GZA
GeoEnvironmental, Inc.

Engineers and Scientists

September 10, 2009
File No. 32795.36-C

Mr. Gary Jablonski
Rhode Island Department of Environmental Management
Office of Waste Management
235 Promenade Street
Providence, Rhode Island 02908-5767

Re: Revised Request for Modification of Order of Approval
Charbert, Division of NFA Corp.
Alton, Rhode Island

530 Broadway
Providence
Rhode Island
02909
401-421-4140
FAX 401-751-8613
www.gza.net

Dear Mr. Jablonski:

On behalf of Charbert, Division of NFA Corp, GZA GeoEnvironmental, Inc. (GZA) is requesting a modification to the Order of Approval dated December 13, 2007, for the soil vapor extraction (SVE) and air sparge (AS) system at the Charbert facility. The requested modifications have been revised per your verbal comments of August 31, 2009 and are summarized as follows:

- The addition of two SVE extraction wells and one air sparge well to the existing SVE/AS system to remediate oily soils associated with the oil line leak in the boiler room as reported in GZA's March 20, 2009 *Boiler Room Oil Line Leak.* The proposed system modifications/additions are presented in GZA's *Boiler Room Pilot Test* dated June 19, 2009. The location of the two SVE wells and the new air sparge well are shown on Figure 1, attached. These new SVE and air sparge wells will be included in GZA's monthly monitoring program and the results will be included in the quarterly interim compliance monitoring (ICMP) reports.

- The addition of five SVE extraction lines and three air sparge wells to the existing exterior SVE/AS system to remediate contaminated soils associated with the oil line leak and the chlorinated solvents reported in GZA's January 9, 2006 *Supplemental Site Investigation Report,* and petroleum impacted soils reported in GZA's May 12, 2009 *Technical Memorandum #2.* These new SVE lines and sparge wells are located in the vicinity of the oil line rupture and former UST area and are shown on Figure 1. These SVE lines and sparge wells will be installed in compliance with the specifications and details used for the initial system construction. These new SVE lines and air sparge wells will be included in GZA's monthly monitoring program and the results will be included in the quarterly interim compliance monitoring (ICMP) reports.

- Construct and operate a temporary SVE system to remediate the soils dredged from Lagoon 5 as reported in GZA's *May 12, 2009 Technical Memorandum #2.* The temporary SVE system will be housed in a trailer as shown on Figure 1. A schematic of the proposed temporary system is attached as Figure 2. The temporary SVE system will be monitored using protocols similar to the existing SVE monitoring program and the results will be included as an attachment to the quarterly ICMP reports.

  This temporary remedial system will be operated until the soil stock pile contaminant concentrations are reduced to a level that would make them eligible for use as alternate daily cover soil at Central Landfill in Johnston, Rhode Island. This will require an approximately 50% reduction in contaminant concentration from the levels originally detected. We anticipate this will require from 3 to 6 months of operation. However, that operation may be interrupted during cold weather conditions due to excessive condensation generation within the treatment system.

  Note, recent testing of the pile suggests that significant reductive dehalogenation is taking place. As this is an anaerobic process we may defer or eliminate the venting program if it appears that our remedial objectives will be achieved in the same time frame through natural biological processes.

- The existing 1-horsepower exterior SVE blower will be replaced with a 3-horsepower blower to increase the system capacity to accommodate the two new boiler room SVE wells and the 5 new oil rupture are SVE lines proposed above.

At this time the SVE pilot tests have been completed for the two new wells located in the boiler room and the five lines located in the oil line rupture and former UST area and the results are included as Attachment 1. Attachment 1 also provides a consolidated summary of a number of previous work plans and pilot test that are germane to this request. Prior to operating the proposed temporary dredged soil SVE system, an air sample will be collected and the air emission control system (granular activated carbon) will be registered with the Rhode Island Department of Environmental Management's Office of Air Resources. Our schedule for completing the above proposed modifications is as follows.

1. As the new boiler room SVE wells are complete, operation can begin immediately upon approval. The air sparge well has been installed and will be connected to the air supply upon approval.
2. Complete the air registration and system construction for the temporary dredged soils stockpile system and begin operation of the system following additional soil testing.
3. At the completion of the dredged soils remediation the 3-horsepower blower and controls will be removed from the trailer and used to replace the existing 1-horsepower blower for the exterior SVE system. As the additional existing exterior system components, including the carbon vessels, were sized to accommodate a 3-horsepower blower, no other modifications will be necessary.

4. After the exterior blower has been changed, the five new exterior vent lines will be activated. The three new air sparge wells will be installed and connected to the existing system concurrent with installation of the remedial system for the former Lagoon 5 chlorinated solvent contamination, if needed. As the compressor is a large variable frequency drive compressor that formerly supplied the industrial building, no changes to the air compressor will be necessary to accommodate these additional air-sparge wells.

If you have any questions please call Stephen Andrus or Edward Summerly at (401) 421-4140. We will await your approval prior to implementing these above proposed SVE system expansions and modifications.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Stephen M. Andrus, P.E.
Assistant Project Manager

Albert I. Flori
Consultant/Reviewer

Edward A. Summerly, P.G.
Principal

EAS:mac

cc: Tracy Nelson Hay, Richmond Town Hall
Clark Memorial Library - Charbert Repository

Attachments: Figures 1 and 2
Pilot Tests Report Letter

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FIGURES

LEGEND

- 200 FT. RIVER BANK BUFFER
- 50 FT. WETLAND BUFFER
- SS — SEWER LINE
- IWW — INDUSTRIAL WASTEWATER LINE
- E — UNDERGROUND ELECTRICAL LINE
- D — STORM WATER DRAINAGE LINE
- OIL — OIL LINE
- SFM — EXISTING SEWER FORCE MAIN
- OHU — OVERHEAD UTILITY
- PIV — POST INDICATOR VALVE
- HYD — FIRE HYDRANT
- UTILITY POLE
- CHAIN LINK FENCE
- 60 — EXISTING SURFACE CONTOURS
- APPROX. 100 YEAR FLOOD LEVEL
- EDGE OF RIVER

