Proactive by Design

SHORT TERM RESPONSE ACTION PLAN (STRAP) ADDENDUM: HOLCIM DRIVEWAY

642 Allens Avenue / 125 Terminal Road
Providence, Rhode Island

May 30, 2017
GZA File No.: 03.0033554.90

PREPARED FOR:
Rhode Island Department of Environmental Management (RIDEM)
Providence, Rhode Island

ON BEHALF OF:
nationalgrid

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May 30, 2017
File No. 03.00033554.90

Via E-Mail and U.S. Mail

Mr. Joseph Martella
Rhode Island Department of Environmental Management (RIDEM)
Office of Waste Management
235 Promenade Street
Providence, Rhode Island 02908

Re: Short Term Response Action Plan (STRAP) Addendum
Holcim Driveway
642 Allens Avenue / 125 Terminal Road
Providence, Rhode Island
RIDEM Case No. 98-004 / Site Remediation File No. SR-28-1152

Dear Mr. Martella:

On behalf of the Narragansett Electric Company d/b/a National Grid (National Grid), GZA GeoEnvironmental, Inc. (GZA) is pleased to present to the Rhode Island Department of Environmental Management (RIDEM) the attached *Short Term Response Action Plan (STRAP)* which serves as an addendum to the RIDEM approved *STRAP* dated June 29, 2016 (and subsequent *STRAP Addendum* dated August 22, 2016) which covered remedial actions associated with the new dike road.

This *STRAP Addendum* describes proposed soil management activities (including the installation of an engineered cap) associated with the installation of a new driveway for the Holcim Cement Facility at the 642 Allens Avenue Site. The new driveway is designed to address safety concerns encountered during the construction of the new dike road at the liquefied natural gas (LNG) facility.

The new driveway is designed to address line of sight safety concerns associated with the existing driveway into the Holcim facility located at 125 Terminal Road. The new driveway will traverse south of the existing Holcim driveway towards the Holcim Cement Facility. This *STRAP Addendum* includes procedures for management of soil generated during the driveway earthwork as well as remedial actions associated with installation of an engineered cap designed to address potential exposure to impacted soils.

Should you have any questions or comments regarding the information presented herein, please do not hesitate to contact the undersigned or Amy Willoughby from National Grid at (781)907-3644.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Sophia Narkiewicz, P.E.
Assistant Project Manager

Margaret S. Kilpatrick, P.E.
Associate Principal

James J. Clark, P.E.
Senior Principal

Attachment: *STRAP Addendum: Holcim Driveway*

cc: Amy Willoughby, National Grid
William Howard, National Grid

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

On behalf of The Narragansett Electric Company (TNEC) d/b/a National Grid (National Grid), GZA GeoEnvironmental, Inc. (GZA) is pleased to present to the Rhode Island Department of Environmental Management (RIDEM) this *Short-Term Response Action Plan (STRAP) Addendum* for the former 642 Allens Avenue Manufactured Gas Plant (MGP) located in Providence, Rhode Island (herein referred to as the "Site"). A Project Locus Map is presented on Figure 1, *Cover Sheet, Index to Drawings and Locus Plan*. This *STRAP Addendum* describes soil management activities associated with the construction of a new driveway at the Holcim Cement Facility. In addition, this *STRAP Addendum* describes engineered caps to be installed in the area of the new driveway.

This *STRAP Addendum* has been prepared to address applicable requirements of Section 6.00 – Emergency or Short Term Response, of the RIDEM Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases (Remediation Regulations). This *STRAP Addendum* is intended to serve as an addendum to the RIDEM approved *STRAP* dated June 29, 2016 (and subsequent *STRAP Addendum* dated August 22, 2016) which covered remedial actions associated with the new dike road.

This *STRAP Addendum* describes proposed soil management activities and construction of an engineered cap associated with the installation of a new driveway for the Holcim Cement Facility at the Site. The new driveway was proposed at the Holcim facility to address safety concerns encountered during the construction of the new dike road at the neighboring LNG facility. The remedial actions associated with the construction of the new dike road were described in the July 29, 2016 *STRAP* and August 22, 2016 *STRAP Addendum*. RIDEM approved the dike road *STRAP* and *STRAP Addendum* via issuance of a *Short Term Response Action Approval (STRA)* Letter dated August 25, 2016.

This *STRAP Addendum* is subject to the Limitations included in Appendix A.

The following figures were prepared to accompany this *STRAP Addendum* and to illustrate the scope of the Project:

- Figure 1 - *Cover Sheet with Site Locus*
- Figure 2 - *Overall Aerial Photograph*
- Figure 3 –*Exploration Location Plan*
- Figure 4 - *Proposed Conditions Plan*
- Figure 5 – *Soil Erosion and Sedimentation Control Plan*

1.1 PROJECT OBJECTIVES

National Grid plans on installing a new asphalt paved driveway for the Holcim Cement Facility. The proposed new driveway will run from Terminal Road, along the southern edge of the lot and to the south of the existing Holcim driveway. This *STRAP Addendum* has been prepared to establish soil and groundwater management procedures associated with this new Holcim driveway (referred to herein as the "STRAP Addendum Area"). In addition, this *STRAP Addendum* presents proposed engineered caps to be installed with this new Holcim driveway.

1.2 PROJECT DESCRIPTION

The extent of the new driveway is illustrated on Figure 4, *Proposed Conditions Plan.*

As described herein, proposed *STRAP Addendum* activities include site preparation, clearing and grubbing, installing erosion and sedimentation controls, grading and off-Site disposal of excess materials, and the installation of an engineered cap in the area of the new driveway. Figure 2, *Overall Aerial Photograph*, presents the location of roads, landscaped areas and approximate property boundaries based on tax map information for the Site. The STRAP Addendum Area is approximately 12,000 square feet (SF) and will consist of a new engineered cap. Figure 4, *Proposed Conditions Plan*, presents the configuration of the new driveway.

As part of the new driveway construction, excavation will extend to depths of approximately 1 to 5 feet into the existing filled slope. All areas of soil disturbance will be capped as described herein to mitigate potential direct exposure to underlying impacted soils consistent with RIDEM requirements. Groundwater and soils approaching the water table are not expected to be encountered as part of this work. In accordance with the *Rhode Island Stormwater Design and Installation Standards Manual* (RISDISM), stormwater management is not required due the limited size of the new driveway (new impervious area of approximately 3,000 SF). All imported fill will be tested in accordance with the sampling requirements discussed in Section 4.3, below. It is currently estimated that approximately 1,100 cubic yards (CY) of soil will be removed to install the new driveway. The contractor may reuse Site soil, but only as subgrade material under the engineered cap (described below in Section 4.1). All excess soils will be disposed/recycled off-Site at a National Grid-approved facility.

1.3 REPORT ORGANIZATION

This *STRAP Addendum* is organized as follows:

- This section (Section 1.00) provides an introduction to the *STRAP Addendum* activities[1];
- Section 2.00 describes the nature and extent of observed impacts in the STRAP Addendum Area;
- Section 3.00 presents an evaluation of the potential volatile emissions associated with the *STRAP Addendum* including a determination related to the applicability of the RIDEM Air Pollution Control Permits (APC) (Regulation No. 9);
- Section 4.00 describes the proposed *STRAP Addendum* response activities, including soil management, proposed air monitoring, proposed capping activities and reporting; and
- Section 5.00 describes the anticipated schedule.

2.0 NATURE AND EXTENT OF OBSERVED IMPACTS IN THE STRAP ADDENDUM AREA

Thirteen (13) explorations (RCA-10, A54, A55, C74, C75, C76, C77, C78, C79, C80, C81, C88 and VHB-11) were completed proximate to the STRAP Addendum Area, to depths ranging from 8 to 18 feet below ground surface (bgs). There are no monitoring wells located in the STRAP Addendum Area (the closest monitoring well is GZ-101 located approximately 100 feet to the west of the STRAP Addendum Area). There were an additional five monitoring wells (RCA-9, RCA-10, RCA-31, VHB-11 and VHB-13) located within or proximate to the STRAP Addendum Area, however, all have been destroyed or

[1] Please refer to the July 29, 2016 *STRAP* for information about the background of the Site.

decommissioned. Boring and test pit logs are included in Appendix B. Figure 3, *Exploration Location Plan*, presents the location of explorations that have been completed in the STRAP Addendum Area.

2.1 FIELD SCREENING AND OBSERVATIONS OF IMPACTED SOILS

Explorations performed proximate to the STRAP Addendum Area indicate the presence of up to approximately 10 feet of fill underlain by outwash deposits and glacial till. The fill consists of sands and gravels with concrete, coal, asphalt, brick fragments, cinders, and cinder ash.

No visual and olfactory indicators of petroleum-like impacts, coal tar-like impacts, or former MGP residuals (i.e., oxide box waste with blue/green/yellow staining) were noted in explorations conducted in the STRAP Addendum Area. Total Volatile Organic Compounds (TVOCs) readings, based on PID measurements, ranged from non-detect (ND) to 7.3 parts per million by volume (ppmv) and were limited to one location, RCA-10 in subsurface soils (greater than 2 feet bgs).

2.2 SOIL ANALYTICAL RESULTS

Twenty-two (22) soil samples (ten (10) surface soil samples (collected between 0 and 2 feet bgs) and twelve (12) subsurface soil samples (collected deeper than 2 feet bgs)) were collected and analyzed proximate to the STRAP Addendum Area for total petroleum hydrocarbons (TPH), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), pesticides and inorganic compounds. As indicated in Table 1, the compounds detected at or in excess of the RIDEM Method 1 Criteria were arsenic (3.2 to 7 mg/kg), benzo(a)anthracene (0.52 to 23 mg/kg), benzo(a)pyrene (0.44 to 18 mg/kg), benzo(b)fluoranthene (0.54 to 24 mg/kg) and dibenzo(a,h)anthracene (ND to 1.4 mg/kg). No compounds were detected in excess of the RIDEM GB Leachability Criteria or the RIDEM Upper Concentration Limit (UCL). Table 1, *Analytical Soil Data*, presents the analytical soil data collected from the STRAP Addendum Area. Overall, the data indicates that materials in the STRAP Addendum Area are generally consistent with typical urban fill (i.e., low level detections of arsenic and certain PAHs).

2.3 GROUNDWATER AND NAPL MEASUREMENTS

There are no monitoring wells located in the STRAP Addendum Area (the closest monitoring well is GZ-101 located approximately 100 feet to the west of the STRAP Addendum Area). There were an additional five monitoring wells (RCA-9, RCA-10, RCA-31, VHB-11 and VHB-13) located within or proximate to the STRAP Addendum Area, however, all have been destroyed or decommissioned during projects at the Site. Based on elevation data from monitoring wells proximate to the STRAP Addendum Area (collected between 2011 and 2016), groundwater is expected to be encountered approximately 9 to 10 feet bgs. Light non-aqueous phase liquids (LNAPL) or dense non-phase liquids (DNAPL) has not been detected in any monitoring wells proximate to the STRAP Addendum Area. A summary of groundwater elevation data (collected between 2011 and 2016) is presented in Table 2, *Summary of Groundwater and NAPL Measurements*. Given the anticipated depth of excavation for the new driveway (up to approximately 5 feet bgs), groundwater is not expected to be encountered as part of the remedial activities conducted under this *STRAP Addendum*.

