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Date:
August 26, 2015

ARCADIS Project No.:
B0033203.0004

Subject:
Summary of VOC Results in Soil and Sediment Samples
Rolling Knolls Landfill Superfund Site

During the June 30, 2015 discussion between the Settling Parties, the United States Environmental Protection Agency (USEPA), and the New Jersey Department of Environmental Protection (NJDEP), the USEPA indicated that the Settling Parties could review the available volatile organic compounds (VOCs) data in soil and sediment data at the Rolling Knolls Landfill Superfund Site to determine whether VOCs should be analyzed in future samples. The goal of this investigation was to demonstrate to the USEPA that, with a few limited exceptions, the data collected to date demonstrates that the Group should not be required to conduct VOC analysis on soil and sediment samples in the future data gap sampling.

ARCADIS has reviewed the results of historical samples to determine whether VOCs should be analyzed for in future soil and sediment samples being collected to delineate constituents of concern (COC) at the landfill. The analysis consisted of determining the frequency of soil samples where VOCs were present at concentrations above their New Jersey Residential Direct Contact Soil Remediation Standards (NJ RDCSRSs), evaluating whether the VOCs were delineated by existing soil samples, and comparing the sediment sample VOC data to applicable screening levels.

Results of VOC analyses in soil and sediment samples are shown in Figures 1 and 2, respectively.

Soil Sample Results

To date, 173 soil samples have been analyzed for VOCs (Figure 1). Of these 173 samples, only four samples (2%) contained VOCs at concentrations above their respective NJ RDCSRSs:

- Chloroform in sample SS-52;
- Chloroform in sample SS-103;
- Chloroform and carbon tetrachloride in sample POI-3; and,
- Chloroform and xylenes (m,p-xylene; o-xylene, and total xylenes) in sample SS-109.

Sample SS-52 is located in the north-central area of the landfill. To date, the extent of VOCs in soil has been delineated in all directions outward from SS-52. As such, no further VOC analyses are necessary to address VOC impact at this location.

Sample SS-103 is located in the south-central area of the landfill. To date, the extent of VOCs in soil has been delineated in all directions outward from SS-103. As such, no further VOC analyses are necessary to address VOC impact at this location.

Samples POI-3 and SS-109 are both located in the southwestern area of the landfill. The extent of VOCs in soil is delineated in all directions outward except to the west and southwest. Samples have been proposed by the New Jersey Department of Environmental Protection (NJDEP) in these areas, and are included in the Data Gaps Sampling and Analysis Plan (SAP) Addendum 1. The samples are designated SD-61 and SD-62 (NJDEP designations 16 and 17). These sample locations are correctly situated to delineate the VOCs detected in soil samples POI-3 and SS-109, but will consist of sediment, as the proposed locations are wet.

Based on these results, VOCs are not a widespread concern in soil at the Rolling Knolls Landfill Superfund Site. The four samples where VOCs are present at levels above their respective NJ RDCSRSs are mostly delineated, and additional sampling has already been proposed in the Data Gaps SAP Addendum to complete this delineation. Therefore, ARCADIS proposes to conduct VOC analysis in the samples needed to complete delineation of VOCs in samples POI-3 and SS-109, but not conduct VOC analysis in other proposed soil samples. If the results of the delineation samples near POI-3 and SS-109 complete VOC delineation, then VOC analysis will not be completed in any future soil samples collected.

NJDEP has recently requested interior soil sampling below the landfill (locations SS-177 through SS-183, corresponding to NJDEP locations 29 through 35). Since these are the first soil samples to be collected below the landfill, VOCs will be included in these analyses along with other Target Compound List (TCL) and Target Analyte List (TAL) constituents. Depending on the results of these initial samples, VOC analysis may not be included in future soil samples below the landfill, if any are warranted.

Sediment Sample Results

Sediment near the landfill may contain COCs that have been contributed by particulate transport in surface water runoff from the landfill. However, based on the information above, soil at the landfill does not contain significant amounts of VOCs, so particulate transport by surface water runoff is unlikely to contribute significant amounts of VOCs to surrounding sediment. Fifty sediment samples were analyzed for VOCs during sampling events completed in 2008 and 2014 (Figure 2). There are currently no New Jersey residential or non-residential standards for VOCs in sediment. As a result, sediment VOC concentrations were compared to NJDEP's Ecologically-Based Screening levels (EBSLs).

