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TECHNICAL MEMORANDUM EVALUATION OF BIOSPARGING AND BIOVENTING SYSTEMS AT SOUTH FUEL FARM FACILITY NAS CECIL FIELD FL

6/6/2006

CH2MHILL CONSTRUCTORS INC

Evaluation of Biosparging and Bioventing Systems at the South Fuel Farm Facility, Naval Air Station, Cecil Field, Jacksonville, Florida

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DATE:	June 6, 2006

CH2M HILL Constructors, Inc. (CH2M HILL) has performed an evaluation of the biosparging and bioventing systems currently being operated at the South Fuel Farm (SFF) site at the former Naval Air Station (NAS) Cecil Field, Jacksonville, Florida, to provide recommendations for upgrades to enhance remediation of petroleum-contaminated soil and groundwater at the site. The evaluations include a review of current site groundwater and soil contamination conditions and of previous recommendations provided in the Remedial Action Plan Addendum (RAPA) for the South Fuel Farm dated July 2004 prepared by Tetra Tech NUS, Inc. (TtNUS).

A draft technical memorandum was submitted to the Florida Department of Environmental Protection (FDEP) and the Naval Facilities Engineering Command, Southern Division (MAVFAC EFD SOUTH or the Navy) by CH2M HILL during February 2006 with draft recommendations for further remedial activities at this site. Comments received from the Navy and FDEP on the draft memorandum have been incorporated in this memorandum.

The evaluation and recommendations for the bioventing and biosparging systems are provided separately in the following sections.

Bioventing System

The existing bioventing system at the SFF site consists of nine vertical bioventing wells (BV-1 through BV-9) that deliver oxygen via injection of compressed air, to aid aerobic bacteria in the vadose zone and enhance bioremediation of petroleum-contaminated soil. The locations of the bioventing wells are shown on Figure 1. The bioventing wells were targeted at areas known to be contaminated at the time of preparation of the RAPA.

Soil Contamination Conditions

Soil sampling has been conducted at the SFF site on an annual basis, in the 4th quarter of each year at 15 soil boring locations (see Figure 1) to assess the effectiveness of the bioventing system in remediating the petroleum contamination in soil. The 2005 soil boring sample results represent the most current soil contamination conditions at the site and are summarized in Table 1. Historical soil analytical results are presented in Table A-1 of Attachment A.

The 2005 soil analytical results indicated that total recoverable petroleum hydrocarbons (TRPH) was detected at concentrations that exceeded the Leachability-based Groundwater Criteria and the Direct Exposure Residential Soil Cleanup Target Levels (SCTLs) (as set forth in Chapter 62-777 of the Florida Administrative Code [FAC]) in soil samples from two boring locations (B-41 and B-104). However, when Total Hydrocarbon Criteria Working Group Analyses (THCWGA) were compared to the analytical results of soil samples from soil boring locations B-41 and B-104, the concentrations of the individual fractions of TRPH were below their respective SCTLs. In addition, benzo(a)pyrene and dibenz(a,h)athracene in boring B-70 exceeded the Direct Exposure Residential SCTL. With the exception of TRPH in boring B-41, this is the first time that these parameters were detected at concentrations above the regulatory standard. TRPH concentrations in boring B-41 have shown a decreasing trend since 2003.

As presented in the table below, historically TRPH is the most frequently detected parameter at concentrations that exceeded an SCTL. Other parameters were detected at concentrations above their respective SCTLs but the frequency of detection was minimal. As shown on Table A-1 in Attachment A, the detections of parameters above the SCTLs were sporadic with the exception of TRPH. Figure 2 presents the extent of TRPH in soil based on the 2005 analytical results.

Frequency of Detections above SCTLs

Parameter	# Of Samples	Detections above SCTL	Boring Location
Benzene	105	2	B-96, B-167
Ethylbenzene	105	3	B31, B-146, B167
Xylenes (total)	105	8	B-31, B-41 (2), B-96, B-137, B-146, B-167 (2)
Naphthalene	90	5	B-41, B-70, B-96, B-167 (2)
1-Methylnaphthalene	90	8	B-31, B-41, B-70, B-96, B-106, B-167 (3)
2-Methylnaphthalene	90	5	B-41, B-70, B-96, B-167 (2)
Acenaphthalene	90	1	B-110
Benzo(a)pyrene	90	2	B-70, B-106
Dibenzo(a,h)anthracene	90	2	B-70, B-106
TRPH	105	35	B-31, B-41 (5), B-70, B-96 (6), B-99 (2), B-101 (3), B-104, B-106 (4), B-110 (2), B-137, B-146 (4), B-167 (4)

Based on a comparison of the 2005 analytical results with the historical analytical results of soil sampling at the site, it appears that the operation of the bioventing system and natural attenuation processes have been successful at reducing contaminant concentrations in soil to levels below the SCTLs. In general, the 2005 TRPH concentrations have decreased from historical concentrations, and the individual fractions detected in 2005 are also below SCTLs. Although a few other parameters have been detected at concentrations above SCTLs, the frequency of these detections is sporadic, indicating that they are not persistent and related to the previous petroleum releases at the site.

The current lateral extent of soil contamination is much smaller than previously identified in the RAP prepared by ABB-ES during 1996. The 1996 RAP indicated areas of soil contamination based on a readings exceeding 50 parts per million (ppm) on a photoionization detector (PID). A small portion of this previously-identified area of contamination (between biosparging well BS-1 and biovent well BV-4) has not been sampled during the annual soil sampling events at this site and needs verification through sampling. This area is indicated as a shaded polygon on Figure 2.

Bioventing System Operational Efficiency Evaluation

A soil permeability test conducted by TtNUS as part of the RAPA activities indicated that the radius of influence (ROI) of the bioventing (BV) system wells was less than 15 feet. This ROI was significantly below the design ROI of 60 feet. In addition, the calculated ROI based on design equations was less than 1 foot. The low ROI is attributed to actual wellhead pressures being lower than the design pressure (average of 10 to 12 inches of water vs. design pressure of 20 inches) and higher flow per well than design flow (average 11 standard cubic feet per minute [scfm] vs. design flow of 4 scfm). In May 2004, CH2M HILL shut down five BV wells (BV-5 through BV- 9) to increase the pressure in the BV wells BV-1 to BV-4. The pressure subsequently increased to approach the design value of 20 inches of water, but the flow rate in the well remained above the design flow rate. The calculated ROI remained below 1 foot.

Recommendations for Bioventing System Upgrades

Based on the 2005 soil analytical results, the bioventing system and natural attenuation processes have been successful at reducing parameter concentrations in soil to levels below the SCTLs. However, soil contamination data are not available for the area between biosparging well BS-1 and bioventing well BV-4 (Figure 2) to assess that the area has been remediated.

A phased approach is recommended to address the soil contamination as follows:

Phase I

- Attempt to improve the radius ROI of the existing wells by meeting the design criteria pressure of 20 inches of water and flow of 4 scfm in each well, by shutting down biovent wells in areas that are shown to have been remediated based on the 2005 analytical data. As discussed above, CH2M HILL has achieved the design pressure in BV wells BV-1 through BV-4.

- Collect four additional analytical soil samples in the area of BS-1 and BV-4 to evaluate if contamination is present at levels that would require additional remediation. Proposed sample locations are presented on Figure 3. Any sample which detects TRPH at a concentration above the SCTL, should be analyzed using the THCWGA method to determine if individual fractions of TRPH are above SCTLs.

Phase II

- If the analytical results of the additional soil samples indicate there is no soil contamination, it is recommended that annual soil sampling program be continued (to include the two new soil sample locations in the area between BS-1 and BV-4).
- If the analytical results indicate soil contamination is present in the area between BS-1 and BV-4, it is recommended that additional bioventing wells be installed.

  The following activities are recommended prior to installation of additional bioventing wells.

  – If the design criteria pressure of 20 inches of water and flow of 4 scfm can be achieved in each well, a soil permeability test should be conducted (similar to Tetra Techs test performed in 2002). This will provide an accurate ROI for placement of the additional BV wells.

  – If design criteria cannot be achieved in the existing wells, a conservative ROI of 20 feet should be used for placement of bioventing wells. As indicated in Section 7.4 of the RAPA (TtNUS, 2004), the ROI of 20 feet is a more conservative and realistic approach rather than the 60-foot ROI prescribed in the RAP (ABB-ES, 1996).

- Using a worst-case scenario in which the soil sampling indicates that the majority of the area between BS-1 and BV-4 is contaminated, it would be necessary to install eight additional bioventing wells, as shown on Figure 4.

BioSparging System

The biosparging system consists of 23 two-inch diameter vertical biosparging wells (BS-1 through BS-23) that inject controlled volumes of air into the groundwater below the deepest point of contamination to treat the contaminated groundwater plume. The locations of the biosparging wells are shown on Figure 5.

Groundwater Contamination Conditions

Groundwater sampling has been conducted on an annual basis in the 2nd quarter of each year at six monitoring wells (CEF-043-2N, -4N, 7N, 9N, 33, and 38 [see Figure 5]) to assess the effectiveness of the biosparging system. The 2005 sample results represent the most current groundwater contamination conditions at the site and are summarized in Table 2. Historical soil analytical results are presented in Table A-2 of Attachment A.

As shown in Table A-2, one or more of the following parameters have been historically detected at concentrations above the Florida Groundwater Cleanup Target Levels (GCTLs) in wells CEF-043-2N, -4N, 7N, and 9N — benzene, ethylbenzene, toluene, total xylenes (BETX), naphthalene, lead and TRPH. Lead and TRPH were the only parameters detected at concentrations above the GCTLs during the well 2005 sampling event. The exceedance of

lead was detected in the groundwater sample from well CEF 43-6N and that of TRPH was detected in the groundwater sample from CEF43-2N. These detections of lead and TRPH are below their respective Natural Attenuation Defaults Concentrations (NADC).

