J
Iron	33,300 E
Lead	264
Manganese	1,700 E
Thallium	2.3 J
Vanadium	165 E N
Metals-Dissolved	
Arsenic	5.1 J N
Iron	6,720 E
Manganese	1,300 E

TWP-2	
Date	12/5/2014
VOCs	
Dichlorodifluoromethane	1,600
Methylene Chloride	16 J B
Pesticides	
Dieldrin	0.078 J
Metals	
Aluminum	53,100 E
Arsenic	12.1 N
Beryllium	17.6
Cadmium	50.9 E
Chromium	112 E N
Iron	123,000 E
Lead	1,530
Manganese	7,790 E
Nickel	427 E
Thallium	6.0 J
Vanadium	595 E N
Zinc	5,680 E
Metals-Dissolved	
Iron	6,370 E
Manganese	1,240 E

MW-9			
Date	12/18/2007	2/11/2008	12/9/2014
Metals			
Aluminum	2,910	80.9 J	25.4 J
Iron	4,970	217	100 U
Manganese	468	185	244

X-6			
Date	12/17/2007	2/11/2008	12/8/2014
Metals			
Iron	100 U	602	43.3 J

MW-8			
Date	12/18/2007	2/12/2008	12/9/2014
Metals			
Aluminum	38.6 J	749 [674]	23.3 J
Iron	175	1,140 [969]	116
Manganese	375	229 [230]	124

X-5			
Date	12/17/2007	2/11/2008	12/8/2014
--	No Exceedances	No Exceedances	No Exceedances

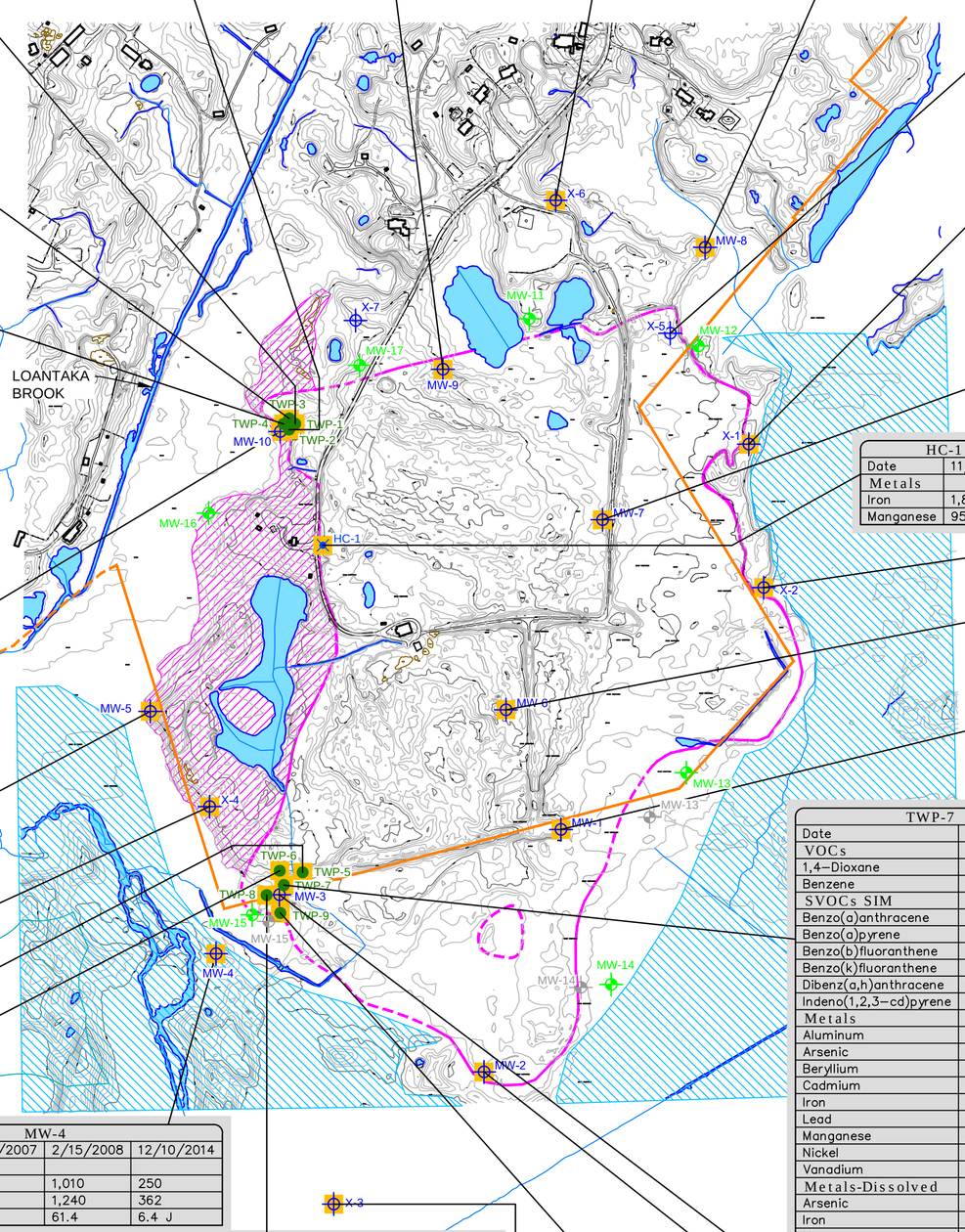
X-1			
Date	12/18/2007	2/12/2008	12/10/2014
Metals			
Iron	2,550	1,330	3,310
Manganese	275	210	429
Thallium	1 U	1 U	2.7 J
Sodium	48,400	67,300	45,900