Acetone and 2-butanone were detected in most sediment samples collected in 2008 and 2014, including samples upstream of the landfill; however, there are no NJDEP EBSLs for these constituents. These constituents are common laboratory contaminants. As such, their presence in the sediment samples collected to date (including upstream samples) likely does not reflect environmental conditions at the site.

Two other VOCs were detected at concentrations above NJDEP EBSLs in 2014, both at sample SD-41: 1,4-dichlorobenzene (0.49 mg/kg compared to an EBSL of 0.318 mg/kg) and methylene chloride (0.17 mg/kg compared to an EBSL of 0.159 mg/kg). Both detections were "JB" qualified values, indicating that while the constituent was positively identified, the value was only estimated, due to the presence of the constituent in the blank. Methylene chloride is also a common laboratory contaminant and is likely associated with laboratory procedures rather than site activities. In addition, VOCs were not present in sediment samples near SD-41 (i.e., SD-39 and SD-40).

Based on these results, ARCADIS does not feel that VOCs are COCs in the sediments around the landfill, and further analysis of VOCs in sediment samples is not warranted. The only exceptions to this will be samples SD-61 and SS-62, which will be analyzed for VOCs to delineate VOCs detected in nearby soil samples POI-3 and SS-109, as discussed above.

Summary

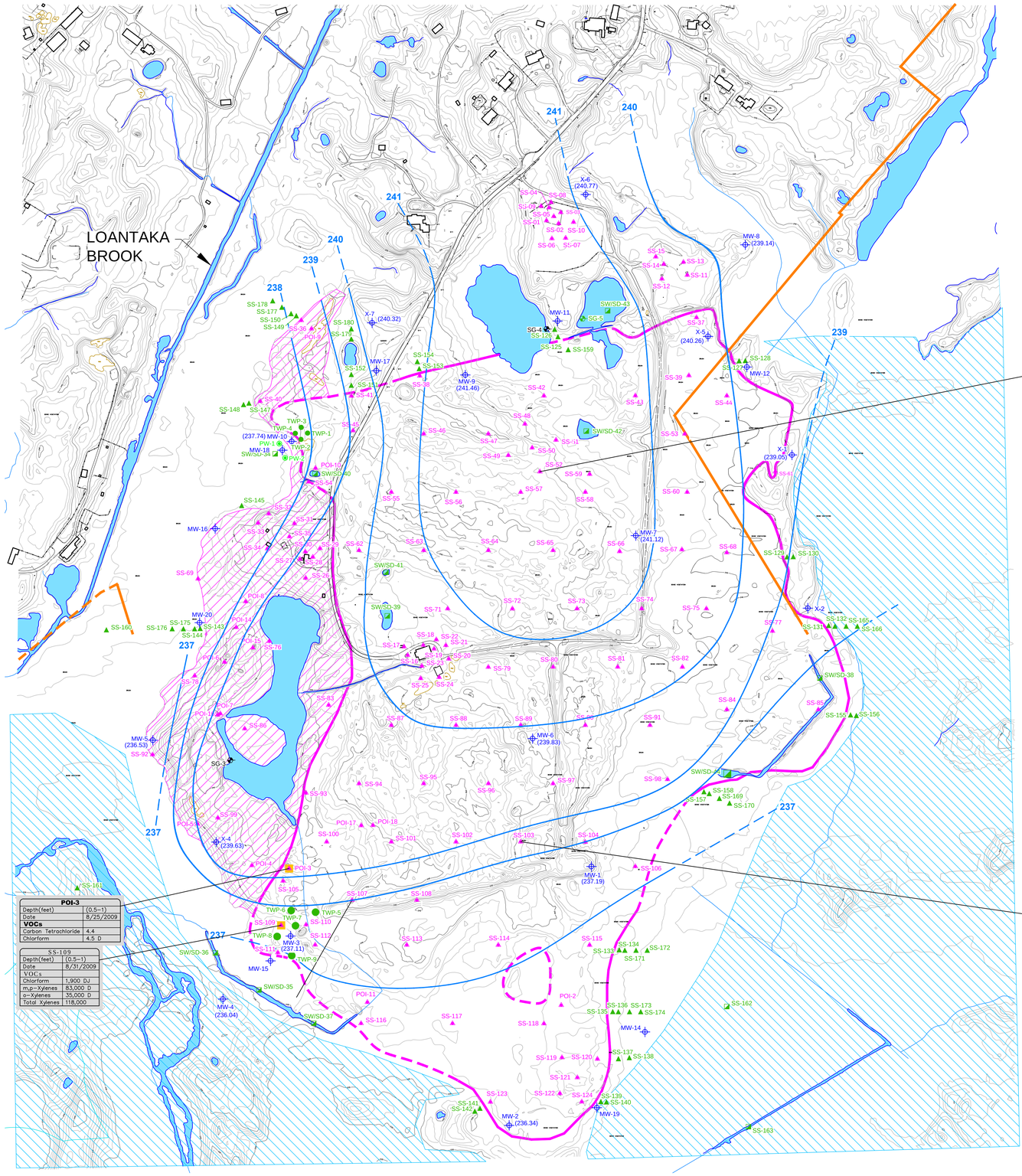
Detected VOC concentrations exceeded applicable NJ RDCSRSs in only four of 173 soil samples (2%) collected to date. The VOCs detected in two of these samples are delineated by existing samples located in all directions outward. The VOC concentrations in soil samples POI-3 and SS-109 are partially delineated.

