Waite
Environmental Management, LLC.

January 23, 2006

Mr. Nick Warner
CEDO
Room 32, City Hall
Burlington, Vermont 05401

RE: Additional Brownfield Site Investigation
Former Moran Generating Plant, Burlington, Vermont (SMS Site #2005-3357)

Dear Nick:

Waite Environmental Management, LLC (WEM) is pleased to present the draft *Additional Brownfield Site Investigation Report* for the Former Moran Generating Plant in Burlington, Vermont. Upon your review and approval, the report will be forwarded to the Hugo at the VT DEC and the Diane at the EPA.

Please note that I am still awaiting the final data validation report, so you will notice that a portion of Section 4.0 has not yet been completed. The results of the data validation effort should not affect the conclusions and recommendations.

Do not hesitate to call or email if your have questions or concerns. I will provide a paper copy to CEDO once the report is finalized.

Sincerely,

Miles E. Waite, Ph.D.
Principal Hydrogeologist

Enclosure

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DRAFT

ADDITIONAL BROWNFIELD SITE INVESTIGATION REPORT

MORAN GENERATING PLANT
Lake Street
Burlington, Vermont

SMS Site #2005-3357

Prepared for:

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January 23, 2006

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Moran Generating Plant
Lake Street, Burlington, Vermont
SMS Site #2005-3357

EXECUTIVE SUMMARY

The following report provides details and results of an additional Brownfield site investigation at the former Moran Generating Plant at the end of Lake Street in Burlington, Vermont. This report was prepared by Waite Environmental Management, LLC (WEM) for the Community and Economic Development Office (CEDO) of the City of Burlington as part of a general effort toward the future reuse redevelopment of the property.

Elements of this additional Brownfield site investigation include soil boring/groundwater monitoring well installation, soil sampling from several different depth intervals, and groundwater sampling from new and existing monitoring wells. Contaminants of concern include volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), arsenic, and cyanide. Conclusions and recommendations developed by WEM from this effort, conducted during November 2005, are summarized below.

SOIL QUALITY
Near surface soil (6”-depth) contaminant concerns appear to be limited to PAHs and arsenic. The PAH distribution is roughly correlated with the presence of residual coal (clasts and dust) in the near surface. WEM has defined an approximate 2-acre area within which the PAHs have a calculated toxicity in excess of EPA’s risk-based guidance level for residential use. Arsenic is ubiquitous in the near surface soil at the Site, and all samples collected to date have had concentrations in excess of EPA’s guidance level. The highest arsenic concentrations seem to correlate with the former coal storage area and an apparent band to the northeast of the Plant where the former coal conveyor belt was located. WEM believes that arsenic is naturally occurring in the soils in this part of Burlington, and that even the background concentration is in excess of EPA’s guidance level.

Currently, the near surface soils are covered by a thin veneer of sod or asphalt and do not pose an immediate threat to public uses such as walking, light recreation, or boat storage.

There are no significant contaminant concerns in the deeper soil (5’- 44’ depth) under the Site. The one exception is the prior detection of TCE at a concentration in excess of the guidance level in the “hot spot” north of the Plant.

GROUNDWATER QUALITY
There does not appear to be any deep aquifer contaminant concerns, and shallow groundwater contaminant concerns are limited to the presence of chlorinated VOCs in a plume under the Plant and an area to the north of the Plant. The concentrations of TCE and PCE are above Vermont’s water quality standards in the “hot spot” north of the Plant. The remainder of the shallow plume consists of chlorinated compounds that are below standards. The source of contamination is not fully understood, but it is possible that the contaminant plume is the result of spills/leaks of solvents used for cleaning of machinery during former operation of the former power plant.

***RECOMMENDATIONS**:*

Regarding near surface soil, WEM recommends that a risk analysis be conducted to develop site specific target cleanup levels. The risk analysis will involve the development of future use scenarios for the Site, development of exposure scenarios for future site users/workers, and the development of use-specific target concentrations for PAHs and arsenic. During the process, it may become apparent that further definition of the distribution of contamination is necessary. Once target cleanup levels are established, the need for and scope of soil remediation can be developed.

Regarding deeper soil, WEM does not believe that further characterization of VOC contamination in the soil is necessary at this time. If future redevelopment involves the need to excavate soil in the "hot spot" surrounding MW-3 and MW-4, then a remediation plan should be developed that involves excavation/disposal of the TCE contaminated soil combined with confirmatory sampling.

Regarding groundwater, WEM recommends a continued groundwater monitoring program for wells MW-1, MW-2, MW-3, MW-7, MW-8, MW-11, MW-12, and MW-14 until there are two consecutive events in which the concentrations are below Vermont's groundwater quality standards. Sampling should be conducted on a semi-annual basis in the Spring and Fall of each year. Samples should be analyzed by EPA Method 8260B.

1.0 INTRODUCTION

The following Additional Brownfield Site Investigation Report was prepared by Waite Environmental Management, LLC (WEM) for the former Moran Generating Plant at the end of Lake Street in Burlington, Vermont ("Site"; refer to Figure 1 in Appendix A). This report was prepared for the Community and Economic Development Office (CEDO) of the City of Burlington as part of a general effort to redevelop the property.

This work was conducted in accordance with WEM's Work Plan for Additional Brownfield Site Investigation dated September 7, 2005 and with WEM's Quality Assurance Project Plan (QAPP) Addendum dated September 23, 2005. The objective of the investigation was to address recommendations provided by WEM and the VT DEC after a Phase II Environmental Site Assessment was conducted in March/April 2005.

Elements of this Additional Brownfield Site Investigation included the following: 1) installation of six soil borings in an area north of the Plant, with four of the borings fitted as groundwater monitoring wells; 2) sampling of the soil from different depth intervals in the borings for analysis of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), arsenic, and cyanide; 3) sampling of the shallow soil at locations around the site for analysis of PAHs, arsenic and cyanide; 4) sampling the groundwater from the four new wells and five existing wells for analysis of VOCs; and 5) validation of the soil and groundwater analytical data.

1.1 Previous Environmental Work

For a full description of the Site and previous environmental results, refer to WEM's Phase II ESA Report, dated June 24, 2005. A summary of the previous environmental work are provided below:

- In 2000, several boreholes were installed surrounding the Moran Plant as part of a Phase II ESA of the Urban Reserve prepared by Lamoureux & Dickinson Consulting Engineers, Inc. Field screening and sampling results indicated that the soil did not have detectable levels of VOCs, semi-volatile organic compound (SVOCs), polychlorinated biphenyls (PCBs), or metals with the exception of elevated concentrations of arsenic, lead, and zinc. However, a low level of groundwater contamination was reported in a well immediately north of the steel structure on the north side of the Plant (refer to Figure 2 in Appendix A). The contamination was by chlorinated VOCs, including 1,1-dichloroethane (1,1-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), tetrachloroethene (PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA). Only the concentration of TCE was above Vermont's groundwater standards. All of these VOCs are chlorinated compounds associated with solvents and industrial chemicals.

- In March 2005, the interior of the Plant was sampled for asbestos containing materials (ACMs) and lead paint. Exterior window caulk, corrugated window panels, and exterior roof flashing all tested positive of chrysotile asbestos. Because asbestos was found in dust inside the Plant in 1987 and there has been no further mitigation since that time, there continues to be an asbestos hazard to future construction workers during any demolition or cleanup activities. Regarding lead paint, results indicated that lead was found to be present in all of

the surfaces tested. Lead concentrations ranged from 0.01% to 14.0%. Lastly, there is contamination by bird droppings on most of the main and upper levels of the plant. The bird droppings are commingled with dust that has accumulated over the years.

- In March 2005, several boreholes/monitoring well were installed on the grounds of the Moran Plant as part of WEM's Phase II ESA. Based on soil quality sampling from the borings, several PAHs and the metal arsenic were detected at concentration in excess of the soil guidance levels in the shallow soil at locations immediately south, north and northeast of the Moran Plant. The PAHs and arsenic appear to be related to the former use/storage of coal by the Plant, which was encountered in most boreholes. In addition, several chlorinated VOCs, including TCE at a concentration in excess the guidance level, were detected in the area immediately north of the Moran Plant. The assessment ruled out contaminant concerns from other metals or PCBs. Based on discussion with a representative of the Burlington Electric Department (BED), which formerly operated the facility, it was postulated that the source of the chlorinated VOCs is drums that were formerly stored in this area for a brief time in 1994, after the Plant was decommissioned.

- In April 2005, the new monitoring wells were sampled as part of WEM's Phase II ESA. Based on these results, several chlorinated VOCs were reported in three wells, including TCE at a concentration in excess of the guidance level in the area immediately north of the Moran Plant. Dissolved PAHs, PCBs, total metals, or petroleum VOCs were not detected in groundwater

Based on the results of the 2005 Phase II ESA, additional investigation was merited to: 1) further characterize the PAH and arsenic contamination in shallow soil around the site, 2) investigate the potential presence of cyanide in shallow soil around the Plant, and 3) further characterize the dissolved VOC contamination in the groundwater north of the plant, including in the deeper aquifer. Results of this work are described below.

2.0 SUBSURFACE INVESTIGATION

2.1 Soil Boring Installation

On November 1, 2005 WEM oversaw the advancement of six soil borings (MW-7, MW-8, SB-9, SB-10, MW-11 and MW-12) at the locations depicted on the Site Plan in Appendix A. All borings were advanced using direct push methods by Specialty Drilling and Investigation, Inc. (SDI) of Burlington, Vermont. Continuous soil samples were collected using a 1¾" O.D. x 48" long steel sampler lined with a clear soil tube. Soil samples were logged by a WEM geologist and classified using the Unified Soil Classification System (USCS) as described in the American Society for Testing and Materials (ASTM) Designation D2487-93. WEM's soil boring logs are contained in Appendix C.

The borings extended to depths ranging from 10 ft to 44 ft below grade (ft bg). The primary soil type encountered in the soil borings was well-graded fine and medium sand. In the deepest boring (MW-12), the sand was present in varying textures and shades to a depth of approximately 37 ft, where the soil changed to a dense silty sand. Saturated soil was encountered between 2.5 and 4.5 ft bg. Refer to the soil boring logs for more detail on the stratigraphy.

WEM used a HNU P-101 (10.2 eV) photo-ionization detector (PID) to screen the soils for the presence of VOCs during drilling. A plastic bag headspace method was used, wherein a composite soil sample from the 4-foot sampler tube was placed into a reclosable plastic bag approximately ½ full, and was allowed to equilibrate for at least 2 minutes. After equilibration, the bag was cracked open and the PID probe inserted to obtain the measurement. The PID was calibrated in the field on the day of drilling to an isobutylene standard. PID readings are all shown in the soil boring logs in Appendix C.

Based on PID readings in parts per million (ppm), there was minimal field evidence of VOCs[1] in any of the borings. The highest PID reading encountered was 0.3 ppm in MW-7 and SB-10. Further discussion of VOC contamination is presented in Section 3.0.

2.2 Soil Sampling

Soil samples were collected for laboratory analysis from borings MW-8, SB-9, SB-10, MW-11, and MW-12 during the drilling process on November 1, 2005. Samples were collected directly from the sampler tubes from three different intervals, as described below:

- **Near Surface**: samples were collected from four (4) of the borings (MW-8, SB-9, MW-11, and MW-12) from the near surface and submitted for analysis of PAHs (EPA Method 8270C) and arsenic (EPA Method 6010). From two (2) of these borings (SB-9 and MW-12), additional samples were submitted for cyanide (EPA Method 9012). These samples were collected in clear 4 oz. glass jars.
- **1-ft. Depth**: samples were collected from two (2) of the borings (SB-9 and MW-12) from a depth of approximately 1 ft. for analysis of VOCs (EPA Method 8260B). These samples were collected in VOAs with methanol preservation.

[1] within the limits of detectability of a 10.2 eV lamp

- **Deep**: samples were collected from three (3) of the borings (SB-10, MW-11 and MW-12) from deeper intervals, including from 5 ft (SB-10 and SB-11), 10 ft (MW-12), 20 ft (MW-12) and 44 ft (MW-12), all for analysis of VOCs (EPA Method 8260B). These samples were collected in VOAs with methanol preservation.

Additional soil sampling was conducted by WEM on November 3, 2005 from the near surface at areas around the site. These locations are shown as SS-1, SS-2, SS-3, SS-4, SS-5, SS-6, and SS-7 on the Site Plan in Appendix A. These samples were collected using a stainless steel hand trowel, decontaminated between sampling locations, and submitted for and submitted for analysis of PAHs and arsenic. From two (2) of these locations (SS-1 and SS-2), additional samples were submitted for cyanide. All samples were collected in clear 4 oz. glass jars.

During each sampling event on November 1 and November 3, samples were placed on ice in a cooler, and transported to Endyne Laboratory in Williston, Vermont under chain-of-custody procedures. Results are discussed in Section 3.1.

2.3 Monitoring Well Installation

Upon completion to the desired depth, four of the soil borings (MW-7, MW-8, MW-11, and MW-12) were fitted as monitoring wells. Wells were constructed of 1.0 inch O.D. PVC plastic with 0.020-inch factory slotted screen. For each well, the screen was surrounded with sand pack, a bentonite seal was placed above the sand pack, native material was placed above the bentonite seal, and the well was finished with a compression fitting and a locking flush-mounted well box. Well construction details are provided Table 1 in Appendix B and in the soil boring logs in Appendix C .

2.4 Site Surveying

On November 9, 2005, WEM surveyed the locations of monitoring wells and soil sampling locations to update the Site Plan (refer to Appendix A). WEM also surveyed the top of casing elevations of the new monitoring wells so that groundwater flow direction and gradient could be evaluated.