- DB-5 — 2007 DIFFUSION BAG MONITORING LOCATION
- DB-5 — 2008 DIFFUSION BAG MONITORING LOCATION
- GZ — GZA MONITORING WELL
- GZ-ML — GZA MULTI-LEVEL MONITORING WELL
- GP — GZA GEOPROBE
- EW — EXTRACTION (PRODUCTION) WELL
- CB — CLAYTON TEMPORARY WELL
- RIZ — RIZZO MONITORING WELL
- SW — SURFACE WATER MONITORING STATION
- GP-103 — GZA GEOPROBE PERFORMED JANUARY 2009
- GP-39 — GZA GEOPROBE PERFORMED OCTOBER 2005
- WR-1 01-30-09 — GZA SURFACE WATER SAMPLING LOCATION

GZA

WOOD RIVER

FORMER (LAGOON 5)

LAGOON 5 SHELF 01-30-09

LAG 5 CHNL 01-30-09

SLUICEWAY 12-30-08

PASSIVE PETROLEUM COLLECTION SUMP

MH

HYD

PIV

PIV W/BALLARDS

SANITARY SEWER CLEANOUT

OLD RACEWAY

OLD WELL POINT TOP ELEV: 51.46'

LOCATION OF FORMER NON-CONTACT COOLING WATER TANK

LOCATION OF BLOWERS, AIR DRYERS AND CARBON DRUMS FOR INTERIOR AND EXTERIOR SOIL VAPOR EXTRACTION SYSTEMS AND AIR COMPRESSOR FOR INTERIOR AND EXTERIOR SPARGE SYSTEMS

APPROXIMATE LOCATION OF PCE HOLDING TANK USED FOR DRY CLEANING PERFORMED ON SITE FROM CIRCA 1980 TO 1987

PREVIOUS OIL TRANSFER PUMP AND CONCRETE PAD

PROPOSED EXTERIOR SVE EXPANSION CONTROL BOX AND VENT LINES

FORMER UST AREA

2,000 POUND CARBON VESSEL

GRAVEL PARKING LOT

CURRENT OIL TRANSFER PAD

FENCED STORAGE AREA

PUMP REMOVED, STEEL CAP WELDED ON TOP OF CASING

TEMPORARY SVE TRAILER

TEMPORARY DEWATERING TANK

CHARBERT MILL BUILDING

LOCATION OF FORMER PROCESS WATER HOLDING TANKS

WELL HAS BEEN CLOSED CASING FILLED WITH GROUT AND CUT 4-FEET BELOW GROUND SURFACE

4-INCH PERFORATED SCH-40 PVC VAPOR EXTRACTION LINES FOR TEMPORARY DREDGE STOCKPILE REMEDIATION

NECO-4-3

U/P 1652

U/P 3435

U/P 5

OHU

GENERAL NOTES

1. BASE MAP DEVELOPED FROM ELECTRONIC CAD FILES PROVIDED BY AEROTECH INTERNATIONAL DIGITAL PHOTOGRAMMETRIC MAPPING DATED 12-01-04, DATE FLOWN MARCH 26, 1999. THE TOPOGRAPHY OF THE LAGOONS, THE 1998, 2001 AND 2004 SOIL STOCK PILES WERE UPDATED BY INSTRUMENT SURVEY CONDUCTED BY GZA PERSONNEL IN SEPTEMBER 2004 THROUGH FEBRUARY 2005.

2. THE LOCATIONS AND ELEVATIONS OF MONITORING WELLS AND EXPLORATIONS WERE APPROXIMATELY DETERMINED BY SURVEY. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

J:\ENV\32795.36.eas\CADD\32795.36_F-1-2.dwg [1] August 11, 2009 - 4:25pm stephen.andrus

REV. NO.	DESCRIPTION	BY	DATE

SCALE: 1" = 30'

0 15 30 60

GZA GeoEnvironmental, Inc.
Engineers and Scientists
539 BROADWAY
PROVIDENCE, RHODE ISLAND 02909
(401) 421-4140
(401) 751-4613

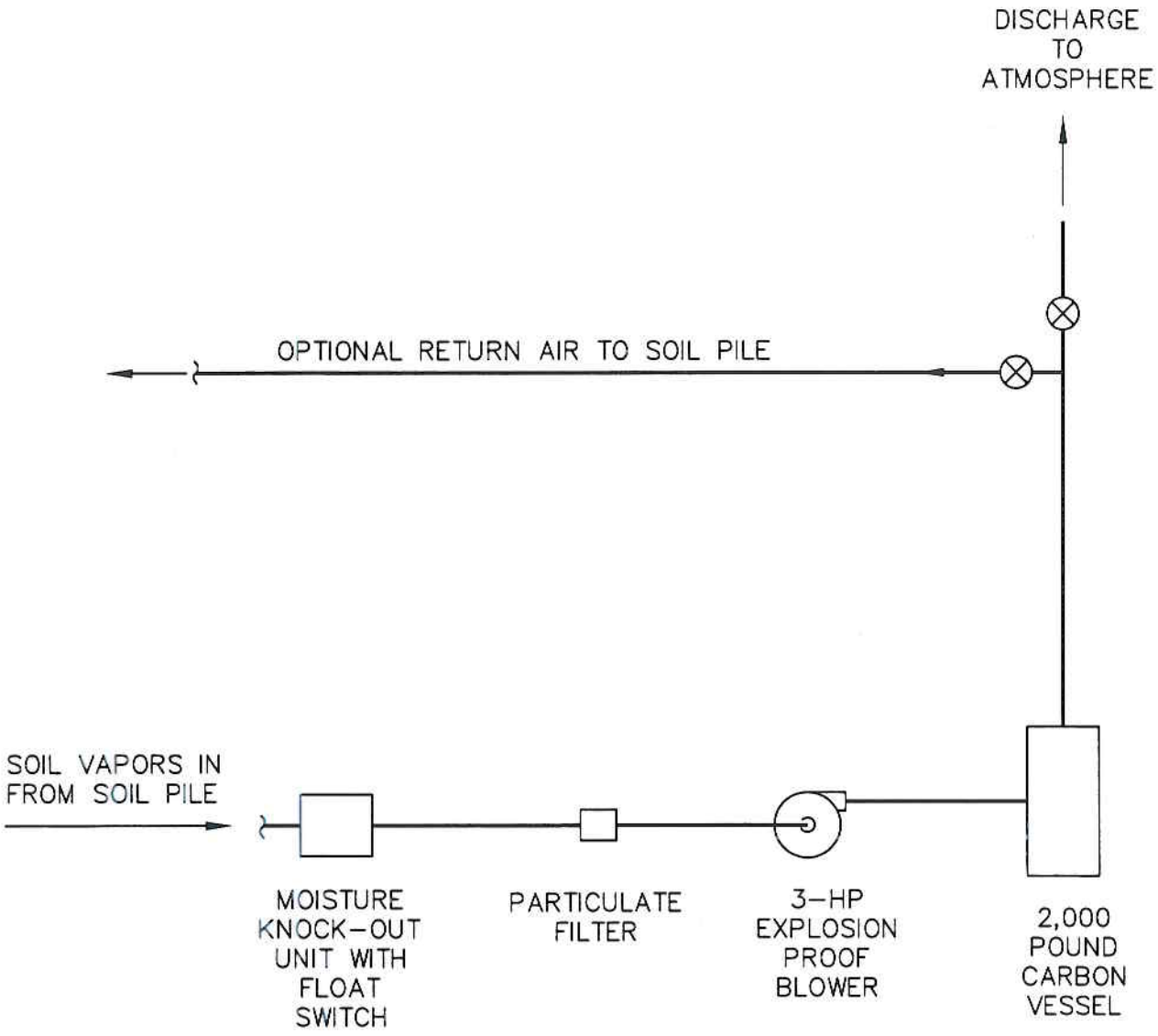
PROJ MGR: SMA
DESIGNED BY: SMA
REVIEWED BY: EAS
OPERATOR: SMA
CHECKED: TRC
DATE: AUG., 2009