TWP-4	
Date	12/5/2014
SVOCs	
Bis(2-ethyl hexyl) phthalate	7.1 B [7.0 B]
SVOCs SIM	
Benzo(a)anthracene	1.4
Benzo(a)pyrene	1.7
Benzo(b)fluoranthene	1.7
Benzo(k)fluoranthene	1.5
Dibenz(a,h)anthracene	0.32
Indeno(1,2,3-cd)pyrene	0.87
PCBs (Aroclors)	
Aroclor-1254	0.99 J
Total PCBs (Aroclors)	1.12 J
Pesticides	
4,4'-DDT	0.13
Metals	
Aluminum	22,900 E
Arsenic	4.3 J N
Beryllium	5.8
Cadmium	195 E
Cobalt	146 E N
Copper	3,210 E N
Cyanide	682
Iron	30,600 E
Lead	3,440
Manganese	22,500 E
Nickel	858 E
Thallium	12.6 J
Vanadium	75.5 E N
Zinc	35,600 E
Metals-Dissolved	
Iron	2,180 E
Manganese	491 E

MW-7			
Date	12/17/2007	2/13/2008	12/9/2014
SVOCs			
Indeno(1,2,3-cd)pyrene	0.1 U	0.51 J	0.11 U
Metals			
Aluminum	200 U	466	646
Antimony	2 U	2 U	13.5 J
Cadmium	1 U	0.82 J	97.6
Iron	24,200	21,300	13,300
Lead	2.1	22	45.5
Manganese	377	293	189
Thallium	1 U	9.2	2.5 J
Zinc	11.2	90.5	3,690

X-2			
Date	12/18/2007	2/15/2008	12/10/2014
Metals			
Aluminum	1,270	575	82.7 J
Arsenic	15.3	0.89 J	3.3 J
Iron	9,410	2,530	2,020
Manganese	613	469	501

HC-1	
Date	11/2/2007
Metals	
Iron	1,840
Manganese	951



MW-10			
Date	12/18/2007	2/11/2008	12/11/2014
VOCs			
Dichlorodifluoromethane	1,300 DJ	580 D	380
Metals			
Aluminum	257	144 J	52.8 J
Arsenic	12.9	10.2	9.7 J
Iron	24,200	23,500	20200
Manganese	3,070	2,800	1,850