2.5 Groundwater Sample Collection

On November 8-9, 2005, WEM collected liquid level measurements from monitoring wells the eight (8) existing monitoring wells and the four (4) new wells. Depth to groundwater ranged from 1.46 to 4.33 feet below top of casing (TOC). No free product was encountered in any of the monitoring wells. Discussion of the groundwater elevations is presented in Section 3.2.

Following water level measurement, WEM collected groundwater samples from the four (4) new monitoring wells and five (5) of the existing monitoring wells. Wells were first purged of at least three (3) well volumes using a peristaltic pump via polyethylene tubing dedicated to each well. In each case the tubing was inserted to a depth of 0.5 feet above the bottom of the well, the pump was activated, and each well was allowed to purge at a rate of approximately 450 milliliters/minute. Purging records are provided in the field sheets in Appendix C. The purgewater was noted to be very clear except for a light silt in MW-5, MW-8 and MW-12. No visual/olfactory evidence of contamination was noted in any of the wells. All purgewater was discharged to the ground surface.

After purging, all groundwater samples were collected in VOAs with HCL preservation, placed on ice in a cooler, and transported to Endyne Laboratory in Williston, Vermont under chain-of-custody procedures. Each sample was analyzed for VOCs via EPA Method 8260B. Results are discussed in Section 3.3.

3.0 SOIL AND GROUNDWATER SAMPLING RESULTS

Soil and groundwater sampling results from November 2005 are discussed below. Analytical results have been compared to the guidance levels that are being used for this project. The soil guidance levels are the EPA Region IX Preliminary Remediation Goals (PRGs) for risk-based data for residential exposures; these are generally viewed as guidelines, not legally enforceable standards, and are typically used for site "screening". The groundwater guidance levels are the Vermont Groundwater Enforcement Standards (VGES) from Chapter 12- Groundwater Protection Rule and Strategy. These are legally enforceable standards adopted by Vermont.

Sample results are tabulated in detail in Tables 3-6 in Appendix B. Full laboratory reports are provided in Appendix D. Visual summaries of results are also provided in Figures 4-6 in Appendix A. Please note that the analytical results have undergone a modified Tier I completeness review to ensure that the precision is consistent with SW-846 Guidelines (refer to Section 4.0).

3.1 Soil Sampling Results

3.1.1 PAHs

PAH results from the eleven (11) near surface samples collected in November 2005 are tabulated in Table 5 in Appendix B in micrograms per kilogram (ug/Kg, or parts per billion (ppb)). As these results indicate, PAH compounds were reported above detection limits in all samples except MW-12. The highest concentrations were noted near the Moran Plant building. While PAHs are also present in the open area north of the Moran Plant, concentrations were of a lower magnitude.

To better understand the relative concentrations in the soil and gauge the associated health risk, the concentrations have been converted to the benzo(a)pyrene toxicity equivalence (B(a)P TE). This method establishes the additive effect of the following six target compounds: benzo(a)pyrene, benzo(a)anthracene. benzo(b&k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. To calculate the toxicity equivalence, the raw concentration is multiplied by a toxicity equivalence factor (TEF). The VT DEC and the Vermont Department of Health (VT DOH) require the use of the TEFs shown in the table below.

Table: Toxicity Equivalence Factors (TEF)
For Target PAH Compounds

PAH Compound	TEF
Benzo(a)pyrene	1.0
Benzo(a)anthracene	0.1
Benzo(b&k)fluoranthene	0.1
Chrysene	0.001
dibenzo(a,h)anthracene	1.0
indeno(1,2,3-cd)pyrene	0.1

To calculate whether a soil sample meets the soil guidance level, the positive concentrations of the six compounds of concern are each converted to a B(a)P TE. The converted concentrations of the six compounds are then summed, and the summation is then compared to the PRG value for B(a)P of 62 ppb. The converted data are shown in Table 5 in Appendix B.

The converted results from both November 2005 sampling and the previous sampling in March 2005 are shown visually in Figure 6 in Appendix A. As this map depicts, soil next to the Moran Plant and under much of the paved area on the east side is out of compliance with PAH soil guideline of 62 ppb B(a)P TE. As well, a large area in the open area north of the Plant is also out of compliance. Only a thin strip in the center of the Site and in the far northern end appears to be free of PAH contamination. The presence of PAHs in the northern open area can be roughly correlated with the footprint of the former coal storage area.

3.1.2 Arsenic

Arsenic results from the eleven (11) near surface samples collected in November 2005 are shown in Table 6 in Appendix B in milligrams per kilogram (mg/Kg, or parts per million (ppm)). In addition, the November 2005 results and the previous March 2005 results for arsenic are depicted visually in Figure 5 in Appendix A. These results show that every sample collected to date has been out of compliance with the soil guidance level for arsenic (0.39 mg/Kg). The highest concentrations were observed in the central part of the Site in the open area, where coal was previously stored.

3.1.3 Cyanide

Cyanide results from the four (4) near surface samples collected in November 2005 are shown in Table 6 in Appendix B in units of ppm. As these results indicate, cyanide was not reported above detection limits in any of the samples collected.

3.1.4 VOCs

VOC results from the seven (7) near soil samples collected in November 2005 are shown in Table 4 in Appendix B in units of ppb. These results are broken down by depth as follows:

1 ft: Samples collected at 1 ft depth in SB-9 and MW-12 had similar results. These samples both had a range of ***petroleum VOCs***, including benzene, toluene, ethylbenzene and xylenes (BTEX), trimethylbenzene, naphthalene, n-butylbenzene, isopropylbenzene, and n-propylbenzene. These constituents are common in gasoline, diesel/No. 2 oil, and used motor oil. Both of these samples also had similar values of one ***chlorinated VOC***: 1,1,1-trichloroethane. The concentration reported in SB-9 and MW-12 is similar to the value reported in nearby well MW-3 in March 2005. All concentrations of VOCs were reported below the guidance levels.

5 ft: Samples collected at the 5 ft depth in SB-10 and MW-11 had the same range of ***petroleum VOCs*** at similar magnitude as seen in SB-9 and MW-12. The sample from MW-11 also had a positive detection of the ***chlorinated VOC*** 1,1,1-trichloroethane. All concentrations of VOCs were reported below the guidance levels.

10 ft: The one sample collected at the 10 ft depth in MW-12 had no reported VOCs above detection limits.

20 ft: The one sample collected at the 20 ft depth in MW-12 had no reported VOCs above detection limits.

44 ft: The one sample collected at the 44 ft depth in MW-12 had two reported ***petroleum VOCs***: 1,3,5-trimethylbenzne and 1,2,4-trimethylbenzene. No ***chlorinated VOCs*** were reported above detection limits. All concentrations of VOCs were reported below the guidance levels. The lack of detectable chlorinated VOCs in this deep interval or the two intervals above indicates that dense non aqueous phase liquid (DNAPL) is not a threat at this Site.

3.2 Groundwater Gradient and Flow Direction

Water table elevations were plotted and contoured to illustrate the estimated gradient and direction of groundwater flow beneath the site (see Figure 3 in Appendix A). According to the November 2005 data, groundwater is flowing to the west/southwest at an average lateral hydraulic gradient of 0.010 ft/ft, or 1.0% slope. This is an expected gradient given the flat topography of the Site and the presence of Lake Champlain to the west, and is similar to the measurements from 2005 and 1999.

Well MW-12 is screened at a different depth interval than the other monitoring wells in this area, enabling the evaluation of vertical hydraulic gradient. Based on the comparison of the groundwater elevation in MW-12 and the nearby wells MW-11 and MW-3, there does not appear to be a noticeable upward or downward vertical gradient.

3.3 Groundwater Sampling Results

Groundwater sampling results from the nine (9) wells sampled in November 2005 are shown in Table 3 in Appendix A. These results indicate that no petroleum VOCs were reported above detection limit in any of the samples. The presence of petroleum VOCs in the shallow soil has had not resulted in a dissolved petroleum contaminant plume. However, there are detectable chlorinated VOCs in the groundwater, including the compounds tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichlroethene (cis-1,2-DCE), 1,1-dichlorethane (1,1-DCA) and 1,1,1-trichlorethane (1,1,1-TCA). Compounds reported in MW-1, MW-2, MW-7, and MW-8 are below the groundwater enforcement standards. The only compounds reported above standards are PCE in MW-3 and MW-14, and TCE in MW-3. It should be noted that the deep well MW-12 had no reported chlorinated VOCs, thus confirming that DNAPL is not a concern in this area.

Compared to the MW-1, MW-2, and MW-3 results from March 2005, there has been a slight increase in the concentration of chlorinated VOCs. However, this increase is likely due to seasonal variation and not suggestive of a ongoing source. Compared to the MW-14 results from 1999, concentrations are decreasing in this well.

The chlorinated VOCs are distributed in a dissolved plume under a portion of the Site north of the Plant, as shown in Figure 4 in Appendix A. The core of the plume is under the northeast portion of the steel structure, and extends in a westerly direction. It is questionable whether the plume extends beneath the sheet pile canal, even though low levels of two compounds were reported in MW-8, west

of the canal. The compounds of highest concern, TCE and PCE, appear to be restricted to a hot spot surrounding MW-3 and MW-14.

3.4 Contaminant Limits and Source Discussion

The results described above confirm that the contaminants of concern continue to be: 1) low levels of chlorinated VOCs in groundwater and soil, 2) PAHs in shallow soil, and 3) arsenic in shallow soil. WEM has attempted to identify the limits of each of these contaminants of concern, as shown in Figures 4, 5, & 6 in Appendix A.

- The VOC plume, consisting of the chlorinated hydrocarbons discussed above, encompasses the area surrounding the Moran Plant and an area to the north and west. It is not well understood whether the VOCs reported on the south side of the building (MW-1) and west of the sheet pile canal (MW-8) are part of the plume centered underneath the steel structure, or whether they are from separate sources. It is possible that the presence of these chemicals in groundwater is not from one defined source, but rather from several small releases (spills, drips) that occurred outside the building over the years of operation. It should be re-iterated that the magnitude of contamination is very low, and only a small, defined "hot spot" (see Figure 4) has concentrations that exceed Vermont's groundwater enforcement standards.

- The PAH distribution is better understood with the new data, and appears to be limited to the area surrounding the plant and the rough boundaries of the coal storage area in the open area north of the Plant. While there are some gaps in the defined PAH limits, as shown by the inferred boundaries on Figure 6, it is assumed that the PAHs correlate with the presence of residual coal (clasts and dust) in the near surface. Regarding magnitude of contamination, all of the area defined on Figure 6 has a calculated toxicity in excess of EPA's risk-based standards.

- The arsenic distribution is better understood with the new data, and appears to be ubiquitous throughout the near surface soils on the Site. Contouring of arsenic concentrations shows that the highest concentrations seem to correlate with the coal storage area and an apparent band to the northeast of the Plant where the former coal conveyor belt was located. Hence, it is assumed that the higher arsenic concentrations correlate with the presence of residual coal (clasts and dust) in the near surface. However, WEM still believes that there is a background presence of arsenic in soils in this part of Burlington that is independent of the former coal burning operation. In terms of magnitude, every sample collected to date from this Site between 1999 and 2005, even samples from outside the coal storage footprint, have had arsenic concentrations in excess of EPA's risk-based standards.

While WEM has determined that petroleum VOCs in soil are not a significant issue of concern, the recent results indicate the presence of several petroleum compounds in a band of soil between 1-10 ft depth in the fenced are north of the Plant (see Figure 5). These compounds appear to be constrained to the soil, as they were not reported above detection levels in groundwater collected from the monitoring wells in this area. The source of these petroleum compounds is not well understood. It should also be noted that two petroleum VOCs were reported at a depth of 44 ft underneath this area, but not at 10 or 20 ft, suggesting that the source of these deep petroleum VOCs may be from a deeper low-level plume emanating from an upgradient source.

Lastly, WEM earlier postulated that the source of the VOCs at this Site might have been from the former storage of drums on the site in the 1990s that happened after the Plant shut down. However, the presence of the low-level chlorinated VOCs on all four sides of the Plant suggest that these VOCs are more likely related to former Plant activities, possibly from the use of solvents to clean electrical generating equipment and components.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

4.1 Data Verification and Validation

The soil and groundwater analytical results were validated by Phoenix Chemistry Services (PCS) of North Ferrisburg, Vermont. PCS's validation was performed in conformance with Tier I guidelines as defined by USEPA Region I, modified by the QAPP and Brownfields guidance from the Region I office. The modified Tier I validation process evaluates the data package submitted by the laboratory (Endyne) for completeness, and issues pertaining to methodological compliance are noted. Issues pertaining to contractual compliance are noted where applicable. Issues pertaining to compliance with the National Environmental Laboratory Accreditation Conference (NELAC) standard (effective date July, 2004) may also be noted.

[THIS PART OF THE REPORT HAS NOT BEEN COMPLETE]
The data validation reporting is presented in Appendix E. Reports were generated by PCS that review both the soil data package (SDG No. 36068) and water data package (SDG No. 36266) submitted by Endyne[2]. In terms of documentation, the tabulated summary forms (sample results, calibration results, blank results, spike sample results, internal standard summaries, etc.), raw data, instrument analytical printouts, chromatograms, calculations, and logbook pages were all present. There were some methodological compliance deficiencies regarding the running of internal standards, the order of semivolatile analyses performed, and the number of a method blanks run for the volatiles analysis. Finally, several improper edits were made in the engineering field notes. While the methodological deficiencies may be pertinent in a litigation situation, they do not affect the usability of the data for the purposes of this ESA.

It should be noted that sample results for two PCB analytes in soil samples MW-1 and MW-2 were classified as estimated by Endyne (see "J" qualifier in Table 4). The Method 8082 spike recoveries for PCBs 1254 and 1260 in the laboratory fortified blank (LFB) and for PCB 1254 in the sample matrix spike (MS) were reported as outside laboratory established acceptance criteria. However, given that the estimated concentrations are still one order of magnitude below the guidance levels for these compounds, this is not a significant issue of concern. No other QA/QC issues were noted by Endyne for any other soil or groundwater data.