VOC concentrations in sediment samples are either less than NJDEP EBSLs or, where detected in one sample above EBSLs, are qualified values due to the presence of the VOC in the laboratory blanks. Therefore, VOCs are not COCs in sediment adjacent to the landfill.

The only soil or sediment samples where VOCs are proposed to be analyzed during completion of the Data Gaps SAP are:

- Sediment samples SD-61 and SD-62 (NJDEP designations 16 and 17), which will delineate VOCs at nearby soil sample locations POI-3 and SS-109; and,

- Interior soil samples collected below the landfill at locations SS-177 through SS-183 (NJDEP designations 29 through 35).



SS-52	
Depth(feet)	(0.5–1)
Date	8/31/2009
VOCs	
Chloroform	0.66 DJ

POI-3	
Depth(feet)	(0.5–1)
Date	8/25/2009
VOCs	
Carbon Tetrachloride	4.4
Chloroform	4.5 D

SS-109	
Depth(feet)	(0.5–1)
Date	8/31/2009
VOCs	
Chloroform	1,900 DJ
m,p–Xylenes	83,000 D
o–Xylenes	35,000 D
Total Xylenes	118,000

SS-103	
Depth(feet)	(0.5–1)
Date	9/2/2009
VOCs	
Chloroform	0.63 DJ

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
- DATA GAP SAMPLING LOCATION
- SAMPLES COLLECTED PRIOR TO DATA GAP SAMPLING
- SOIL SAMPLING LOCATION
- SOIL SAMPLING LOCATION WITH DETECTED VOC CONCENTRATIONS GREATER THAN NJDEP NONRESIDENTIAL SOIL REMEDIATION STANDARDS
- MONITORING WELL
- DATA GAP TEMPORARY WELL POINT
- DATA GAP SOIL SAMPLE LOCATION
- DATA GAP SURFACE WATER AND SEDIMENT SAMPLE LOCATION
- PROPOSED POREWATER SAMPLE
- STREAM GAUGE
- DATA GAP STREAM GAUGE LOCATION
- GROUNDWATER ELEVATION CONTOUR – DECEMBER 2014 (DASHED WHERE INFERRED)
- (236.34) GROUNDWATER ELEVATION – DECEMBER 2014 (FEET ABOVE MEAN SEA LEVEL)

NJDEP Soil Remediation Standards		
Constituent	Non–Residential	Residential
VOCs		
Carbon Tetrachloride	2	0.6
Chloroform	2	0.6
Total Xylenes	170,000	12,000

DATA NOTES:

UNITS = MILLIGRAMS PER KILOGRAM

VOCS = VOLATILE ORGANIC COMPOUNDS

NA = NOT ANALYZED

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

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

NOTES:

1. VOC ANALYTICAL RESULTS GIVEN IN MILLIGRAMS PER KILOGRAM FOR SOIL SAMPLES WITH DETECTED CONCENTRATIONS GREATER THAN NEW JERSEY RESIDENTIAL OR NON–RESIDENTIAL SOIL REMEDIATION STANDARDS (DATED OCTOBER 2011).
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. CONDITIONS ENCOUNTERED AT LOCATIONS SS–162, SS–163, AND SS–164 WERE REPRESENTATIVE OF SEDIMENT. RESULTS FOR THESE SAMPLES ARE PRESENTED WITH THE SEDIMENT RESULTS.