In general, parameter concentrations from the 2005 sampling event decreased one to three orders of magnitude when compared to the baseline and previous sampling events conducted from March 1998 to May 2004.

Conclusions and Recommendations

Based on an evaluation of historic groundwater data versus the 2005 data, the biosparging system and natural attenuation process have been successful in reducing contaminant concentrations in groundwater. Only TRPH in well CEF-043-2N remains at a level above a GCTL. However the TRPH concentration in this well is below the NADC.

Based on the above evaluation and concurrence from the Navy, it is recommended that the biosparging system be taken off-line. In addition, groundwater monitoring should be continued on an annual basis for wells CEF-043-2N, -4N, 7N, and 9N to confirm that natural attenuation conditions for groundwater remain favorable at the site, and that contaminant reduction is occurring due to natural attenuation.

Tables

Table 1
Soil Analytical Results
South Fuel Farm; 4th Quarter 2005

Station ID	Sample ID	Sample Depth (ft bgs)	Sample Date	Benzene	Ethylbenzene	Toluene	Xylenes, total	tert-butyl methyl ether	Naphthalene	1-methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Indeno(1,2,3-c,d)pyrene	Dibenz(a,h)anthracene	Fluorene	Fluoranthene	Phenanthrene	Pyrene	Petroleum Hydrocarbons	C10-C12 Petroleum Hydrocarbons	C12-C16 Petroleum Hydrocarbons	C16-C22 Petroleum Hydrocarbons	C22-C36 Petroleum Hydrocarbons	C8-C10 Petroleum Hydrocarbons
Leachability to GW Criteria[1]				0.007	0.6	0.5	0.2	0.09	1.2	2.2	6.1	2.1	27	2500	0.8	8	2.4	25	32000	77	6.6	0.7	160	1200	250	880	340	NE	NE	NE	NE	NE
Direct Exposure Residential[1]				1.2	1500	7500	130	4200	55	200	210	2400	1800	21000	1.3	0.1	1.3	13	2500	130	1.3	0.1	2600	3200	2200	2400	460	900	1500	1300	2300	460
				Unit in mg/kg																												
B-7	86-B7-S-1201-05	2	12/1/2005	0.00493 U	0.00493 U	0.00493 U	0.00986 U	0.00493 U	0.00933 U	0.0374 U	0.0374 U	0.0374 U	0.0374 U	0.00371 U	0.00371 U	0.00371 U	0.00371 U	0.00371 U	0.00371 U	0.00371 U	0.00933 U	0.00371 U	0.0188 U	0.00371 U	0.00371 U	0.00371 U	8.99 UJ	NA	NA	NA	NA	NA
B-31	86-B31-S-1201-05	2	12/1/2005	0.00517 U	0.00517 U	0.00517 U	0.0103 U	0.00517 U	0.0216 J	0.0359 U	0.0359 U	0.0232 J	0.0359 U	0.00356 U	0.00356 U	0.00356 U	0.0199 J	0.00356 U	0.00356 U	0.00356 U	0.00896 U	0.00356 U	0.018 U	0.00356 U	0.00356 U	0.00356 U	10.7 JB	NA	NA	NA	NA	NA
B-41	86-B41-S-1201-05	4	12/1/2005	0.23 U	0.23 U	0.23 U	0.459 U	0.23 U	0.112 J	1.75 J	1.38 J	0.189 U	0.0322 J	0.0187 U	0.0187 U	0.0187 U	0.0187 U	0.0187 U	0.0187 U	0.0187 U	0.0471 U	0.0187 U	0.0592 J	0.0415 J	0.117 J	0.0372 J	**1970 JB**	504.927 JB	1130.903 JB	26.691 JB	11.221 JB	43.644 JB
B-70	86-B70-S-1201-05	4	12/1/2005	0.00263 J	0.00123 J	0.00451 J	0.00569 J	0.00529 U	0.0873 U	0.35 U	0.35 U	0.35 U	0.35 U	0.019 J	0.257 J	**0.705**	0.797	0.244 J	0.522 J	0.477 J	0.726 J	**0.545**	0.0948 J	0.475 J	0.149 J	0.415 J	22.8 JB	NA	NA	NA	NA	NA
B-96	86-B96-S-1201-05	4	12/1/2005	0.249 U	0.249 U	0.249 U	0.498 U	0.249 U	0.017 U	0.0682 U	0.0682 U	0.0682 U	0.0682 U	0.00676 U	0.00676 U	0.00676 U	0.00676 U	0.00676 U	0.00676 U	0.00676 U	0.017 U	0.00676 U	0.0342 U	0.00676 U	0.00676 U	0.00676 U	8.3 UJ	NA	NA	NA	NA	NA
B-99	86-B99-S-1201-05	4	12/1/2005	0.00439 U	0.00439 U	0.00439 U	0.00879 U	0.00439 U	0.0376 J	0.0287 J	0.0385 U	0.0385 U	0.0385 U	0.00381 U	0.00381 U	0.00735	0.00381 U	0.00381 U	0.179 J	0.00935	0.0517 J	0.00381 U	0.0193 U	0.00381 U	0.00768	0.00381 U	43.9 JB	NA	NA	NA	NA	NA
B-101	86-B101-S-1201-05	4	12/1/2005	0.00508 U	0.00508 U	0.00508 U	0.0102 U	0.00508 U	0.00885 U	0.0355 U	0.0355 U	0.0355 U	0.0355 U	0.00352 U	0.00352 U	0.00352 U	0.00838	0.00352 U	0.00331 J	0.00352 U	0.00449 J	0.00352 U	0.0178 U	0.00352 U	0.00352 U	0.00352 U	8.53 UJ	NA	NA	NA	NA	NA
B-104	86-B104-S-1201-05	4	12/1/2005	0.00514 U	0.00514 U	0.00779	0.00502 J	0.00514 U	0.0455 U	0.182 U	0.182 U	0.182 U	0.182 U	0.0181 U	0.0181 U	0.0364	0.0353	0.0136 J	0.0181 U	0.0181 U	0.056 J	0.0181 U	0.0915 U	0.0181 U	0.0181 U	0.0927 J	**1380 JB**	0.858 JB	331.275 JB	743.94 JB	139.018 JB	1.17 JB
B-106	86-B106-S-1201-05	4	12/1/2005	0.00503 U	0.00503 U	0.00503 U	0.0101 U	0.00503 U	0.0453 U	0.182 U	0.182 U	0.182 U	0.182 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.0167 J	0.018 U	0.0911 U	0.018 U	0.018 U	0.018 U	19.7 JB	NA	NA	NA	NA	NA
B-110	86-B110-S-1201-05	2	12/1/2005	0.00508 U	0.00508 U	0.00508 U	0.0102 U	0.00508 U	0.00996 U	0.04 U	0.04 U	0.04 U	0.04 U	0.00396 U	0.00396 U	0.00396 U	0.00396 U	0.00396 U	0.00396 U	0.00396 U	0.00996 U	0.00396 U	0.02 U	0.00396 U	0.00396 U	0.00396 U	9.53 UJ	NA	NA	NA	NA	NA
B-137	86-B137-S-1201-05	4	12/1/2005	0.00529 U	0.00529 U	0.00529 U	0.0106 U	0.00529 U	0.0091 U	0.0365 U	0.0365 U	0.0365 U	0.0365 U	0.00362 U	0.00362 U	0.00362 U	0.00362 U	0.00362 U	0.00362 U	0.00362 U	0.0091 U	0.00362 U	0.0183 U	0.00362 U	0.00362 U	0.00362 U	9.5 JB	NA	NA	NA	NA	NA
B-146	86-B146-S-1201-05	4	12/1/2005	0.00523 U	0.00523 U	0.000974 J	0.00248 J	0.00523 U	0.00886 U	0.0356 U	0.0132 J	0.0356 U	0.0356 U	0.00352 U	0.0228 J	0.00352 U	0.0105	0.00366 J	0.0258 J	0.00352 U	0.0164 J	0.038 J	0.0178 U	0.0092	0.00352 U	0.00516	13.4 JB	NA	NA	NA	NA	NA
B-158	86-B158-S-1201-05	2	12/1/2005	0.00515 U	0.00515 U	0.00515 U	0.0103 U	0.00515 U	0.009 U	0.0361 U	0.0361 U	0.0361 U	0.0361 U	0.00358 U	0.00358 U	0.00358 U	0.00358 U	0.00358 U	0.00358 U	0.00358 U	0.009 U	0.00358 U	0.0181 U	0.00358 U	0.00358 U	0.00358 U	6.36 JB	NA	NA	NA	NA	NA
B-167	86-B167-S-1201-05	2	12/1/2005	0.00571 U	0.00571 U	0.00571 U	0.0114 U	0.00571 U	0.00996 U	0.0399 U	0.0399 U	0.0399 U	0.0399 U	0.00396 U	0.0097 J	0.0102 J	0.0202 J	0.00652 J	0.029 J	0.00638 J	0.0164 J	0.0749 J	0.02 U	0.00693 J	0.00396 U	0.0145 J	14.9 JB	NA	NA	NA	NA	NA
B-189	86-B189-S-1201-05	4	12/1/2005	0.00534 U	0.00534 U	0.00534 U	0.0107 U	0.00534 U	0.00892 U	0.0358 U	0.0358 U	0.0358 U	0.0358 U	0.00355 U	0.00355 U	0.00355 U	0.00355 U	0.00355 U	0.00355 U	0.00355 U	0.00892 U	0.00355 U	0.0179 U	0.00355 U	0.00355 U	0.00355 U	7.38 JB	NA	NA	NA	NA	NA