CHARBERT FACILITY
ALTON, RHODE ISLAND

REQUEST FOR ORDER OF APPROVAL MODIFICATION
REMEDIAL SYSTEM LOCATIONS AND EXPLORATION LOCATION PLAN

PROJECT NO.
32795.36

FIGURE NO.
1



DRAFT COPY
NOT FOR CONSTRUCTION

NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
530 BROADWAY
PROVIDENCE, RHODE ISLAND 02909
(401) 421-4140

PREPARED FOR:
R.I.D.E.M
"ODER OF APPROVAL MODIFICATIONS"

CHARBERT FACILITY
ALTON, RHODE ISLAND

REQUEST FOR ORDER OF APPROVAL MODIFICATION
TEMPORARY TRAILER TREATMENT SYSTEM SCHEMATIC

FIGURE 2

PROJ MGR:	SMA	REVIEWED BY:	EAS	CHECKED BY:	DATE	PROJECT NO.	REVISION NO.	SHEET NO.
DESIGNED BY:	SMA	DRAWN BY:	CRB	SCALE: NOT TO SCALE	8-3-09	32795.36		2 OF 2

ATTACHMENT I

PILOT TEST AND REPORT LETTER

GZA
GeoEnvironmental, Inc.

Engineers and Scientists

August 12, 2009
File No. 32795.36-C

Mr. Gary Jablonski
Rhode Island Department of Environmental Management
Office of Waste Management
235 Promenade Street
Providence, Rhode Island 02908-5767

Re: Soil Vapor Extraction Pilot Test Results
Charbert, Division of NFA Corp.
Alton, Rhode Island

530 Broadway
Providence
Rhode Island
02909
401-421-4140
FAX 401-751-8613
www.gza.net

Dear Mr. Jablonski:

On behalf of Charbert, Division of NFA Corp, GZA GeoEnvironmental, Inc. (GZA) is pleased to provide you with this letter report to present the results of the soil vapor extraction pilot tests conducted in the boiler room and the in the oil line rupture area of the Charbert facility.

BOILER ROOM OIL LEAK BACKGROUND

As reported in GZA's March 20, 2009 *Boiler Room Oil Line Leak* notification letter, on or about December 2, 2008, the property manager of the Charbert facility noticed oil leaking from a cast iron oil line that supplies one of two boilers. The line was cast into the concrete floor of the boiler room circa 1960. The oil line was immediately turned off and the oil was drained from the line. A new oil line to the boiler was installed above the concrete floor and the normal boiler operation was resumed. The oil line to the second boiler runs above the concrete floor, having previously been replaced.

On January 5, 2009 GZA conducted soil exploration below the boiler room floor using a track mounted Geoprobe rig. Continuous soil samples were collected to a depth of 10-feet below the concrete floor and a number of monitoring/vent/sparge wells were installed. The 2-inch PVC wells in borings GP-114 and GP-116 (renamed SVE-31 and SVE-32, respectively) were installed to be used as soil vapor extraction (SVE) wells and the 2-inch PVC wells in GP-115 and GP-117 were installed for water quality monitoring and petroleum product recovery. A 1-inch well was installed in boring GP-118 to be used as a sparge well, if necessary. The monitoring and vent well locations are shown on Figure 1, attached.

Soil samples collected during soil explorations on January 5 were submitted for laboratory analysis of total petroleum hydrocarbons (TPH) via EPA Method 8100M and four of the samples contained TPH levels above the RIDEM industrial/commercial direct exposure

criteria (I/CDEC) limit of 2,500 mg/kg and one sample exceeded the lower range of the RIDEM residential direct exposure criteria (RDEC) of 500/1,000 mg/kg. GZA personnel were on site on January 6, 2009, to collect stabilized groundwater elevations. An oil/water interface probe was used to screen for floating (LNAPL) and sinking (DNAPL) non-aqueous phase liquid in the 2-inch wells. Floating product was detected in wells GZ-115 and GZ-116 and sheen was observed in well GZ-114. The floating product was removed with a disposable bailer and stored in a 55-gallon drum for off site disposal. Groundwater readings have been taken a total of seven times with the oil/water interface probe and the results are summarized in the table below:

Inches of Floating Product							
Date	01-06-09	01-08-09	01-09-09	01-14-09	01-16-09	01-19-09	02-23-09
Well ID							
GZ-114	Sheen	ND	ND	ND	ND	ND	ND
GZ-115	0.5	<0.01	<0.01	<0.01	ND	<0.01	ND
GZ-116	3.0	<0.01	<0.01	<0.01	ND	ND	ND
GZ-117	ND	ND	ND	ND	ND	ND	ND

ND = Not Detected

To evaluate the presence of volatile organic compounds beneath the boiler room, GZA collected groundwater samples for laboratory analysis from wells GZ-115, GZ-117 and GZ-118 on January 16, 2009. The samples were analyzed for VOCs via EPA Method 8260 and TPH via EPA Method 8100M. Of the three wells sampled there were no exceedances of the RIDEM GA Groundwater Standards for VOCs, the sample from GP-117 contained cis-1,2-dichloroethene at 40 µg/L, above the RIDEM preventative action limit (PAL) of 35 µg/L and TPH was detected in all three samples. The results of the soil and groundwater laboratory analysis have been summarized in the table below.