As part of WEM's quality assurance/quality control (QA/QC) procedure, the following samples were collected: deionized water trip blank, deionized water field blank, soil field duplicate "SB-X" (duplicate of SB-9), and groundwater field duplicate "MW-Z" (duplicate of MW-3). There were no reported detections in any of the blanks, indicating that there were no effects of spurious influences on sample quality. The field duplicate results are presented in Table 7 in Appendix B. These results were evaluated using a relative percent difference (RPD) analysis (The RPD is defined as 100 times the difference in reported concentration between sample and duplicate, divided by the mean of the two samples. A small RPD indicates good correlation between sample and duplicate.) RPD data indicate the following:

- Precision in the field duplicate soil sample pair SB-9 (4-10") and SB-X was deemed acceptable for PAHs (EPA Method 8270C), as there was less than 30 % average RPD.

[2] It should be noted that these data packages are not included in this report due to the volume of material, but are available for review at WEM's office.

- Precision in the field duplicate soil sample pair SB-9 (10-16") and SB-X was deemed unacceptable for VOCs (EPA Method 8260B), as there was greater than 30 % average RPD. However, WEM suspects that the difference in concentrations in the sample pair is due to variability in the presence of VOCs in this particular soil interval, and not due to laboratory imprecision.
- Precision in the field duplicate groundwater sample pair MW-3 and MW-Z was deemed acceptable for VOCs (EPA Method 8260B), as there was less than 30 % average RPD.

4.2 Data Usability

Based on the results of PCS's data validation, there are no documentation or methodological issues that limit the usability of the soil or groundwater data.

It should be noted that the reported method detection levels (MDLs) for two compounds in some of the soil samples was above the established guidance level for soil (EPA Region IX PRG), which can limit the usability of select data. Specifically, the MDLs for the compounds benzo(a)pyrene and dibenzo(a,h)anthracene were above the guidance level of 62 ppb for all samples, as shown below:

Sample	Compound	MDL (ppb)	Result (ppb)	Guidance (ppb)
SB-9	Benzo(a)pyrene	72	ND<72	62
	Dibenzo(a,h)anthracene	72	ND<72	62
SB-12	Benzo(a)pyrene	69	ND<69	62
	Dibenzo(a,h)anthracene	69	ND<69	62
SS-1	Dibenzo(a,h)anthracene	71	ND<71	62
SS-4	Dibenzo(a,h)anthracene	72	ND<72	62
SS-5	Benzo(a)pyrene	75	ND<75	62
	Dibenzo(a,h)anthracene	75	ND<75	62
SS-7	Benzo(a)pyrene	73	ND<73	62
	Dibenzo(a,h)anthracene	73	ND<73	62

Typically, when the MDL exceeds the guidance level, the concentration must be assumed to exceed the guidance level unless otherwise documented. It is WEM's professional opinion that for the cases above, in which few other PAH compounds were reported in the samples and the MDLs were within 7-13 ppb of the guidance level, it should <u>not</u> be assumed that the concentrations of the two subject compounds exceed the guidance levels. The MDLs for all other compounds in the soil analyses and all of the groundwater analyses were below their respective guidance levels, so there are no other limitations to the usability of data.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations have been developed by WEM after conducting this additional Brownfield site investigation during November 2005, and take into account previous results from the March and April 2005 Phase II assessment.

Contamination in Near Surface Soil

Conclusion: Near surface soil (6"-depth) contaminant concerns include PAHs and arsenic. While low levels of VOCs (petroleum and chlorinated) were detected in several samples on the north side of the Plant, these compounds were all below guidance levels.

The PAH distribution appears to roughly correlate with the presence of residual coal (clasts and dust) in the near surface. WEM has roughly defined an approximate 2-acre area in which the PAHs have a calculated toxicity in excess of EPA's risk-based standards for residential use.

Arsenic is ubiquitous in the near surface soil at the Site, and all concentrations are in excess of the guidance level. The highest concentrations seem to correlate with the coal storage area and an apparent band to the northeast of the Plant where the former coal conveyor belt was located. WEM believes that arsenic is naturally occurring in the soils in this part of Burlington, and that even the background concentration is in excess of the guidance standard.

Cyanide was not reported above detection levels in any of the near surface soil sampled. WEM concludes that Cyanide is not a contaminant of concern.

Currently, the near surface soils are covered by a thin veneer of sod or asphalt and do not pose an immediate threat to public uses such as walking, light recreation, or boat storage. Potential dermal contact and/or ingestion are considered exposure pathways, but are not likely to occur during these uses.

Recommendation: Prior to making the decision whether it's necessary undertake additional soil sampling for PAH and/or arsenic, WEM recommends that a risk analysis be conducted to develop site specific target cleanup levels. The risk analysis should involve the following:

- Development of future use scenarios for the Site. It should be established whether future use will be of a residential, commercial, or industrial nature, and whether there are restrictions to particular uses.
- Development of exposure scenarios for future site users/workers.
- Use of standard point estimate risk assessment equations and a pre-determined maximum acceptable excess lifetime risk levels to develop use-specific target concentrations for PAHs (B(a)P-TE) and arsenic. The risk assessment for arsenic will need to take into consideration the background presence of this contaminant.

During the process, it may become apparent that further definition of the distribution of contamination is necessary. Once target cleanup levels are established, the need for and scope of soil remediation can be developed. Remediation of soils will very likely be necessary on a portion of the Site prior to redevelopment. The most cost-efficient and feasible remediation method will likely be to cap the soil with a clean layer of topsoil and to use institutional controls to limit future disturbance of the soils.

Contamination in Deep Soil

Conclusion: There are no significant contaminant concerns in the deeper soil (5'- 44' depth) under the Site. The one exception is the prior detection of TCE at a concentration in excess of the guidance level in the "hot spot" north of the Plant. While other petroleum and chlorinated VOCs are present in the soil in the 5-10 ft depth, the concentrations are all below guidance levels. The lack of detectable contamination at 10 ft, 20 ft and 44 ft rule out the potential presence of DNAPL in the deep aquifer. The low-level presence of two petroleum compounds in the deep aquifer are presumed to be from an upgradient source of contamination.

Recommendation: WEM does not believe that further characterization of VOC contamination in the soil is necessary at this time. If future redevelopment involves the need to excavate soil in the "hot spot" surrounding MW-3 and MW-4, then a remediation plan should be developed that involves excavation/disposal of the TCE contaminated soil combined with confirmatory sampling.

Contamination in Groundwater

Conclusion: There does not appear to be any deep aquifer contaminant concerns, and shallow groundwater contaminant concerns are limited to the presence of chlorinated VOCs in a plume under the Plant and an area to the north of the Plant. The concentrations of TCE and PCE are above Vermont's groundwater standards in the pre-mentioned shallow "hot spot". The remainder of the shallow plume consists of chlorinated compounds that are below standards. The source of contamination is not fully understood, but it is possible that the contaminant plume is the result of spills/leaks of solvents used for cleaning of machinery during former operation of the power plant.

Recommendation: Per VT DEC protocol, WEM recommends a continued groundwater monitoring program for wells MW-1, MW-2, MW-3, MW-7, MW-8, MW-11, MW-12, and MW-14 until there are two consecutive events in which the concentrations are below the VGES. Sampling should be conducted on a semi-annual basis in the Spring and Fall of each year. Samples should be analyzed by EPA Method 8260B.

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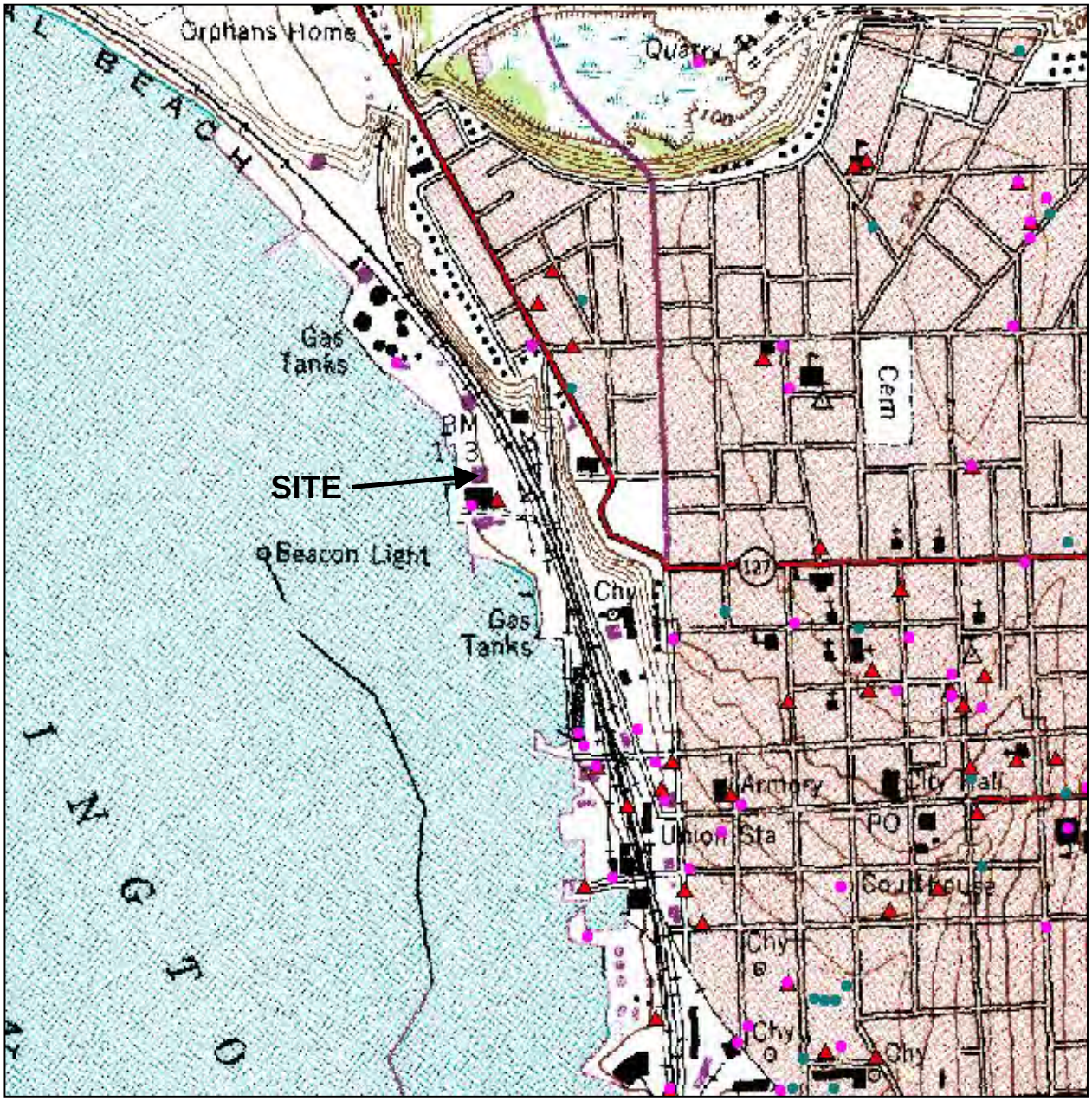
APPENDIX A

FIGURES

Figure 1: USGS Site Location Map
Figure 2: Site Plan
Figure 3: Groundwater Elevation Contour Map
Figure 4: Contaminant Contour Map – Dissolved VOCs
Figure 5: Contaminant Contour Map – Arsenic
Figure 6: Contaminant Contour Map - PAHs



LEGEND

- State-Listed Hazardous Waste Site
- Registered UST
- Registered Hazardous Waste Generator

N

WEM Job Number:	*02052-28*
Map Source:	*USGS Mapping 7.5 Minute Burlington, Vermont Quadrangle (1987)*
Data Source	*ANR databases, updated October 2003*