MW-6			
Date	12/20/2007	2/14/2008	12/11/2014
Metals			
Beryllium	1.1 [1.2]	1 U	5.0 U
Iron	20,100 [19,400]	27,000	27,500
Manganese	135 J [127 J]	72	102
Thallium	1 U [1 U]	1.6	2.8 J

MW-1			
Date	12/20/2007	2/14/2008	12/10/2014
Metals			
Antimony	2 U	0.63 J	4.9 J [6.2 J]
Iron	15,200	11,300	8,110 [8,480]
Manganese	440 J	320	233 [239]
Thallium	1 U	0.47 J	2.1 J [25.0 U]

MW-5			
Date	12/19/2007	2/13/2008	12/10/2014
Metals			
Aluminum	272	532	56.6 J
Iron	631	821	168
Manganese	58	58.2	13.1 J

X-4			
Date	12/19/2007	2/13/2008	12/9/2014
Metals			
Aluminum	1,150	670	1,240
Iron	1,920	1,170	2,050

TWP-7		
Date	12/4/2014	
VOCs		
1,4-Dioxane	89 J	
Benzene	16	
SVOCs SIM		
Benzo(a)anthracene	1.8	
Benzo(a)pyrene	1.7	
Benzo(b)fluoranthene	1.6	
Benzo(k)fluoranthene	1.4	
Dibenz(a,h)anthracene	0.35 J	
Indeno(1,2,3-cd)pyrene	0.90	
Metals		
Aluminum	18,700 E	
Arsenic	11.4 N	
Beryllium	5.9	
Cadmium	7.3 E	
Iron	53,600 E	
Lead	307	
Manganese	8,570 E	
Nickel	111 E	
Vanadium	132 E N	
Metals-Dissolved		
Arsenic	6.5 J N	
Iron	307 E	E
Manganese	1,050 E	E
Sodium	58,400 E	E

MW-3			
Date	12/19/2007	2/13/2008	12/11/2014
VOCs			
1,4-Dioxane	200 D	190 J	100 U
Benzene	280 D	310 D	130
SVOCs			
Bis(2-Chloroethyl) Ether	8.7	9	8.2
Pesticides			
alpha-BHC	0.21 J	0.054 UJ	0.0071 J P
beta-BHC	0.045 J	0.054 UJ	0.022 J P B
delta-BHC	0.055 JN	0.054 UJ	0.023 J P
Metals			
Aluminum	1,120	1,090	37.1 J
Arsenic	28.4	25	24.8
Iron	30,000	28,400	33,000
Manganese	1,060	1,170	986
Sodium	79,200	87,100	59,500

TWP-5	
Date	12/3/2014
VOCs	
Benzene	15
SVOCs SIM	
Benzo(a)anthracene	1.1 J
Benzo(a)pyrene	1.5
Benzo(b)fluoranthene	1.6
Benzo(k)fluoranthene	1.5
Dibenz(a,h)anthracene	0.31 J
Indeno(1,2,3-cd)pyrene	1.0 J
Pentachlorophenol	0.32 J
Metals	
Aluminum	14,100 E
Beryllium	2.3 J
Cyanide	641
Iron	605,000 E
Lead	46.8
Manganese	5,050 E
Mercury	8.6 N
Nickel	167 E
Thallium	9.0 J
Vanadium	180 E N
Metals-Dissolved	
Cadmium	5.0 U E
Iron	44,000 E
Manganese	571 E

MW-4			
Date	12/19/2007	2/15/2008	12/10/2014
Metals			
Aluminum	1,870	1,010	250
Iron	2,400	1,240	362
Manganese	89.1	61.4	6.4 J

TWP-6	
Date	12/4/2014
SVOCs SIM	
Benzo(b)fluoranthene	0.092 J
Metals-Total	
Arsenic	16.9 N
Cadmium	14.9 E
Iron	98,000 E
Lead	1,310
Manganese	2,550 E
Vanadium	319 E N
Metals-Dissolved	
Arsenic	7.4 J N
Iron	33,600 E
Manganese	1,640 E
Thallium	2.6 J