Location	Soil	Groundwater	
	TPH (mg/kg)	TVOCs (µg/L)	TPH (µg/L)
GP-114 S-2	2,900	NT	NT
GP-115 S-1	11,000	15	1,400
GP-116 S-1	9,600	NT	NT
GP-117 S-1	70	47	560
GP-117 S-2	70	NA	NA
GP-118 S-2	4,400	20	500

NT = Not Tested
NA = Not Applicable

OIL LINE RUPTURE AREA BACKGROUND

The remediation of the southern end of the oil line (which was inadvertently broken by the contractor during the installation of the piping to the new ISDS system in 2005) was conducted in accordance with GZA's August 22, 2008 *Old Lagoon 5 Remedial Work Plan* and in accordance with the procedures presented in the October 15, 2007 RAWP; Section 5.12 "Oil Line Rupture Area".

As reported in GZA's May 12, 2009 *Technical Memorandum #2*, on December 22, 2008 the area of the oil line was excavated and the soils segregated by using visual and olfactory evidence of petroleum contamination. The soils suspected of containing contaminates were loaded on a truck and placed in the lined containment berm for off-site disposal. Clean soils were stockpiled adjacent to the excavation for backfill. Approximately 10 cubic yards of clean soil and 10 cubic yards of contaminated soil were removed from the area. Based on visual evidence, the area of oil contamination appeared to be more extensive than initially delineated. The excavation was extended to the east and to the west across the northern end of the oil tank bunker and to the driveway located approximately 20 feet to the north to a depth of approximately 2-feet below the driveway elevation. The oil contamination appeared to extend under the oil tank bunker and the old fill station concrete pad. At that time the excavation was halted to further evaluate the extent of contamination. The exposed area was covered with 10-mil polyethylene sheeting to prevent stormwater infiltration.

On January 5, 2009 a track mounted geoprobe was brought to the site and a grid pattern of soil explorations was conducted in the vicinity of the oil tank bunker. A total of 13 explorations (GP-101 to 113) were conducted to a depth of 10 to 15-feet below the ground surface and sample tubes were opened and observed on-site for visual and olfactory evidence of petroleum contamination and field screened with a Thermo Environmental Instruments Model 580B photoionization detector with a 10.6 eV bulb. One sample was collected for laboratory analysis from each soil exploration just above the groundwater table. Three soil samples were also collected for laboratory analysis from the bottom of the excavation. The samples taken in the remedial excavation were taken 6 to 12-inches below the oil lines in the center of the excavation (BOT EX-1 and 2) and one approximately 2-feet under the oil bunker, approximately 1-foot below the oil line (CNTR BNKR). The soil exploration locations are shown on Figure 1, attached.

The laboratory analysis consisted of total petroleum hydrocarbons (TPH) via EPA Method 8100M. The samples collected from GP-104 and the CNTR BNKR area were also evaluated using Petroleum Hydrocarbon Fingerprint (PHCF) techniques to evaluate the type and approximate age of the oil release. The results of the geoprobe grid soil analysis did not detect any TPH levels above the RDEC limit of 500 mg/kg. Two of the samples taken from within the excavation did exceeded the I/CDEC of 2,500 for TPH with the sample CNTR BNKR at 3,700 mg/kg and the sample BOT EX-2 at 3,000 mg/kg. The fingerprint analysis of sample GP-104 S-2 estimated the oil was weathered fuel oil/diesel

or machine/cutting oil. The fingerprint analysis of sample CNTR BNKR indicated that the petroleum was #2 fuel oil/diesel and that weathering had occurred.

Based on these findings, on January 22, 2009, soil excavations resumed with the intent to excavate the oil contaminated soils within the open excavation that exceeded the I/CDEC for TPH and collect confirmatory samples.

The excavation was expanded to the groundwater table and to the north and south to the extents possible. Approximately 50 cubic yards of additional soil was removed. Excavation was limited in three directions: to the south the excavation was limited by the oil bunker foundation; to the west the excavation was limited by existing underground utilities including the active oil line and to the north excavation was limited by limited by a large concrete pad that was historically used as a fill pad for the petroleum distribution. The pad could not be removed with the 40-ton excavator used for the excavation. The excavation extended approximately 6.5 feet below the driveway grade with groundwater at approximately 5.0 feet below the driveway grade.

One confirmatory sample was collected from each of the sidewalls at 3 to 6 feet below the driveway grade for laboratory analysis. The excavation was backfilled with clean sand from the on-Site gravel borrow to the top of the existing oil lines. The remaining excavation was left open as Charbert had contracted with Eastern Piping to install a new double walled oil line from the oil bunker, under the driveway to the main building. The new line was installed and placed in service on February 26, 2009 and the old oil lines running under the driveway were cut, drained and capped in place.

Laboratory analysis results of the four sidewall samples have been summarized in the table below and the sample locations are shown on Figure 1. As shown in the summary table below, three of the four sidewall samples contained TPH at levels that exceed RIDEM's I/CDEC and require alternative remedial methods due to the obstructions discussed above.

OIL LINE SOIL TPH ANALYSIS SUMMARY					
	UNITS	South SW 3-6ft. BGS	West SW 3-6ft. BGS	East SW 3-6ft. BGS	North SW 3-6ft. BGS
		01/22/2009	01/22/2009	01/22/2009	01/22/2009
Hydrocarbon Content	mg/kg	7,300	5,800	48	14,000

In accordance with GZA's January 9, 2006 *Supplemental Site Investigation Report*, remediation of contaminants in the area of the former underground storage tanks (UST) were to be conducted concurrent with the oil line rupture remediation work. Geoprobes conducted in October of 2005 showed three samples (GP-39, 40 and 45) which had detectable levels of tetrachloroethene that were below RIDEM's RDEC, but exceeded the GA-Leachability criterion and one sample that contained TPH above the RDEC. The sample taken from GP-40 contained 1,500 mg/kg of TPH. The October 2005 Geoprobe locations are shown on Figure A-1.

