

April 28, 2006
File No. 32795.11-C

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



Re: Additional Sediment Sampling
Supplemental Site Investigation Report
Charbert, Division of NFA
Alton, Rhode Island

140 Broadway
Providence
Rhode Island
02903
401-421-4140
Fax: 401-751-8613
www.gza.com

Dear Ms. Taylor:

GZA GeoEnvironmental, Inc. (GZA) is pleased to provide you with this *Additional Sediment Sampling Report* as part of the *Supplemental Site Investigation Report* for the above-referenced Site. This report serves as an addendum to our original June 2, 2005 *Site Investigation Report* (SIR) and as such, is subject to the Limitations referenced therein. This report presents our findings related to the supplemental work recommended by GZA and requested by the Department and integrates these new findings into our overall understanding of Site conditions and remedial requirements.

BACKGROUND

During a conference call on February 9, 2006, that involved representatives from Charbert, RIDEM and GZA, it was agreed that additional sediment sampling in Former Lagoon 5 was necessary to better characterize and evaluate the extent of previously observed sediment contamination. RIDEM requested a time schedule for the sampling and reporting of the findings which Charbert agreed to. RIDEM provided written confirmation of the verbal consensus of the conference call and comments to the *Supplemental Site Investigation Report* on February 13, 2006. GZA, on behalf of Charbert, would perform additional sediment sampling and analysis in Former Lagoon 5 as proposed in the January 9, 2006 *Supplemental Site Investigation Report* within 30 days and submit a letter report of findings to RIDEM within 60 days. The scope of work was to be implemented and reported as the final submittal for the supplemental studies in conjunction with the June 2, 2005 SIR.

SCOPE OF WORK

GZA had recommended in the January 9, 2006 *Supplemental Site Investigation Report* that additional sediment sampling be conducted using a subsurface coring method. The objective of the sediment coring was to assess both the lateral and vertical extent of the contamination to be delineated. The analysis would focus on total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAHs) and metals assessment as these were the only contaminants of concern identified during the initial sediment sampling effort conducted on October 26, 2005. Four locations were selected to evaluate contaminant concentrations with depth: SED-1 and SED-2 were to be resampled as the initial samples were surficial; plus two additional locations on the west side of the sluiceway channel were chosen to provide better areal coverage of the lagoon sediments. The field work would be completed in general accordance with the procedures outlined in GZA's December 22, 2004 *Site Investigation Work Plan*.

The following sections discuss the field study, analytical results and observations for the additional sediment sampling with a comparison to appropriate risk-based screening criteria and integration into the overall assessment of environmental conditions at the Site. This report is considered an addendum to the June 2, 2005 *Site Investigation Report*.

SAMPLE COLLECTION PROCEDURES AND FIELD OBSERVATIONS



The January 9, 2006 *Supplemental Site Investigation Report* identified sediment contamination consisting of TPH, PAHs and metals as shown on Table 1, in the eastern portion of the Former Lagoon 5, located west of the facility. On March 17, 2006, additional sediment samples from Former Lagoon 5 were collected from a boat with a hand operated sediment coring device. Samples were collected at the locations previously sampled (SED-1 and SED-2), and at two locations in the western portion of the former lagoon (SED06-3A and SED06-4A) on the west side of the sluiceway channel shown in photographs 1-4, attached. GZA attempted to collect sediment samples to a depth of 2-feet below the sediment surface, but was unable to retrieve samples from a depth greater than 0.5 feet below the sediment surface. The sediment in the western portion of the lagoon varied from 2 to 4 inches with sand beneath. The sand beneath the sediment was too loose to be captured in the coring device. In the sluiceway channel the sediment was approximately 4 inches deep with sand and cobbles beneath. The cobbles prevented deeper coring. All sampling locations are shown on Figure 1, attached.

Previous sampling and analysis had been performed for samples of a similar depth at locations SED-1 and SED-2, thus the samples collected at these two points were not analyzed. Field observations noted that the area where SED-1 and SED-2 were collected is the location of the former sluiceway that conveyed water from the facility's former electrical generator and process waste-water to the Wood River. This area, approximately 25-feet wide and extending from the facility along the eastern edge, is approximately 3 to 4 feet deeper than the western portion of the lagoon. While GZA was on site Charbert personnel located Polaroid photos taken in approximately 1978 that show the work performed to close Lagoon 5 after Lagoons 1 and 2 began operation. The photos reveal the pond bottom and the former sluiceway that lead from the facility to the Wood River. Selected photos are attached.