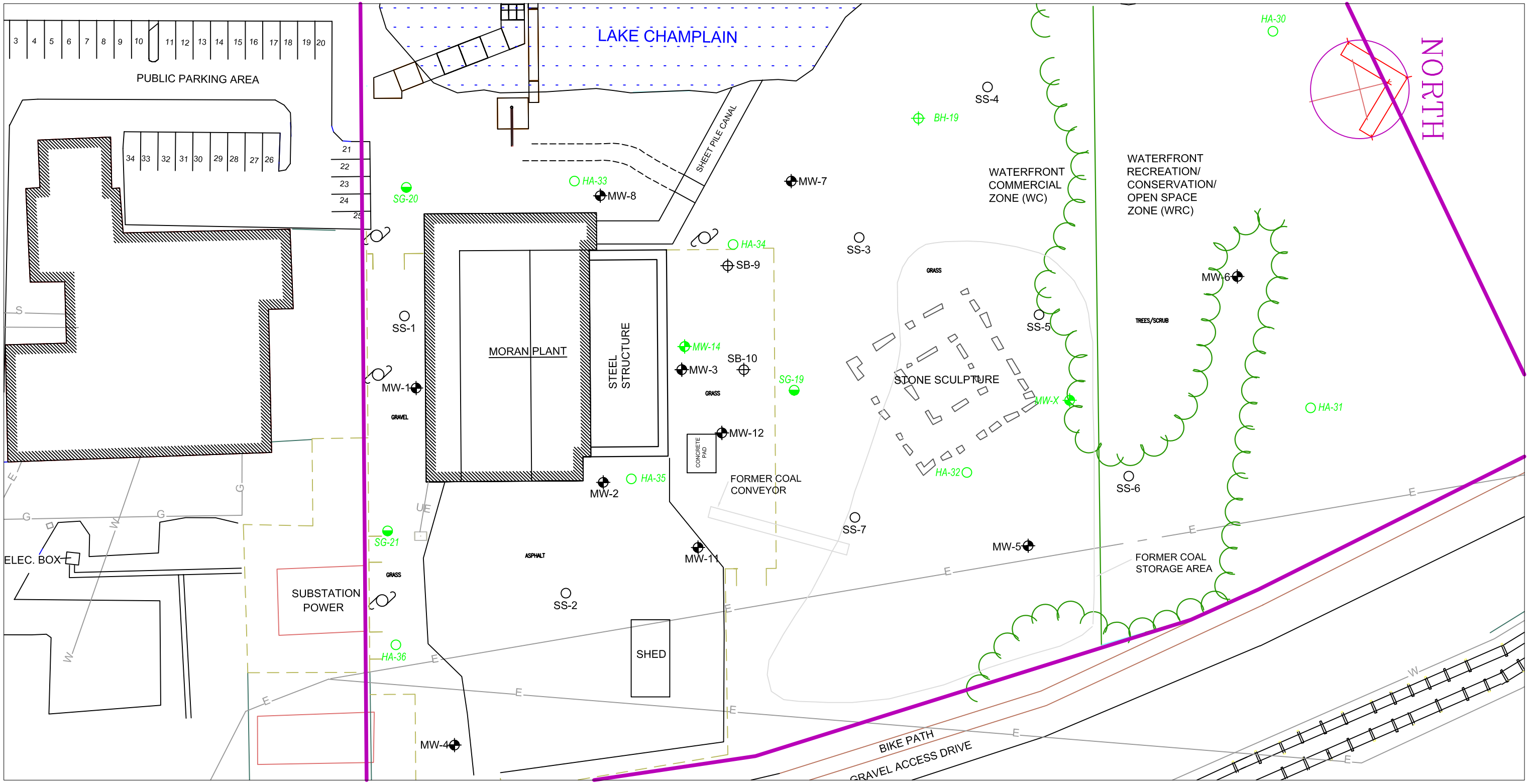
Waite Environmental Management, LLC

FIGURE 1
SITE LOCATION MAP

Moran Generating Plant (SMS Site #2005-3357)

Burlington, VT

Date: 03/07/05	Drawing No. 1	Scale: 1" = 1,200	By: MEW



50 25 0 50 150

GRAPHIC SCALE

DRAWING LEGEND

MW-1	MONITORING WELL INSTALLED BY WEM (2005)
SB-9	SOIL BORING INSTALLED BY WEM (2005)
SS-1	SHALLOW SOIL SAMPLE COLLECTED BY WEM (2005)
MW-X	MONITORING WELL INSTALLED BY OTHERS (1991,1999)
HA-31	HAND AUGER INSTALLED BY OTHERS (1999)
SG-21	SOIL GAS POINT INSTALLED BY OTHERS (1999)
BH-19	SOIL BORING INSTALLED BY OTHERS (1999)
	SITE BOUNDARY
E	ELECTRIC LINE
G	UNDERGROUND GAS LINE
W	UNDERGROUND WATER LINE
	FENCE

Monitoring well and sampling locations surveyed by W.E.M. in March and November 2005.

Base Map Source: Smith, Alvarez & Sienkiewycz Architects, titled "Moran model with topo#A212E". Map modified by WEM; monitoring well locations were surveyed by WEM on March 30, 2005.

Previous sampling locations taken from "Plate 1: Site Features, Urban Reserve Site, Burlington, Vermont" prepared b Lamoureux & Dickinson, 5/6/00. These locations were not surveyed by W.E.M.

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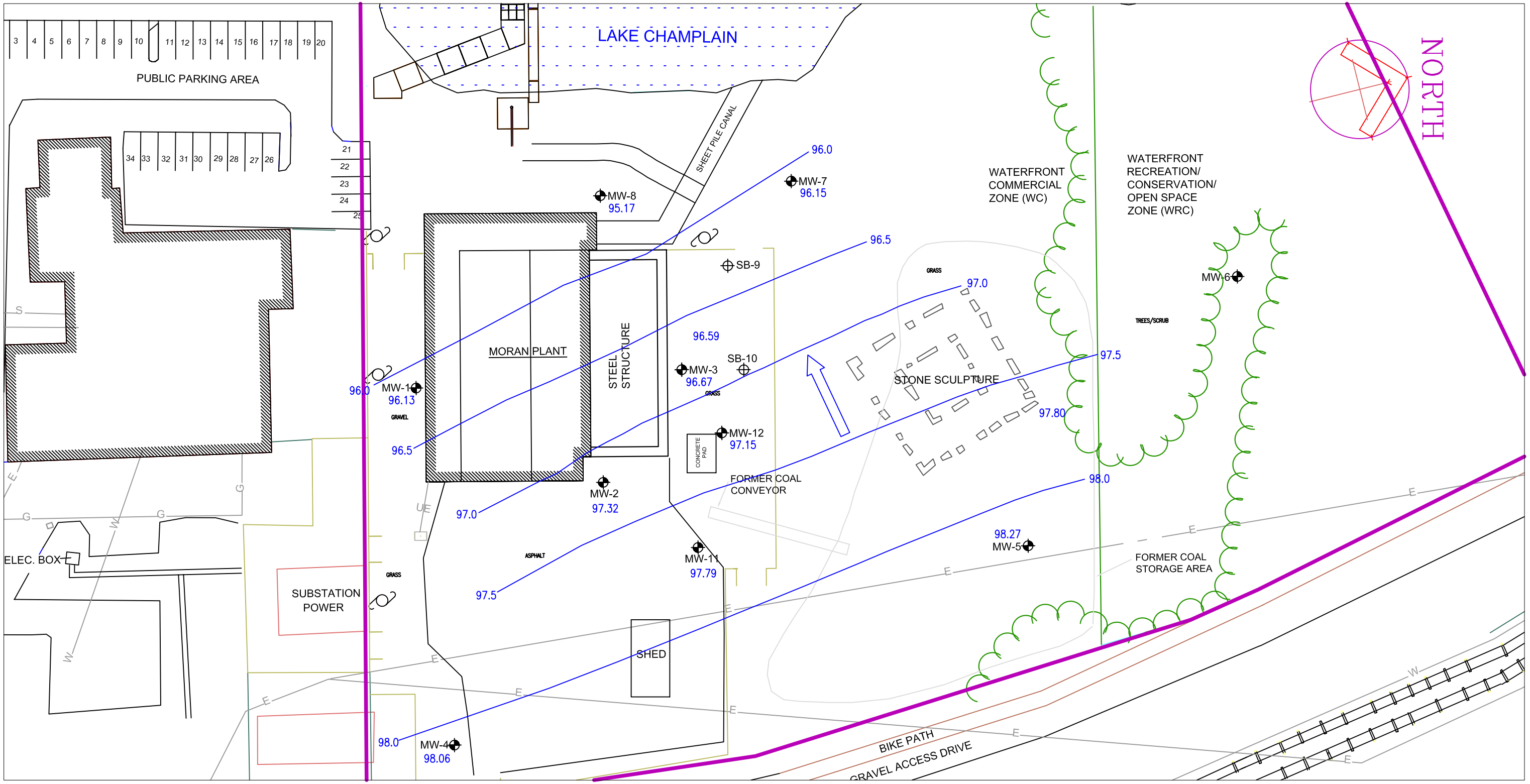
SCALE:1" = 50'	REVISION:	DRAWN BY: MEW
DATE: 12/6/05	DATE:	PROJECT #: 02052-28

SITE PLAN

MORAN GENERATING PLANT
BURLINGTON, VERMONT



Groundwater elevations measured by W.E.M on November 8 and 9, 2005.

50 25 0 50 150

GRAPHIC SCALE

DRAWING LEGEND

MW–1 98.03	MONITORING WELL WITH GROUNDWATER ELEVATION (FT)
98.0	GROUNDWATER ELEVATION CONTOUR (FT)
	GROUNDWATER FLOW DIRECTION

Source: Base map provided by Smith, Alvarez & Sienkiewycz Architects, titled "Moran model with topo#A212E". Map modified by WEM; monitoring well locations were surveyed by WEM on March 30, 2005 and on November 9, 2005.

All elevations are relative to an arbitrary benchmark of 100 ft at the rim of the well box for MW-1. Groundwater elevations measured by WEM on November 8, 2005.

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SCALE: 1" = 50'	REVISION:	DRAWN BY: MEW
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GROUNDWATER ELEVATION CONTOUR MAP
NOVEMBER 2005
MORAN GENERATING PLANT
BURLINGTON, VERMONT

LAKE CHAMPLAIN

PUBLIC PARKING AREA

SHEET PILE CANAL

MORAN PLANT

STEEL STRUCTURE

HOT SPOT

MW-1 4.7

MW-2 60.3

MW-3 44.3

MW-4

MW-5 ND

MW-6

MW-7 8.5

MW-8 8.0

MW-11 ND

MW-12

MW-X

SB-9

SB-10

FORMER COAL CONVEYOR

STONE SCULPTURE

WATERFRONT COMMERCIAL ZONE (WC)

WATERFRONT RECREATION/ CONSERVATION/ OPEN SPACE ZONE (WRC)

FORMER COAL STORAGE AREA

SUBSTATION POWER

SHED

ELEC. BOX

BIKE PATH

GRAVEL ACCESS DRIVE

GRAVEL

GRASS

ASPHALT

TREES/SCRUB

NORTH

50 25 0 50 150

GRAPHIC SCALE

DRAWING LEGEND

MW-1 98.03 — GROUNDWATER MONITORING WELL WITH TOTAL REPORTED CHLORINATED VOC CONCENTRATION (PPB)

50 — TOTAL REPORTED CHLORINATED VOC CONCENTRATION CONTOUR (PPB) DASHED WHERE INFERRED

DETECTABLE PETROLEUM COMPOUNDS IN SOIL (1–5 FT DEPTH)

Source: Base map provided by Smith, Alvarez & Sienkiewycz Architects, titled "Moran model with topo#A212E". Map modified by WEM; monitoring well and sampling locations were surveyed by WEM on March 30, 2005 and on November 9, 2005.

Total reported VOC concentrations are calculated as the sum of reported compounds (ppb) from EPA Method 8260B from samples collected by WEM in November 2005. Only overburden groundwater results shown; wells screened between 2-10 ft depth.

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SCALE: 1" = 50'	REVISION:	DRAWN BY: MEW
DATE: 1/3/06	DATE:	PROJECT #: 02052-28

CONTAMINANT CONTOUR MAP: DISSOLVED VOCs
OVERBURDEN GROUNDWATER - NOVEMBER 2005

MORAN GENERATING PLANT
BURLINGTON, VERMONT

LAKE CHAMPLAIN

PUBLIC PARKING AREA

SHEET PILE CANAL

MORAN PLANT

STEEL STRUCTURE

WATERFRONT COMMERCIAL ZONE (WC)

WATERFRONT RECREATION/ CONSERVATION/ OPEN SPACE ZONE (WRC)

NORTH

STONE SCULPTURE

FORMER COAL CONVEYOR

FORMER COAL STORAGE AREA

SUBSTATION POWER

SHED

ELEC. BOX

BIKE PATH

GRAVEL ACCESS DRIVE

GRASS

TREES/SCRUB

ASPHALT

GRAVEL

CONCRETE PAD

MW-1 21.9
MW-2 29.4
MW-3 18.4
MW-4
MW-5 41.6
MW-6 8.2
MW-7
MW-8 8.6
MW-11 13.9
MW-12 2.7
MW-14
MW-X
SB-9 11.5
SB-10
SS-1 3.6
SS-2 4.5
SS-3 15.4
SS-4 4.3
SS-5 0.8
SS-6 15.3
SS-7 88.5

50 25 0 50 150

GRAPHIC SCALE

DRAWING LEGEND

MW–1 21.9	MONITORING WELL / SOIL BORING WITH ARSENIC CONCENTRATION (PPM)
SS–1 3.6	SHALLOW SOIL SAMPLE WITH ARSENIC CONCENTRATION (PPM)
50	ARSENIC CONCENTRATION CONTOUR (PPM) DASHED WHERE INFERRED

Source: Base map provided by Smith, Alvarez & Sienkiewycz Architects, titled "Moran model with topo#A212E". Map modified by WEM; monitoring well locations were surveyed by WEM on March 30, 2005.

Arsenic concentrations are from samples collected by WEM on March 29, 2005, and November 1-3, 2005, analyzed by EPA Method 6010. Sampling depth approximately 0.5 ft.