BOILER ROOM SOIL VAPOR EXTRACTION PILOT TEST

The testing to date indicates that petroleum contamination is present below the boiler room and this contamination is believed to exist primarily above the water table, which has been observed to fluctuate approximately 2 to 4 feet in this area on a seasonal basis.

As proposed in the March 20, 2009 oil leak notification letter, GZA conducted a SVE Pilot Test within the boiler room area on May 14, 2009. The pilot test area with soil vapor extraction wells and monitoring points are shown on the attached Figure 1. The objective of the pilot test was to evaluate the effectiveness of the SVE technology, and estimate the approximate radius of influence for a soil vent system to address the identified contaminants.

The pilot tests provided data on the flow rates and the areas of influence of individual vacuum extraction/vent wells. We interpret this information to mean:

-1- SVE Vacuum, Flow and Radius of Influence: The SVE test well area within the boiler room (SVE-31 and 32) yielded soil vapor flows of 5 to 28 standard cubic feet per minute (scfm) at applied vacuums of 2 to 30 inches of water (W.C.).

-2- The existing exterior system operates at a total flow of approximately 75 scfm or an average of 5.3 per well. With the addition of the two new wells and no system modifications the average operating flow per well will be approximately 4.7 scfm.

-3- A vacuum response of approximately 0.01 inch W.C. is estimated to have occurred at radial distances of approximately 20 to 25 feet at the average system operating flow of 4.5 to 5 scfm per well.

-4- The results of the boiler room pilot test are consistent with the data collected by GZA during previous SVE pilot test.

Refer to Attachment A for copies of the boiler room vent pilot test and radius of influence data.

This testing confirms that the two new vent wells in the boiler room can address the entire boiler room area at flow rates achievable with the existing exterior SVE system blower and air quality controls. The soil vapor extraction will reduce the total petroleum hydrocarbon concentrations in the unsaturated zone primarily through the process of bio-venting. That is, the increased air circulation will create an aerobic environment resulting in an increase in the population of indigenous micro-flora that are already acclimated to using the petroleum as a food source. We are not proposing air sparging at this time because we do not believe there is a submerged contaminant source within the boiler room area, but if future monitoring suggest otherwise, we will petition RIDEM to permit the activation of the sparge well (GP-118).

OIL LINE RUPTURE AREA SOIL VAPOR EXTRACTION PILOT TEST

The testing to date indicates that petroleum contamination is present in the soils in the area of the oil line rupture and the area of the former USTs and this contamination is believed to exist primarily above the water table, which has been observed to fluctuate approximately 3 to 5 feet in this area on a seasonal basis.

As proposed in the May 12, 2009 *Technical Memorandum #2*, GZA conducted a SVE Pilot Test in this area on May 14, 2009. The pilot test area with soil vapor extraction lines and monitoring points are shown on Figure 1. The objective of the pilot test was to evaluate the effectiveness of the SVE technology, and estimate the approximate radius of influence for a soil vent system to address the identified contaminants.

The pilot tests provided data on the flow rates and the areas of influence of individual vacuum extraction/vent wells. We interpret this information to mean:

-1- SVE Vacuum, Flow and Radius of Influence: The SVE test well area within the oil line rupture and former UST area (SVE-33 through 37) yielded soil vapor flows of 9 to 31 standard cubic feet per minute (scfm) at applied vacuums of 2.4 to 21 inches of water (W.C.).

-2- The existing exterior system operates at a total flow of approximately 75 scfm or an average of 5.3 per well for the existing 14 wells. By increasing the blower size to 3 horsepower we anticipate a total system flow of 150 scfm. With the proposed modification of the two new boiler room wells and the 5 new oil line rupture SVE lines the anticipated average operating flow per well for the 21 wells will be approximately 7.1 scfm.

-3- A vacuum response of approximately 0.02 inch W.C. is estimated to have occurred at a radial distances of approximately 35 to 40 feet at the average system operating flow of 18 scfm per well.

-4- The results of the oil line rupture area pilot test are consistent with the data collected by GZA during previous SVE pilot test.

Refer to Attachment B copies of the oil line rupture area vent pilot test and radius of influence data.

This testing confirms that the five new vent wells in the oil line rupture and former UST area can address the entire area at flow rates achievable with the modified exterior SVE system blower and existing air quality controls. The soil vapor extraction will reduce the total petroleum hydrocarbon concentrations in the unsaturated zone primarily through the process of bio-venting. That is, the increased air circulation will create an aerobic environment resulting in an increase in the population of indigenous micro-flora that are already acclimated to using the petroleum as a food source. We are not proposing air sparging at this time because we do not believe there is a submerged contaminant source within the boiler room area. If future monitoring suggest otherwise, we will petition RIDEM to permit the installation of sparge wells.

We trust that this information fulfills your present needs. If you have any questions please call Stephen Andrus or Edward Summerly at (401)-421-4140.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Stephen M. Andrus, P.E.
Assistant Project Manager