0 200' 400'
GRAPHIC SCALE

SOURCES:

1. BASEMAP FROM JAMES M. STEWART INC., LAND SURVEYORS, PHILADELPHIA, PA., (ELECTRONIC FILE: 292406.DWG DATED: 6/30/06)
2. TAX PARCEL DATA FOR CHATHAM TOWNSHIP WAS PROVIDED BY CIVIL SOLUTIONS.

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY

SOIL ANALYTICAL RESULTS GREATER THAN NEW JERSEY SOIL REMEDIATION STANDARDS FOR VOCs

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FIGURE 1

CITY: CRANBURY-NJ DIV/GROUP: ENVCAD DB: T.FATTO LD: T.FATTO PIC:(99) PM: K.ROMAINE TM: L.HYATT LYR:ON=*;OFF=*REF*
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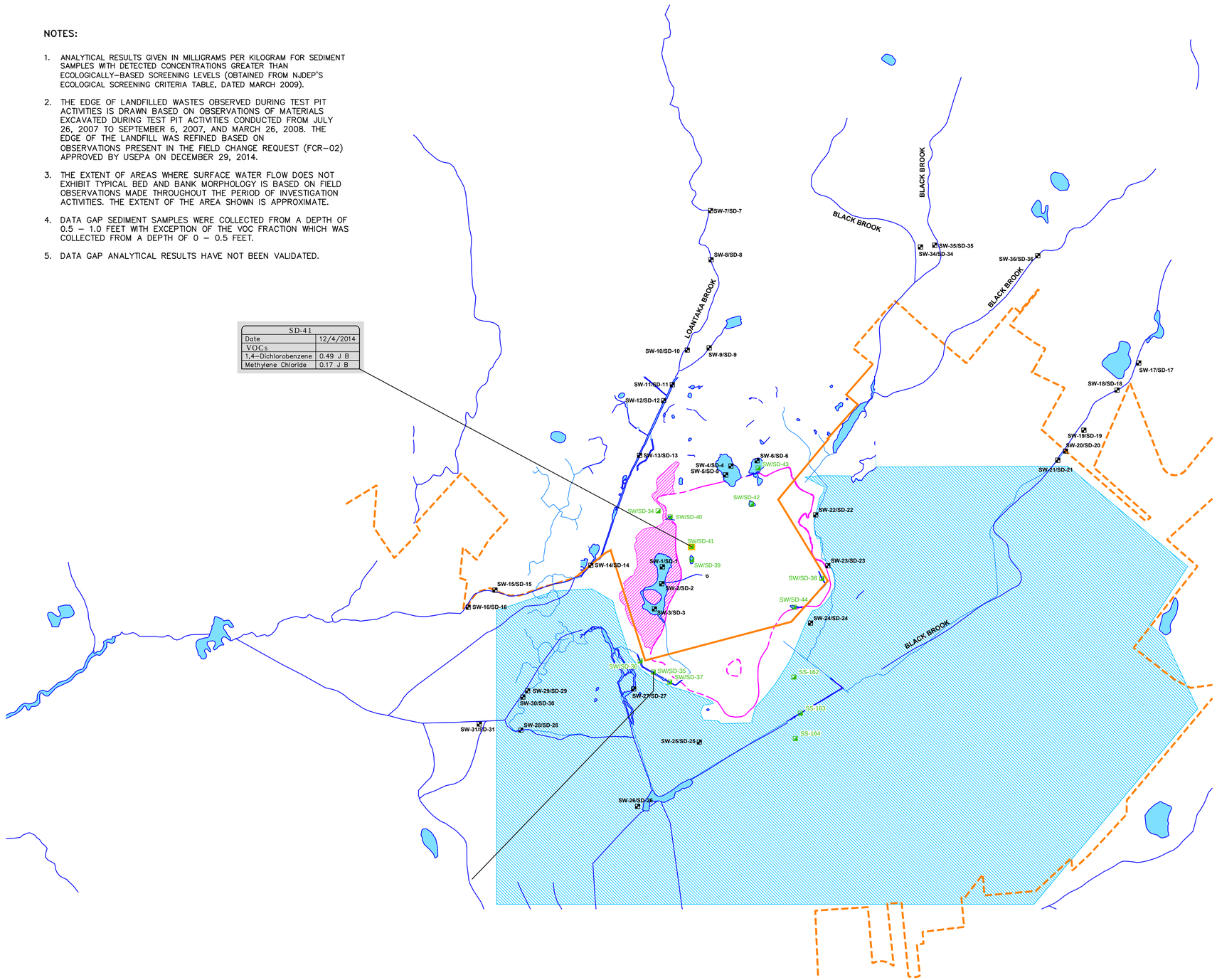
XREFS: 33203X01 B0033203X15 IMAGES: PROJECTNAME: ----