The samples from the two new locations, SED06-3A collected in the northwestern portion of the lagoon and SED06-4A collected in the southwestern portion of the lagoon, were submitted for laboratory analysis. For each sample two 8-ounce jars with a Teflon-lined lid were collected, labeled and place in an ice-filled cooler and transported to GZA's Environmental Chemistry Laboratory in Hopkinton, Massachusetts under chain-of-custody. Sediment sample analysis consisted of the following target analyte groups:

- Total Petroleum Hydrocarbons (TPH) with Fingerprint Analysis (EPA Method 8100M)
- Polyaromatic Hydrocarbons, (EPA Method 8270C),
- Total PP-13 Metals (EPA Method 6010B/7471A).

SAMPLE ANALYSIS RESULTS

The results of the March 17, 2006 and the October 26, 2005 laboratory analysis have been combined in Table 1, (attached) and compared to several risk-based sediment quality benchmarks. The NOAA threshold effects limit (TEL) appears to be the most complete and conservative set of benchmarks. The benchmarks were developed to protect sensitive aquatic organisms and were used as a "first pass

comparison” to the laboratory results. The New Jersey DEP sediment criteria Lowest Effects Level (LEL) are similar to the NOAA TEL criteria.

As previously reported, the sediment samples collected on October 26, 2005 contained seven metals and TPH, while one sample, SW-1 also contained three PAHs. Of the three PAHs detected in sample SED-1, both fluoranthene and pyrene exceeded the benchmark and both SED-1 and SED-2 exceed the benchmarks for copper and zinc. SED-1 also exceeded for five other metals. The next higher level of benchmark is the NOAA Probable Effects Level (PEL). This was used as an “Action Level” benchmark comparison. Sample SED-2 does not have any exceedances of the PEL, while SED-1 exceeds this benchmark for pyrene and five individual metals.

The two sediment samples collected on March 17, 2006 contained six metals and TPH, but did not contain any PAHs. The TPH concentrations were below RIDEM Method 1 Residential Direct Exposure Criteria and the metals were below both the NOAA TEL and the New Jersey LEL, the two most conservative criteria. Fingerprint analysis of the March 17, 2006 samples identified the TPH as 50% organosiloxanes and 50% weathered No. 2 fuel oil.

CONCLUSIONS AND RECOMMENDATIONS

Based on our evaluation of the results from the sediment sampling GZA has developed the following conclusions:

- The combination of field observations, analytical results (displayed in Table 1) and review of historic photographs have allowed us to adequately delineate and characterize the area of contamination in Former Lagoon 5.
- The sediments in the former sluiceway channel area appear to be impacted from past process waste-water disposal practice and petroleum releases. The metals concentrations are likely the result of past usage as a process water holding pond. The petroleum products may have migrated through the subsurface from past releases in the rear maintenance yard. The PAHs are typical constituents of weathered petroleum products.
- The deeper channel area has apparently formed a break that has prevented contaminants from migrating into the western portion of Former Lagoon 5 or the contaminated sediments in this area were removed as part of the 1978 closure activities.
- Former Lagoon 5 has not been connected to the Wood River since 1978. Photographs taken of the closure of the canal leading from the facility to the Wood River and the grading of the bottom surface of Former Lagoon 5 show the sluiceway channel area to be deeper than the western portions of the former lagoon. Field observations confirm the channel portion extends from the eastern bank approximately 25 feet west from the facility southward toward the Wood River. The water is 3 to 4 feet deeper in this area than the remaining portion of the former lagoon.
- The fingerprint analysis identified the total petroleum hydrocarbons as 50% organosiloxanes and 50% weathered No. 2 fuel oil. The organosiloxanes have been identified as a by-product of the facility operations and are therefore the result of past use of the lagoon as a process water holding pond. The weathered No. 2 fuel oil is likely the result of past releases as mentioned above.
- The sluiceway channel area of Former Lagoon 5 exceeds ecological risk-based screening criteria for PAHs and metals and Method 1 Residential Direct Exposure criteria for petroleum products



and will require remediation and/or encapsulation to reduce exposure to contaminants. The western portion of the lagoon does not exceed criteria for any of the analysis performed and will not require remediation. GZA will present a remediation alternative for the impacted portion of Former lagoon 5 in the forth coming Remedial Action Work Plan (RAWP) for the site.

We believe this information addresses your comments to the SIR and look forward to receiving a *Program Letter*. If you have any questions or comments please call Stephen Andrus or Edward Summerly at (401)-421-4140.

