GZA
GeoEnvironmental, Inc.

Engineers and Scientists

June 19, 2009
File No. 32795.16-C

Ms. Joan Taylor
Rhode Island Department of Environmental Management
Office of Waste Management
235 Promenade Street
Providence, Rhode Island 02908-5767

Re: Boiler Room Pilot Test
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 Ms. Taylor:

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 test conducted in the boiler room of the Charbert facility. As reported in GZA's March 20, 2009 *Boiler Room Oil Line Leak* notification letter, on or about December 2, 2008, the property manger 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.

BACKGROUND

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	<0.01	ND	ND	ND	ND	ND	ND
GZ-115	0.5	<0.01	<0.01	<0.01	0.0	<0.01	0.0
GZ-116	3.0	<0.01	<0.01	<0.01	0.0	0.0	0.0
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

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 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, 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 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. If future monitoring suggest otherwise, we will petition RIDEM to permit the activation of the sparge well (GP-118).

At this time we request the December 18, 2007 Order of Approval for the existing soil vapor extraction system be revise to allow for the operation of the two additional wells in the boiler room. These new wells will be included in the existing monthly monitoring program and the results will be included in the quarterly Interim Compliance Monitoring Program reports. We will await your approval prior to activating the boiler room SVE system. 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
Assistant Project Manager

Albert I. Flori
Consultant/Reviewer

Edward A. Summerly, P.G.
Principal

EAS:mac

cc: Cynthia Gianfrancesco, RIDEM-OWM
Tracy Nelson Hay, Richmond Town Hall
Clark Memorial Library - Charbert Repository

FIGURES

LEGEND

- 200 FT. RIVER BANK BUFFER
- 50 FT. WETLAND BUFFER
- SEWER LINE
- INDUSTRIAL WASTEWATER LINE
- UNDERGROUND ELECTRICAL LINE
- STORM WATER DRAINAGE LINE
- OIL LINE
- EXISTING SEWER FORCE MAIN
- OVERHEAD UTILITY
- POST INDICATOR VALVE
- FIRE HYDRANT
- UTILITY POLE
- CHAIN LINK FENCE
- EXISTING SURFACE CONTOURS
- APPROX. 100 YEAR FLOOD LEVEL
- EDGE OF RIVER
- INFERRED GROUNDWATER FLOW DIRECTION
- DB-5 — 2007 DIFFUSION BAG MONITORING LOCATION
- 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-101 — GZA GEOPROBE PERFORMED JANUARY 2009
- GP-39 — GZA GEOPROBE PERFORMED OCTOBER 2005
- WR-1 01-30-09 — GZA SAMPLING LOCATION JANUARY 2009

N

GP-28, RIZ-5, GZ-20, GP-P34, SVE-26, AS-26, SVE-27, AS-27, SVE-28, SVE-29, AS-29, SVE-30, AS-30, DB-5, WR-1 01-30-09, DB-4, GZ-19, RIZ-7, DB-6, GZ-23, HYD, PIV, MH, GP-35, GZ-36, GZ-ML-3, RIZ-13, GZ-3, GP-32, SVE-25, AS-25, SVE-24, SVE-21, AS-24, AS-23, SVE-22, SVE-23, GP-37, GP-38, GZ-7, GP-26, SVE-20, AS-20, SVE-19, AS-19, GP-33, SVE-18, AS-18, GP-25, SVE-17, AS-17, W, PIV W/BALLARDS, SANITARY SEWER CLEANOUT, PIV, W, PIV, UE, UE

MICRO-4, MICRO-6, MICRO-5, SED06-2, LAG 5 CHNL 01-30-09, SW-1/SED-1, SED06-1, MICRO-1, MICRO-3, SW-2/SED-2, MICRO-7, MICRO-8, SLUICEWAY 12-30-08

PASSIVE PETROLEUM COLLECTION SUMP

20-FOOT RADIUS OF INFLUENCE

OLD RACEWAY

OLD WELL POINT TOP ELEV: 51.46'

SVE-32, GP-117, GP-115, GP-118, SVE-31

BOILER ROOM

WATER TANK, BOILER, BOILER

APPROXIMATE LOCATION OF OIL LINE LEAK

INDUSTRIAL WASTE PUMP HOUSE

PREVIOUS OIL TRANSFER PUMP AND CONCRETE PAD

APPROXIMATE LOCATION OF PCE HOLDING TANK CIRCA 1980 TO 1988

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

GZ-21, GZ-22, GP-102, GP-101, RIZ-3, GP-103, OIL, BOT EX-1, GP-104, WEST SW 3-6' BGS, CNTR BNKR, SOUTH SW 3-6' BGS, NORTH SW 3-6' BGS, SCT EX-2, GP-105, EAST SW 3-6' BGS, GP-109, GP-106, GP-47, GP-45, GZ-6, GP-39, GP-40, GP-44, GP-113, GP-108, GP-107, GP-46, B-9, GP-48, GP-112, GP-111, GP-110

OIL BUNKER WITH 2-10,000 GALLON FUEL OIL TANKS

APPROXIMATE AREA OF OIL CONTAMINATED SOILS THAT WERE REMOVED TO THE GROUNDWATER TABLE

CURRENT OIL TRANSFER PAD

EDGE OF GRAVEL PARKING LOT

FENCED STORAGE AREA

EW-4, PT-5

DYE LAB AND BASEMENT

OFFICES

SSVW-7, SSVW-6, SSVW-1, SVE-12, SVE-11

0 15 30 60 120

SCALE IN FEET 1" = 30'

CHARBERT MILL BUILDING

NO.	ISSUE/DESCRIPTION	BY	DATE
1	ADDED BOILER ROOM SVE WELLS	SMA	05/18/09

CHARBERT FACILITY

ALTON, RHODE ISLAND

BOILER ROOM OIL LINE LEAK EXPLORATION LOCATION SITE PLAN

APPROVED:

PREPARED BY:		PREPARED FOR:		
GZA GeoEnvironmental, Inc. Engineers and Scientists, 530 BROADWAY, PROVIDENCE, RHODE ISLAND 02909, (401) 421-4140				
PROJ. MGR: SMA	REVIEWED BY: TRG	CHECKED BY: EAS	FIGURE	
DESIGNED BY: SMA	DRAWN BY: SMA	SCALE: 1" = 30'	1	
DATE: FEB., 2009	PROJECT NO: 32795.16	REVISION NO: 1	SHEET NO: 1 OF 1	

ATTACHMENT A

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-31	GP-115	9	0.56	20.0	0.9	12.2
@ 13:05	GP-117	15	0.60			
SVE-31	GP-115	9	0.30	11.0	0.4	8.1
@ 13:18	GP-117	15	0.20			
SVE-31	GP-115	9	0.15	5.0	0.1	4.7
@ 13:30	GP-117	15	0.10			

Flow Curve for SVE-31 and SVE-32

Charbert Facility
Alton, Rhode Island