Notes:
All concentrations reported in micrograms per kilogram (mg/kg) unless otherwise noted.
1 = Ch 62-777 F.A.C Soil Cleanup Target Level (SCTLs) reported in mg/kg
U - The analyte was analyzed for , but not detected.
J - Result is estimated
UJ- Value non-detected estimated.
JB- Estimate value..The analyte was detected in the associated method and/or calibration blank.
Bold values indicate compounds that exceed Residential Direct Exposure Level
Shaded values indicate compounds that exceed Leachability to GW Criteria
NA - Not Analyzed
NE - Not Established

TABLE 2

Groundwater Analytical Results
South Fuel Farm; 2d Quarter 2005

		GCTL[1]	1	30	20	40	5	20	20	20	15	5000
		NADC[1]	10	300	200	400	50	200	200	200	150	50000
Station ID	**Sample ID**	**Sample Date**	Benzene	Ethylbenzene	Xylenes, total	Toluene	Methylene chloride	1-methylnaphthalene	2-Methylnaphthalene	Naphthalene	Lead	Petroleum Hydrocarbons
			micrograms per Liter (ug/L)									
CEF-043-2N	86-CEF43-2N-Q2-05	6/16/2005	5 U	7.24	7.7 J	5 U	10 U	4.01 J	2.53	2.01 J	15 U	**9170 JB**
CEF-043-6N	86-CEF43-6N-Q2-05	6/16/2005	5 U	5 U	10 U	5 U	10 U	1 U	1 U	0.25 U	**17**	1100 JB
CEF-043-7N	86-CEF43-7N-Q2-05	6/16/2005	5 U	5 U	10 U	5 U	10 U	1 U	1 U	0.25 U	15 U	184 JB
CEF-043-9N	86-CEF43-9N-Q2-05	6/16/2005	5 U	7.87	19.4	5 U	10 U	7.87 J	1.73	11.9	15 U	3170 JB
CEF-043-33N	86-CEF43-33N-Q2-05	6/16/2005	5 U	5 U	10 U	5 U	1.05 J	1 U	1 U	0.25 U	15 U	175 JB
CEF-043-38N	86-CEF43-38N-Q2-05	6/16/2005	5 U	5 U	10 U	5 U	10 U	1 U	1 U	0.25 U	15 U	183 JB

Notes:

All concentrations reported in micrograms per liter (ug/L).

GCTL - Groundwater Cleanup Target Level

NADC - Natural Attenuation Default Concentration

1 = Ch 62-777 FAC Groundwater Cleanup Target Levels (GCTLs) reported in µg/L

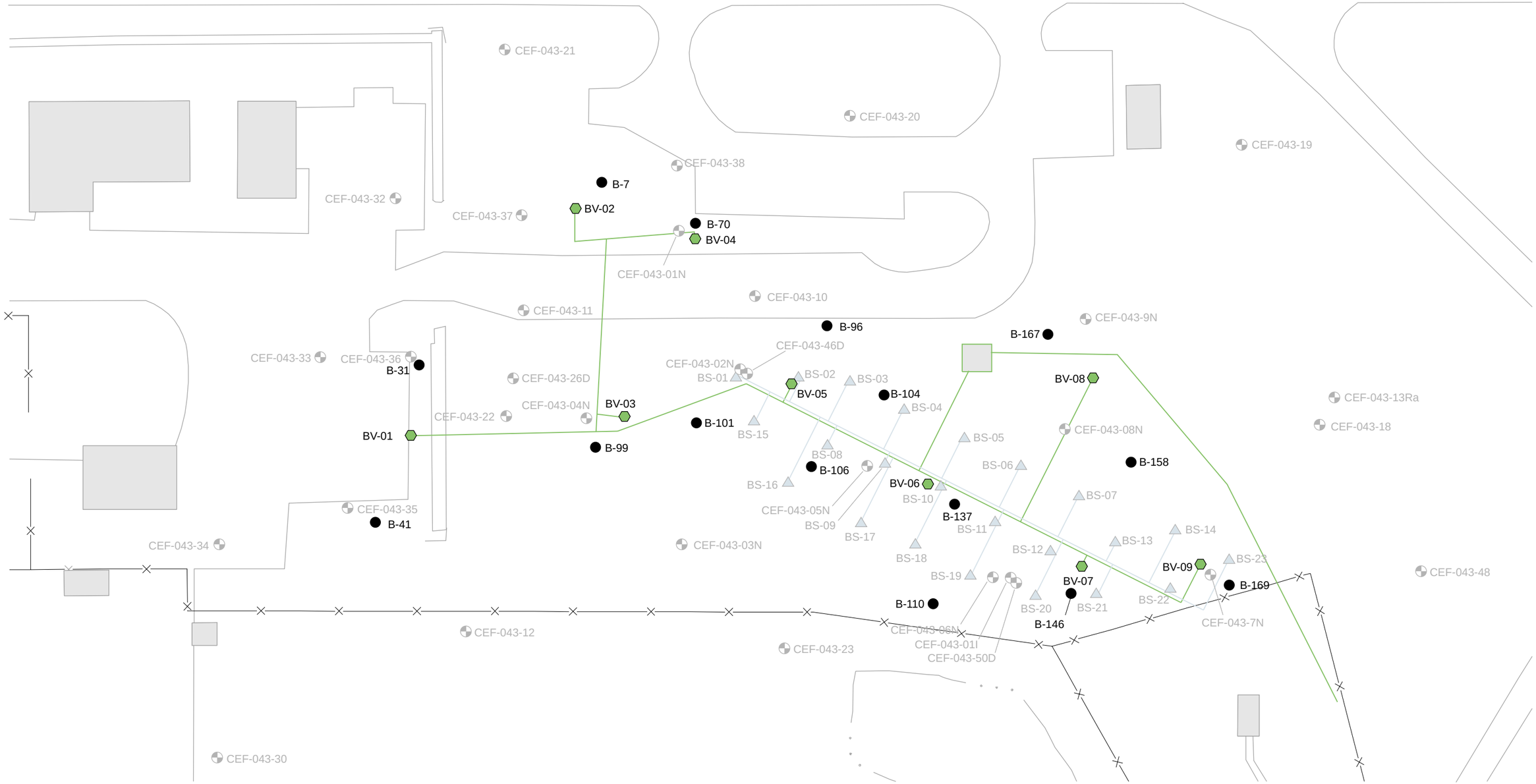
U - The analyte was analyzed for , but not detected.

J - Result is estimated

JB- Estimate value..The analyte was detected in the associated method and/or calibration blank.

Bold indicates concentration exceeds Groundwater Target Cleanup Level

Figures



LEGEND

- Monitoring Well Location
- Biovent Well Location
- Biosparging Well Location
- Soil Boring Location

North

0 80 160

Approximate scale in feet

FIGURE 1
Bioventing System Layout
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

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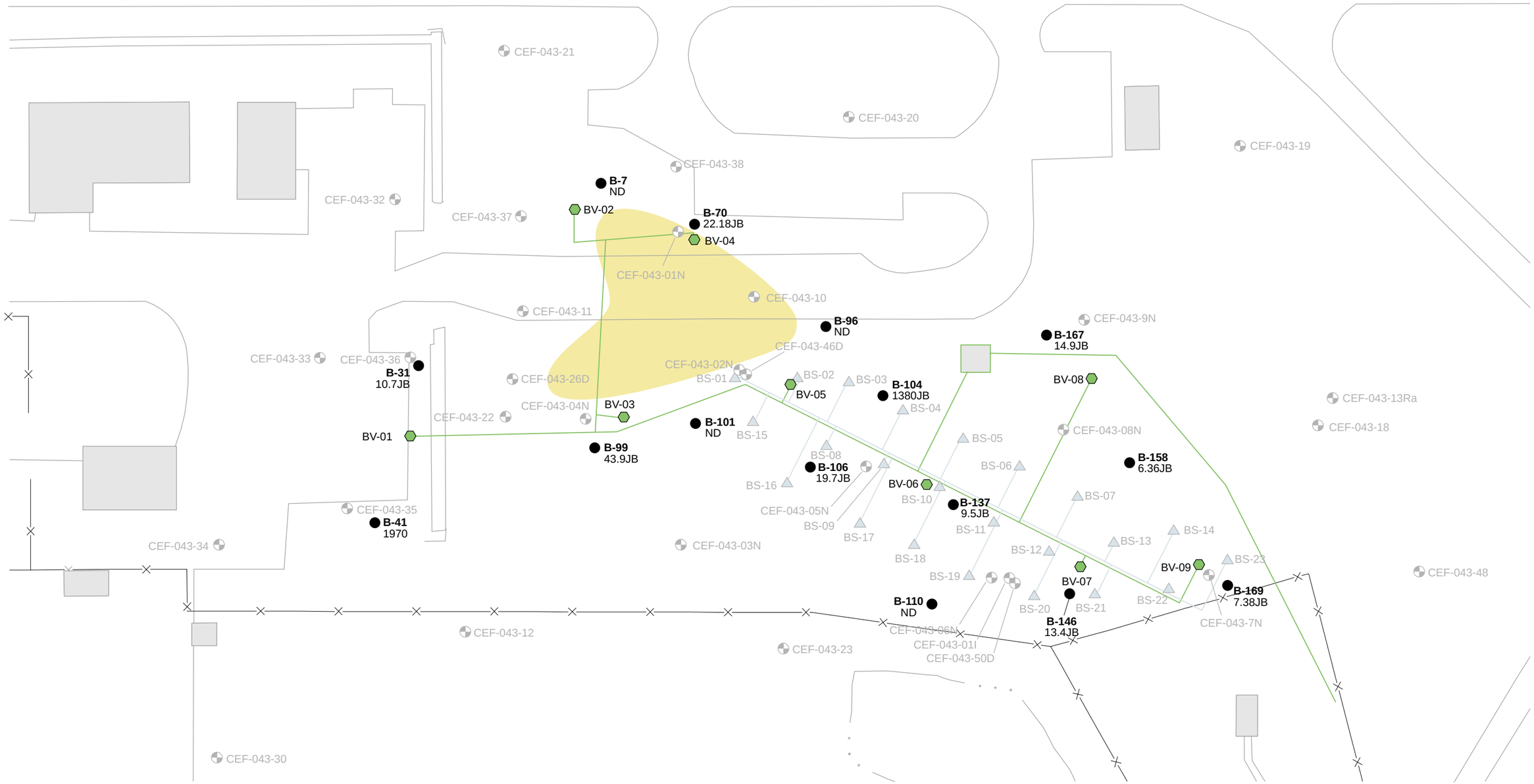