2.4 GROUNDWATER ANALYTICAL RESULTS

Seventeen (17) groundwater samples were collected within or proximate to the STRAP Addendum Area between 1994 and 2016 and analyzed for VOCs, SVOCs, TPH and total cyanide. As indicated in Table 3, *Analytical Groundwater Data,* VOCs and total cyanide levels ranged from non-detect to low levels, with no exceedances of RIDEM GB Groundwater Objectives and RIDEM GB UCLs. As described previously, groundwater is not expected to be encountered as part of the remedial activities conducted under this *STRAP Addendum*.

2.5 CONCLUSIONS

As presented above, soils proximate to the STRAP Addendum Area are generally consistent with typical urban fill (i.e., low level detections of arsenic and certain PAHs). Groundwater proximate to the STRAP Addendum Area is generally characterized by non-detect to low levels of VOCs, SVOCs and total cyanide, with no compounds detected at concentrations above the GB Groundwater Objectives. No measurable LNAPL or DNAPL has been detected in this area.

Based on these soil and groundwater conditions, the STRAP Addendum activities for the new driveway were designed to mitigate potential direct exposure to soils above the RIDEM Method 1 Criteria through installation of an engineered soil cap. In addition, this STRAP Addendum describes proposed soil management activities for installation of the new driveway. Given the limited anticipated depth of excavation for the new driveway (up to approximately 5 feet bgs), groundwater is not expected to be encountered as part of the remedial activities conducted under this *STRAP Addendum*.

3.0 STRAP ADDENDUM SPECIFIC – AIR EMISSION EVALUATION

Implementation of this *STRAP Addendum* will involve earthwork activities that require certain impacted soil excavation, re-grading, temporary stockpiling, and off-Site disposal. GZA performed an evaluation of the potential volatile emissions including a determination related to the applicability of the RIDEM Air Pollution Control Permits (APC) (Regulation No. 9).

The applicability of Regulation No. 9 was evaluated based on potential volatile emissions calculations/modeling performed consistent with published United States Environmental Protection Agency (EPA) guidance. As described below, this evaluation is a two-step process; first a conservative estimate of emissions potential is calculated and used to evaluate the applicability of Regulation No. 9 (see Section 3.1). If the results indicate an emission potential above the minimum quantities presented in Regulation No. 9, the results are further evaluated using predictive modeling using EPA guidance (Section 3.2). This emissions modeling was developed for the specific earthwork activities to be performed during this effort. As described further herein and in Appendix C, the results of this modeling indicate that earthwork activities completed under this *STRAP Addendum* do not have the potential to increase emissions by greater than the minimum quantities specified in Appendix A of RIDEM APC Regulation No. 9, and, therefore, a minor source permit is not required for this activity.

3.1 EMISSIONS POTENTIALS

The emissions potential of a particular analyte was calculated by conservatively assuming all of the mass of the analyte volatilizes during the associated earthwork activities. This would represent the maximum amount of mass of the specific analyte in the volume of soil being excavated and managed on-Site. It is based on analyte concentration, soil volume disturbed, and typical bulk density. The predicted modeled emissions, described in the subsequent section, are generally lower than these calculated emissions potentials.

Excavation activities for the proposed driveway will consist of grading and off-Site disposal of excess materials and installation of an engineered cap.

Using both the average and maximum concentrations for the potential calculation, GZA conservatively calculated the total emissions potential (in pounds (lbs)) for all the detected VOCs with minimum quantities included in Appendix A of RIDEM's APC Regulation No. 9. This calculation assumes all the mass of the VOCs in the associated soil is emitted, providing conservative upper bounds to potential excavation emissions. As indicated in Table C-2 (in Appendix C), based on this conservative analysis, naphthalene had an excavation emissions potential exceeding the RIDEM annual minimum

quantities (3 lbs/year) based on both the average and maximum measured concentrations. Based on these calculations, naphthalene was further evaluated using emissions modeling consistent with published EPA guidance to estimate the predicted emissions that would be generated during the planned *STRAP Addendum* implementation activities.

3.2 EMISSIONS MODELING

Based on the results of the emissions potentials calculations described above for the earthwork activities, predicted emissions related to naphthalene were calculated based on modeling. The predicted emissions modeling used the average concentration of naphthalene that was detected. Appendix C describes these emission modeling calculations, which were based on the following EPA guidance document:

- Eklund, et al. 1997. Air Emissions from the Treatment of Soils Contaminated with Petroleum Fuels and Other Substances. Prepared for U.S. Environmental Protection Agency Office of Air and Radiation and Office of Research and Development Washington, D.C. EPA-600/R-97-116. October.

The modeling results for the excavation activity are presented in Table C-3 (in Appendix C). GZA assumed that one re-handling event would occur for the earthwork activities when the excavated soil was loaded from stockpiles to trucks for subgrade backfilling on-Site or for disposal. Furthermore, GZA assumed that the bulk of the soil excavation activities would be conducted during the calendar year 2017.

Table C-3 (in Appendix C) and the following presents a summary of the modeled predicted total excavation emissions for naphthalene (expressed in pounds) compared to RIDEM's Minimum Quantities (expressed in pounds/year) published in Regulation No. 9, Appendix A.

Analyte	Total Modeled Excavation Emissions (lbs)	RIDEM Annual Minimum Quantity (lbs)
Naphthalene	0.0005	3

3.3 ESTIMATED EMISSIONS MODELING CONCLUSIONS

As described previously, RIDEM issued the *STRA Approval Letter* on August 25, 2016 for the Dike Access Road Project at the Site. The Dike Access Road *STRAP* activities began in August 2016 and is expected to be completed by July 2017. The following emissions were expected to be generated as part of the Dike Access Road *STRAP*:

Analyte	Total Modeled Excavation Emissions (lbs)	RIDEM Annual Minimum Quantity (lbs)
Naphthalene	0.003	3

Therefore, total emissions expected to be generated at the Site during the calendar year 2017[2] are:

Analyte	Cumulative Modeled Excavation Emissions (lbs) - 2016	RIDEM Annual Minimum Quantity (lbs)
Naphthalene	0.0035	3

[2] Estimated emissions for calendar year 2017 conservatively assume that all earthwork conducted as part of the Dike Access Road *STRAP* took place in 2017.

The results of this predictive modeling indicate that the *STRAP Addendum* earthwork activities do **not** have the potential to increase cumulative emissions for calendar year 2017 by greater than the minimum quantities as specified in Appendix A of RIDEM APC Regulation No. 9, and, therefore, a minor source permit is not required for the *STRAP Addendum* implementation work.

4.0 PROPOSED RESPONSE ACTIONS IN THE STRAP ADDENDUM AREA

The proposed *STRAP Addendum* activities include site preparation, clearing and grubbing, installing erosion and sedimentation controls, grading and off-Site disposal of excess materials, and the installation of an engineered cap.

The following figures were prepared to illustrate the scope of the *STRAP Addendum*:

- Figure 4 – *Proposed Conditions Plan; and*
- Figure 5 – *Soil Erosion and Sedimentation Control Plan.*

4.1 REMEDIAL CAPS

Engineered caps have been designed to mitigate direct exposure to underlying impacted soils across the approximately 12,000 SF STRAP Addendum Area. The following is a description of the engineered caps:

- Asphalt Engineered Cap (approximately 3,000 SF): the engineered cap will consist of 12-inches of import processed gravel, 3-inches of binder course asphalt overlain with 2-inches of top course;
- Topsoil Engineered Cap (approximately 7,000 SF): the engineered cap will consist of 6-inches of topsoil, 6-inches of import processed gravel, underlain by a non-woven geotextile; and
- Crushed Stone Engineered Cap (approximately 2,000 SF): the engineered cap will consist of 6-inches of crushed stone, 6-inches of import processed gravel, underlain by a non-woven geotextile.

The approximate extent of these engineered caps and details showing each cap type is depicted on Figure 4, *Proposed Conditions Plan*.

4.2 SOIL DISPOSAL

All soil disposal associated with the STRAP Addendum work will be performed in accordance with the July 29, 2016 *STRAP* Section 4.3.

4.3 IMPORT SAMPLING

All material imported for the STRAP Addendum work will be performed in accordance with the July 29, 2016 *STRAP* Section 4.4.

4.4 DEWATERING AND GROUNDWATER MANAGEMENT

As described previously, excavation dewatering is not anticipated to be required during performance of this work. However, in the event that groundwater is encountered and requires management, groundwater will be containerized into fractionation tanks and disposed off-Site at a licensed disposal/recycling facility approved by National Grid.

Groundwater is not allowed to be discharged directly to the ground surface, collection utilities, or neighboring water bodies. Copies of all manifest(s) and Bills of Lading (BOLs) documenting the off-Site disposal will be included in the *Short Term Response Action Closure Report* (described below in Section 4.10).

4.5 MONITORING WELLS

No monitoring wells are expected to be disturbed as part of the *STRAP Addendum*.

4.6 REQUIRED AIR MONITORING AND CONTROLS

The air monitoring program for this *STRAP Addendum* was developed based on the results of the STRAP Addendum Emissions Evaluation presented in Section 3.0, above. The air monitoring program for this *STRAP Addendum* is consistent with the air monitoring program presented in the RIDEM approved July 29, 2016 *STRAP (*Section 4.8) and previous air monitoring programs used for similar size/scope projects performed at the Site.

4.6.1 Perimeter Air Monitoring

During all Project earthwork activities, real time perimeter air monitoring will be performed involving the use of the following hand held instrumentation.

- Portable Photoionization Detector (PID) MiniRAE – this instrument measures TVOCs with a detection limit of 0.1 parts per million (ppm) or 100 parts per billion (ppb). TVOC readings will be measured at the perimeter of the STRAP Addendum Area approximately every two hours during each day or more frequently depending on field conditions (at least four times a day).

- DustTRAK Dust Meter – this instrument uses infrared electromagnetic radiation to sense airborne particles less than 10 microns in size. The detection limit for this instrument is 1 microgram per cubic meter ($\mu g/m^3$). Similar to the PID, the readings from this hand-held instrument will be measured at the perimeter of the STRAP Addendum Area approximately every two hours during each day or more frequently depending on field conditions (at least four times a day).

The use of hand held field equipment allows field personnel to alter monitoring locations based on the activity being performed and changing wind directions.

Perimeter TVOCs and respirable dust (PM_{10}) monitoring will be performed during all earthwork activities. This monitoring will include both any observations of odors or visual dust as well as measurements of TVOCs and respirable dust using field instruments. The following table presents the real-time monitoring threshold levels for the perimeter work area locations.