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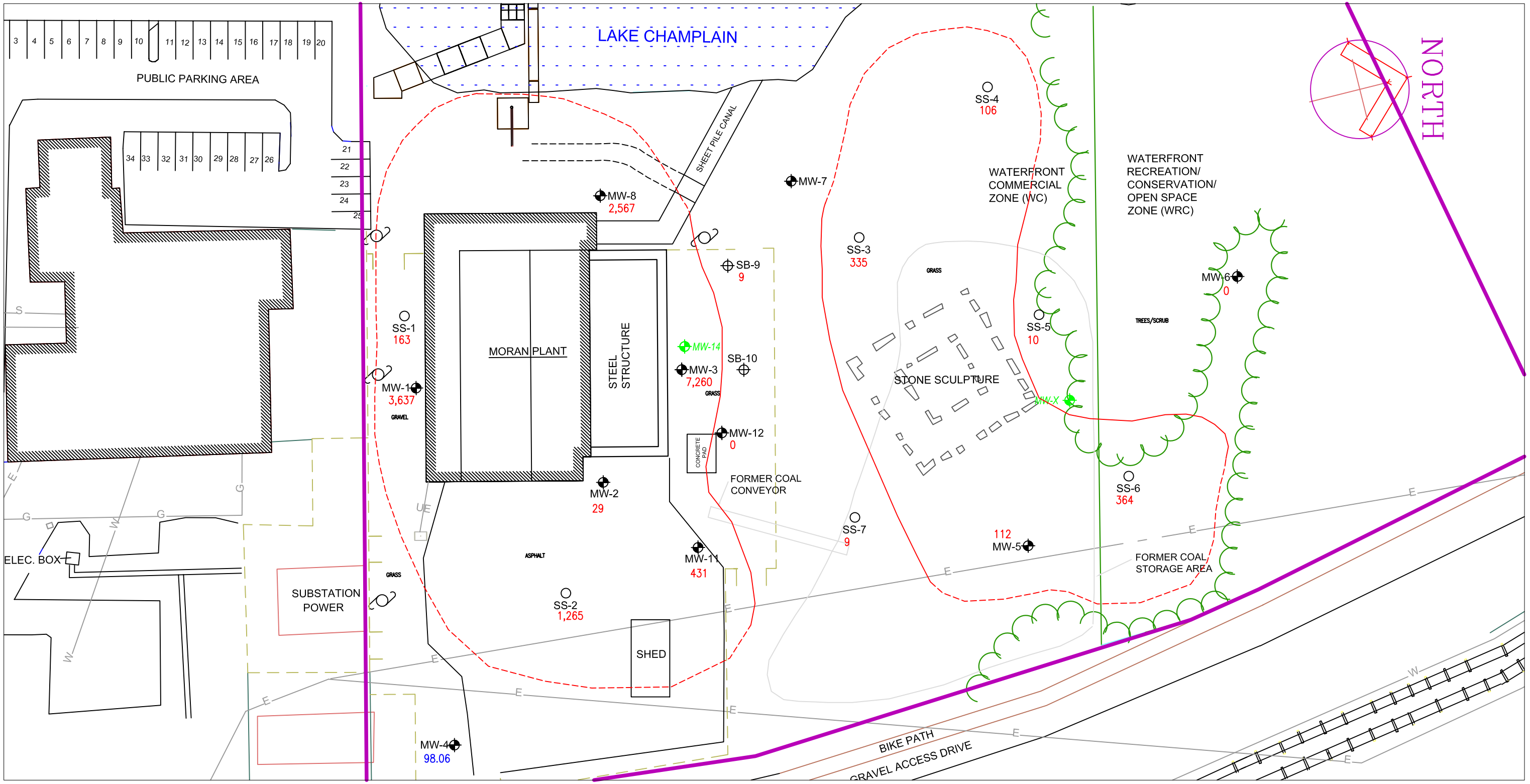
DATE: 1/7/06	DATE:	PROJECT #: 02052-28

CONTAMINANT CONTOUR MAP: ARSENIC
NEAR SURFACE SOIL SAMPLES

MORAN GENERATING PLANT
BURLINGTON, VERMONT



50 25 0 50 150

GRAPHIC SCALE

DRAWING LEGEND

MW–1 3,637	MONITORING WELL / SOIL BORING WITH B(a)P TE CONCENTRATION (PPB)
SS–1 163	SHALLOW SOIL SAMPLE WITH B(a)P TE CONCENTRATION (PPB)
	ESTABLISHED ZONE OF PAH CONTAMINATION >62 PPB B(a)P TE DASHED WHERE INFERRED

Source: Base map provided by Smith, Alvarez & Sienkiewycz Architects, titled "Moran model with topo#A212E". Map modified by WEM; monitoring well locations were surveyed by WEM on March 30, 2005.

Polycyclic aromatic hydrocarbon (PAH) concentrations are from samples collected by WEM on March 29, 2005, and November 1-3, 2005, analyzed by EPA Method 8270C. Concentrations have been converted into benzo(a)pyrene toxicity equivalence (B(a)P TE).

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DATE: 1/7/06	DATE:	PROJECT #: 02052–28

CONTAMINANT CONTOUR MAP: PAHs
NEAR SURFACE SOIL SAMPLES
MORAN GENERATING PLANT
BURLINGTON, VERMONT

APPENDIX B

TABLES

Table 1: Well Construction Details
Table 2: Liquid Level Monitoring Data
Table 3: Groundwater Quality Data: VOCs
Table 4: Soil Quality Data: VOCs
Table 5: Soil Quality Data: PAHs
Table 6: Soil Quality Data: Arsenic & Cyanide
Table 7: Quality Assurance/Quality Control Summary

TABLE 1
Well Construction Details
Moran Plant
Burlington, Vermont

Well I.D.	Installed By	Well Diameter (in)	Total Depth (ft)	Screened Interval (ft bgs)	TOC Elevation (ft)	Notes
MW-1	WEM - KENNEDY DRILLING	1.0	9.0	2' - 9'	99.37	flush mounted well box
MW-2	WEM - KENNEDY DRILLING	1.0	9.0	2' - 9'	99.54	flush mounted well box
MW-3	WEM - KENNEDY DRILLING	1.0	7.0	2' - 7'	101.00	flush mounted well box
MW-4	WEM - KENNEDY DRILLING	1.0	9.0	2' - 9'	99.52	flush mounted well box
MW-5	WEM - KENNEDY DRILLING	1.0	9.0	2 - 9'	102.52	stickup above grade
MW-6	WEM - KENNEDY DRILLING	1.0	6.0	1' - 6'	98.80	stickup above grade
MW-7	WEM - SDI	1.0	10.0	3' - 10'	98.74	flush mounted well box
MW-8	WEM - SDI	1.0	10.0	3' - 10'	98.84	flush mounted well box
MW-11	WEM - SDI	1.0	10.0	3' - 10'	99.87	flush mounted well box
MW-12	WEM - SDI	1.0	40.0	35' - 40'	99.76	flush mounted well box
MW-14	LAMEROUX & DICKINSON	2.0	9.70		100.51	flush mounted well box
MW-X	GRIFFIN INTL'	2.0	9.5		101.48	stickup above grade

Notes:

Elevations referenced to an elevation of 100 feet at the wellbox rim of well MW-1.

Blank spaces indicate that information is unavailable.

TABLE 2
Liquid Level Monitoring Data
Moran Plant
Burlington, Vermont

Measurement Date: 4/6/2005

Well I.D.	Top of Casing Elevation	Depth To Product	Depth To Water	Product Thickness	Specific Gravity Of Product	Water Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW-1	99.37	n/a	4.58					94.79
MW-2	99.54	n/a	2.25					97.29
MW-3	101.00	n/a	4.35					96.65
MW-4	99.52	n/a	1.49					98.03
MW-5	102.52	n/a	4.17					98.35
MW-6	98.80	n/a	4.01					94.79
MW-14		n/a	4.13					
MW-X	101.48	n/a	3.53					97.95

Measurement Date: 11/8-9, 2005

Well I.D.	Top of Casing Elevation	Depth To Product	Depth To Water	Product Thickness	Specific Gravity Of Product	Water Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW-1	99.37	n/a	3.24					96.13
MW-2	99.54	n/a	2.22					97.32
MW-3	101.00	n/a	4.33					96.67
MW-4	99.52	n/a	1.46					98.06
MW-5	102.52	n/a	4.25					98.27
MW-6	98.80	n/a	3.89					94.91
MW-7	98.74	n/a	2.59					96.15
MW-8	98.84	n/a	3.67					95.17
MW-11	99.87	n/a	2.08					97.79
MW-12	99.76	n/a	2.61					97.15
MW-14	100.51	n/a	3.92					96.59
MW-X	101.48	n/a	3.68					97.80

Notes:
All data in feet.
Elevations referenced to an elevation of 100 feet rim of wellbox of well MW-1.
n/a signifies that free product (LNAPL) was not detected.

TABLE 3
Groundwater Quality Data: VOCs
Moran Plant
Burlington, Vermont

Sample Location			MW-1		MW-2		MW-3		MW-4	MW-5		MW-6	MW-7
Sample Date		VGES	4/6/2005	11/8/2005	4/6/2005	11/8/2005	4/6/2005	11/9/2005	4/6/2005	4/6/2005	11/8/2005	4/6/2005	11/8/2005
VOCs (EPA Method 8260B)													
Benzene	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L (ppb)	1000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L (ppb)	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes	ug/L (ppb)	10000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,3,5-Trimethylbenzene	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L (ppb)	4.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	ug/L (ppb)	20.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U
MTBE	ug/L (ppb)	40.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
n-Butylbenzene	ug/L (ppb)	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene (Cumene)	ug/L (ppb)	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
n-Propylbenzene	ug/L (ppb)	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethane (PCE)	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	1.0 U	**4.0**	**7.0**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethane (TCE)	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	1.0 U	**11.8**	**28.0**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene (cis-1,2-DCE)	ug/L (ppb)	70.0	1.0 U	1.0 U	1.0 U	1.0 U	**3.6**	**4.4**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene (trans-1,2-DCE)	ug/L (ppb)	100.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl Chloride (VC)	ug/L (ppb)	2.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethane (1,1-DCA)	ug/L (ppb)	70.0	**3.4**	**4.7**	**24.1**	**39.9**	**2.7**	**2.2**	1.0 U	1.0 U	1.0 U	1.0 U	**8.5**
1,1,1-Trichloroethane (1,1,1-TCA)	ug/L (ppb)	200.0	1.0 U	1.0 U	**7.8**	**20.4**	**1.7**	**2.7**	1.0 U	**1.2 J**	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene (1,4-DCB)	ug/L (ppb)	75.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
TOTAL REPORTED VOCS	*ug/L (ppb)*		***3.4***	***4.7***	***31.9***	***60.3***	***23.8***	***44.3***	*ND*	***1.2***	*ND*	*ND*	***8.5***
UNIDENTIFIED PEAKS (EPA Method 8260B)													
TOTAL REPORTED VOCS	#	--	0	0	0	0	0	0	0	0	0	0	0

NOTES:

"U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value; "UJ" the detection limit is an estimated value

VGES = Vermont Groundwater Enforcement Standard (Table 1 of the Groundwater Protection Rule and Strategy 1/00)

Blank spaces indicate data not collected

EPA Method 8260B compounds not shown indicate that they were not detected above respective quantitation limits.

Results reported above quantitation limits are indicated in bold.

Values greater than the VGES are shaded.

1999 results from MW-14 were obtained from the report: "Phase II ESA, North 40 - Urban Reserve" prepared by Lamoureux & Dickenson, May 2000, and these data have not been formally validated.

TABLE 3
Groundwater Quality Data: VOCs
Moran Plant
Burlington, Vermont

Sample Location			MW-8	MW-11	MW-12	MW-14	
Sample Date		VGES	11/8/2005	11/8/2005	11/9/2005	10/1/1999	11/9/2005
VOCs (EPA Method 8260B)							
Benzene	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	2 U	1.0 U
Toluene	ug/L (ppb)	1000	1.0 U	1.0 U	1.0 U	2 U	1.0 U
Ethylbenzene	ug/L (ppb)	700	1.0 U	1.0 U	1.0 U	2 U	1.0 U
Xylenes	ug/L (ppb)	10000	2.0 U	2.0 U	2.0 U	4 U	2.0 U
1,3,5-Trimethylbenzene	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	2 U	1.0 U
1,2,4-Trimethylbenzene	ug/L (ppb)	4.0	1.0 U	1.0 U	1.0 U	2 U	1.0 U
Naphthalene	ug/L (ppb)	20.0	2.0 U	2.0 U	2.0 U	5 U	2.0 U
MTBE	ug/L (ppb)	40.0	2.0 U	2.0 U	2.0 U	5 U	2.0 U
n-Butylbenzene	ug/L (ppb)	--	1.0 U	1.0 U	1.0 U	2 U	1.0 U
Isopropylbenzene (Cumene)	ug/L (ppb)	--	1.0 U	1.0 U	1.0 U	2 U	1.0 U
n-Propylbenzene	ug/L (ppb)	--	1.0 U	1.0 U	1.0 U	2 U	1.0 U
Tetrachloroethane (PCE)	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	**3.9**	**1.1**
Trichloroethane (TCE)	ug/L (ppb)	5.0	1.0 U	1.0 U	1.0 U	**12**	**6.7**
cis-1,2-Dichloroethene (cis-1,2-DCE)	ug/L (ppb)	70.0	1.0 U	1.0 U	1.0 U	**13**	**2.2**
trans-1,2-Dichloroethene (trans-1,2-DCE)	ug/L (ppb)	100.0	1.0 U	1.0 U	1.0 U	5 U	1.0 U
Vinyl Chloride (VC)	ug/L (ppb)	2.0	2.0 U	2.0 U	2.0 U	5 U	2.0 U
1,1-Dichloroethane (1,1-DCA)	ug/L (ppb)	70.0	**6.2**	1.0 U	1.0 U	**9.2**	**9.6**
1,1,1-Trichloroethane (1,1,1-TCA)	ug/L (ppb)	200.0	**1.8**	1.0 U	1.0 U	**20**	**3.4**
1,4-Dichlorobenzene (1,4-DCB)	ug/L (ppb)	75.0	1.0 U	1.0 U	1.0 U		1.0 U
TOTAL REPORTED VOCS	*ug/L (ppb)*		***8.0***	*ND*	*ND*	***58***	***23.0***
UNIDENTIFIED PEAKS (EPA Method 8260B)							
TOTAL REPORTED VOCS	#	--	**>10**	0	0		**>10**

NOTES:

"U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value.

VGES = Vermont Groundwater Enforcement Standard (Table 1 of the Groundwater Protection Rule and Strategy 1/00)

Blank spaces indicate data not collected

EPA Method 8260B compounds not shown indicate that they were not detected above respective quantitation limits.

Results reported above quantitation limits are indicated in bold.

Values greater than the VGES are shaded.

1999 results from MW-14 were obtained from the report: "Phase II ESA, North 40 - Urban Reserve" prepared by Lamoureux & Dickenson, May 2000, and these data have not been formally validated.