LEGEND

- Monitoring Well Location
- Biovent Well Location
- Biosparging Well Location
- Soil Boring Location

ND Not Detected

JB Estimated Concentration Analyte Detected in Association with Method Blank

Approximate Area of PID Reading Above 50 ppm without Annual Soil Sample Locations

North

0 80 160

Approximate scale in feet

FIGURE 2
2005 TRPH Concentration in Soil
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

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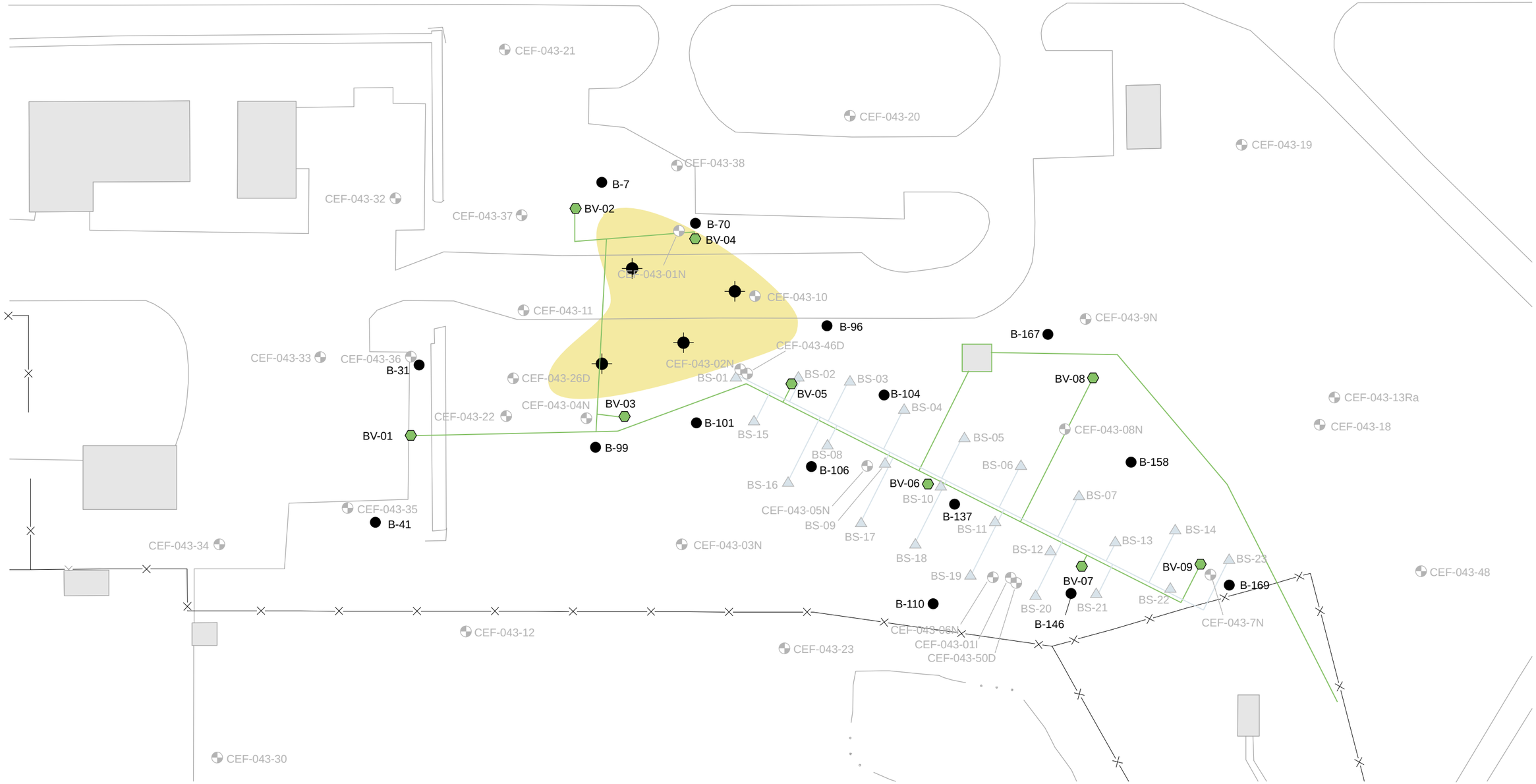
ES042006017ATL NAS-102.ai



LEGEND

- Monitoring Well Location
- Biovent Well Location
- Biosparging Well Location
- Soil Boring Location
- Proposed Additional Soil Sample Location
- Approximate Area of PID Reading Above 50 ppm without Annual Soil Sample Locations

North

0 80 160

Approximate scale in feet

FIGURE 3
Proposed Sampling and Biovent System Upgrades
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

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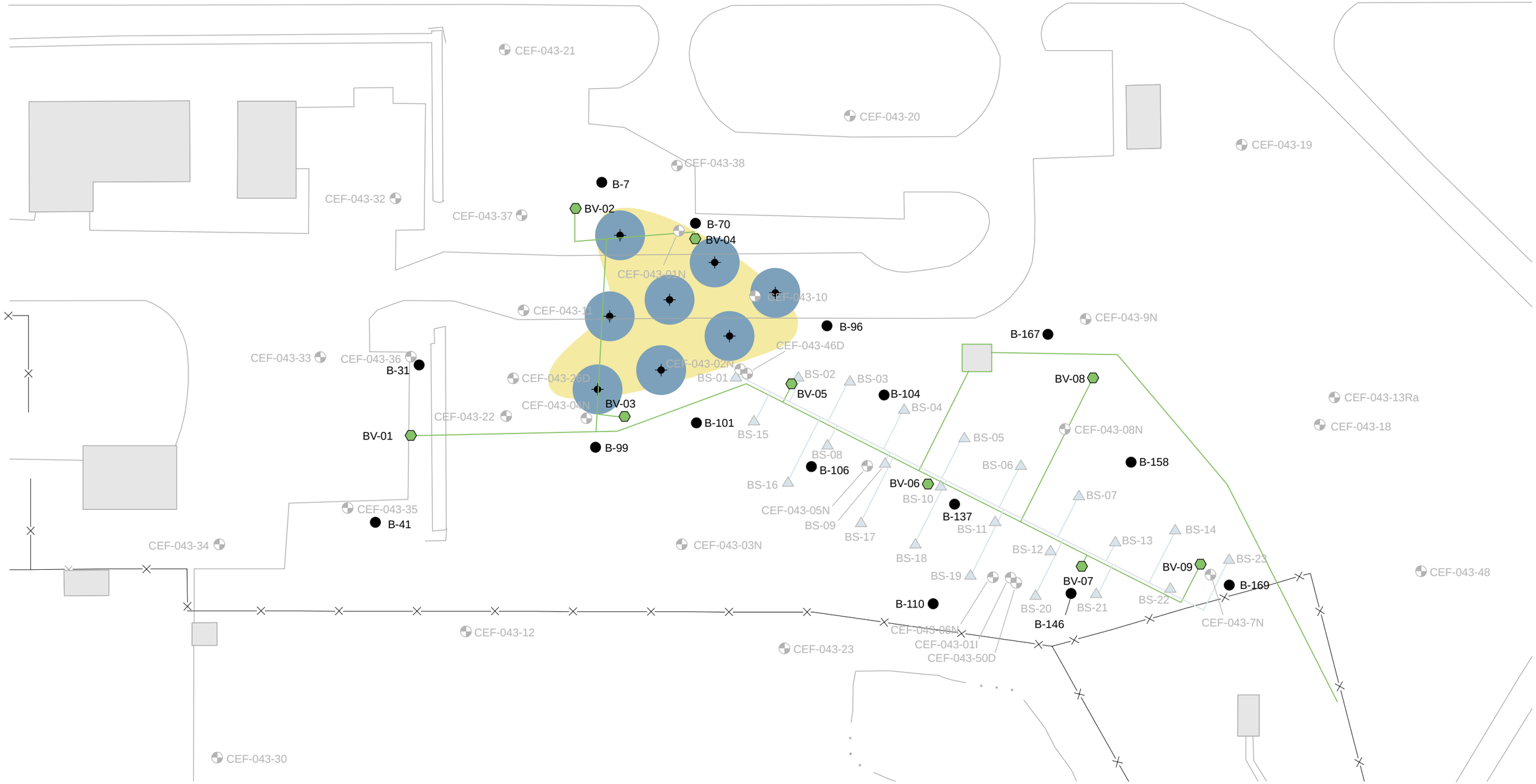
ES042006017ATL NAS-104.ai



LEGEND

- Monitoring Well Location
- Biovent Well Location
- Biosparging Well Location
- Soil Boring Location
- Proposed Additional Bioventing Well Location (based on worst case scenario of full contamination)
- Radius of Influence of Proposed Biosparg Well (20 feet)
- Approximate Area of PID Reading Above 50 ppm without Annual Soil Sample Locations

North

0 80 160

Approximate scale in feet

FIGURE 4
Proposed Bioventing System Upgrades
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