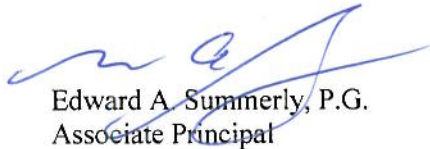


Very truly yours,

GZA GEOENVIRONMENTAL, INC.


Stephen Andrus
Project Engineer


John P. Hartley
Principal/Reviewer


Edward A. Summerly, P.G.
Associate Principal

EAS:mac

Attachments: Table 1
Figure 1
Photos
Attachment A - Laboratory Certificate of Analysis

cc: Cynthia Gianfrancesco, RIDEM-OWM
Mary Morgan, Richmond Town Hall
Clark Memorial Library - Charbert Repository

TABLE

TABLE 1

SUMMARY OF GZA's SEDIMENT TESTING RESULTS

Charbert Phase II Site Investigation
Alton, Rhode Island

PARAMETERS	UNITS	FRESH WATER SEDIMENT BENCHMARKS				SED -1		SED - 2		SED06 -3A		SED06 - 4A	
		NOAA SQRT (TEL)	NOAA SQRT (PEL)	NEW JERSEY DEP (LEL)	NEW JERSEY DEP (SEL)	10/26/2005		10/26/2005		3/17/2006		3/17/2006	
						Result	Limit	Result	Limit	Result	Limit	Result	Limit
SEMI-VOLATILE ORGANICS													
bis(2-Ethylhexyl)Phthalate	mg/kg (ppm)	*750	--	--	--	1.9	1.3	<	0.99	<	1.3	<	0.99
Fluoranthene	mg/kg (ppm)	0.111	2.355	0.75	1020	1.7	1.3	<	0.99	<	1.3	<	0.99
Pyrene	mg/kg (ppm)	0.53	0.875	0.419	850	1.8	1.3	<	0.99	<	1.3	<	0.99
TOTAL PETROLEUM HYDROCARBON 8100M													
Hydrocarbon Content	mg/kg (ppm)	--	--	--	--	8500	50	1500	50	99	50	320	50
PRIORITY POLLUTANT METALS EPA 6010B													
Antimony	mg/kg (ppm)	--	--	--	--	<	9.92	<	2.99	<	9.92	<	2.99
Arsenic	mg/kg (ppm)	5.9	17	6	33	11.3	3.97	3	1.2	0.757	0.587	0.777	0.647
Beryllium	mg/kg (ppm)	--	--	--	--	<	1.98	<	0.598	<	1.98	<	0.598
Cadmium	mg/kg (ppm)	0.596	3.53	0.6	10	<	1.98	<	0.598	<	1.98	<	0.598
Chromium	mg/kg (ppm)	37.3	90	26	110	108	1.98	17.4	0.598	1.41	0.293	4.25	0.324
Copper	mg/kg (ppm)	35.70	197.00	16	110	378	5.95	65.8	1.79	5.51	0.88	15.8	0.971
Lead	mg/kg (ppm)	35.0	91.3	31	250	141	3.97	26.3	1.2	1.13	0.587	4.28	0.647
Mercury (EPA 7471A)	mg/kg (ppm)	0.174	0.486	0.2	2	0.361	0.0948	0.0778	0.0441	<	0.0948	<	0.0441
Nickel	mg/kg (ppm)	18.0	35.9	16	75	41.5	3.97	6.99	1.2	0.698	0.587	2.31	0.647
Selenium	mg/kg (ppm)	--	--	--	--	<	9.92	<	2.99	<	9.92	<	2.99
Silver	mg/kg (ppm)	--	--	--	--	<	1.98	<	0.598	<	1.98	<	0.598
Thallium	mg/kg (ppm)	--	--	--	--	<	9.92	<	2.99	<	9.92	<	2.99
Zinc	mg/kg (ppm)	123.10	315.00	120	820	1550	3.97	252	1.2	20	0.587	67.9	0.647
PERCENT SOLID	%					12.4		29.7		73.1		70	

* NOAA SQRTS list this as the lowest reliable value among AET test on a 1% TOC basis.