TABLE 4
Soil Quality Data: VOCs
Moran Plant
Burlington, Vermont

			Aug-00		*Mar-05*					*Nov-05*						
Sample Location		EPA Region IX	HA-34	HA-35	MW-1	MW-2	MW-3	MW-5	MW-6	SB-9	SB-10	MW-11	MW-12	MW-12	MW-12	MW-12
Sample Depth Interval (ft)		PRG	0 - 2'	0 - 2'	9-10	9-10	6.5-7.0	7.5-8.5	5.5-6.0	0.8 - 1.3'	5.0 - 5.7'	5.0 - 5.3	1.0 - 1.6'	10'	20'	44'
Sample Date		Residential	8/12/1999	8/12/1999	3/29/2005	3/29/2005	3/29/2005	3/29/2005	3/29/2005	11/1/2005	11/1/2005	11/1/2005	11/1/2005	11/1/2005	11/1/2005	11/1/2005
PETROLEUM VOCs (EPA Method 8260B)																
Benzene	ug/Kg (ppb)	640	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**27.4**	**93.0**	**75.7**	19.0 U	20.0 U	20.0 U	19.0 U
Toluene	ug/Kg (ppb)	520,000	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**169**	**86.0**	**213**	**60.6**	20.0 U	20.0 U	19.0 U
Ethylbenzene	ug/Kg (ppb)	400,000	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**51.7**	**35.2**	**58.2**	**30.9**	20.0 U	20.0 U	19.0 U
Xylenes	ug/Kg (ppb)	270,000	20 U	16 U	20.0 U	18.0 U	34.0 U	22.0 U	26.0 U	**290**	**160**	**269**	**195**	40.0 U	40.0 U	38.0 U
1,3,5-Trimethylbenzene	ug/Kg (ppb)	21,000	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**21.7**	16.0 U	16.0 U	**25.7**	20.0 U	20.0 U	**44.6**
1,2,4-Trimethylbenzene	ug/Kg (ppb)	52,000	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**83.9**	**46.9**	**67.6**	**90.7**	20.0 U	20.0 U	**62.0**
Naphthalene	ug/Kg (ppb)	56,000	10 U	8 U	20.0 U	18.0 U	34.0 U	22.0 U	26.0 U	**105**	**57.1**	**105**	**153**	40.0 U	40.0 U	38.0 U
MTBE	ug/Kg (ppb)	32,000	25 U	20 U	20.0 U	18.0 U	34.0 U	22.0 U	26.0 U	26.0 U	32.0 U	32.0 U	38.0 U	40.0 U	40.0 U	38.0 U
n-Butylbenzene	ug/Kg (ppb)	240,000	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**15.5**	16.0 U	16.0 U	19.0 U	20.0 U	20.0 U	19.0 U
Isopropylbenzene (Cumene)	ug/Kg (ppb)	570,000	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**25.2**	**27.0**	**28.0**	**25.0**	20.0 U	20.0 U	19.0 U
n-Propylbenzene	ug/Kg (ppb)	240,000	10 U	8 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	**34.7**	**37.4**	**40.1**	**24.8**	20.0 U	20.0 U	19.0 U
CHLORINATED VOCs (EPA Method 8260B)																
Tetrachloroethane (PCE)	ug/Kg (ppb)	480	10 U	8 U	10.0 U	9.0 U	**222.**	11.0 U	13.0 U	13.0 U	16.0 U	13.0 U	19.0 U	20.0 U	20.0 U	19.0 U
Trichloroethane (TCE)	ug/Kg (ppb)	53	10 U	8 U	10.0 U	9.0 U	**253.**	11.0 U	13.0 U	13.0 U	16.0 U	13.0 U	19.0 U	20.0 U	20.0 U	19.0 U
cis-1,2-Dichloroethene (cis-1,2-DCE)	ug/Kg (ppb)	43,000	25 U	20 U	10.0 U	9.0 U	**36.4**	11.0 U	13.0 U	13.0 U	16.0 U	13.0 U	19.0 U	20.0 U	20.0 U	19.0 U
trans-1,2-Dichloroethene (trans-1,2-DCE)	ug/Kg (ppb)	69,000	25 U	20 U	10.0 U	9.0 U	17.0 U	11.0 U	13.0 U	13.0 U	16.0 U	13.0 U	19.0 U	20.0 U	20.0 U	19.0 U
Vinyl Chloride (VC)	ug/Kg (ppb)	79	25 U	20 U	20.0 U	18.0 U	34.0 U	22.0 U	26.0 U	26.0 U	32.0 U	26.0 U	38.0 U	40.0 U	40.0 U	26.0 U
1,1-Dichloroethane (1,1-DCA)	ug/Kg (ppb)	510,000	25 U	20 U	10.0 U	**33.8**	17.0 U	11.0 U	13.0 U	13.0 U	16.0 U	13.0 U	19.0 U	20.0 U	20.0 U	19.0 U
1,1,1-Trichloroethane (1,1,1-TCA)	ug/Kg (ppb)	1,200,000	25 U	20 U	10.0 U	**14.5**	**32.4**	11.0 U	13.0 U	**30.8**	16.0 U	**309**	**26.3**	20.0 U	20.0 U	19.0 U
1,4-Dichlorobenzene (1,4-DCB)	ug/Kg (ppb)	3,400			**12.9**	9.0 U	17.0 U	11.0 U	13.0 U	13.0 U	16.0 U	13.0 U	20.0 U	20.0 U	20.0 U	19.0 U
TOTAL REPORTED VOCS	*ug/Kg (ppb)*		*ND*	*ND*	*12.9*	*48.3*	*543.8*	*ND*	*ND*	*855*	*543*	*1,166*	*632*	*ND*	*ND*	*106.6*
UNIDENTIFIED PEAKS (EPA Method 8260B)																
UIPS	ug/Kg (ppb)	--			0	0	0	0	0	**>10**	**>10**	**>10**	**>10**	**3**	**1**	**>10**

NOTES:
"U" = not detected above listed quantitation limit; "J" = reported concentration is an estimated value.
EPA Region IX PRGs are Preliminary Remediation Goals for Residential Soil (October 2004).
Blank spaces indicate data not collected
EPA Method 8260B compounds not shown indicate that they were not detected above respective quantitation limits.
Results reported above quantitation limits are indicated in bold.
Values greater than the EPA Region IX PRGs are shaded.
1999 results for HA-34 and HA-35 were obtained from the report: "Phase II ESA, North 40 - Urban Reserve" prepared by Lamoureux & Dickinson; these data have not been formally validated.

TABLE 5
Soil Quality Data: PAHs
Moran Plant
Burlington, Vermont

RAW DATA

			Aug-00		*Mar-05*					*Nov-05*			
Sample Location	Units	EPA Region IX	HA-34	HA-35	MW-1	MW-2	MW-3	MW-5	MW-6	MW-8	SB-9	MW-11	MW-12
Sample Depth Interval (ft)		PRG	0 - 2'	0 - 2'	0.5	0.5	0.67	0.5	0.5	0.63'	0.58'	0.63'	0.54'
Sample Date		Residential	8/12/1999	8/12/1999	3/29/2005	3/29/2005	3/29/2005	3/29/2005	3/29/2005	11/1/2005	11/1/2005	11/1/2005	11/1/2005
POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) (EPA Method 8270)													
Acenapthene	ug/Kg (ppb)	3,700,000	350 U	350 U	**609.**	153. U	**1,480.**	76.0 U	84.0 U	**125.**	72.0 U	76.0 U	69.0 U
Acenapthylene	ug/Kg (ppb)	--	350 U	350 U	76.0 U	153. U	79.0 U	76.0 U	84.0 U	**105.**	72.0 U	76.0 U	69.0 U
Anthracene	ug/Kg (ppb)	22,000,000	350 U	350 U	**1,170.**	153. U	**2,910.**	76.0 U	84.0 U	**456.**	72.0 U	**89.6**	69.0 U
Benzo(a)anthracene	ug/Kg (ppb)	620	350 U	350 U	**2,810.**	153. U	**5,850.**	**147.**	84.0 U	**1,630.**	72.0 U	**309.**	69.0 U
Benzo(b&k)fluoranthene	ug/Kg (ppb)	620	350 U	350 U	**4,110.**	**288.**	**9,250.**	**189.**	84.0 U	**2,860.**	**89.5**	**562.**	69.0 U
Benzo(a)pyrene	ug/Kg (ppb)	62	350 U	350 U	**2,380.**	153. U	**4,350.**	**77.9**	84.0 U	**1,590.**	72.0 U	**250.**	69.0 U
Benzo(g,h,i)perylene	ug/Kg (ppb)	--	350 U	350 U	**1,490.**	153. U	**3,570.**	**80.1**	84.0 U	**844.**	72.0 U	**180.**	69.0 U
Chrysene	ug/Kg (ppb)	62,000	350 U	350 U	**2,330.**	**275.**	**6,490.**	**229.**	84.0 U	**1,500.**	72.0 U	**286.**	69.0 U
Dibenzo(a,h)anthracene	ug/Kg (ppb)	62	350 U	350 U	**422.**	153. U	**1,030.**	76.0 U	84.0 U	**443.**	72.0 U	**78.3**	69.0 U
Fluoranthene	ug/Kg (ppb)	2,300,000	350 U	350 U	**5,150.**	153. U	**11,000.**	**175.**	84.0 U	**3,840.**	**79.3**	**623.**	69.0 U
Fluorene	ug/Kg (ppb)	2,700,000	350 U	350 U	**502.**	153. U	**1,280.**	**76.7**	84.0 U	**145.**	72.0 U	76.0 U	69.0 U
Indeno(1,2,3-cd)pyrene	ug/Kg (ppb)	620	350 U	350 U	**1,410.**	153. U	**3,640.**	76.0 U	84.0 U	**839.**	72.0 U	**152.**	69.0 U
1-Methylnaphthalene	ug/Kg (ppb)	--	350 U	350 U	**121.**	**1,510.**	**274.**	**2,010.**	84.0 U	77. U	**75.3**	**257.**	69.0 U
2-Methylnaphthalene	ug/Kg (ppb)	--	350 U	350 U	**129.**	**2,370.**	**295.**	**2,450.**	84.0 U	77. U	**82.6**	**253.**	69.0 U
Naphthalene	ug/Kg (ppb)	56,000	350 U	350 U	**204.**	**1,070.**	**539.**	**1,670.**	84.0 U	77. U	72.0 U	**94.9**	69.0 U
Phenanthrene	ug/Kg (ppb)	--	350 U	350 U	**3,810.**	**1,050.**	**9,960.**	**1,030.**	84.0 U	**1,990.**	**74.6**	**538.**	69.0 U
Pyrene	ug/Kg (ppb)	2,300,000	350 U	350 U	**4,610.**	**208.**	**9,600.**	**186.**	84.0 U	**3,310.**	**80.8**	**558.**	69.0 U
TOTAL REPORTED PAHS	*ug/Kg (ppb)*		ND	ND	**31,257.**	**6,771.**	**71,518.**	**8,321.**	ND	**19,677.**	**482.**	**4,231.**	ND

BENZO(A)PYRENE TOXICITY EQUIVALENCE

			Aug-00		*Mar-05*					*Nov-05*			
Sample Location	Units	TEF	HA-34	HA-35	MW-1	MW-2	MW-3	MW-5	MW-6	MW-8	SB-9	MW-11	MW-12
Sample Depth Interval (ft)			0 - 2'	0 - 2'	0.5	0.5	0.67	0.5	0.5	0.63'	0.58'	0.63'	0.54'
Sample Date			8/12/1999	8/12/1999	3/29/2005	3/29/2005	3/29/2005	3/29/2005	3/29/2005	11/1/2005	11/1/2005	11/1/2005	11/1/2005
Benzo(a)anthracene	ug/Kg (ppb)	0.1	ND	ND	**281.**	ND	**585.**	**15.**	ND	**163.**	ND	**31.**	ND
Benzo(b&k) fluoranthene	ug/Kg (ppb)	0.1	ND	ND	**411.**	**29.**	**925.**	**19.**	ND	**286.**	**9.**	**56.**	ND
Benzo(a)pyrene	ug/Kg (ppb)	1.0	ND	ND	**2,380.**	ND	**4,350.**	**78.**	ND	**1,590.**	ND	**250.**	ND
Chrysene	ug/Kg (ppb)	0.001	ND	ND	**2.3**	**0.3**	**6.5**	**0.2**	ND	**1.5**	ND	**0.3**	ND
Dibenzo(a,h)anthracene	ug/Kg (ppb)	1.0	ND	ND	**422.**	ND	**1,030.**	ND	ND	**443.**	ND	**78.**	ND
Indeno(1,2,3-cd)pyrene	ug/Kg (ppb)	0.1	ND	ND	**141.**	ND	**364.**	ND	ND	**84.**	ND	**15.**	ND
B(a)P-TE			0.	0.	**3,637.**	**29.**	**7,260.**	**112.**	0.	**2,567.**	**9.**	**431.**	0.

NOTES:
U = not detected above listed quantitation limit; "J" = reported concentration is an estimated value.
TEF = Toxicity Equivalence Factor
EPA Region IX PRGs are Preliminary Remediation Goals for Residential Soil (October 2004).
Blank spaces indicate data not collected
Results reported above quantitation limits are indicated in bold.
Values greater than the EPA Region IX PRGs are shaded.
Results from HA-34 and HA-35 were obtained "Phase II ESA, North 40 - Urban Reserve" prepared by Lamoureux & Dickenson, May 2000; these data have not been formally validated.