Real Time Monitoring – Action Levels	
Compound	**Perimeter**
Total Volatile Organic Compounds (TVOC)	1 ppm
Respirable Particulate Dust (PM_{10})	150 $\mu g/m^3$

4.6.2 Dust Controls

Dust control measures will be employed to mitigate the potential for release of airborne particulate matter beyond the limits of the Site in accordance with RIDEM *Air Pollution Control Regulation No. 5, Fugitive Dust*. Methods of dust control

will consist of sprinkling the ground surface with water and/or calcium chloride, covering of temporary stockpiles, mulching, or similar methods. If excessive dust generation occurs and cannot be reasonably controlled, the job shall be shut down by the environmental professional or National Grid until appropriate engineering control measures are implemented by the contractor.

4.6.3 Odor Controls

Odor and organic vapor control measures will be employed to mitigate the potential for release of odors and organic vapors during the *STRAP Addendum* work. Methods of control will consist of backfilling excavations, covering stockpiles or excavations with 6-mil polyethylene sheeting, application of specially engineered foams or other methods. If excessive odors or TVOCs readings occur and cannot be reasonably controlled, the job shall be shut down by the environmental professional or National Grid until appropriate engineering control measures are implemented by the contractor.

4.7 DECONTAMINATION PROTOCOL

At the conclusion of the construction activities and prior to removal from the Site, heavy equipment and tools will be decontaminated. At a minimum, soil will be brushed from the equipment and containerized prior to washing the equipment surfaces if needed. The containerized material will be sampled for disposal determination (as required) and then properly disposed/recycled at on off-Site licensed receiving facility. All liquid (water) will be containerized and sampled for disposal determination (as required), and then properly disposed at on off-Site facility.

4.8 SOIL STOCKPILE MANAGEMENT REQUIREMENTS

Impacted excavated materials will be temporarily staged on two layers of minimum 6-mil polyethylene sheeting in working stockpiles or in water-tight containers proximate to the excavation area. At the end of each work day and to the extent practical during the workdays, working stockpiles will be relocated to a central stockpile area and covered with a layer of polyethylene sheeting (or National Grid or environmental professional approved equivalent) to control the generation of wind-blown dusts and potential migration of soils with stormwater runoff. Stockpile areas will be equipped with appropriate controls to limit the loss of the cover and protect against storm water erosion. These controls will include the installation of Filtrexx Siltsoxx or equivalent surrounding the perimeter of the stockpiles and weighting the polyethylene cover with sand bags or concrete blocks. Stockpiles will be inspected daily by the environmental professional. Should tears or punctures be observed in either the polyethylene sheeting covering or underlying the piles, repairs shall be made immediately. Daily shutdown procedures shall include the covering and securing of all stockpiled material area with polyethylene sheeting and appropriately sized materials to secure the polyethylene sheeting in place. A typical material stockpile detail is shown on Figure 5, *Soil Erosion and Sedimentation Control Plan***.**

4.9 SEDIMENTATION AND EROSION CONTROLS REQUIREMENTS

Prior to the commencement of any Site work, staked Filtrexx Siltsoxx will be installed by the contractor to mitigate the potential migration of Site contaminants with stormwater run-off. The approximate layout of these sedimentation and erosion control devices is shown on Figure 5, *Soil Erosion and Sedimentation Control Plan***.**

4.10 REPORTING

These STRAP Addendum activities will be documented in the *Short Term Response Action Closure Report* described in the July 29, 2016 *STRAP*. The report will summarize field activities conducted as part of the *STRAP* and *STRAP Addendum(s)* and document the completion of the work described herein.

5.0 PROPOSED SCHEDULE

The schedule for implementation of the activities described herein will depend on receipt of the *STRAP Addendum* Approval from RIDEM. The current plan is to perform the work described herein beginning in early August 2017. We anticipate the implementation of the *STRAP Addendum* activities described herein will be completed by Fall 2017.

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TABLES

Table 1 Analytical Soil Data

Holcim Driveway
STRAP Addendum
642 Allens Avenue
Providence, Rhode Island

	RIDEM GB Leachability Criteria	RIDEM I/C DEC	RIDEM UCL	Units	Number of Samples	Number of Detections	Number of RIDEM Method 1 Exceedances	Range Detected		RCA-10		A54		A55		C74		C75		C76		C77	
										4-6 FT	12-14 FT	0-2 FT	8-10 FT	0-2 FT	6-8 FT	0-2 FT	2-4 FT	0-2 FT	8-10 FT	0-2 FT	10-12 FT	0-2 FT	8-10 FT
								Minimum	Maximum	1994		2/10/2000		2/9/2000		2/11/2000		2/10/2000		2/10/2000		2/10/2000	
Volatile Organic Compounds (VOCs)																							
Acetone	NE	10,000	10,000	mg/kg	22	6	0	0.76	2.1	ND	ND	ND	ND	1.9	2	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	NE	940	10,000	mg/kg	22	8	0	0.21	0.33	ND	ND	ND	0.25	0.26	0.24	ND	ND	0.23	ND	ND	ND	0.33	ND
Methylene Chloride	NE	760	10,000	mg/kg	22	1	0	0.01	0.01	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	NE	10,000	10,000	mg/kg	22	3	0	0.1	2.7	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	0.1	ND	ND
Toluene	54	10,000	10,000	mg/kg	22	1	0	0.88	0.88	ND	ND	0.88	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (Total)	NE	10,000	10,000	mg/kg	22	1	0	1.5	1.5	ND	ND	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Inorganic Compounds																							
Total Cyanide	NE	10,000	10,000	mg/kg	20	16	0	0.066	2.8	NA	NA	0.27	0.092	0.43	0.22	ND	ND	0.59	ND	0.33	ND	0.39	2.8
Antimony	NE	820	10,000	mg/kg	10	3	0	0.25	3.9	NA	NA	ND	NA	0.25	NA	ND	NA	ND	NA	ND	NA	ND	NA
Arsenic	NE	7	10,000	mg/kg	10	10	1	3.2	7	NA	NA	3.3	NA	5.3	NA	4.4	NA	5.8	NA	3.2	NA	5.7	NA
Barium	NE	10,000	10,000	mg/kg	10	10	0	17.5	46.6	NA	NA	24.2	NA	34.6	NA	17.5	NA	30.8	NA	33.5	NA	46.4	NA
Beryllium	NE	1.5	10,000	mg/kg	10	4	0	0.28	0.35	NA	NA	0.28	NA	0.35	NA	0.32	NA	ND	NA	ND	NA	ND	NA
Cadmium	NE	1,000	10,000	mg/kg	10	9	0	0.99	3.3	NA	NA	1.5	NA	3.3	NA	ND	NA	1.4	NA	1.9	NA	2	NA
Chromium	NE	10,000	10,000	mg/kg	10	10	0	7.9	213	NA	NA	29.6	NA	13.7	NA	7.9	NA	33.3	NA	11.8	NA	79.9	NA
Copper	NE	10,000	10,000	mg/kg	10	10	0	11.6	23.7	NA	NA	15.7	NA	18.1	NA	12.7	NA	12.7	NA	13.9	NA	23.7	NA
Iron	NE	NE	NE	mg/kg	20	20	0	6910	14000	NA	NA	9910	8760	9870	14000	13700	11200	9530	7780	13100	11800	13000	6910
Lead	NE	500	10,000	mg/kg	10	10	0	10	32.6	NA	NA	27.7	NA	32.5	NA	10.9	NA	16.5	NA	20.2	NA	15.2	NA
Mercury	NE	610	10,000	mg/kg	10	6	0	0.039	0.32	NA	NA	0.055	NA	0.2	NA	ND	NA	ND	NA	ND	NA	0.32	NA
Nickel	NE	10,000	10,000	mg/kg	10	10	0	6.8	68.5	NA	NA	16.9	NA	8	NA	13	NA	15.9	NA	11.4	NA	27.1	NA
Selenium	NE	10,000	10,000	mg/kg	10	6	0	2.4	5.9	NA	NA	5	NA	ND	NA	ND	NA	2.4	NA	5.9	NA	ND	NA
Silver	NE	10,000	10,000	mg/kg	10	2	0	0.66	1.6	NA	NA	ND	NA	0.66	NA	ND	NA	ND	NA	ND	NA	ND	NA
Zinc	NE	10,000	10,000	mg/kg	10	10	0	32.5	60.7	NA	NA	57.2	NA	57.2	NA	34.8	NA	36.5	NA	49.3	NA	36	NA
Polychlorinated Biphenyls (PCBs) and Pesticides																							
Aroclor 1254	10	10	10,000	mg/kg	20	1	0	0.42	0.42	NA	NA	0.42	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Chlordane	NE	NE	10,000	mg/kg	10	4	0	0.025	0.082	NA	NA	ND	NA	0.032	NA	ND	NA	ND	NA	ND	NA	ND	NA
delta-BHC	NE	NE	10,000	mg/kg	10	1	0	0.038	0.038	NA	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA
gamma-Chlordane	NE	NE	10,000	mg/kg	10	1	0	0.022	0.022	NA	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA
Semi-Volatile Organic Compounds (SVOCs)																							
2-Methylnaphthalene	NE	10,000	10,000	mg/kg	22	2	0	0.95	1.2	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	0.95	ND	ND
Acenaphthene	NE	10,000	10,000	mg/kg	22	1	0	2.2	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	NE	10,000	10,000	mg/kg	22	6	0	0.56	7.6	ND	ND	0.93	ND	ND	ND	ND	ND	ND	ND	ND	1.9	2.2	4.8
Anthracene	NE	10,000	10,000	mg/kg	22	10	0	0.54	16	ND	ND	1.6	ND	0.67	0.54	ND	ND	ND	ND	1.1	7.7	4.2	14
Benzo(a)anthracene	NE	7.8	10,000	mg/kg	22	10	2	0.52	23	ND	ND	3	ND	0.98	ND	ND	ND	0.52	ND	3.2	5.9	7.7	**11**
Benzo(a)pyrene	NE	0.8	10,000	mg/kg	22	9	8	0.44	18	ND	ND	**2.4**	ND	**0.8**	ND	ND	ND	ND	ND	**3.1**	**5.3**	**6**	**10**
Benzo(b)fluoranthene	NE	7.8	10,000	mg/kg	22	10	3	0.54	24	ND	ND	3.3	ND	1.1	ND	ND	ND	0.54	ND	4.1	5.8	**8.7**	**12**
Benzo(g,h,i)perylene	NE	10,000	10,000	mg/kg	22	6	0	0.55	6.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.96	1.8	1.5	3.8
Benzo(k)fluoranthene	NE	78	10,000	mg/kg	22	10	0	0.39	13	ND	ND	1.3	ND	0.44	ND	ND	ND	0.4	ND	1.4	2.8	2.8	5.3
Carbazole	NE	NE	10,000	mg/kg	22	6	0	0.52	16	ND	ND	1.3	ND	ND	ND	ND	ND	ND	ND	0.8	1.4	3.6	ND
Chrysene	NE	780	10,000	mg/kg	22	10	0	0.48	18	ND	ND	2.7	ND	0.88	ND	ND	ND	0.55	ND	2.9	6.1	6.2	1.2
Dibenzo(a,h)Anthracene	NE	0.8	10,000	mg/kg	22	1	1	1.4	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	NE	NE	10,000	mg/kg	22	4	0	0.6	5.9	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	0.78	1.6	ND
Fluoranthene	NE	10,000	10,000	mg/kg	22	13	0	0.46	33	ND	ND	4.7	ND	1.9	0.58	0.46	ND	0.86	ND	5.2	10	12	1.6
Fluorene	NE	10,000	10,000	mg/kg	22	6	0	0.44	9.9	ND	ND	0.98	ND	ND	ND	ND	ND	ND	ND	0.44	2	2.6	ND
Indeno(1,2,3-cd)Pyrene	NE	7.8	10,000	mg/kg	22	5	0	0.7	7.3	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	1	1.6	1.9	ND
Naphthalene	NE	10,000	10,000	mg/kg	22	5	0	0.61	15	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	1.5	2	0.61
Phenanthrene	NE	10,000	10,000	mg/kg	22	15	0	0.56	45	ND	ND	5.4	ND	2.5	2	0.64	0.56	0.63	ND	4.7	15	15	1.1
Pyrene	NE	10,000	10,000	mg/kg	22	13	0	0.4	46	ND	ND	5.2	ND	1.5	0.47	0.4	ND	0.9	ND	6.8	23	14	2

Notes:

Data is compared to RIDEM Method 1 Standards. Shaded results represent numerical exceedances of standards.