Albert I. Flori
Consultant/Reviewer

Edward A. Summerly, P.G.
Principal

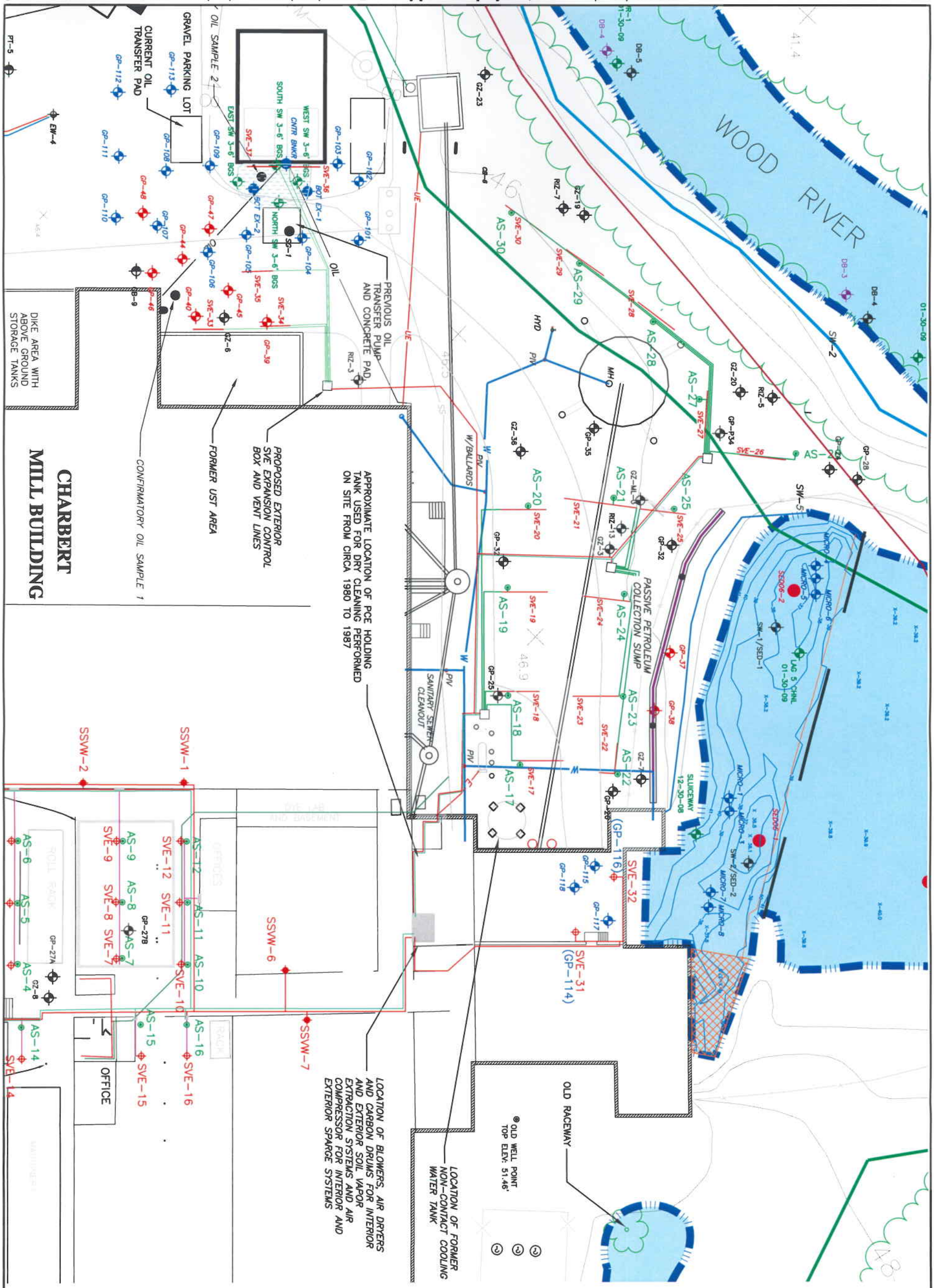
EAS:mac

cc: Tracy Nelson Hay, Richmond Town Hall
Clark Memorial Library - Charbert Repository

Attachments: Figure 1: Pilot Test Well Locations
Attachment A: Boiler Room Pilot Test Data Tables
Attachment B: Oil Line Rupture and Former UST Area Pilot Test Data Tables

J:\ENV\32795.36.EAS\ORDER OF APPROV MOD\PILOT TEST\32795-36 PILOT TEST SUM.DOC

FIGURES



CHARBERT
MILL BUILDING

REV. NO.	DESCRIPTION	BY	DATE

CHARBERT FACILITY
ALTON, RHODE ISLAND

PILOT TESTS LOCATION AND EXPLORATION LOCATION PLAN

1 INCH = 30 FEET

0 15 30 60

PROJ MGR: SMA
DESIGNED BY: SMA
REVIEWED BY: EAS

OPERATOR: DL
DATE: AUG., 2009

JOB NO. 32795.36

FIGURE NO. 1

GZA
GeoEnvironmental, Inc.
Engineers and Scientists
530 BROADWAY
PROVIDENCE, RI 02909
(401) 421–4140
(401) 751–8613

ATTACHMENT A

BOILER ROOM PILOT TEST DATA TABLES

Boiler Room Soil Vent System Pilot Test
SVE-31 and SVE-32
May 14, 2009

Charbert Facility
Alton, Rhode Island

Orifice

Serial # 6889
Pipe I.D. = 1.939
Bore = 0.9811

Orifice Equation

Qscfm = (K1*d^2*K2*Y*SQRhw*SGRdensity of fluid)/0.0764

AP - Applied Pressure
Line pressure = 14.7 + AP(psig)

SVE-31
Date: May 14, 2009

Applied Vacuum (inch of H_2O)	Line Pressure (psig)	hw (inches of H2O)	Q (scfm)
2	14.6	0.3	7.22
4.2	14.5	0.9	12.47
7.5	14.4	1.8	17.55
11	14.3	3.2	23.27
18	14.0	4.7	27.91

SVE-32
Date: May 14, 2009

Applied Vacuum (inch of H_2O)	Line Pressure (psig)	hw (inches of H2O)	Q (scfm)
5	14.5	0.1	4.74
11	14.3	0.4	8.14
20	14.0	0.9	12.22
30	13.6	1.9	17.51

Boiler Room Soil Vent System Pilot Test
May 14, 2009

Charbert Facility
Alton, Rhode Island

Date	Well I.D.	Time	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)	TVOC (ppmv)	O_2 %	CO_2 %	LEL %	CH_4 %	Notes
5/14/2009	SVE-31	10:40	18.0	4.4	-	-	-	-	-	-	SVE Start-up
		11:10	18.0	4.7	27.9	4	20.8	0.2	1	0.1	
		11:20	11.0	3.2	-	-	-	-	-	-	
		11:35	11.0	3.2	23.3	3.5	20.5	0.2	2	0.2	
		11:40	7.5	1.8	-	-	-	-	-	-	
		11:55	7.5	1.8	17.5	4.5	20.6	0.1	1	0.1	
		12:00	4.2	0.9	12.5	6	20.6	0.1	1	0.1	
		12:15	2.0	0.3	7.2	9	20.6	0.1	1	0.1	

Date	Well I.D.	Time	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)	TVOC (ppmv)	O_2 %	CO_2 %	LEL %	CH_4 %	Notes
5/14/2009	SVE-32	12:15	30.0	1.9	-	-	-	-	-	-	SVE Start-up
		12:45	30.0	1.9	17.5	2.5	20.8	0.6	0	0.0	
		12:50	20.0	0.9	-	-	-	-	-	-	
		13:05	20.0	0.9	12.2	3.6	20.8	0.5	0	0.0	
		13:08	11.0	0.4	-	-	-	-	-	-	
		13:18	11.0	0.4	8.1	6	20.8	0.5	0	0.0	
		13:20	5.2	0.1	-	-	-	-	-	-	
		13:30	5.0	0.1	4.7	7	20.6	0.5	0	0.0	

Note: 1. Air Flow measurements made through Oriface # 6889.