TABLE 5
Soil Quality Data: PAHs
Moran Plant
Burlington, Vermont

RAW DATA

			Nov-05						
Sample Location	Units	EPA Region IX	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7
Sample Depth Interval (ft)		PRG	0.5'	0.67'	0.5'	0.42	0.5'	0.5'	0.5'
Sample Date		Residential	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005
POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) (EPA Method 8270)									
Acenapthene	ug/Kg (ppb)	3,700,000	71.0 U	**181.**	75.0 U	72.0 U	75.0 U	80.0 U	73.0 U
Acenapthylene	ug/Kg (ppb)	--	71.0 U	75.0 U	75.0 U	72.0 U	75.0 U	80.0 U	73.0 U
Anthracene	ug/Kg (ppb)	22,000,000	71.0 U	**398.**	75.0 U	72.0 U	75.0 U	80.0 U	73.0 U
Benzo(a)anthracene	ug/Kg (ppb)	620	**102.**	**774.**	**138.**	72.0 U	75.0 U	**100.**	73.0 U
Benzo(b&k)fluoranthene	ug/Kg (ppb)	620	**217.**	**1,440.**	**343.**	**124.**	**99.6**	**282.**	**93.5**
Benzo(a)pyrene	ug/Kg (ppb)	62	**123.**	**763.**	**186.**	**86.2**	75.0 U	**150.**	73.0 U
Benzo(g,h,i)perylene	ug/Kg (ppb)	--	**90.0**	**546.**	**184.**	**149.**	**103.**	**213.**	73.0 U
Chrysene	ug/Kg (ppb)	62,000	**118.**	**743.**	**160.**	72.0 U	75.0 U	**135.**	73.0 U
Dibenzo(a,h)anthracene	ug/Kg (ppb)	62	71.0 U	**234.**	**86.6**	72.0 U	75.0 U	**158.**	73.0 U
Fluoranthene	ug/Kg (ppb)	2,300,000	**214.**	**1,580.**	**210.**	**82.9**	75.0 U	**127.**	**83.7**
Fluorene	ug/Kg (ppb)	2,700,000	71.0 U	**170.**	75.0 U	72.0 U	75.0 U	80.0 U	73.0 U
Indeno(1,2,3-cd)pyrene	ug/Kg (ppb)	620	**74.9**	**462.**	**140.**	**75.4**	75.0 U	**176.**	73.0 U
1-Methylnaphthalene	ug/Kg (ppb)	--	71.0 U	**124.**	**109.**	72.0 U	**101.**	**323.**	73.0 U
2-Methylnaphthalene	ug/Kg (ppb)	--	71.0 U	**93.5**	**76.9**	72.0 U	**90.7**	**285.**	73.0 U
Naphthalene	ug/Kg (ppb)	56,000	71.0 U	**77.3**	75.0 U	72.0 U	75.0 U	**115.**	73.0 U
Phenanthrene	ug/Kg (ppb)	--	**103.**	**1,330.**	**116.**	72.0 U	**90.0**	**300.**	**73.9**
Pyrene	ug/Kg (ppb)	2,300,000	**180.**	**1,270.**	**202.**	**96.5**	75.0 U	**130.**	73.0 U
TOTAL REPORTED PAHS	*ug/Kg (ppb)*		**1,222.**	**10,186.**	**1,952.**	**614.**	**484.**	**2,494.**	**251.**

BENZO(A)PYRENE TOXICITY EQUIVALENCE

			Nov-05						
Sample Location	Units	TEF	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7
Sample Depth Interval (ft)			0.5'	0.67'	0.5'	0.42	0.5'	0.5'	0.5'
Sample Date			11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005
Benzo(a)anthracene	ug/Kg (ppb)	0.1	**10.**	**77.**	**14.**	ND	ND	**10.**	ND
Benzo(b&k) fluoranthene	ug/Kg (ppb)	0.1	**22.**	**144.**	**34.**	**12.**	**10.**	**28.**	**9.**
Benzo(a)pyrene	ug/Kg (ppb)	1.0	**123.**	**763.**	**186.**	**86.**	ND	**150.**	ND
Chrysene	ug/Kg (ppb)	0.001	**0.1**	**0.7**	**0.2**	ND	ND	**0.1**	ND
Dibenzo(a,h)anthracene	ug/Kg (ppb)	1.0	ND	**234.**	**87.**	ND	ND	**158.**	ND
Indeno(1,2,3-cd)pyrene	ug/Kg (ppb)	0.1	**7.**	**46.**	**14.**	**8.**	ND	**18.**	ND
B(a)P-TE			**163.**	**1,265.**	**335.**	**106.**	**10.**	**364.**	**9.**

NOTES:
U = not detected above listed quantitation limit; "J" = reported concentration is an estimated value.
TEF = Toxicity Equivalence Factor
EPA Region IX PRGs are Preliminary Remediation Goals for Residential Soil (October 2004).
Blank spaces indicate data not collected
Results reported above quantitation limits are indicated in bold.
Values greater than the EPA Region IX PRGs are shaded.
Results from HA-34 and HA-35 were obtained "Phase II ESA, North 40 - Urban Reserve" prepared by Lamoureux & Dickenson, May 2000; these data have not been formally validated.

TABLE 6
Soil Quality Data: Arsenic and Cyanide
Moran Plant
Burlington, Vermont

Sample Location		EPA Region IX	HA-34	HA-35	MW-1	MW-2	MW-3	MW-5	MW-6
Sample Depth Interval (ft)		PRG	0 - 2'	0 - 2'	0.5'	0.5'	0.67'	0.5'	0.5'
Sample Date		Residential	8/12/1999	8/12/1999	3/29/2005	3/29/2005	3/29/2005	3/29/2005	3/29/2005
Total Arsenic	mg/Kg (ppm)	0.39	**52.1**	**68.6**	**21.9**	**29.4**	**18.4**	**41.6**	**8.15**
Total Cyanide	mg/Kg (ppm)	1,200	NS	NS	NS	NS	NS	NS	NS

Sample Location		EPA Region IX	MW-8	SB-9	MW-11	MW-12			
Sample Depth Interval (ft)		PRG	0.63'	0.58'	0.63'	0.54'			
Sample Date		Residential	11/1/2005	11/1/2005	11/1/2005	11/1/2005			
Total Arsenic	mg/Kg (ppm)	0.39	**8.63**	**11.5**	**13.9**	**2.70**			
Total Cyanide	mg/Kg (ppm)	1,200	NS	0.050 U	NS	0.050 U			

Sample Location		EPA Region IX	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7
Sample Depth Interval (ft)		PRG	0.5'	0.67'	0.5'	0.42'	0.5'	0.5'	0.5'
Sample Date		Residential	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005	11/3/2005
Total Arsenic	mg/Kg (ppm)	0.39	**3.57**	**4.46**	**15.4**	**4.3**	**0.786**	**15.3**	**88.5**
Total Cyanide	mg/Kg (ppm)	1,200	0.092 U	0.092 U	NS	NS	NS	NS	NS

NOTES:
Arsenic analysis is by EPA Method EPA 6010; Cyanide analysis is by EPA 9012.
"U" = not detected above listed quantitation limit; "NS" = not sampled for this compound.
EPA Region IX PRGs are Preliminary Remediation Goals for Residential Soil (October 2004).
Results reported above quantitation limits are indicated in bold.
Values greater than the EPA Region IX PRGs are shaded.
Results from HA-34 and HA-35 were obtained "Phase II ESA, North 40 - Urban Reserve" prepared by Lamoureux & Dickenson, May 2000; these data have not been formally validated.

TABLE 7
Quality Assurance/Quality Control Summary
Moran Plant
Burlington, Vermont

SOIL ANALYTICAL DATA

Sample Location		SB-9	Duplicate	RPD
			("SB-X")	
Sample Date		11/1/2005	11/1/2005	
Acenapthene	ug/Kg (ppb)	72.0 U	72.0 U	na
Acenapthylene	ug/Kg (ppb)	72.0 U	72.0 U	na
Anthracene	ug/Kg (ppb)	72.0 U	72.0 U	na
Benzo(a)anthracene	ug/Kg (ppb)	72.0 U	72.0 U	na
Benzo(b&k)fluoranthene	ug/Kg (ppb)	**89.5**	**82.2**	8.50
Benzo(a)pyrene	ug/Kg (ppb)	72.0 U	72.0 U	na
Benzo(g,h,i)perylene	ug/Kg (ppb)	72.0 U	72.0 U	na
Chrysene	ug/Kg (ppb)	72.0 U	72.0 U	na
Dibenzo(a,h)anthracene	ug/Kg (ppb)	72.0 U	72.0 U	na
Fluoranthene	ug/Kg (ppb)	**79.3**	**76.1**	4.12
Fluorene	ug/Kg (ppb)	72.0 U	72.0 U	na
Indeno(1,2,3-cd)pyrene	ug/Kg (ppb)	72.0 U	72.0 U	na
1-Methylnaphthalene	ug/Kg (ppb)	**75.3**	**102.0**	-30.12
2-Methylnaphthalene	ug/Kg (ppb)	**82.6**	**107.0**	-25.74
Naphthalene	ug/Kg (ppb)	72.0 U	72.0 U	na
Phenanthrene	ug/Kg (ppb)	**74.6**	**85.8**	-13.97
Pyrene	ug/Kg (ppb)	**80.8**	**82.6**	-2.20
			Average RPD	**-9.90**
Benzene	ug/Kg (ppb)	**27.4**	12.0 U	na
Toluene	ug/Kg (ppb)	**169**	**44.3**	116.92
Ethylbenzene	ug/Kg (ppb)	**51.7**	**13.5**	117.18
Xylenes	ug/Kg (ppb)	**290**	**98**	98.97
1,3,5-Trimethylbenzene	ug/Kg (ppb)	**21.7**	12.0 U	na
1,2,4-Trimethylbenzene	ug/Kg (ppb)	**83.9**	**34.9**	82.49
Naphthalene	ug/Kg (ppb)	**105**	**56.1**	60.71
MTBE	ug/Kg (ppb)	26.0 U	12.0 U	na
n-Butylbenzene	ug/Kg (ppb)	**15.5**	12.0 U	na
Isopropylbenzene (Cumene)	ug/Kg (ppb)	**25.2**	12.0 U	na
n-Propylbenzene	ug/Kg (ppb)	**34.7**	12.0 U	na
			Average RPD	**95.25**

GROUNDWATER ANALYTICAL DATA

Sample Location		MW-3	Duplicate	RPD
			("MW-Z")	
Sample Date		11/9/2005	11/9/2005	
Tetrachloroethane (PCE)	ug/L (ppb)	**7.0**	**7.3**	-4.20
Trichloroethane (TCE)	ug/L (ppb)	**28.0**	**28.5**	-1.77
cis-1,2-Dichloroethene (cis-1,2-DCE)	ug/L (ppb)	**4.4**	**4.4**	0.00
trans-1,2-Dichloroethene (trans-1,2-DC	ug/L (ppb)	1.0 U	1.0 U	na
Vinyl Chloride (VC)	ug/L (ppb)	2.0 U	2.0 U	na
1,1-Dichloroethane (1,1-DCA)	ug/L (ppb)	**2.2**	**2.3**	-4.44
1,1,1-Trichloroethane (1,1,1-TCA)	ug/L (ppb)	**2.7**	**2.8**	-3.64
1,4-Dichlorobenzene (1,4-DCB)	ug/L (ppb)	1.0 U	1.0 U	na
			Average RPD	**-2.81**

The results of the laboratory analysis of the duplicate sample were analyzed using a relative percent difference (RPD) analysis. The RPD is defined as 100 times the difference in reported concentration between sample and duplicate, divided by the mean of the two samples. A small RPD indicates good correlation between sample and duplicate.
RPD values cannot be calculated ("n/a") for undetected compounds.

APPENDIX C

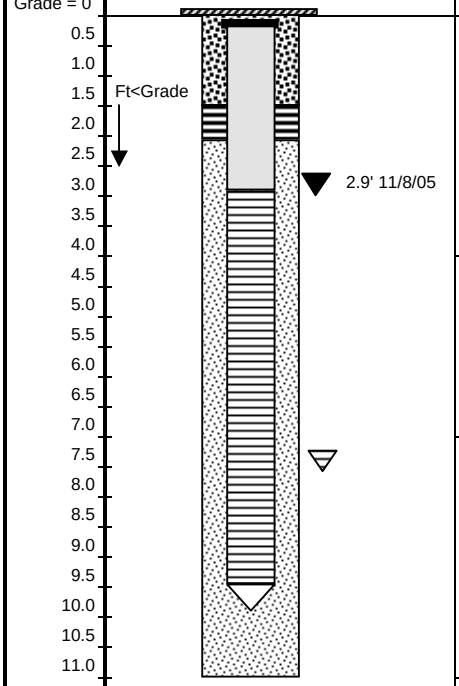
SOIL BORING LOGS

SOIL BORING LOG
WELL CONSTRUCTION RECORD
MW-7

Site Name: **Moran Plant**
Lake Street, Burlington, Vermont

WEM Project #	02052-28	Date Installed:	11/1/2005
VT DEC Site #	2005-3357	Drilling Method:	Direct Push; 2" / 3" probe
Drilled by :	SDI, Inc.	Sampling Method:	Direct Push: 2" x 48" clear soil liners
Logged by:	Miles Waite	Development Method:	Peristaltic Pump

Well Construction



Pen/Rec(') BlowCounts	Interval (ft)	PID (ppm)	Soil Characteristics	Letter Symbol
4.0' / 3.8' na	0 - 4.0'		0-6": **Top Soil**	
		0.1	6-17": Well Graded Fine **Sand**, black, some coal ash, loose	**SW**
		0.2	17-48": Well Graded Fine **Sand**, olive, dry	
3.0' / 2.2' na	4.0 - 7.0	0.0	48-68": Well Graded Fine **Sand**, olive, dry, loose	**SW**
			68-84": Silty Fine **Sand and Gravel**, 10% fines, olive, medium firm, damp	**SM**
4.0' / 3.1' na	7.0 - 11.0	0.0	84-111": Medium - Coarse **Sand and Gravel**, gray-black, wet	**SM**
		0.3	111-132": Well Graded Medium **Sand**, red-brown, red mottling, wet	**SW**
			End of Boring @ 11.0' Set well @ 10.0'	