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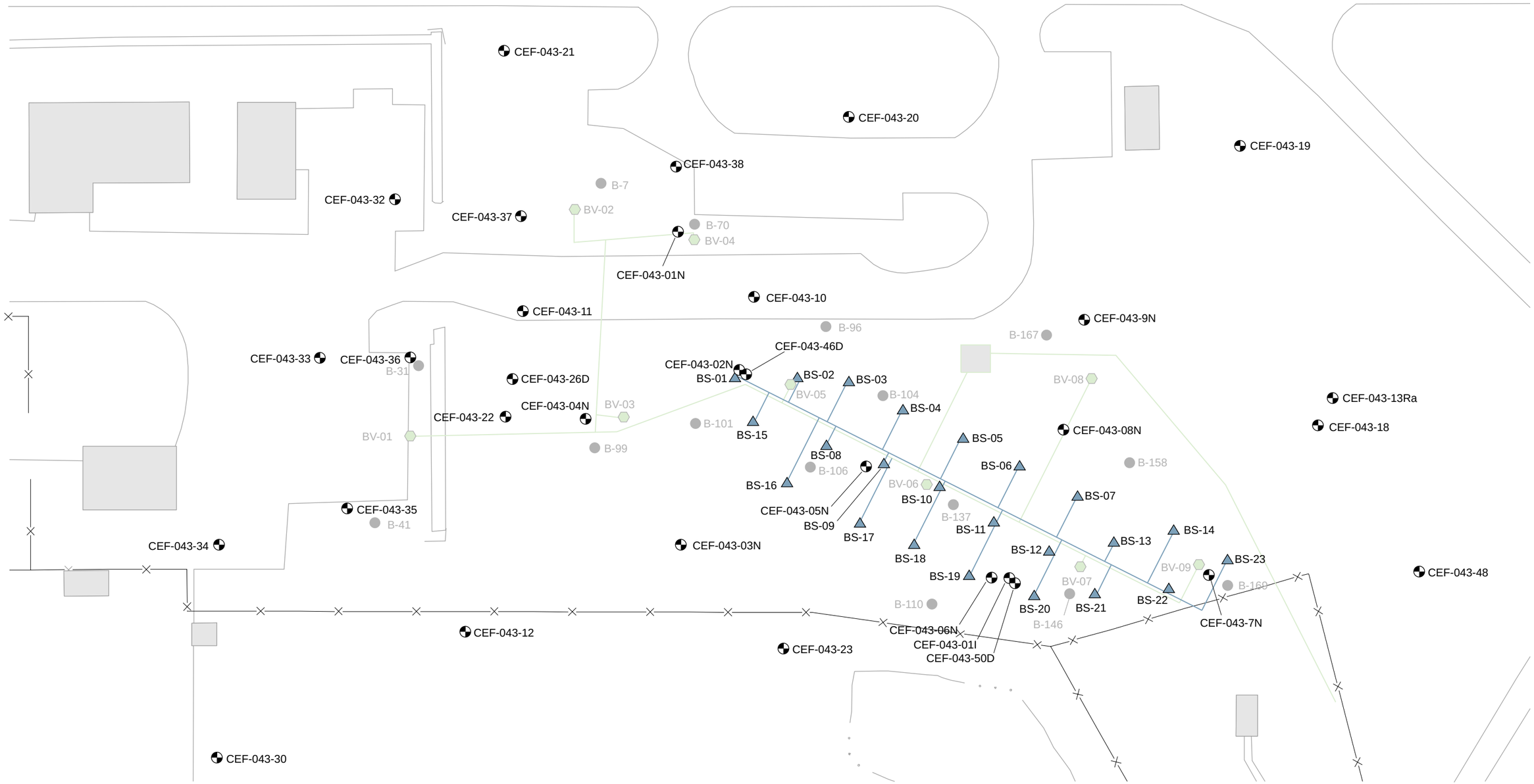
ES042006017ATL NAS-103.ai



LEGEND

- Monitoring Well Location
- Biovent Well Location
- Biosparging Well Location
- Soil Boring Location

North

0 80 160

Approximate scale in feet

FIGURE 5
Biosparging System Location
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

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Attachment A
Historical Groundwater Analytical Data