SVE-31
Boiler Room Radius of Influence Data
May 14, 2009

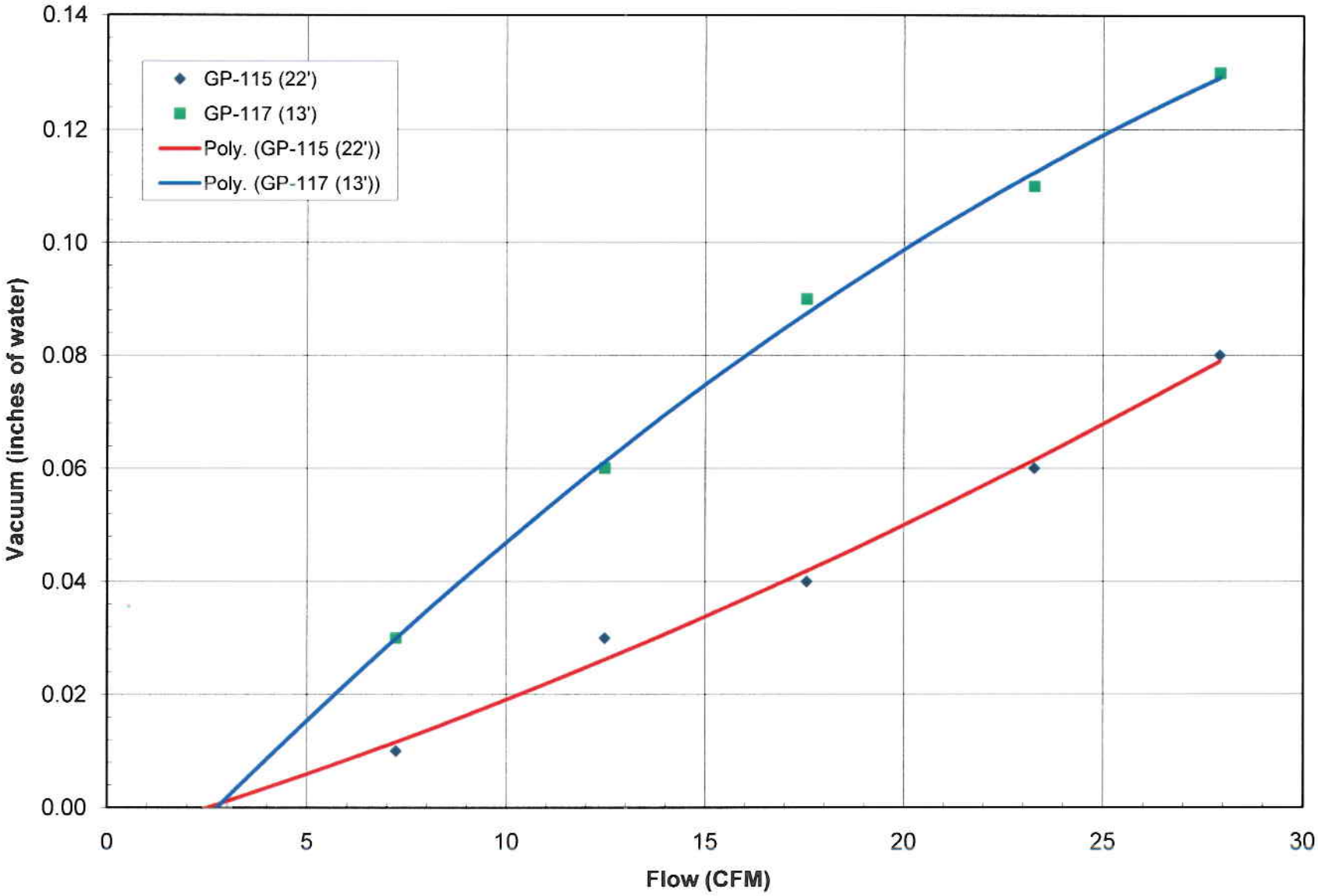
Charbert Facility
Alton, Rhode Island

Soil Gas Points				SVE Pilot Test		
Vent Well Operating	Well I.D.	Distance From Vent Well (ft)	Vacuum (inches of H2O)	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)
SVE-31	GP-115	22	0.08	18.0	4.7	27.9
@ 11:10	GP-117	13	0.13			
SVE-31	GP-115	22	0.06	11.0	3.2	23.3
@ 11:35	GP-117	13	0.11			
SVE-31	GP-115	22	0.04	7.5	1.8	17.5
@ 11:55	GP-117	13	0.09			
SVE-31	GP-115	22	0.03	4.2	0.9	12.5
@ 12:00	GP-117	13	0.06			
SVE-31	GP-115	22	0.01	2.0	0.3	7.2
@ 12:10	GP-117	13	0.06			

Soil Gas Points				SVE Pilot Test		
Vent Well Operating	Well I.D.	Distance From Vent Well (ft)	Vacuum (inches of H2O)	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)
SVE-32	GP-115	9	0.75	30.0	1.9	17.5
@ 12:45	GP-117	15	0.70			
SVE-32	GP-115	9	0.56	20.0	0.9	12.2
@ 13:05	GP-117	15	0.60			
SVE-32	GP-115	9	0.30	11.0	0.4	8.1
@ 13:18	GP-117	15	0.20			
SVE-32	GP-115	9	0.15	5.0	0.1	4.7
@ 13:30	GP-117	15	0.10			

Radius of Influence for SVE-31

Charbert Facility
Alton, Rhode Island



ATTACHMENT B

OIL LINE RUPTURE AND FORMER UST
AREA PILOT TEST DATA TABLES

Oil Line Rupture Area Soil Vent System Pilot Test
SVE-33 Through SVE-37
May 14, 2009

Charbert Facility
Alton, Rhode Island

Orifice

Serial # 6889
Pipe I.D. = 1.939
Bore = 0.9811

Orifice Equation

Qscfm = (K1*d^2*K2*Y*SQRhw*SGRdensity of fluid)/0.0764

AP - Applied Pressure
Line pressure = 14.7 + AP(psig)