Table only indicates the compounds that were detected, other compounds were analyzed for, but not detected.

Table only shows explorations within the STRAP Addendum Area

ND - Not Detected NE - Not Established

NA - Not Analyzed mg/kg - milligrams per kilogram

Sample depths noted here are from original grade. This table presents data that has since been disturbed or regraded. As such, the final grades are unknown and as such the modified sampling depths are unknown.

While the Direct Exposure and Leachability Criteria apply to the vadose zone, certain subsurface soil samples were collected below the water table to define the nature and extent of impact. The data comparisons summarized in these tables compare all subsurface soil data (vadose and saturated zone) to the I/C-DEC, GB Leachability criteria and GB Upper Concentration Limit (UCLs).

Table 1 Analytical Soil Data

Holcim Driveway
STRAP Addendum
642 Allens Avenue
Providence, Rhode Island

	RIDEM GB Leachability Criteria	RIDEM I/C DEC	RIDEM UCL	Units	Number of Samples	Number of Detections	Number of RIDEM Method 1 Exceedances	Range Detected		C78		C79		C80		C81	
										0-2 FT	6-8 FT	0-2 FT	8-10 FT	0-2 FT	10-12 FT	0-2 FT	8-10 FT
								Minimum	Maximum	2/9/2000		2/10/2000		2/10/2000		2/10/2000	
Volatile Organic Compounds (VOCs)																	
Acetone	NE	10,000	10,000	mg/kg	22	6	0	0.76	2.1	2.1	1.8	1.3	ND	ND	ND	0.76	ND
Chloroform	NE	940	10,000	mg/kg	22	8	0	0.21	0.33	0.26	0.22	ND	ND	ND	ND	ND	0.21
Methylene Chloride	NE	760	10,000	mg/kg	22	1	0	0.01	0.01	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	NE	10,000	10,000	mg/kg	22	3	0	0.1	2.7	ND	ND	ND	ND	ND	ND	2.7	ND
Toluene	54	10,000	10,000	mg/kg	22	1	0	0.88	0.88	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (Total)	NE	10,000	10,000	mg/kg	22	1	0	1.5	1.5	ND	ND	ND	ND	ND	ND	ND	ND
Inorganic Compounds																	
Total Cyanide	NE	10,000	10,000	mg/kg	20	16	0	0.066	2.8	0.098	0.1	0.89	2.7	0.3	0.09	0.55	0.066
Antimony	NE	820	10,000	mg/kg	10	3	0	0.25	3.9	ND	NA	3.9	NA	3.2	NA	ND	NA
Arsenic	NE	7	10,000	mg/kg	10	10	1	3.2	7	5.2	NA	**7**	NA	5.3	NA	4.7	NA
Barium	NE	10,000	10,000	mg/kg	10	10	0	17.5	46.6	41.1	NA	46.6	NA	45.5	NA	39.7	NA
Beryllium	NE	1.5	10,000	mg/kg	10	4	0	0.28	0.35	0.28	NA	ND	NA	ND	NA	ND	NA
Cadmium	NE	1,000	10,000	mg/kg	10	9	0	0.99	3.3	0.99	NA	2	NA	2	NA	2.2	NA
Chromium	NE	10,000	10,000	mg/kg	10	10	0	7.9	213	8.1	NA	213	NA	174	NA	76.5	NA
Copper	NE	10,000	10,000	mg/kg	10	10	0	11.6	23.7	11.6	NA	14.2	NA	14.2	NA	17.2	NA
Iron	NE	NE	NE	mg/kg	20	20	0	6910	14000	11900	10500	12500	13500	12900	11200	12900	11800
Lead	NE	500	10,000	mg/kg	10	10	0	10	32.6	10	NA	19.3	NA	14.6	NA	32.6	NA
Mercury	NE	610	10,000	mg/kg	10	6	0	0.039	0.32	0.039	NA	0.096	NA	0.063	NA	ND	NA
Nickel	NE	10,000	10,000	mg/kg	10	10	0	6.8	68.5	6.8	NA	68.5	NA	55.4	NA	31.1	NA
Selenium	NE	10,000	10,000	mg/kg	10	6	0	2.4	5.9	ND	NA	4.3	NA	4.8	NA	5.5	NA
Silver	NE	10,000	10,000	mg/kg	10	2	0	0.66	1.6	1.6	NA	ND	NA	ND	NA	ND	NA
Zinc	NE	10,000	10,000	mg/kg	10	10	0	32.5	60.7	32.5	NA	38.3	NA	34.8	NA	60.7	NA
Polychlorinated Biphenyls (PCBs) and Pesticides																	
Aroclor 1254	10	10	10,000	mg/kg	20	1	0	0.42	0.42	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Chlordane	NE	NE	10,000	mg/kg	10	4	0	0.025	0.082	ND	NA	0.025	NA	0.035	NA	0.082	NA
delta-BHC	NE	NE	10,000	mg/kg	10	1	0	0.038	0.038	ND	NA	ND	NA	ND	NA	0.038	NA
gamma-Chlordane	NE	NE	10,000	mg/kg	10	1	0	0.022	0.022	ND	NA	0.022	NA	ND	NA	ND	NA
Semi-Volatile Organic Compounds (SVOCs)																	
2-Methylnaphthalene	NE	10,000	10,000	mg/kg	22	2	0	0.95	1.2	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	NE	10,000	10,000	mg/kg	22	1	0	2.2	2.2	ND	ND	ND	ND	ND	ND	2.2	ND
Acenaphthylene	NE	10,000	10,000	mg/kg	22	6	0	0.56	7.6	ND	ND	ND	ND	0.56	ND	7.6	ND
Anthracene	NE	10,000	10,000	mg/kg	22	10	0	0.54	16	ND	0.55	ND	ND	1.4	ND	16	ND
Benzo(a)anthracene	NE	7.8	10,000	mg/kg	22	10	2	0.52	23	ND	ND	0.61	ND	3.3	ND	**23**	ND
Benzo(a)pyrene	NE	0.8	10,000	mg/kg	22	9	8	0.44	18	ND	ND	0.44	ND	**2.5**	ND	**18**	ND
Benzo(b)fluoranthene	NE	7.8	10,000	mg/kg	22	10	3	0.54	24	ND	ND	0.56	ND	3.4	ND	**24**	ND
Benzo(g,h,i)perylene	NE	10,000	10,000	mg/kg	22	6	0	0.55	6.1	ND	ND	ND	ND	0.55	ND	6.1	ND
Benzo(k)fluoranthene	NE	78	10,000	mg/kg	22	10	0	0.39	13	ND	ND	0.39	ND	1.8	ND	13	ND
Carbazole	NE	NE	10,000	mg/kg	22	6	0	0.52	16	ND	ND	ND	ND	0.52	ND	16	ND
Chrysene	NE	780	10,000	mg/kg	22	10	0	0.48	18	ND	ND	0.48	ND	2.9	ND	18	ND
Dibenzo(a,h)Anthracene	NE	0.8	10,000	mg/kg	22	1	1	1.4	1.4	ND	ND	ND	ND	ND	ND	**1.4**	ND
Dibenzofuran	NE	NE	10,000	mg/kg	22	4	0	0.6	5.9	ND	ND	ND	ND	ND	ND	5.9	ND
Fluoranthene	NE	10,000	10,000	mg/kg	22	13	0	0.46	33	ND	0.67	0.83	ND	5.5	ND	33	ND
Fluorene	NE	10,000	10,000	mg/kg	22	6	0	0.44	9.9	ND	ND	ND	ND	0.63	ND	9.9	ND
Indeno(1,2,3-cd)Pyrene	NE	7.8	10,000	mg/kg	22	5	0	0.7	7.3	ND	ND	ND	ND	ND	ND	7.3	ND
Naphthalene	NE	10,000	10,000	mg/kg	22	5	0	0.61	15	ND	ND	ND	ND	ND	ND	15	ND
Phenanthrene	NE	10,000	10,000	mg/kg	22	15	0	0.56	45	1.5	2.1	0.73	ND	4.9	ND	45	ND
Pyrene	NE	10,000	10,000	mg/kg	22	13	0	0.4	46	ND	0.56	0.86	ND	6.1	ND	46	ND

Notes:

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Table 2 Summary of Groundwater and NAPL Gauging
Holcim Driveway
STRAP Addendum
642 Allens Avenue
Providence, Rhode Island

Well ID	Surveyed Elevations			Well Installation Details					Range of LNAPL Observed (feet)	Range of DNAPL Observed (feet)	August 2011					February 2012					July 2012				
	Top of Casing Elevation (Feet)	Top of PVC Elevation (Feet)	Grade Elevation (Feet)	Type of Well	Well Depth Modifier	Date of Installation	Measured Well Depth (feet bgs)	Screened Interval (feet bgs)			Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)	Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)	Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)
VHB-13	12.88	12.72	13.34	Roadbox	Shallow	1/16/2002	16.56	7 - 17	NP	NP	10.47	15.90	2.25	NP	NP	10.73	15.86	1.99	NP	NP	10.5	15.84	2.22	NP	NP
GZ-101	13.43	13.10	13.43	Roadbox	Shallow	4/29/2004	20.21	10 - 20	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes
Elevations are relative to NAVD88
NP - Indicates No Product observed.
Blanks indicate no measurement collected on that particular day.

Table 2 Summary of Groundwater and NAPL Gauging
Holcim Driveway
STRAP Addendum
642 Allens Avenue
Providence, Rhode Island

Well ID	Surveyed Elevations			Well Installation Details					Range of LNAPL Observed (feet)	Range of DNAPL Observed (feet)	February 2013					November 2013					June 2014				
	Top of Casing Elevation (Feet)	Top of PVC Elevation (Feet)	Grade Elevation (Feet)	Type of Well	Well Depth Modifier	Date of Installation	Measured Well Depth (feet bgs)	Screened Interval (feet bgs)			Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)	Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)	Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)
VHB-13	12.88	12.72	13.34	Roadbox	Shallow	1/16/2002	16.56	7 - 17	NP	NP	10.71	15.85	2.01	NP	NP	10.9	15.86	1.82	NP	NP	10.45	15.95	2.27	NP	NP
GZ-101	13.43	13.10	13.43	Roadbox	Shallow	4/29/2004	20.21	10 - 20	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes
Elevations are relative to NAVD88
NP - Indicates No Product observed.
Blanks indicate no measurement collected on that particular day.