TABLE A-1
South Fuel Farm Historical Soil Analytical Results

Soil Boring Number	Sample Date	Sample Depth (feet bls)	Benzene	Ethyl Benzene	Toluene	Xylene	Methyl tert-butyl ether	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (g,h,i) perylene	Chrysene	Indeno (1, 2, 3-cd) pyrene	Dibenzo (a,h) anthracene	Fluorene	Fluoranthene	Phenanthrene	Pyrene	TRPH (mg/kg)
Direct Exposure Residential [1]			1.1	1100	380	5900	3200	40	68	80	1900	1100	18000	1.4	0.1	1.4	15	2300	140	1.5	0.1	2200	2900	2000	2200	340
Leachability to GW Criteria [1]			0.007	0.6	0.5	0.2	0.2	1.7	2.2	6.1	2.1	27	2500	3.2	8	10	25	32000	77	28	30	160	1200	250	880	340
B-7	3/22/99	N/A	0.11 U	0.11 U	0.11 U	0.33 U	0.64 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	84
	9/13/00	N/A	0.001 U	0.001 U	0.001 U	0.003 U	0.002 U	0.018 U	0.037 U	0.037 U	0.019 U	0.037 U	0.0018 U	0.0018 U	0.002 U	0.0037 U	0.0018 U	0.003 U	0.0018 U	0.0018 U	0.0036 U	0.003 U	0.0037 U	0.037 U	0.0018 U	8
	10/18/01	2	0.001 U	0.001 U	0.001 U	0.0031 U	0.001 U	0.597 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	18 U
	10/10/02	2	0.00102 J	0.00141 J	0.00325 J	0.0119	0.00589 U	0.00884 U	0.0177 U	0.0177 U	0.00353 U	0.0353 U	0.0177 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.0177 U	0.00353 U	0.00353 U	0.00353 U	9.42 U
	11/5/03	2	0.00486 U	0.00486 U	0.00486 U	0.00971 U	0.00486 U	0.00966 U	0.0387 U	0.0387 U	0.0387 U	0.0387 U	0.00384 U	0.00384 U	0.00384 U	0.00384 U	0.00384 U	0.00384 U	0.00384 U	0.00966 U	0.00384 U	0.0194 U	0.00384 U	0.00384 U	0.00384 U	127
	12/7/04	2	0.00504 U	0.00504 U	0.00504 U	0.0101 U	0.00504 U	0.00914 U	0.0367 U	0.0367 U	0.0367 U	0.0367 U	0.00363 U	0.00363 U	0.00363 U	0.00363 U	0.00363 U	0.00363 U	0.00363 U	0.00914 U	0.00363 U	0.0184 U	0.00363 U	0.00363 U	0.00363 U	35 JB
B-31	3/22/99	N/A	0.012 U	0.012 U	0.012 U	0.036 U	0.071 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	170
	9/13/00	N/A	0.0011 U	0.0011 U	0.0011 U	0.0031 U	0.002 U	0.02 U	0.04 U	0.04 U	0.02 U	0.04 U	0.002 U	0.002 U	0.002	0.004 U	0.002 U	0.01	0.002 U	0.0028	0.01	0.004 U	0.004 U	0.04 U	0.002 U	180
	10/18/01	4	0.0011 U	0.0011 U	0.0011 U	0.0033 U	0.0011 U	0.604 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	18 U
	10/10/02	3	0.225 U	0.225 U	0.0506 J	0.45 U	0.225 U	0.00863 U	0.0173 U	0.0173 U	0.00345 U	0.0345 U	0.0173 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.0173 U	0.0116	0.00345 U	0.00345 U	8.38 J
	11/5/03	2	0.00518 U	0.00518 U	0.00518 U	0.0104 U	0.00518 U	0.00935 U	0.0375 U	0.0375 U	0.0375 U	0.0375 U	0.00372 U	0.00372 U	0.00372 U	0.00372 U	0.00372 U	0.00372 U	0.00372 U	0.00935 U	0.00372 U	0.0188 U	0.00372 U	0.00372 U	0.00372 U	9.01 U
	12/7/04	2	0.461 U	1.04	0.278 J	6.81	0.461 U	1.2	4.18	3.49	0.392 U	0.392 U	0.0389 U	0.0389 U	0.0389 U	0.0389 U	0.0389 U	0.0389 U	0.0389 U	0.0978 U	0.0389 U	0.0531 J	0.0389 U	0.0389 U	0.0389 U	1440 JB
B-41	3/22/99	N/A	0.013 U	0.013 U	0.013 U	0.038 U	0.076 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	30
	9/13/00	N/A	0.55 U	0.55 U	0.55 U	24.9	1.1 U	3.3	22	14	1 U	2 U	0.098 U	0.098 U	0.099 U	0.2 U	0.098 U	0.2 U	0.098 U	0.098 U	0.19 U	0.21	0.88	0.2 U	0.098 U	460
	10/18/01	4	0.0011 U	0.0011 U	0.0011 U	0.0033 U	0.0011 U	0.579 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	17 U
	10/10/02	4	0.219 U	0.219 U	0.219 U	0.437 U	0.219 U	0.00859 U	0.0172 U	0.0172 U	0.00344 U	0.0344 U	0.0172 U	0.00344 U	0.00344 U	0.00344 U	0.00344 U	0.00344 U	0.00344 U	0.00344 U	0.00344 U	0.0172 U	0.00344 U	0.00344 U	0.00344 U	1640
	11/5/03	4	0.212 U	0.212 U	0.212 U	1.58	0.212 U	0.00984 U	0.066	0.0395 U	0.0395 U	0.0395 U	0.00391 U	0.00391 U	0.00146 J	0.00147 J	0.00391 U	0.00391 U	0.00391 U	0.00984 U	0.00391 U	0.0198 U	0.00391 U	0.00391 U	0.00391 U	10400
	12/7/04	4	0.242 U	0.242 U	0.242 U	0.484 U	0.242 U	0.0145	0.0628	0.0394 U	0.0394 U	0.0394 U	0.0039 U	0.0443	0.0039 U	0.0039 U	0.0039 U	0.0039 U	0.0039 U	0.00981 U	0.0039 U	0.0197 U	0.0256	0.0039 U	0.0717	3200 JB
B-70	3/22/99	N/A	0.13 U	0.13 U	0.13 U	0.4 U	0.8 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	830
	9/13/00	N/A	0.0014	0.001 U	0.002	0.019	0.002 U	0.02 U1	0.041 U	0.041 U	0.094	0.109	0.002 U1	0.016	0.005	0.014	0.012	0.004 U	0.043	0.0025	0.004 U	0.004 U	0.091	0.041 U	0.148	100
	10/18/01	4	0.001 2 U	0.001 2 U	0.001 2 U	0.0036 U	0.001 2 U	0.565 U	0.056 U	0.035 J	0.056 U	0.056 U	0.056 U	0.0053J	0.007J	0.015J	0.056 U	0.016J	0.008J	0.010J	0.056 U	0.056 U	0.056 U	0.0049 J	0.0057J	64
	10/10/02	4	0.00141 J	0.00104 J	0.00337 J	0.0102	0.00495 U	0.151 J	0.0161 U	0.0161 U	0.00614 J	0.0322 U	0.0161 U	0.0554 J	0.0847 J	0.0795 J	0.0747 J	0.0746 J	0.0952 J	0.0588 J	0.0616 J	0.0161 U	0.168 J	0.0222 J	0.0621 J	114 J
	11/5/03	4	0.00547	0.00136 J	0.0175 B	0.0164	0.00496 U	1.97	7.77	9.7	0.738 U	0.738 U	0.0731 U	0.0731 U	0.0731 U	0.0731 U	0.0731 U	0.0731 U	0.0731 U	0.184 U	0.0731 U	0.37 U	0.0731 U	0.0731 U	0.134	93.5
	12/7/04	4	0.00465 U	0.00465 U	0.00465 U	0.00929 U	0.00465 U	0.00853 U	0.0342 U	0.0342 U	0.0342 U	0.0342 U	0.00339 U	0.00339 U	0.00339 U	0.00339 U	0.00339 U	0.00339 U	0.00339 U	0.00853 U	0.00339 U	0.0172 U	0.00339 U	0.00339 U	0.00339 U	9.33 JB
B-96	3/22/99	N/A	0.1 U	0.25	0.1 U	5.8	0.63 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	7600
	9/13/00	N/A	0.22 U	0.22 U	0.22 U	0.65 U	0.43 U	0.074	0.48	0.58	0.032	0.058	0.039	0.015	0.012	0.02	0.011	0.005	0.021	0.0063	0.0087	0.11	0.004 U	0.26	0.002 U	1800
	10/18/01	4	0.024	0.017	0.0017	0.0141	0.001 U4	0.562	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.016	0.056 U	0.033	0.015	0.016	0.018	0.014	0.056 U	0.056 U	0.056 U	0.056 U	0.128	969
	10/10/02	4	0.269 U	0.269 U	0.269 U	0.538 U	0.269 U	0.0404 U	0.0807 U	0.0807 U	0.0161 U	0.161 U	0.0807 U	0.0161 U	0.0161 U	0.0161 U	0.0161 U	0.0161 U	0.0161 U	0.0181 U	0.0161 U	0.0807 U	0.0274 J	0.0161 U	0.142 J	2710 J
	11/5/03	4	0.00517 U	0.00188 J	0.0013 B	0.00894 J	0.00517 U	0.135	0.0382 U	0.0382 U	0.0382 U	0.0382 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00952 U	0.00378 U	0.0191 U	0.00378 U	0.0259	0.00378 U	4880
	12/7/04	4	0.216 U	0.216 U	0.216 U	0.433 U	0.216 U	8.19 J	15.5 J	24.5 J	0.339 U	0.772 J	0.0336 U	0.0336 U	0.0336 U	0.0336 U	0.0336 U	0.0336 U	0.0336 U	0.0846 U	0.0336 U	0.649 J	0.0336 U	0.0336 U	0.455 J	59600 JB
B-99	3/22/99	N/A	0.11 U	0.11 U	0.11 U	0.33 U	0.67 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	570
	9/13/00	N/A	0.001	0.001 U	0.0018	0.0017	0.002 U	0.02 U	0.04 U	0.073	0.14	0.04 U	0.004	0.0076	0.016	0.025	0.0057	0.024	0.02	0.013	0.019	0.004 U	0.052	0.04 U	0.028	8.1 U
	10/18/01	4	0.001 2 U	0.001 2 U	0.001 2 U	0.0035 U	0.001 2 U	0.593 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.027J	0.032J	0.040J	0.017J	0.029J	0.040J	0.024J	0.059 U	0.059 U	0.046J	0.024J	0.015J	36
	10/10/02	4	0.00157 J	0.00156 J	0.00516	0.0154	0.00482 U	0.0235 J	0.0171 U	0.0171 U	0.009 J	0.0342 U	0.0171 U	0.165 J	0.0713 J	0.0805 J	0.0357 J	0.0418 J	0.117 J	0.0351 J	0.00342 U	0.0171 U	0.223 J	0.0396 J	0.147 J	33.7 J
	11/5/03	4	0.00517 U	0.00188 J	0.0013 B	0.00894 J	0.00517 U	0.135	0.0382 U	0.0382 U	0.0382 U	0.0382 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00378 U	0.00952 U	0.00378 U	0.0191 U	0.00378 U	0.0259	0.00378 U	4880
	12/7/04	4	0.235 U	0.235 U	0.235 U	0.47 U	0.235 U	0.00887 U	0.0356 U	0.0356 U	0.0356 U	0.0356 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.071	0.00353 U	0.00887 U	0.0325	0.0179 U	0.00353 U	0.00353 U	0.00353 U	20 JB
B-101	3/22/99	N/A	0.12 U	0.12 U	0.12 U	0.36 U	0.72 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	320
	9/13/00	N/A	0.0011 U	0.0011 U	0.0011 U	0.0031 U	0.002 U	0.021 U	0.04 U2	0.042 U	0.021 U	0.04 U2	0.021 U	0.021 U	0.006	0.0066	0.0029	0.018	0.0046	0.009	0.0084	0.004 U	0.04 U2	0.04 U2	0.021 U	8.4 U
	10/18/01	4	0.00088	0.001 U	0.0012	0.003 U	0.001 U	0.572 U	0.206	1.09	0.17	1.25	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	1.14	0.057 U	0.057 U	0.321	1.84	0.912	0.201	7510
	10/10/02	4	0.268 U	0.268 U	0.268 U	0.537 U	0.268 U	0.805 U	1.61 U	1.61 U	0.322 U	3.22 U	1.61 U	0.322 U	0.322 U	0.322 U	0.322 U	0.322 U	0.322 U	0.322 U	0.322 U	1.61 U	2.49	1.03	6.77	13100
	11/5/03	4	0.00586 U	0.00586 U	0.00586 U	0.0117 U	0.00586 U	0.0509 U	0.204 U	0.204 U	0.204 U	0.204 U	0.0202 U	0.0304	0.0202 U	0.0202 U	0.0202 U	0.0202 U	0.0202 U	0.0509 U	0.0202 U	0.102 U	0.0202 U	0.0241	0.0202 U	965 J
	12/7/04	4	0.00477 U	0.00477 U	0.00477 U	0.0012 J	0.00477 U	0.00916 U	0.0367 U	0.0367 U	0.0367 U	0.0367 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00916 U	0.00364 U	0.0184 U	0.00364 U	0.00364 U	0.00364 U	67.7 JB
B-104	3/22/99	N/A	0.11 U	0.11 U	0.11 U	0.33 U	0.67 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	28
	9/13/00	N/A	0.001 U	0.001 U	0.0018	0.0084	0.002 U	0.02 U1	0.041 U	0.041 U	0.02 U1	0.041 U	0.002 U1	0.002 U1	0.002 U	0.0041 U	0.002 U1	0.004 U	0.002 U1	0.002 U1	0.0041 U	0.004 U	0.0041 U	0.041 U	0.002 U1	8.3 U
	10/18/01	4	0.001 U2	0.001 U2	0.001 U2	0.0035 U	0.001 U2	0.569 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.011J	0.057 U	0.0041J	0.057 U	0.057 U	0.057 U	0.057 U	0.0049J	0.057 U	0.014J	80
	10/10/02	4	0.00169 J	0.00268 J	0.0107	0.029	0.00584 U	0.00864 U	0.0173 U	0.0173 U	0.00346 U	0.0346 U	0.0173 U	0.00346 U	0.00346 U	0.00346 U	0.00346 U	0.00346 U	0.00346 U	0.00346 U	0.00346 U	0.0173 U	0.00346 U	0.00346 U	0.00346 U	10.3
	11/5/03	4	0.00548 U	0.00548 U	0.00548 U	0.00165 J	0.00548 U	0.00939 U	0.0377 U	0.0377 U	0.0377 U	0.0377 U	0.00373 U	0.00373 U	0.00373 U	0.00373 U	0.00373 U	0.00373 U	0.00373 U	0.00939 U	0.00373 U	0.0189 U	0.00373 U	0.00373 U	0.00373 U	37.7
	12/7/04	4	0.00495 U	0.00495 U	0.00495 U	0.00989 U	0.00495 U	0.00872 U	0.035 U	0.035 U	0.035 U	0.035 U	0.00347 U	0.0351	0.00347 U	0.00347 U	0.00347 U	0.00347 U	0.00347 U	0.00872 U	0.00347 U	0.0175 U	0.00347 U	0.00347 U	0.00347 U	12.6 JB