NOTES:

1. ANALYTICAL RESULTS GIVEN IN MILLIGRAMS PER KILOGRAM FOR SEDIMENT SAMPLES WITH DETECTED CONCENTRATIONS GREATER THAN ECOLOGICALLY–BASED SCREENING LEVELS (OBTAINED FROM NJDEP'S ECOLOGICAL SCREENING CRITERIA TABLE, DATED MARCH 2009).
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 PRESENT 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. DATA GAP SEDIMENT SAMPLES WERE COLLECTED FROM A DEPTH OF 0.5 – 1.0 FEET WITH EXCEPTION OF THE VOC FRACTION WHICH WAS COLLECTED FROM A DEPTH OF 0 – 0.5 FEET.
5. DATA GAP ANALYTICAL RESULTS HAVE NOT BEEN VALIDATED.

SD-41	
Date	12/4/2014
VOCs	
1,4–Dichlorobenzene	0.49 J B
Methylene Chloride	0.17 J B



LEGEND:

- OPEN WATER
- EDGE OF LANDFILLED WASTES OBSERVED DURING TEST PIT ACTIVITIES (DASHED WHERE APPROXIMATE)
- GREAT SWAMP NATIONAL WILDLIFE REFUGE PROPERTY BOUNDARY (FROM CHATHAM TOWNSHIP TAX MAP)
- GREAT SWAMP NATIONAL WILDLIFE REFUGE PROPERTY BOUNDARY (APPROXIMATE)
- SURFACE–WATER/SEDIMENT SAMPLING LOCATION
- DATA GAP SURFACEWATER/SEDIMENT SAMPLING LOCATION
- 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
- SEDIMENT SAMPLING LOCATION WITH DETECTED CONCENTRATIONS GREATER THAN ECOLOGICALLY–BASED SCREENING LEVELS
- DATA GAP SAMPLING LOCATION
- SAMPLES COLLECTED PRIOR TO DATA GAP SAMPLING

NJDEP Ecologically-Based Screening Levels	
Constituent	Value
VOCs	
1,4–Dichlorobenzene	0.318
Methylene Chloride	0.159

DATA NOTES:

UNITS = MILLIGRAMS PER KILOGRAM

PCBS = POLYCHLORINATED BIPHENYLS

VOCS = VOLATILE ORGANIC COMPOUNDS

B = FOR ORGANICS THE ANALYTE WAS FOUND IN THE ASSOCIATED BLANK, AS WELL AS THE SAMPLE.

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

SOURCES:

1. BASEMAP FROM JAMES M. STEWART INC., LAND SURVEYORS, PHILADELPHIA, PA., (ELECTRONIC FILE: 292406.DWG DATED: 6/30/06)
2. AERIAL IMAGE COURTESY OF NJ IMAGE WAREHOUSE (HTTP: //NJGIN.NJ.GOV/OIT_IW/INDEX.JSP)

0 800' 1600'
GRAPHIC SCALE

ROLLING KNOLLS LANDFILL SUPERFUND SITE
CHATHAM, NEW JERSEY
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SEDIMENT ANALYTICAL RESULTS GREATER THAN NJDEP ECOLOGICALLY-BASED SCREENING LEVELS FOR VOCs

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FIGURE
2

CITY: CRANBURY-NJ DIV/GROUP: ENVCAD DB: TFATTO LD:T.FATTO PIC: PM: L.MARTINEAU TM:S.WALLS LYR:ON=*;OFF=*REF*
C:\ENVCAD\CRANBURY\ACT\B0033203\0004\00008\DWG\B0033203C01.DWG LAYOUT: 2 SAVED: 8/20/2015 2:00 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 8/20/2015 2:01 PM BY: FATTO, TRACEY
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