TWP-8	
Date	12/4/2014
VOCs	
1,4-Dioxane	100 U [52 J]
Benzene	130 [130]
SVOCs	
Bis(2-ethyl hexyl) phthalate	3.2 J B (2.5 J D B) [2.0 J B (41 U)]
SVOCs SIM	
Benzo(a)anthracene	0.64 [0.10 J]
Benzo(a)pyrene	0.88 [0.15]
Benzo(b)fluoranthene	0.75 [0.12 J]
Benzo(k)fluoranthene	0.60 [0.092 J]
Indeno(1,2,3-cd)pyrene	0.29 [0.057 J]
PCBs (Aroclors)	
Aroclor-1260	0.98 J [0.70 J]
Total PCBs (Aroclors)	1.39 J P [0.99 J P]
Metals	
Aluminum	22,300 E [18,300 E]
Arsenic	7.7 J N [7.3 J N]
Beryllium	7.0 [6.0]
Cadmium	31.0 E [27.2 E]
Iron	182,000 E [151,000 E]
Lead	3,110 [2,190]
Manganese	8,060 E [6,820 E]
Mercury	6.2 N [1.9 N]
Nickel	170 E [149 E]
Thallium	5.5 J [5.7 J]
Vanadium	188 E N [158 E N]
Zinc	7,720 E [6,790 E]
Metals-Dissolved	
Iron	9,380 E [10,700 E]
Lead	6.6 J [10.0 U]
Manganese	1,310 E [1,320 E]

TWP-9	
Date	12/4/2014
SVOCs SIM	
Benzo(a)anthracene	1.6
Benzo(a)pyrene	1.9
Benzo(b)fluoranthene	1.9
Benzo(k)fluoranthene	1.8
Dibenz(a,h)anthracene	0.42 J
Indeno(1,2,3-cd)pyrene	1.0
Metals	
Aluminum	19,200 E
Arsenic	11.3 N
Beryllium	4.0 J
Cadmium	23.4 E
Iron	151,000 E
Lead	5,950
Manganese	1,460 E
Nickel	124 E
Thallium	4.4 J
Vanadium	142 E N
Zinc	5,260 E
Metals-Dissolved	
Iron	37,300 E
Lead	14.4
Manganese	859 E

MW-2			
Date	12/20/2007	2/14/2008	12/11/2014
Metals			
Iron	27,200	24,700	24,000
Manganese	526 J	390	617

X-3			
Date	12/19/2007	2/15/2008	12/10/2014
Metals			
Aluminum	309	283	292
Iron	377	483	524

NJDEP Groundwater Quality Criteria	
Constituent	Value
VOCs	
1,4-Dioxane	10
Benzene	1
Dichlorodifluoromethane	1,000
Methylene Chloride	3
SVOCs	
Benzo(a)anthracene	0.1
Benzo(a)pyrene	0.1
Benzo(b)fluoranthene	0.05
Benzo(k)fluoranthene	0.5
Bis(2-Chloroethyl) Ether	7
Bis(2-ethyl hexyl) phthalate	3
Dibenz(a,h)anthracene	0.3
Indeno(1,2,3-cd)pyrene	0.2
Pentachlorophenol	0.3
PCBs (Aroclors)	
Aroclor-1254	0.5
Total PCBs (Aroclors)	0.5
Pesticides	
4,4'-DDT	0.1
alpha-BHC	0.02
beta-BHC	0.04
delta-BHC	0.03
Dieldrin	0.03
Metals	
Aluminum	200
Antimony	6
Arsenic	3
Beryllium	1
Cadmium	4
Chromium	70
Cobalt	100
Copper	1,300
Cyanide	100
Iron	300
Lead	5
Manganese	50
Nickel	100
Sodium	50,000
Thallium	2
Vanadium	60
Zinc	2,000

LEGEND:

- OPEN WATER
- EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES (DASHED WHERE APPROXIMATE)
- GREAT SWAMP NATIONAL WILDLIFE REFUGE PROPERTY BOUNDARY (DASHED WHERE APPROXIMATE)
- WASTE AND DEBRIS OBSERVED ON GROUND SURFACE BUT NOT OBSERVED OR ANTICIPATED TO BE BELOW GROUND SURFACE
- AREAS WHERE SURFACE WATER FLOW DOES NOT EXHIBIT TYPICAL BED AND BANK MORPHOLOGY
- PROPOSED MONITORING WELL (PREVIOUS LOCATIONS SHOWN IN GREY)
- MONITORING WELL LOCATION
- DATA GAP TEMPORARY WELL LOCATION
- EXISTING WELL LOCATION
- WELL LOCATION WITH DETECTED CONCENTRATIONS GREATER THAN NJDEP GROUNDWATER QUALITY CRITERIA

DATA NOTES:

UNITS = MICROGRAMS PER LITER

[] = DUPLICATE SAMPLE

() = RESULTS OF SECONDARY ANALYSIS

SVOCS = SEMIVOLATILE ORGANIC COMPOUNDS

VOCS = VOLATILE ORGANIC COMPOUNDS

B = THE COMPOUND HAS BEEN FOUND IN THE SAMPLE AS WELL AS ITS ASSOCIATED BLANK.

D = CONCENTRATIONS IDENTIFIED FROM ANALYSIS OF THE SAMPLE AT A SECONDARY DILUTION.

E = FOR INORGANICS THE REPORTED VALUE IS ESTIMATED DUE TO INTERFERENCE RESULTING FROM SERIAL DILUTIONS.

J = FOR ORGANICS THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

J = FOR INORGANICS THE SAMPLE RESULT IS GREATER THAN THE MDL BUT BELOW THE CRDL.

JN = FOR ORGANICS THE ANALYSIS INDICATES THE PRESENCE OF A COMPOUND FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE A TENTATIVE IDENTIFICATION. THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

N = FOR INORGANICS THE SPIKED SAMPLE RECOVERY IS NOT WITHIN CONTROL LIMITS.

P = DUAL COLUMN ANALYSIS RESULTED IN GREATER THAN 25% DIFFERENCE FOR DETECTED CONCENTRATIONS BETWEEN THE TWO COLUMNS.

U = THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.

NOTES:

1. ANALYTICAL RESULTS GIVEN IN MICROGRAMS PER LITER FOR GROUNDWATER SAMPLES WITH DETECTED CONCENTRATIONS GREATER THAN NEW JERSEY GROUNDWATER QUALITY CRITERIA (DATED JULY 2010).
2. THE EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES IS DRAWN BASED ON OBSERVATIONS OF MATERIALS EXCAVATED DURING TEST PIT ACTIVITIES CONDUCTED FROM JULY 26, 2007 TO SEPTEMBER 6, 2007 AND MARCH 26, 2008. THE EDGE OF THE LANDFILL WAS REFINED BASED ON OBSERVATIONS PRESENTED IN THE FIELD CHANGE REQUEST (FCR-02) APPROVED BY USEPA ON DECEMBER 29, 2014.
3. THE EXTENT OF AREAS WHERE SURFACE WATER FLOW DOES NOT EXHIBIT TYPICAL BED AND BANK MORPHOLOGY IS BASED ON FIELD OBSERVATIONS MADE THROUGHOUT THE PERIOD OF INVESTIGATION ACTIVITIES. THE EXTENT OF THE AREA SHOWN IS APPROXIMATE.
4. MONITORING WELL X-7 WAS DAMAGED AND COULD NOT BE SAMPLED.
5. DATA GAP ANALYTICAL RESULTS HAVE NOT BEEN VALIDATED.

SOURCES:

1. BASEMAP FROM JAMES M. STEWART INC., LAND SURVEYORS, PHILADELPHIA, PA., (ELECTRONIC FILE: 292406.DWG DATED: 6/30/06)

0 500' 1000'
GRAPHIC SCALE

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY
DATA GAP INTERIM REPORT

GROUNDWATER ANALYTICAL RESULTS GREATER THAN NEW JERSEY GROUNDWATER QUALITY CRITERIA

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FIGURE
1