TABLE A-1
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Soil Boring Number	Sample Date	Sample Depth (feet bls)	Benzene	Ethyl Benzene	Toluene	Xylene	Methyl tert-butyl ether	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (g,h,i) perylene	Chrysene	Indeno (1, 2, 3-cd) pyrene	Dibenzo (a,h) anthracene	Fluorene	Fluoranthene	Phenanthrene	Pyrene	TRPH (mg/kg)
Direct Exposure Residential [1]			1.1	1100	380	5900	3200	40	68	80	1900	1100	18000	1.4	0.1	1.4	15	2300	140	1.5	0.1	2200	2900	2000	2200	340
Leachability to GW Criteria [1]			0.007	0.6	0.5	0.2	0.2	1.7	2.2	6.1	2.1	27	2500	3.2	8	10	25	32000	77	28	30	160	1200	250	880	340
B-106	3/22/99	N/A	0.12 U	0.12 U	0.12 U	0.37 U	0.75 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3200
	9/13/00	N/A	0.001 U	0.001	0.002	0.0145	0.002 U	0.19 U	2.4	0.38 U	0.47	0.38 U	0.019 U	0.62	0.68	0.97	0.62	0.5	0.89	0.31	0.34	0.038 U	0.93	0.38 U	2.8	1000
	10/18/01	4	0.0011 U	0.0011 U	0.0011 U	0.0033 U	0.0011 U	0.55 U0	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.023J	0.040J	0.037J	0.055 U	0.040J	0.034J	0.038J	0.055 U	0.055 U	0.055 U	0.023J	0.019J	37
	10/10/02	4	0.00479 U	0.00132 J	0.00494	0.0122	0.00479 U	0.125	0.0167 U	0.0167 U	0.00334 U	0.0334 U	0.0167 U	0.00334 U	0.0197	0.0309	0.00334 U	0.0395	0.0303	0.00334 U	0.00334 U	0.0167 U	0.0781	0.00334 U	0.0409	483
	11/5/03	4	0.00522 U	0.00522 U	0.00349 B	0.00151 J	0.00522 U	0.00917 U	0.0368 U	0.0368 U	0.0368 U	0.0368 U	0.00365 U	0.00365 U	0.00497	0.0134	0.0107	0.00365 U	0.0282	0.00917 U	0.00365 U	0.0185 U	0.00565	0.00365 U	0.00365 U	401
	12/7/04	4	0.00447 U	0.00447 U	0.00447 U	0.00895 U	0.00447 U	0.00854 U	0.0343 U	0.0343 U	0.0343 U	0.0343 U	0.0034 U	0.0034 U	0.0034 U	0.0034 U	0.0034 U	0.0034 U	0.0034 U	0.00854 U	0.0034 U	0.0172 U	0.0034 U	0.0034 U	0.0034 U	6.91 JB
B-110	3/22/99	N/A	0.13 U	0.13 U	0.13 U	0.39 U	0.78 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1000
	9/13/00	N/A	0.097 U	0.097 U	0.097 U	0.286 U	0.2 U	0.97 U	1.9 U	1.9 U	3.7	4.3	0.097 U	0.097 U	0.098 U	0.19 U	0.097 U	0.19 U	1.6	0.097 U	0.19 U	0.23	0.19 U	1.9 U	0.097 U	530
	10/18/01	4	0.001 U	0.001 U	0.001 U	0.003 U	0.001 U	0.575 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	17 U
	10/10/02	4	0.248 U	0.248 U	0.248 U	0.495 U	0.248 U	0.00857 U	0.0171 U	0.0171 U	0.00343 U	0.0343 U	0.0171 U	0.00343 U	0.00343 U	0.00343 U	0.00343 U	0.00343 U	0.00343 U	0.00343 U	0.00343 U	0.0171 U	0.00343 U	0.00343 U	0.00343 U	9.14 U
	11/5/03	2	0.00523 U	0.00523 U	0.00523 U	0.0105 U	0.00523 U	0.00888 U	0.0356 U	0.0356 U	0.0356 U	0.0356 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00353 U	0.00888 U	0.00353 U	0.0179 U	0.00353 U	0.00353 U	0.00353 U	95.1
	12/7/04	2	0.00466 U	0.00466 U	0.00466 U	0.00932 U	0.00466 U	0.00867 U	0.0348 U	0.0348 U	0.0348 U	0.0348 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00345 U	0.00867 U	0.00345 U	0.0174 U	0.00345 U	0.00345 U	0.00345 U	7.85 JB
B-137	3/22/99	N/A	0.1 U	0.1 U	0.1 U	0.52	0.63 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1200
	9/13/00	N/A	0.001 U3	0.001 U3	0.001 U3	0.008	0.002 U	0.02 U	0.04 U	0.04 U	0.02 U	0.04 U	0.002 U	0.002 U	0.002 U	0.004 U	0.002 U	0.004 U	0.002 U	0.002 U	0.003 U9	0.004 U	0.004 U	0.04 U	0.002 U	8
	10/18/01	2	0.001 2 U	0.001 2 U	0.001 2 U	0.0037 U	0.001 2 U	0.563 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	0.056 U	17 U
	10/10/02	4	0.00161 J	0.00108 J	0.00414 J	0.0111	0.00497 U	0.00811 U	0.0162 U	0.0162 U	0.00325 U	0.0325 U	0.0162 U	0.00325 U	0.00325 U	0.00325 U	0.00325 U	0.00325 U	0.00325 U	0.00325 U	0.00325 U	0.0162 U	0.00325 U	0.00325 U	0.00325 U	127
	11/5/03	4	0.0012 J	0.00533 U	0.00226 B	0.00337 J	0.00533 U	0.00917 U	0.0368 U	0.0368 U	0.0368 U	0.0368 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00364 U	0.00917 U	0.00364 U	0.0184 U	0.00364 U	0.0155	0.00364 U	22.9
	12/7/04	4	0.255 U	0.255 U	0.255 U	0.51 U	0.255 U	0.00891 U	0.0358 U	0.0358 U	0.0358 U	0.0358 U	0.00354 U	0.00354 U	0.00354 U	0.00354 U	0.00354 U	0.00354 U	0.00354 U	0.00891 U	0.00354 U	0.0179 U	0.00354 U	0.00354 U	0.103	14.9 JB
B-146	3/22/99	N/A	0.1 U	0.1 U	0.1 U	0.31 U	0.63 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1000
	9/13/00	N/A	0.001 U3	0.001 U3	0.002	0.006	0.002 U	0.028	0.041 U	0.041 U	0.02 U1	0.041 U	0.002 U	0.002 U	0.008	0.0041 U	0.002 U	0.004 U	0.002 U	0.002 U	0.004 U	0.005	0.0041 U	0.041 U	0.002 U	13
	10/18/01	4	0.001 U2	0.001 U2	0.001 U2	0.0037 U	0.001 U2	0.541 U	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	0.0059	0.0099	0.017	0.054 U	0.184	0.0092	0.054 U	0.012	0.185	0.054 U	0.029	1640
	10/10/02	4	0.239 U	0.616	0.239 U	3.22	0.239 U	0.392 U	0.783 U	0.783 U	0.157 U	1.57 U	0.783 U	0.157 U	0.157 U	0.157 U	0.157 U	0.157 U	0.157 U	0.157 U	0.157 U	0.783 U	1.04	0.157 U	3.18	4180
	11/5/03	4	0.00514 U	0.00514 U	0.00514 U	0.0103 U	0.00514 U	0.00886 U	0.0356 U	0.0356 U	0.0356 U	0.0356 U	0.00352 U	0.00352 U	0.00352 U	0.00352 U	0.00352 U	0.00352 U	0.00352 U	0.00886 U	0.00352 U	0.0178 U	0.00352 U	0.00352 U	0.00352 U	365
	12/8/04	4	0.0047 U	0.0047 U	0.0047 U	0.00362 J	0.0047 U	0.00871 U	0.0349 U	0.0349 U	0.0349 U	0.0349 U	0.00346 U	0.0178	0.00346 U	0.00346 U	0.00567	0.0074	0.00346 U	0.00991	0.026	0.0175 U	0.00346 U	0.00346 U	0.00346 U	43.5 JB
B-158	3/22/99	N/A	0.12 U	0.12 U	0.12 U	0.36 U	0.7 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.5
	9/13/00	N/A	0.0016	0.003	0.002	0.0342	0.002 U	0.13	0.041 U	0.041 U	0.02 U1	0.041 U	0.002 U	0.002 U	0.004	0.0041 U	0.0028	0.01	0.002 U	0.002 U	0.005	0.01	0.0041 U	0.041 U	0.002 U	8.2 U
	10/18/01	4	0.001 U2	0.001 U2	0.001 U2	0.0037 U	0.001 U2	0.596 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	18 U
	10/10/02	2	0.00341 J	0.00268 J	0.00622	0.0252	0.00189 J	0.00825 U	0.0165 U	0.0165 U	0.0033 U	0.033 U	0.0165 U	0.0033 U	0.00678	0.00766	0.00396	0.0202	0.0033 U	0.0033 U	0.0033 U	0.0165 U	0.0129	0.0033 U	0.0033 U	5.9 J
	11/5/03	2	0.00537 U	0.00108 J	0.00537 U	0.00233 J	0.00537 U	0.00908 U	0.0364 U	0.0364 U	0.0364 U	0.0364 U	0.00361 U	0.0552	0.084	0.00361 U	0.0558	0.0802	0.0976	0.062	0.0669	0.0183 U	0.00361 U	0.00361 U	0.108	19.6
	12/8/04	2	0.00469 U	0.00111 J	0.00469 U	0.00333 J	0.00469 U	0.00862 U	0.0346 U	0.0346 U	0.0325 J	0.0346 U	0.00354	0.204	0.113	0.0867	0.145	0.0493	0.057	0.0518	0.048	0.0173 U	0.0344	0.0101	0.0701	63.5 JB
B-167	3/22/99	N/A	0.12 U	0.45	0.29	2.8	0.72 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4200
	9/13/00	N/A	0.0011 U	0.0011 U	0.0011 U	0.0031 U	0.002 U	0.02 U	0.04 U	0.04 U	0.02 U	0.04 U0	0.002 U	0.002 U	0.002 U	0.004 U	0.002 U	0.004 U	0.002 U	0.002 U	0.004 U	0.004 U	0.004 U	0.04 U	0.002 U	8.1 U
	10/18/01	4	0.029	3.84	0.019	5.334	0.0034	10.3	22.3	26.3	0.188	0.573 U	0.573 U	0.573 U	0.573 U	0.573 U	0.573 U	0.573 U	0.351	0.573 U	0.573 U	1.71	2.07	2.37	0.573 U	11400
	10/10/02	4	0.219 U	0.219 U	0.219 U	0.439 U	0.219 U	9.05	21	34.9	0.334 U	3.34 U	1.67 U	0.334 U	0.334 U	0.334 U	0.334 U	0.334 U	0.334 U	0.334 U	0.334 U	1.67 U	0.334 U	0.334 U	0.334 U	13800
	11/5/03	2	0.00501 U	0.00501 U	0.00501 U	0.01 U	0.00501 U	0.00869 U	0.0349 U	0.0349 U	0.0349 U	0.0349 U	0.00346 U	0.00346 U	0.0015 J	0.00194 J	0.00232 J	0.00346 U	0.00346 U	0.00869 U	0.00346 U	0.0175 U	0.00346 U	0.00346 U	0.00346 U	8.38 U
	12/8/04	2	0.235 U	0.235 U	0.235 U	0.469 U	0.235 U	0.533 J	5.91 J	1.98 J	0.0362 U	0.0362 U	0.00359 U	0.00359 U	0.00359 U	0.00359 U	0.00359 U	0.00359 U	0.00359 U	0.00903 U	0.00359 U	0.0182 U	0.00359 U	0.233 J	0.00359 U	1840 JB
B-189	3/22/99	N/A	0.11 U	0.11 U	0.11 U	0.33 U	0.67 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	7.4 U
	9/13/00	N/A	0.0018	0.0011 U	0.0038	0.0061	0.002 U	0.02 U	0.041 U	0.041 U	0.02 U1	0.041 U	0.002 U	0.002 U	0.004	0.0041 U	0.0021	0.005	0.002 U	0.002	0.004 U	0.006	0.0041 U	0.041 U	0.004	8.2 U
	10/18/01	4	0.001 U2	0.00062J	0.001 U2	0.0042	0.001 U2	<0.570	0.057 U	0.013J	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	0.057 U	18
	10/10/02	2	0.285 U	0.285 U	0.285 U	0.57 U	0.285 U	0.00953 U	0.0191 U	0.0191 U	0.00381 U	0.0381 U	0.0191 U	0.00381 U	0.00686	0.00593	0.00606	0.00381 U	0.00381 U	0.00381 U	0.00381 U	0.0191 U	0.014	0.00381 U	0.00932	10.2 U
	11/5/03	4	0.00583 U	0.00583 U	0.00583 U	0.0117 U	0.00583 U	0.00967 U	0.0388 U	0.0388 U	0.0388 U	0.0388 U	0.00385 U	0.00385 U	0.00385 U	0.00387	0.00385 U	0.00385 U	0.00385 U	0.00967 U	0.00385 U	0.0195 U	0.00385 U	0.00385 U	0.00385 U	11
	12/8/04	4	0.00174 J	0.00106 J	0.00333 J	0.0118	0.00497 U	0.00874 U	0.0351 U	0.0351 U	0.0351 U	0.0351 U	0.00348 U	0.00348 U	0.00348 U	0.00348 U	0.00348 U	0.00348 U	0.00348 U	0.00874 U	0.00348 U	0.0176 U	0.00348 U	0.00348 U	0.00348 U	57.9 JB