SVE-33

Applied Vacuum (inch of H_2O)	Line Pressure (psig)	hw (inches of H2O)	Q (scfm)
2.4	14.6	0.5	9.32
4.2	14.5	1.2	14.39
4.4	14.5	1.2	14.39
9	14.4	3.3	23.69
14	14.2	5.6	30.60

SVE-34

Applied Vacuum (inch of H_2O)	Line Pressure (psig)	hw (inches of H2O)	Q (scfm)
2.4	14.6	0.6	10.21
6	14.5	2.0	18.53
12	14.3	5.5	30.41

SVE-35

Applied Vacuum (inch of H_2O)	Line Pressure (psig)	hw (inches of H2O)	Q (scfm)
6	14.5	0.5	9.28
16	14.1	2.1	18.75
21	13.9	4.1	25.98

Oil Line Rupture Area Soil Vent System Pilot Test
SVE-33 Through SVE-37
May 14, 2009

Charbert Facility
Alton, Rhode Island

Orifice

Serial # 6889
Pipe I.D. = 1.939
Bore = 0.9811

Orifice Equation

Qscfm = (K1*d^2*K2*Y*SQRhw*SGRdensity of fluid)/0.0764

AP - Applied Pressure
Line pressure = 14.7 + AP(psig)

SVE-36

Applied Vacuum (inch of H_2O)	Line Pressure (psig)	hw (inches of H2O)	Q (scfm)
2.8	14.6	0.7	10.62
5	14.5	1.6	16.60
16	14.1	5.5	30.25

SVE-37

Applied Vacuum (inch of H_2O)	Line Pressure (psig)	hw (inches of H2O)	Q (scfm)
2.2	14.6	0.6	10.21
5.5	14.5	2.0	18.54
14	14.2	6.0	31.67

Oil Line Rupture Area Soil Vent System Pilot Test

May 14, 2009

Charbert Facility
Alton, Rhode Island

Date	Well I.D.	Time	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)	TVOC (ppmv)	O_2 %	CO_2 %	LEL %	CH_4 %	Notes
5/14/2009	SVE-33	13:55	14.0	5.6	30.6	-	-	-	-	-	SVE Start-up
		14:30	14.0	5.6	30.6	11	19.2	1.6	1	0.1	
		14:40	9.0	3.3	23.7	10	19.1	1.5	0	0	
		14:55	4.4	1.2	14.4	-	-	-	-	-	
		15:10	4.2	1.2	14.4	12	19.8	1.0	0	0	
		15:22	2.4	0.5	9.3	16	19.7	1.1	1	0.1	

Date	Well I.D.	Time	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)	TVOC (ppmv)	O_2 %	CO_2 %	LEL %	CH_4 %	Notes
5/14/2009	SVE-34	15:30	12.0	5.5	30.4	-	-	-	-	-	SVE Start-up
		16:00	12.0	5.5	30.4	6	19.9	1.2	1	0.1	
		16:05	6.0	2	18.5	8	20.7	0.7	1	0.1	
		16:15	2.4	0.6	10.2	11	20.2	1.1	1	0.1	

Date	Well I.D.	Time	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)	TVOC (ppmv)	O_2 %	CO_2 %	LEL %	CH_4 %	Notes
5/14/2009	SVE-35	16:15	21.0	4.1	26.0	-	-	-	-	-	SVE Start-up
		16:45	21.0	4.1	26.0	4	19.1	1.2	1	0.1	
		16:50	16.0	2.1	18.8	4	20.2	0.9	0	0	
		17:00	6.0	0.5	9.3	6	20.2	0.9	0	0.0	

Date	Well I.D.	Time	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)	TVOC (ppmv)	O_2 %	CO_2 %	LEL %	CH_4 %	Notes
5/14/2009	SVE-36	17:05	16.0	5.5	30.3	-	-	-	-	-	SVE Start-up
		17:35	16.0	5.5	30.3	15	20.4	0.9	1	0.1	
		17:45	5.0	1.6	16.6	12	20.4	0.9	1	0.1	
		17:50	2.8	0.7	10.6	10	20.3	0.9	1	0.1	

Date	Well I.D.	Time	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)	TVOC (ppmv)	O_2 %	CO_2 %	LEL %	CH_4 %	Notes
5/14/2009	SVE-37	17:55	14.0	6.0	31.7	-	-	-	-	-	SVE Start-up
		18:20	14.0	6	31.7	12	20.6	0.2	1	0.1	
		18:30	5.5	2	18.5	12	20.9	0.2	1	0.1	
		18:40	2.2	0.6	10.2	10	20.8	0.4	1	0.1	

Note: 1. Air Flow measurements made through Oriface # 6889.

SVE-33 TO SVE-35
Oil Line Rupture Area Soil Vent System Pilot Test
May 14, 2009

Charbert Facility
Alton, Rhode Island

Soil Gas Points				SVE Pilot Test		
Vent Well Operating	Well I.D.	Distance From Vent Well (ft)	Vacuum (inches of H2O)	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)
SVE-33 @ 14:30	CB-9	29	0.32	14.0	5.6	30.6
SVE-33 @ 14:40	CB-9	29	0.16	9.0	3.3	23.7
SVE-33 @ 15:10	CB-9	29	0.25	4.2	1.2	14.4
SVE-33 @ 15:22	CB-9	29	0.32	2.4	0.5	9.3

Soil Gas Points				SVE Pilot Test		
Vent Well Operating	Well I.D.	Distance From Vent Well (ft)	Vacuum (inches of H2O)	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)
SVE-34 @ 16:00	CB-9	45	0.15	12.0	5.5	30.4
SVE-34 @ 16:05	CB-9	45	0.02	6.0	2.0	18.5
	SG-1	30	0.02			

Soil Gas Points				SVE Pilot Test		
Vent Well Operating	Well I.D.	Distance From Vent Well (ft)	Vacuum (inches of H2O)	Vacuum (inches of H2O)	Vacuum Diff. (inches of H2O)	Flow (CFM)
SVE-35 @ 16:45	CB-9	34	0.06	21.0	4.1	26.0
	SG-1	14	0.04			
SVE-35 @ 16:50	CB-9	34	0.20	16.0	2.1	18.8
	SG-1	14	0.20			

Flow Curve for SVE-33 TOSVE-37

Charbert Facility
Alton, Rhode Island