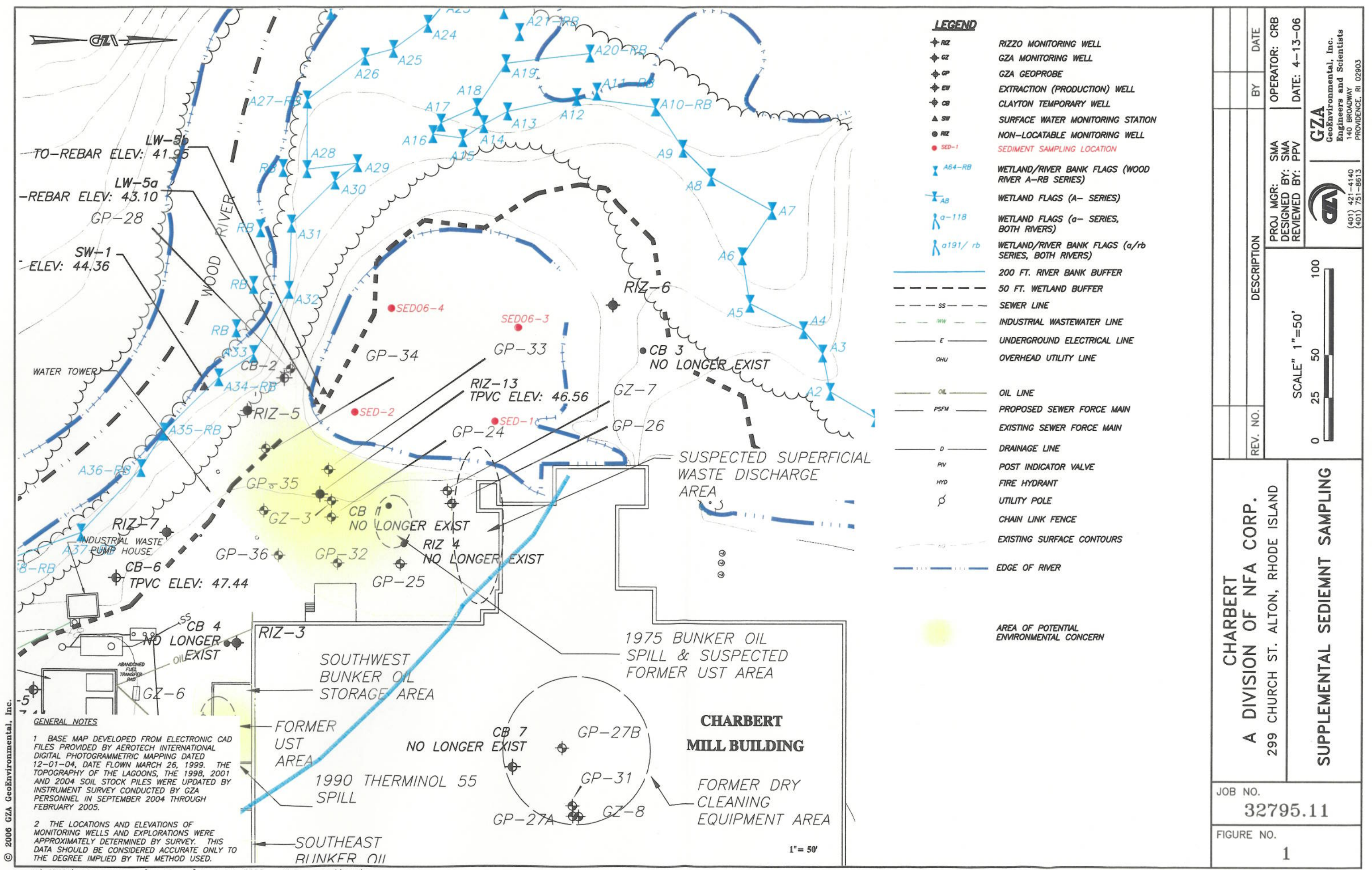
TEL = Threshold Effects Level
 PEL = Probable Effects Level
 LEL = Lowest Effects Level
 SEL = Severe Effects Level

Parameter Detected Above MDL

NOAA TEL Exceedance

NOAA PEL Exceedance

FIGURE



CHARBERT
A DIVISION OF NFA CORP.
 299 CHURCH ST. ALTON, RHODE ISLAND

JOB NO.
32795.11

FIGURE NO.
1

REV. NO.	DESCRIPTION	BY	DATE
	PROJ MGR: SMA		
	DESIGNED BY: SMA		
	REVIEWED BY: PPV		
	OPERATOR: CRB		
	DATE: 4-13-06		

GZA
 GeoEnvironmental, Inc.
 Engineers and Scientists
 140 BROADWAY
 PROVIDENCE, RI 02903

© 2006 GZA GeoEnvironmental, Inc.