Graphic

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Locking Plug.
- 1" ID, Schedule 40 PVC Riser.
- 1" ID, Schedule 40 PVC, 0.020"-Slotted Well Screen
- Plug Point
- Approximate Water Level During Drilling, below grade
- Static Water Level During Sampling

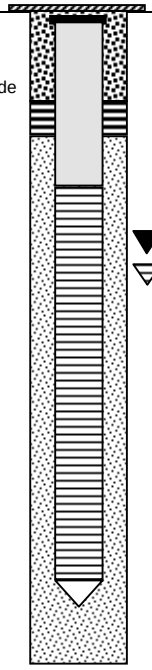
SOIL BORING LOG
WELL CONSTRUCTION RECORD
MW-8

Site Name: **Moran Plant**
Lake Street, Burlington, Vermont

WEM Project # 02052-28
VT DEC Site # 2005-3357
Drilled by : SDI, Inc.
Logged by: Miles Waite

Date Installed: 11/1/2005
Drilling Method: Direct Push; 2" probe operated by jack hammer
Sampling Method: Direct Push: 2" x 48" clear soil liners
Development Method: Peristaltic Pump

Grade = 0



Pen/Rec(') BlowCounts	Interval (ft)	PID (ppm)	Soil Characteristics	Letter Symbol
4.0' / 1.95' na	0 - 4.0'	0.0	0-6": **Top Soil** Well Graded Fine-Medium**Sand**, gray at top, brown below, some brick clasts, trace coal, loose Collected sample*SB-8 (6-9")* @ 08:57	**SW**
4.0' / 1.9' na	4.0 - 8.0	0.0	Medium - Coarse**Sand and Gravel**, brown, wet	**SW**
4.0' / 1.5' na	8.0 - 11.0	0.0	Well Graded Fine - Medium**Sand**, olive brown, wet	**SW**
			End of Boring @ 11.0' Set well @ 10.0'	

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Locking Plug.
- 1" ID, Schedule 40 PVC Riser.
- 1" ID, Schedule 40 PVC, 0.020"-Slotted Well Screen
- Plug Point
- Approximate Water Level During Drilling, below grade
- Static Water Level During Sampling

SOIL BORING LOG
WELL CONSTRUCTION RECORD
SB-9

Site Name: **Moran Plant**
Lake Street, Burlington, Vermont

WEM Project # 02052-28
VT DEC Site # 2005-3357
Drilled by : SDI, Inc.
Logged by: Miles Waite

Date Installed: 11/1/2005
Drilling Method: Direct Push; 2" probe
Sampling Method: Direct Push: 2" x 48" clear soil liners
Development Method: Peristaltic Pump

Grade = 0

NO WELL INSTALLED

Ft<Grade

Pen/Rec(') BlowCounts	Interval (ft)	PID (ppm)	Soil Characteristics	Letter Symbol
4.0' / 3.0' na	0 - 4.0'	0.0	0-3": **Top Soil** Well Graded Fine-Medium**Sand**, few pebbles, gray at top, black below 9", trace coal, loose Collected sample*SB-9 (4-10")* @ 10:10 Collected duplicate sample*SB-X* @ 10:10 Collected sample*SB-9 (10-16")* @ 10:12	**SW**
3.0' / 3.1' na	4.0 - 7.0	0.0	Well Graded Fine-Medium**Sand**, gray with zones of black, med. firm, wet	**SW**
3.0' / 2.3' na	7.0 - 10.0	0.0	Well Graded Fine**Sand**, 10% silt, gray-brown, firm, wet	**SW**
			End of Boring @ 10.0' No Well	

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Locking Plug.
- 1" ID, Schedule 40 PVC Riser.
- 1" ID, Schedule 40 PVC, 0.020"-Slotted Well Screen
- Plug Point
- Approximate Water Level During Drilling, below grade
- Static Water Level During Sampling

SOIL BORING LOG
WELL CONSTRUCTION RECORD
SB-10

Site Name: **Moran Plant**
Lake Street, Burlington, Vermont

WEM Project # 02052-28
VT DEC Site # 2005-3357
Drilled by : SDI, Inc.
Logged by: Miles Waite

Date Installed: 11/1/2005
Drilling Method: Direct Push; 2" probe
Sampling Method: Direct Push: 2" x 48" clear soil liners
Development Method: Peristaltic Pump

Grade = 0

NO WELL INSTALLED

Ft<Grade

Pen/Rec(') BlowCounts	Interval (ft)	PID (ppm)	Soil Characteristics	Letter Symbol
4.0' / 3.0' na	0 - 4.0'	0.0	0-8": **Top Soil with Gravel Fill** Well Graded Fine **Sand**, gray with black zones, trace coal, loose, dry	**SW**
3.0' / 3.2' na	4.0 - 7.0	0.3	Well Graded Fine **Sand**, trace gravel, gray-brown with zones of black, med. firm, wet @ 65" Collected sample *SB-10 (60-68")* @ 10:30	**SW**
3.0' / 2.3' na	7.0 - 10.0	0.2	Well Graded Fine **Sand**, trace gravel, gray-brown, med. firm, iron staining, wet	**SW**
			End of Boring @ 10.0' No Well	

Graphic

Legend

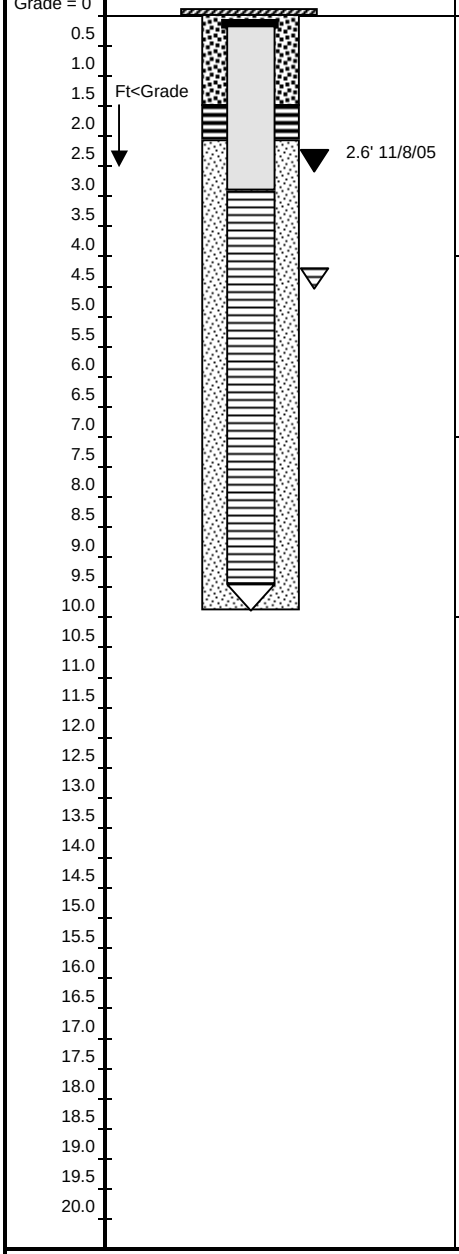
- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Locking Plug.
- 1" ID, Schedule 40 PVC Riser.
- 1" ID, Schedule 40 PVC, 0.020"-Slotted Well Screen
- Plug Point
- Approximate Water Level During Drilling, below grade
- Static Water Level During Sampling

SOIL BORING LOG
WELL CONSTRUCTION RECORD
MW-11

Site Name: **Moran Plant**
Lake Street, Burlington, Vermont

WEM Project #	02052-28	Date Installed:	11/1/2005
VT DEC Site #	2005-3357	Drilling Method:	Direct Push; 2" / 3" probe
Drilled by :	SDI, Inc.	Sampling Method:	Direct Push: 2" x 48" clear soil liners
Logged by:	Miles Waite	Development Method:	Peristaltic Pump

Well Construction



Pen/Rec(') BlowCounts	Interval (ft)	PID (ppm)	Soil Characteristics	Letter Symbol
4.0' / 2.7' na	0 - 4.0'	 0.0 0.0	0-7": **Top Soil** 7-20": **Coal** dust and clasts Well Graded Fine **Sand**, trace silt, gray-black until 40" brown below, loose, some iron staining, moist Collected sample *SB-11 (6-9")* @ 10:45	**SW**
3.0' / 3.9' na	4.0 - 7.0	0.0	Well Graded Fine **Sand**, light brown, wet below 50" Collected sample *SB-11 (60-63")* @ 10:55	**SW**
3.0' / 1.75' na	7.0 - 10.0	0.0	Well Graded Fine **Sand**, light brown, wet	**SW**
			End of Boring @ 11.0' Set well @ 10.0'	

Graphic

Legend

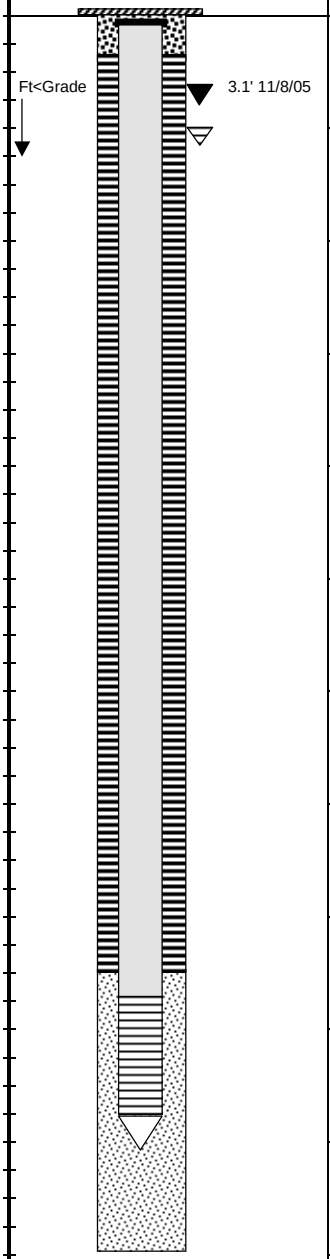
- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Locking Plug.
- 1" ID, Schedule 40 PVC Riser.
- 1" ID, Schedule 40 PVC, 0.020"-Slotted Well Screen
- Plug Point
- Approximate Water Level During Drilling, below grade
- Static Water Level During Sampling

SOIL BORING LOG
WELL CONSTRUCTION RECORD
MW-12

Site Name: **Moran Plant**
Lake Street, Burlington, Vermont

WEM Project #	02052-28	Date Installed:	11/1/2005
VT DEC Site #	2005-3357	Drilling Method:	Direct Push; 2" / 3" probe
Drilled by :	SDI, Inc.	Sampling Method:	Direct Push: 2" x 48" clear soil liners
Logged by:	Miles Waite	Development Method:	Peristaltic Pump

Well Construction



Pen/Rec(') BlowCounts	Interval (ft)	PID (ppm)	Soil Characteristics	Letter Symbol
4.0' / 1.0'	0 - 4.0'		Top Soil and Gravel Fill	
na		0.0	Well Graded Fine **Sand**, trace coal, gray	SW
			Collected sample *SB-12 (4-9")* @ 12:10	
			Collected sample *SB-12 (12-19")* @ 12:15	
4.0' / 3.7'	4.0 - 8.0'	0.2	Well Graded Fine - Medium **Sand**, black at top, tan below, loose,	SW
na			wet at 50"	
3.0' / 2.5'	8.0 - 12.0	2.5	Well Graded Medium - Coarse **Sand**, red-brown, med. firm, wet	SW
na				
			Collected sample *SB-12 (10')* @ 12:30	
4.0' / 2.5'	12.0 - 16.0'	4.0	Well Graded Medium **Sand**, gray-brown, med. firm, wet	SW
na				
4.0' / 0.8'	16.0 - 20.0'	0.6	Well Graded Medium **Sand**, gray-brown, med. firm, wet	SW
na				
4.0' / 2.8'	20.0 - 24.0'	0.2	Well Graded Medium **Sand**, gray-brown, med. firm, wet	SW
na				
			Collected sample *SB-12 (20')* @ 13:00	
4.0' / 3.3'	24.0 - 28.0'	0.2	288-310": Very Fine **Sand** with some silt, gray, dense	SW
na			310-322": Well Graded Medium **Sand**, red-brown, loose	
			322-336": Very Fine **Sand** with some silt, red-brown, dense	
4.0' / 3.6'	28.0 - 32.0'	0.0	336-342": Very Fine **Sand** with some silt, grey-brown	SW
na			342-384": Well Graded Medium **Sand**, red-brown	
4.0' / 2.9'	32.0 - 36.0'	0.0	Well Graded Fine - Medium **Sand**, orange-brown	SW
na				
4.0' / 3.5'	36.0 - 40.0'	0.0	432-444": Well Graded Fine - Medium **Sand**, orange-brown	SW
na			444-480": Fine **Silty Sand**, 30% fines, gray, dense	SM
4.0' / 3.6'	40.0 - 44.0'	0.0	Fine **Silty Sand**, 30% fines, gray-green, dense	SM
na				
			Collected sample *SB-12 (44')* @ 14:40	
			End of Boring @ 44.0'	
			Set well @ 40.0'	

Graphic

Legend

- Road Box with Bolt Down Cover, Set in Cement.
- Existing Surface.
- Bentonite Seal Placed in Annulus.
- Grade #1 Silica Sand Pack Placed in Annulus.
- Drill Cuttings Placed in Annulus.
- Locking Plug.
- 1" ID, Schedule 40 PVC Riser.
- 1" ID, Schedule 40 PVC, 0.020"-Slotted Well Screen
- Plug Point
- Approximate Water Level During Drilling, below grade
- Static Water Level During Sampling

APPENDIX D

LABORATORY REPORTS

APPENDIX E

SUPPLEMENTAL REPORTS/DOCUMENTATION