Table 2 Summary of Groundwater and NAPL Gauging
Holcim Driveway
STRAP Addendum
642 Allens Avenue
Providence, Rhode Island

Well ID	Surveyed Elevations			Well Installation Details					Range of LNAPL Observed (feet)	Range of DNAPL Observed (feet)	October 2014					April 2015					October 2015				
	Top of Casing Elevation (Feet)	Top of PVC Elevation (Feet)	Grade Elevation (Feet)	Type of Well	Well Depth Modifier	Date of Installation	Measured Well Depth (feet bgs)	Screened Interval (feet bgs)			Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)	Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)	Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)
VHB-13	12.88	12.72	13.34	Roadbox	Shallow	1/16/2002	16.56	7 - 17	NP	NP	10.7	15.88	2.02	NP	NP	10.51	15.75	2.21	NP	NP	10.49	15.87	2.23	NP	NP
GZ-101	13.43	13.10	13.43	Roadbox	Shallow	4/29/2004	20.21	10 - 20	NP	NP	-	-	-	-	-	9.54	20.23	3.56	NP	NP	9.85	20.21	3.25	NP	NP

Notes
Elevations are relative to NAVD88
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Blanks indicate no measurement collected on that particular day.

Table 2 Summary of Groundwater and NAPL Gauging

Holcim Driveway
STRAP Addendum
642 Allens Avenue
Providence, Rhode Island

Well ID	Surveyed Elevations			Well Installation Details					Range of LNAPL Observed (feet)	Range of DNAPL Observed (feet)	May 2016					October 2016				
	Top of Casing Elevation (Feet)	Top of PVC Elevation (Feet)	Grade Elevation (Feet)	Type of Well	Well Depth Modifier	Date of Installation	Measured Well Depth (feet bgs)	Screened Interval (feet bgs)			Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)	Depth to Water (ft)	Total Well Depth (ft)	GW Elevation (feet)	LNAPL Thickness (feet)	DNAPL Thickness (feet)
VHB-13	12.88	12.72	13.34	Roadbox	Shallow	1/16/2002	16.56	7 - 17	NP	NP	10.58	15.85	2.14	NP	NP	Well Decommissioned in 2016				
GZ-101	13.43	13.10	13.43	Roadbox	Shallow	4/29/2004	20.21	10 - 20	NP	NP	9.77	20.22	3.33	NP	NP	9.79	20.15	3.31	NP	NP

Notes
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Blanks indicate no measurement collected on that particular day.

Table 3 Analytical Groundwater Data
Holcim Driveway
STRAP Addendum
642 Allens Avenue
Providence, Rhode Island

	RIDEM		Sample ID:	RCA-10		VHB-11	VHB-13											
	GB GW	GB UCL	Sample Date:	10/5/1994	3/1/1996	6/27/2002	6/20/2002	9/23/2003	9/27/2005	2/25/2008	3/24/2008	12/1/2009	6/1/2010	1/1/2011	8/1/2011	7/18/2012	10/19/2015	5/19/2016
Volatile Organic Compounds (VOCs)																		
1,2,4-Trimethylbenzene	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	0.0049
1,3,5-Trimethylbenzene	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	0.0004
Acetone	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	0.0035	ND	NA	NA	NA	ND	0.0035	ND	ND
Benzene	0.14	18	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	0.0468
Carbon Disulfide	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND
Ethylbenzene	1.6	16	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	0.0043
Isopropylbenzene	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	0.0018
Methyl Tert-Butyl Ether	5	NE	mg/L	ND	ND	ND	NA	ND	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND
n-Butylbenzene	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND
n-Propylbenzene	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	0.0009
sec-Butylbenzene	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND
Styrene	2.2	50	mg/L	ND	ND	ND	ND	ND	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND
tert-Butylbenzene	NE	NE	mg/L	ND	ND	ND	NA	ND	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND
Toluene	1.7	21	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	0.0003
Xylene O	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND
Xylene P,M	NE	NE	mg/L	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND
Xylenes (Total)	NE	NE	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND	ND	ND
Total VOCs	NE	NE	mg/L	ND	ND	ND	0.0035	ND	ND	NA	ND	NA	NA	NA	ND	0.0035	ND	0.0032
Inorganics																		
Total Cyanide	NE	NE	mg/L	NA	NA	ND	0.041	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Data is compared to RIDEM GB Groundwater Standards. Shaded results represent numerical exceedances of standards.

Table only indicates the compounds that were detected, other compounds were

Table only shows monitoring wells or groundwater samples collected within the

ND - Not Detected
NA - Not Analyzed
NE - Not Established

GB GW - GB Groundwater Objective
GB UCL - GB Upper Concentration Limit

FIGURES

NATIONAL GRID
HOLCIM DRIVEWAY
PROVIDENCE, RHODE ISLAND

SHORT TERM RESPONSE ACTION PLAN (STRAP) ADDENDUM

MAY 2017

PREPARED FOR:

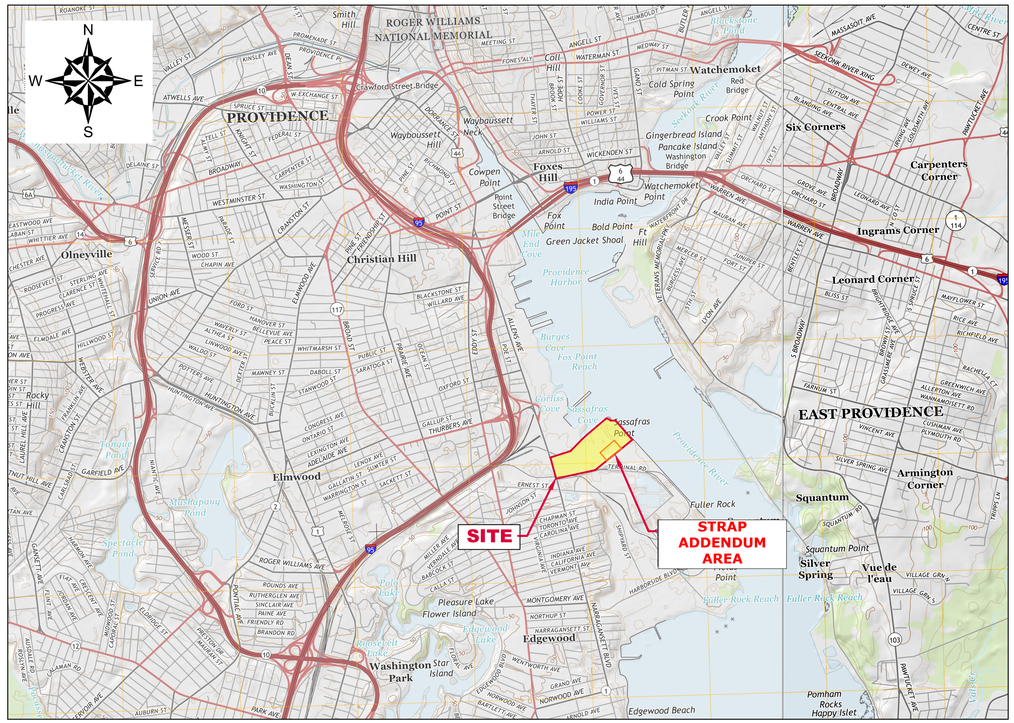
nationalgrid

PREPARED BY:

GZA GEOENVIRONMENTAL, INC.
530 BROADWAY
PROVIDENCE, RHODE ISLAND 02909

DESIGNED BY:

CLE ENGINEERING
15 CREEK ROAD
MARION, MASSACHUSETTS 02738



PROJECT LOCUS MAP

SOURCE: USGSSTORE.GOV

0 1000' 2000' 4000' 6000'

SCALE: 1 INCH = 2000 FEET

INDEX OF DRAWINGS	
SHEET #	SHEET TITLE
1	COVER SHEET WITH SITE LOCUS
2	OVERALL AERIAL PHOTOGRAPH
3	EXPLORATION LOCATION PLAN
4	PROPOSED CONDITIONS PLAN
5	SOIL EROSION & SEDIMENTATION CONTROL PLAN

LEGEND:

- PROPERTY LINES
- 642 ALLENS AVENUE FORMER MGP SITE
- STRAP ADDENDUM AREA
- STRAP AREA

REFERENCE NOTES:

1. THIS MAP CONTAINS THE ESRI ARCGIS ONLINE BING MAPS AERIAL LAYER PACKAGE. IMAGE COURTESY OF USGS EARTHSTAR GEOGRAPHICS SIO © MICROSOFT CORPORATION 2015.
2. PARCEL AND STREET DATA PROVIDED BY THE CITY OF PROVIDENCE PLANNING AND DEVELOPMENT DEPARTMENT. PARCELS OF REAL ESTATE ASSESSED AS OF DECEMBER 31, 2012. GIS DATA ARE FOR PLANNING PURPOSES ONLY. THESE DATA DO NOT REPRESENT A LEGALLY RECORDED PLAN, DEED, SURVEY OR ENGINEERING SCHEMATIC AND ARE NOT INTENDED TO BE USED AS SUCH.
3. SITE BOUNDARIES ARE APPROXIMATE.

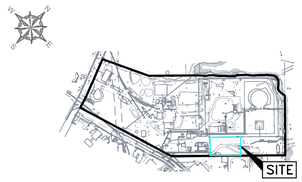
N
W E
S

0 75' 150' 300' 450'
SCALE IN FEET 1" = 150'

NATIONAL GRID HOLCIM DRIVEWAY
PROVIDENCE, RHODE ISLAND
SHORT TERM RESPONSE ACTION PLAN (STRAP) ADDENDUM

OVERALL AERIAL PHOTOGRAPH

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: nationalgrid	
PROJ MGR: MSK	REVIEWED BY: TRG	CHECKED BY: SDN	DRAWING 2
DESIGNED BY: SDN	DRAWN BY: LDT	SCALE: AS NOTED	
DATE: MAY, 2017	PROJECT NO. 33554.60	REVISION NO. 0	SHEET NO. 2 OF 5



KEY PLAN:
SCALE: 1"=800'

GENERAL NOTES:

1) EXISTING CONDITIONS BASE MAP DEVELOPED FROM THE FOLLOWING:

   - ELECTRONIC CAD FILE "ACAD-7257PL.DWG" PROVIDED BY VANASSE HANGEN BRUSTLIN (VHB) ENTITLED "EXISTING CONDITIONS PLAN," PROJECT TITLE "NATIONAL GRID LNG TERMINAL ROAD LNG FACILITY" DATED MARCH 10, 2014, ORIGINAL SCALE 1" = 50', DRAWING NO. SV-1 THROUGH SV-3 AND AERIAL MAPPING BY WSP TRANSPORTATION AND INFRASTRUCTURE DATED JANUARY 15, 2014 PREPARED FOR NATIONAL GRID LAND SURVEYING DEPARTMENT, WALTHAM, MASSACHUSETTS AND CAD FILE NO. 09303023.052-1.DWG
   - ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS BETWEEN 2011 AND 2016.

2) PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM INFORMATION PROVIDED ON A DRAWING ENTITLED "EXISTING CONDITIONS PLAN," PROJECT TITLE "NATIONAL GRID LNG TERMINAL ROAD LNG FACILITY" DATED MARCH 10, 2014, ORIGINAL SCALE 1" = 50', DRAWING NO. SV-1 THROUGH SV-3.

3) EXPLORATION LOCATION PLANS WERE DEVELOPED FROM THE FOLLOWING:

   - SITE PLANS PROVIDED BY RESOURCE CONTROLS ASSOCIATES (RCA) IN THE RIDEM-SUBMITTED JULY 5, 1994 "SITE CHARACTERIZATION PLAN" PREPARED ON BEHALF OF THE PROVIDENCE GAS COMPANY. PLANS PROVIDED BY NATIONAL GRID.
   - SITE PLANS PROVIDED BY RCA IN THE RIDEM-SUBMITTED JUNE 28, 1996 "PHASE IB FIELD CHARACTERIZATION INVESTIGATION" PREPARED ON BEHALF OF THE PROVIDENCE GAS COMPANY. PLANS PROVIDED BY NATIONAL GRID.
   - SITE PLANS PROVIDED BY ESS IN THE RIDEM-SUBMITTED OCTOBER 21, 1999 "SUBSURFACE INVESTIGATION AND PROPOSED ALGONQUIN GENERATOR CONSTRUCTION AREA" PREPARED ON BEHALF OF THE PROVIDENCE GAS COMPANY. PLANS PROVIDED BY NATIONAL GRID.
   - SITE PLANS PROVIDED BY VHB IN THE RIDEM-SUBMITTED NOVEMBER 2002 "REMEDIAL ACTION CLOSURE REPORT" PREPARED ON BEHALF OF THE NEW ENGLAND GAS COMPANY. PLANS PROVIDED BY NATIONAL GRID.
   - SITE PLANS PROVIDED BY VHB IN THE RIDEM-SUBMITTED APRIL 2003 "SITE INVESTIGATION REPORT" PREPARED ON BEHALF OF THE NEW ENGLAND GAS COMPANY. PLANS PROVIDED BY NATIONAL GRID.
   - SITE PLANS PROVIDED BY VHB IN THE RIDEM-SUBMITTED JANUARY 26, 2009 "OXIDE BOX INVESTIGATION TECHNICAL MEMORANDUM" PREPARED ON BEHALF OF NATIONAL GRID. PLANS PROVIDED BY NATIONAL GRID.
   - FIGURE 3 "EXPLORATION LOCATION PLAN" PREPARED BY GZA GEOENVIRONMENTAL, INC. (GZA) ON BEHALF OF CHICAGO BRIDGE AND IRON (CB&I) IN JULY 2005. PLANS PROVIDED BY NATIONAL GRID.
   - ELECTRONIC CAD FILE "ACAD-7257PL.DWG" PROVIDED BY VANASSE HANGEN BRUSTLIN (VHB) ENTITLED "EXISTING CONDITIONS PLAN," PROJECT TITLE "NATIONAL GRID LNG TERMINAL ROAD LNG FACILITY" DATED MARCH 10, 2014, ORIGINAL SCALE 1" = 50', DRAWING NO. SV-1 THROUGH SV-3 AND AERIAL MAPPING BY WSP TRANSPORTATION AND INFRASTRUCTURE DATED JANUARY 15, 2014 PREPARED FOR NATIONAL GRID LAND SURVEYING DEPARTMENT, WALTHAM, MASSACHUSETTS AND CAD FILE NO. 09303023.052-1.DWG. PLANS PROVIDED BY NATIONAL GRID.
   - FIGURE 2 "EXPLORATION LOCATION PLAN," DATED SEPTEMBER 18, 2015, BY WEIDLINGER ASSOCIATES, INC. (WEI) ON BEHALF OF KIEWIT CORPORATION (KIEWIT). PLAN PROVIDED BY NATIONAL GRID.
   - FIGURE 2 "EXPLORATION LOCATION PLAN," DATED MARCH 22, 2016, BY GOLDER ASSOCIATES, INC. PREPARED FOR CHI ENGINEERING AND PROVIDED BY NATIONAL GRID.
   - ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS BETWEEN 2011 AND 2016.

4) THE LOCATION OF THE EXPLORATIONS AND MONITORING WELLS AT THE SITE WERE APPROXIMATELY DETERMINED AND HAVE BEEN ALIGNED AND ADJUSTED FOR THE "BEST FIT" AND THESE DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

5) HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY VHB.

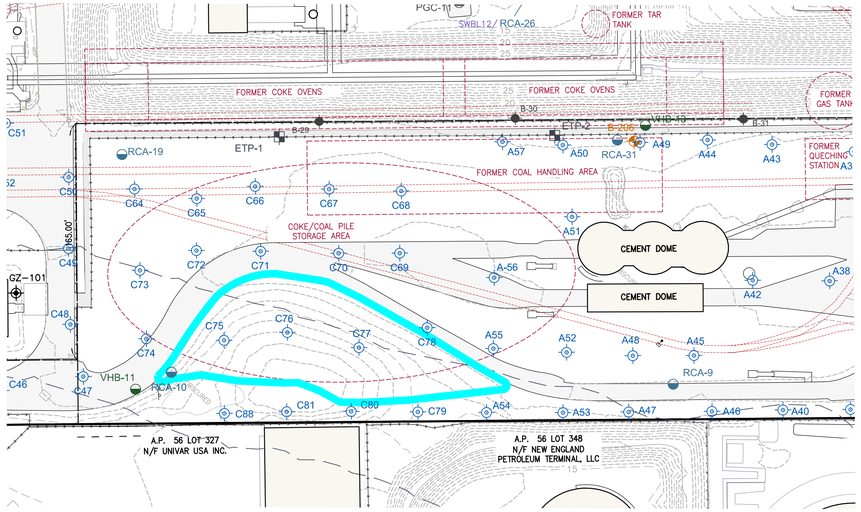
6) VERTICAL DATUM IS BASED ON NAVD 1988 FROM BASE MAPPING PROVIDED BY VHB.

7) APPROXIMATE HISTORICAL STRUCTURE/EQUIPMENT LOCATIONS AND DATES WERE OBTAINED FROM THE FOLLOWING SOURCES:

   - CERTIFIED SANBORN MAPS DATED: 1950, 1956, 1972, 1977 AND 1982
   - AERIAL ORTHOPHOTOGRAPHIC IMAGES OBTAINED FROM RIGIS: 1939, 1951, 1962, 1972, 1976, 1981, 1988, 1992, 1995, 1997, 2002, 2008
   - SITE PLANS PROVIDED BY RESOURCE CONTROLS ASSOCIATES (RCA) IN THE RIDEM-SUBMITTED JULY 5, 1994 "SITE CHARACTERIZATION PLAN" PREPARED ON BEHALF OF THE PROVIDENCE GAS COMPANY. PLANS PROVIDED BY NATIONAL GRID.
   - HISTORIC SITE PLAN "GENERAL PLAN OF WORKS, PROVIDENCE GAS COMPANY, SASSAFRAS POINT PLANT, PROVIDENCE, RHODE ISLAND." UNDATED. PLANS PROVIDED BY NATIONAL GRID.

10) THE SITE HAS BEEN THE LOCATION OF NUMEROUS REMEDIAL ACTIONS. THIS PLAN SET DOES NOT PRESENT THE LOCATIONS OF ANY CONFIRMATORY SAMPLES THAT HAVE BEEN COLLECTED AT THE SITE. THIS PLAN SET MAY INCLUDE LOCATIONS THAT HAVE BEEN FULLY EXCAVATED AND THE PRESENTED EXPLORATIONS MAY NOT BE TRUE TO CURRENT CONDITIONS.

11) THIS PLAN SET DOES NOT PRESENT THE LOCATIONS OF SAMPLES THAT WERE COLLECTED FOR GEOTECHNICAL PURPOSES ONLY. THIS INCLUDES CONE PENETROMETER TESTING SAMPLES AND TEST PITS CONDUCTED WITH NO SOIL DESCRIPTIONS OR ENVIRONMENTAL SAMPLES COLLECTED. HOWEVER, THE LOCATIONS OF KNOWN GEOTECHNICAL BORINGS (PRESENTED ON PLANS PROVIDED BY NATIONAL GRID) ARE SHOWN.



0 25 50 100 150
SCALE IN FEET 1" = 50'

LEGEND:

- PROPERTY LINE
- INTERIOR PROPERTY LINE
- STRAP ADDENDUM AREA
- EXISTING BUILDING
- UTILITY POLE
- LIGHT POLE
- STEEL POST
- PILING
- EDGE OF WATER
- FENCE
- RAILROAD TRACKS
- EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
- EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
- HISTORIC STRUCTURE OR FEATURE
- PAVEMENT
- CONCRETE PAD
- HYDRANT

EXPLORATION LEGEND:

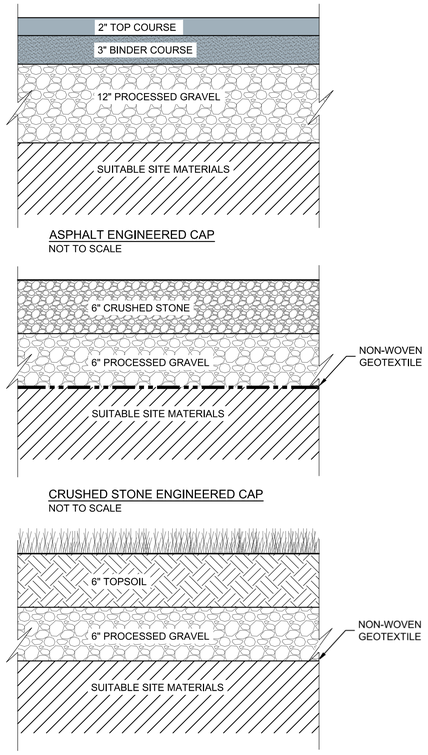
VHB-7	ENVIRONMENTAL BORING OBSERVED BY VHB IN 2002 AND 2003
F47	ENVIRONMENTAL BORING OBSERVED BY ESS IN 1999 AND 2000
RCA-40	ENVIRONMENTAL BORING OBSERVED BY RCA BETWEEN 1994-1996
GZA-206	GEOTECHNICAL BORING OBSERVED BY GZA IN 2005
B-25	GEOTECHNICAL BORING OBSERVED BY HALEY & ALDRICH IN 1971 AND 1972
B-201	GEOTECHNICAL BORINGS OBSERVED BY GOLDER ASSOCIATES IN 2016