All values reported in milligram per kilogram (mg/kg)
1 - Ch 62-777 F.A.C Soil cleanup Target Level (SCTLs) reported in mg/kg
bgs - below ground surface
U - result was not detected
N/A - not available
NS - not sampled for compound
J - concentration is less than the reporting limit but greater than the method detection limit
JB- Estimate value. The analyte was detected in the associated method and/or calibration blank.
Bolded values indicate the compounds that exceed the Direct Exposure SCTLs
Shaded values indicate the compounds that exceed the Leachability to groundwater SCTLs
Sampling events dated prior to 10/18/01 were performed by previous CONTRACTOR.

TABLE A-2
Groundwater Analytical Results

Well Identification	Sample Date	Benzene	Ethyl Benzene	Toluene	Total Xylenes	BTEX	Naphthalene	Lead	TRPH
CEF-043-2N	03/09/1998	<1	<1	<1	<2	<5	<10	5	3,500
	05/19/1998	6	300	4,900	1,320	6,526	230	29	900
	08/25/1998	<1	24	70	72	166	<10	15	9,000
	12/14/1998	2.2	86	830	240	1,158	<10	22	4,200
	04/10/2000	<5	100	380	290	770	56	19	30,000
	05/09/2002	0.32	20.5	26.3	63	110.1	3.8	4.0 B	24,600
	05/27/2003	<5	2.29	<5	7.09	9.38	<0.25	<15	7,930
	05/26/2004	<5	22.4	<5	26.9	49.3	40.1 J	<15	36400
CEF-043-6N	03/09/1998	730	930	1,500	5,500	8,660	<100	51	15,000
	05/19/1998	230	1,300	1,700	10,000	13,230	82	120	19,000
	08/25/1998	60	400	360	1,820	2,640	<10	9	3,900
	12/14/1998	24	280	85	2,580	2,969	<10	78	18,000
	04/10/2000	11	190	80	880	1,161	<10	48	14,000
	05/09/2002	<1	15.6	0.66	67.7	83.96	1.1	20	3,600
	05/27/2003	<5	1.58	<5	6.89	8.47	<0.25	17	<84.8
	05/26/2004	<5	10.3	<5	29.9	40.2	3.91	21	2220 J
CEF-043-7N	03/09/1998	39	320	62	1,560	1,981	<10	76	14,000
	05/19/1998	<50	2,300	300	10,200	12,800	54	120	12,000
	08/25/1998	<1	90	10	1,050	1,150	<10	61	1,800
	12/14/1998	<1	320	24	5,400	5,744	<10	7	19,000
	04/10/2000	<1	3	2.2	12.6	18	<10	13	600
	05/09/2002	<1	<1	<1	<3	<6	<0.21	4.2 B	2,600
	05/27/2003	<5	<5	<5	<10	<25	<0.25	5.9	<776
	05/26/2004	<5	<5	<5	<10	0	<0.25	7.1 J	157 J
CEF-043-9N	03/09/1998	<2	1.2	<1	11.3	12.5	<10	15	1,300
	05/19/1998	<2	18	1.3	68	87.3	62	17	1,300
	08/25/1998	<2	1	<1	8	9	<10	<5	<200
	12/14/1998	<2	18	<1	24	42	24	<5	300
	04/10/2000	<1	23	4.2	78	105.2	18	20	1,500
	05/09/2002	<1	18	0.4	71.4	89.8	30	10.5	5,300
	05/27/2003	<5	16.8	<5	82.6	99.4	58.9	<15	21,500
	05/26/2004	<5	27.2	3.31 J	106	133.2	84.7	<15	8040 J
CEF-043-33N	03/09/1998	<1	<1	<1	<2	<5	<10	5	<200
	05/19/1998	<1	<1	<1	<2	<5	<10	5	<200
	08/25/1998	<1	<1	<1	<2	<5	<10	10	<200
	12/14/1998	<1	<1	<1	<2	<5	<10	<5	<200
	04/10/2000	<1	<1	<1	<2	<5	<10	20	<200
	05/09/2002	<1	<1	<1	<3	<6	0.21 J	<5	<370
	05/28/2003	<5	<5	<5	<10	<25	<0.25	<15	<211
	05/26/2004	<5	<5	<5	<10	0	<0.25	<15	<100
CEF-043-38N	03/09/1998	<1	<1	<1	<2	<5	<10	140	<200
	05/19/1998	<1	<1	<1	<2	<5	<10	78	<200
	08/25/1998	<1	<1	<1	1	1	<10	46	<200
	12/14/1998	<1	<1	<1	8.8	8.8	<10	54	<200
	04/10/2000	<1	<1	<1	<2	<5	<10	49	<200
	05/09/2002	<1	<1	<1	<3	<6	<0.21	2.5 B	<380
	05/28/2003	<5	<5	<5	<10	<25	<0.25	<15	<131
	05/26/2004	<5	<5	<5	<10	0	<0.25	<15	51 J
Groundwater Criteria [1]		1	30	40	20	n/a	20	15	5000
Natural Attenuation Default Source [1]		100	300	400	200	n/a	200	150	50000

All values reported in µg/L
1 = Ch 62-777 FAC Groundwater Cleanup Target Levels (GCTLs) reported in µg/L
BTEX = sum of benzene, toluene, ethylbenzene, and xylene
N/A = not analyzed for this compound
Shaded values indicate the compounds that exceed the GCTLs
Bolded values indicate the compounds that exceed the natural attenuation default source criteria
B = compound is present in the method blank
J = concentration is less than the reporting limit but greater than the method detection limit
Sampling events dated prior to 5/9/02 were performed by previous contractors.
Sampling event dated 3/9/98 is the baseline sampling event.