NATIONAL GRID HOLCIM DRIVEWAY
PROVIDENCE, RHODE ISLAND
SHORT TERM RESPONSE ACTION PLAN (STRAP) ADDENDUM

EXPLORATION LOCATION PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com
PREPARED FOR: nationalgrid

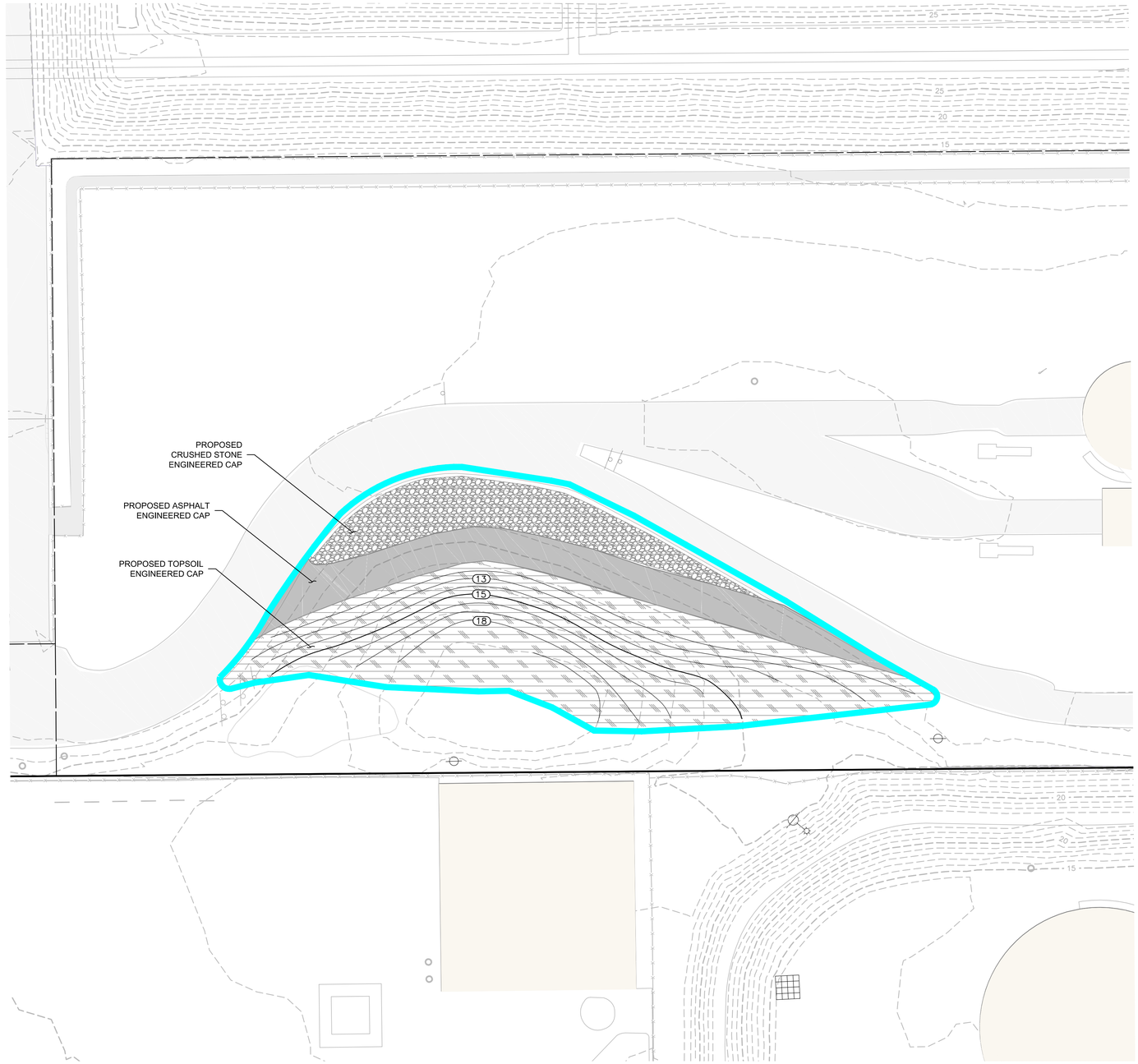
PROJ MGR: MSK	REVIEWED BY: TRG	CHECKED BY: SDN	DRAWING 3
DESIGNED BY: SDN	DRAWN BY: LDT	SCALE: AS NOTED	
DATE: MAY, 2017	PROJECT NO. 33554.60	REVISION NO. 0	SHEET NO. 3 OF 5

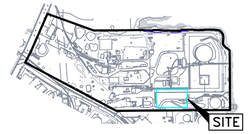


ASPHALT ENGINEERED CAP
NOT TO SCALE

CRUSHED STONE ENGINEERED CAP
NOT TO SCALE

TOPSOIL ENGINEERED CAP
NOT TO SCALE





KEY PLAN:
SCALE: 1"=800'

LEGEND:

- EXISTING STRUCTURE
- EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
- EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
- EXISTING PAVEMENT
- UTILITY POLE
- LIGHT POLE
- HYDRANT
- PROPERTY LINES
- INTERIOR PROPERTY LINE
- PROPOSED CONTOUR (MAJOR 5 FOOT INTERVAL)
- PROPOSED CONTOUR (MINOR 1 FOOT INTERVAL)
- PROPOSED ASPHALT ENGINEERED CAP
- PROPOSED CRUSHED STONE ENGINEERED CAP
- PROPOSED TOPSOIL ENGINEERED CAP
- STRAP ADDENDUM AREA

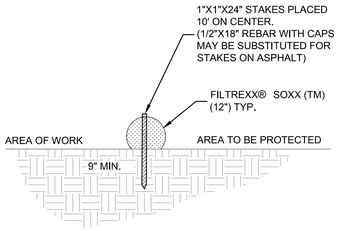
GENERAL NOTES:

1) BASE MAP DEVELOPED FROM THE FOLLOWING:
   - ELECTRONIC CAD FILE "ACAD-7257PL.DWG" PROVIDED BY VANASSE HANGEN BRUSTLIN (VHB) ENTITLED "EXISTING CONDITIONS PLAN," PROJECT TITLE "NATIONAL GRID LNG TERMINAL ROAD LNG FACILITY" DATED MARCH 10, 2014, ORIGINAL SCALE 1" = 50', DRAWING NO. SV-1 THROUGH SV-3 AND AERIAL MAPPING BY WSP TRANSPORTATION AND INFRASTRUCTURE DATED JANUARY 15, 2014 PREPARED FOR NATIONAL GRID LAND SURVEYING DEPARTMENT, WALTHAM, MASSACHUSETTS AND CAD FILE NO. 09303023.052-1.DWG. PLANS PROVIDED BY NATIONAL GRID.
   - ELECTRONIC CAD FILE14-152_SU1_REV2.DWG, TITLED "TOPOGRAPHIC SURVEY PLAN, PORTION OF A.P. 56 LOT 5" DATED OCTOBER 27, 2014 AND PROVIDED BY NATIONAL GRID.
   - PDF OF A CAD FILE TITLED, "CONCEPTUAL REPAVING PLAN" DATED FEBRUARY 24, 2017, REVISED MARCH 31, 2017, PREPARED FOR NATIONAL GRID BY CLE ENGINEERING.
2) HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY VHB.
3) VERTICAL DATUM IS BASED ON NAVD 1988 FROM BASE MAPPING PROVIDED BY VHB.
4) ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS BETWEEN 2011 AND 2016.
5) SITE BOUNDARIES ARE APPROXIMATE.

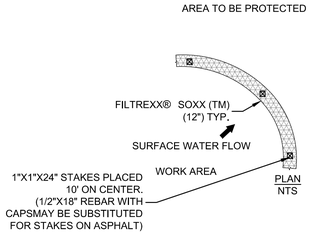
NATIONAL GRID HOLCIM DRIVEWAY
PROVIDENCE, RHODE ISLAND
SHORT TERM RESPONSE ACTION PLAN (STRAP) ADDENDUM

PROPOSED CONDITIONS PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: nationalgrid	
PROJ MGR: MSK	REVIEWED BY: TRG	CHECKED BY: SDN	DRAWING 4
DESIGNED BY: SDN	DRAWN BY: LDT	SCALE: AS NOTED	
DATE: MAY, 2017	PROJECT NO. 33554.60	REVISION NO. 0	SHEET NO. 4 OF 5



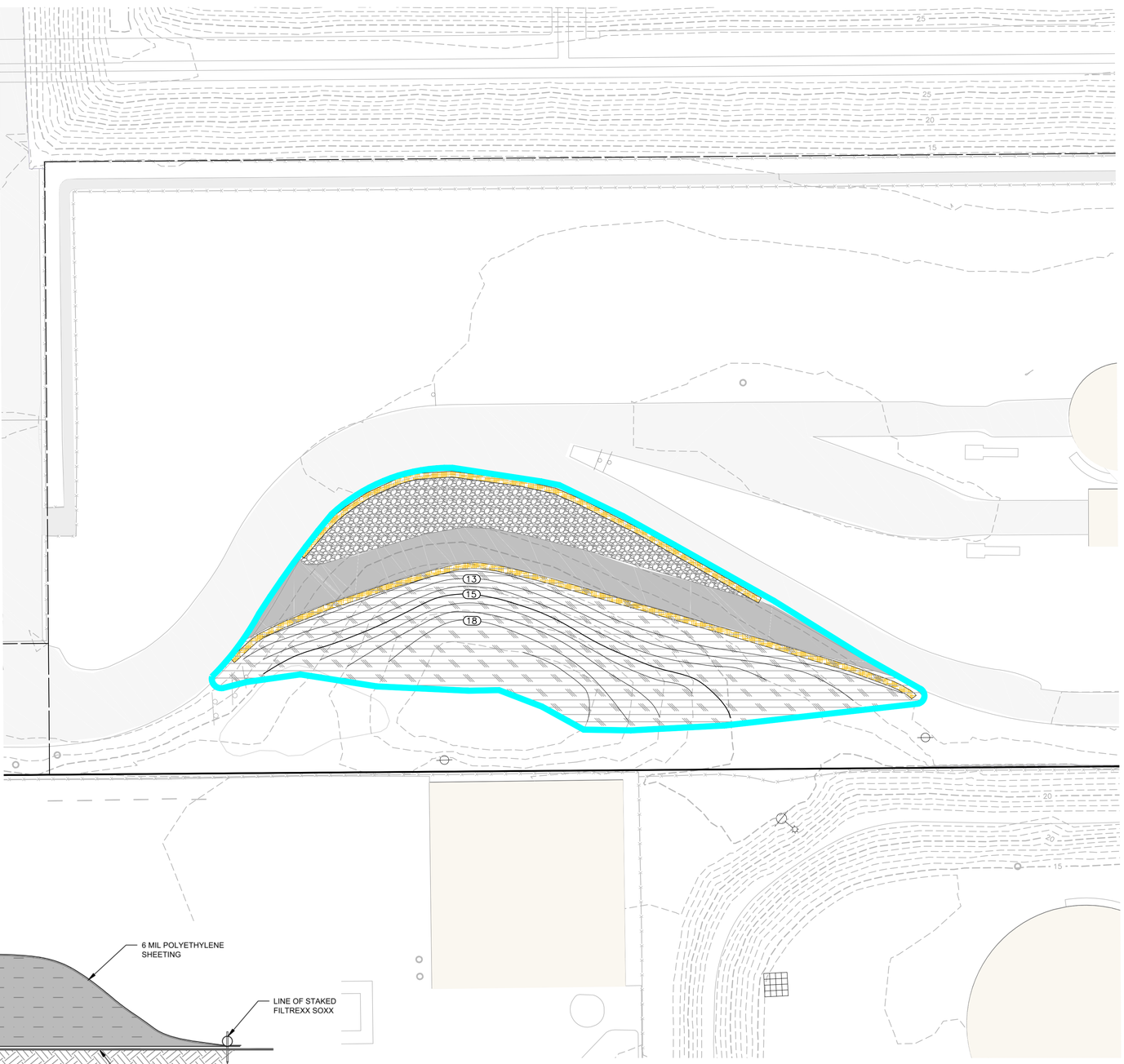
SECTION
NTS

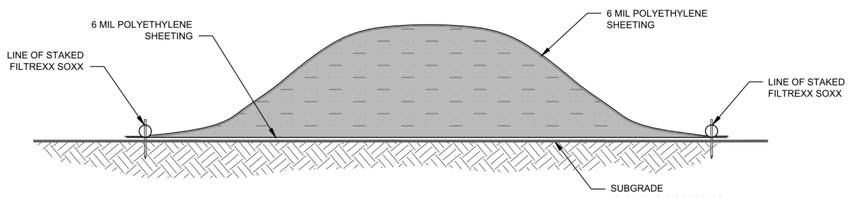


PLAN
NTS

NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. FILTER MEDIA (TM) FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE AS APPROVED BY ENGINEER.
4. REBAR PINS SHALL HAVE PROTECTIVE CAPS INSTALLED TO PREVENT FALL INJURY.
5. IF FILTREXX SOXX ARE INSTALLED IN PAVED AREA, CONCRETE BLOCKS OR ENGINEER APPROVED EQUIVALENT WIL BE INSTALLED BEHIND THE SOXX TO STABILIZE THEM FOR RAIN EVENTS.

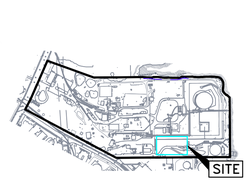
FILTREXX® SOXX SEDIMENT CONTROL DETAIL
NOT TO SCALE





TYPICAL MATERIAL STOCKPILE DETAIL
NOT TO SCALE

0 10' 20' 40' 60'
SCALE IN FEET



KEY PLAN:
SCALE: 1"=800'

LEGEND:

- EXISTING STRUCTURE
- EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
- EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
- EXISTING PAVEMENT
- UTILITY POLE
- LIGHT POLE
- HYDRANT
- PROPERTY LINES
- INTERIOR PROPERTY LINE
- PROPOSED CONTOUR (MAJOR 5 FOOT INTERVAL)
- PROPOSED CONTOUR (MINOR 1 FOOT INTERVAL)
- PROPOSED ASPHALT ENGINEERED CAP
- PROPOSED CRUSHED STONE ENGINEERED CAP
- PROPOSED TOPSOIL ENGINEERED CAP
- STRAP ADDENDUM AREA
- STAKED FILTREXX SOXX OR OTHER NATIONAL GRID ENVIRONMENTAL APPROVED EQUAL

GENERAL NOTES:

1) BASE MAP DEVELOPED FROM THE FOLLOWING:
   - ELECTRONIC CAD FILE "ACAD-7257PL.DWG" PROVIDED BY VANASSE HANGEN BRUSTLIN (VHB) ENTITLED "EXISTING CONDITIONS PLAN," PROJECT TITLE "NATIONAL GRID LNG TERMINAL ROAD LNG FACILITY" DATED MARCH 10, 2014, ORIGINAL SCALE 1" = 50', DRAWING NO. SV-1 THROUGH SV-3 AND AERIAL MAPPING BY WSP TRANSPORTATION AND INFRASTRUCTURE DATED JANUARY 15, 2014 PREPARED FOR NATIONAL GRID LAND SURVEYING DEPARTMENT, WALTHAM, MASSACHUSETTS AND CAD FILE NO. 09303023.052-1.DWG. PLANS PROVIDED BY NATIONAL GRID.
   - ELECTRONIC CAD FILE14-152_SU1_REV2.DWG, TITLED "TOPOGRAPHIC SURVEY PLAN, PORTION OF A.P. 56 LOT 5" DATED OCTOBER 27, 2014 AND PROVIDED BY NATIONAL GRID.
   - PDF OF A CAD FILE TITLED, "CONCEPTUAL REPAVING PLAN" DATED FEBRUARY 24, 2017, REVISED MARCH 31, 2017, PREPARED FOR NATIONAL GRID BY CLE ENGINEERING.
2) HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY VHB.
3) VERTICAL DATUM IS BASED ON NAVD 1988 FROM BASE MAPPING PROVIDED BY VHB.
4) ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS BETWEEN 2011 AND 2016.

NATIONAL GRID HOLCIM DRIVEWAY
PROVIDENCE, RHODE ISLAND
SHORT TERM RESPONSE ACTION PLAN (STRAP) ADDENDUM

SOIL EROSION & SEDIMENTATION CONTROL PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: nationalgrid	
PROJ MGR: MSK	REVIEWED BY: TRG	CHECKED BY: SDN	DRAWING 5
DESIGNED BY: SDN	DRAWN BY: LDT	SCALE: AS NOTED	
DATE: MAY, 2017	PROJECT NO. 33554.60	REVISION NO. 0	SHEET NO. 5 OF 5

APPENDIX A

Limitations

LIMITATIONS

1. This Short Term Response Action Plan (STRAP) Addendum has been prepared on behalf of and for the exclusive use of The Narragansett Electric Company d/b/a National Grid (National Grid), solely for use in documenting the work completed as described herein at the 642 Allens Avenue / 125 Terminal Avenue Former MGP ("Site") under the applicable provisions of the State of Rhode Island Department of Environmental Management Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations). This report and the findings contained herein shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party in whole or in part, without the prior written consent of GZA GeoEnvironmental, Inc.(GZA) or National Grid.

2. GZA's work was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area, and GZA observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. GZA's findings and conclusions must be considered not as scientific certainties, but rather as our professional opinion concerning the significance of the limited data gathered during the course of the study. No other warranty, express or implied is made. Specifically, GZA does not and cannot represent that the Site contains no hazardous material, oil, or other latent condition beyond that observed by GZA during the work described herein.

3. The observations described in this report were made under the conditions stated therein. The conclusions presented in the report were based upon services performed and observations made by GZA.

4. In the event that National Grid or others authorized to use this report obtain information on environmental or hazardous waste issues at the Site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this evaluation, may modify the conclusions stated in this report.

5. The conclusions and recommendations contained in this report are based in part upon the data obtained from environmental samples obtained from relatively widely spread subsurface explorations. The nature and extent of variations between these explorations may not become evident until further exploration. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

6. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the boring logs.

7. In the event this work included the collection of water level data, these readings have been made in the test pits, borings and/or observation wells at times and under conditions stated on the exploration logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may

occur due to variations in rainfall and other factors different from those prevailing at the time measurements were made.

8. The conclusions contained in this report are based in part upon various types of chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the report. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, and other factors. Should additional chemical data become available in the future, these data should be reviewed by GZA and the conclusions and recommendations presented herein modified accordingly.

APPENDIX B

Boring and Test Pit Logs

NOT MENTIONED IN VtlB SIR

RESOURCE CONTROLS — TEST BORING LOG

PROJECT:	Providence Gas Company
PROJECT NO.:	A2000
LOCATION:	642 Allens Avenue, Providence, R.I.
DRILLING CO.:	American Drilling, Inc.
DRILLED BY:	Jim Campbell
INSPECTED BY:	Daniel Lanier

BORING NO.	RCA-10
PAGE	1 OF 1
DATE STARTED:	9/13/94
DATE FINISHED:	9/13/94
SURFACE ELEVATION:	

GROUNDWATER OBSERVATIONS

DEPTH	STABILIZATION TIME

	CASING	SAMPLER
TYPE:		Split Spoon
SIZE I.D.:		1-3/8"
HAMMER WT.:		140 lbs.
HAMMER FALL:		30 in.

DEPTH (FT.)	SAMPLING DEPTH (FT.) FROM - TO	SAMPLE DATA ID	PERCENT RECOV.	BLOWS PER 6 INCHES	WELL DATA	STRATA CHANGE (FT.)	LITHOLOGY (DESCRIPTION OF MATERIALS) GRASS	FIELD TEST DATA PID - 10.2 eV (ppm)
	1'	S-1	NA	GRAB			dry, brown, medium to fine SAND (fill)	5.9
	2-4	SS-1	65%	5-5-7-6			damp, tan, fine SAND, trace silt	7.1
5'	4-6	SS-2	60%	3-8-10-10			moist, olive, fine SAND and SILT	7.3
	6-8	SS-3	100%	14-11-10-10			SAME	7
	8-10	SS-4	60%	10-14-22-20			saturated, olive, fine SAND, little silt	4.7
10'	10-12	SS-5	55%	20-20-16-19		11	olive, coarse SAND and medium SAND, little fine sand, trace silt (flow till)	7.9
	12-14	SS-6	80%	19-19-34-38			SAME	8.6
15'	14-16	SS-7	20%	13-17-22-25			olive, medium SAND, little silt, trace fine sand	6.6
20'							Bottom of exploration at 16'	
25'								
30'								

GENERAL REMARKS:

10' 0.020"-slot EFG screen
8-1/2" borehole
HSA / boring
#2 silica sand pack
roadbox at grade

EOIPROV0003865

TEST BORING LOG

ESS
2 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: A54
ESS Job No: P151-002	Date: 2/10/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
Well Diameter: N/A	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVM
Drilling Method: Geoprobe	Boring Depth: 10.0'
Sample Method: 4' Acetate Sampler	Depth to Water: 9.5'
	Logged By: Nicole Murry

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1045	0.0	(0-2") brown sand with roots. (2-20") F/M brown sand with SO gravel bits and black ash 16-20. (20-24") M light brown sand.
B	2-4	48/48		0.0	(24-30") F/M dense, brown silty sand. (30-72") F/C brown sand, loose at 68", small pebbles 50-60".
C	4-6			0.0	
D	6-8	48/48		0.0	(72-80") dense brown M silty sand. (80-100") F/M loose brown sand, orange staining at 80". (100-120") very F, loose brown sand, saturated at 116".
E	8-10		1100	0.0	
F	10-12				
G	12-14				

Comments:

PROPORTIONS USED		ABBREVIATIONS	Well Construction	DEPTH INTERVALS	
		F = FINE	N/A	A = 0-24 in.	G = 144-168 in.
TRACE (TR)	0-10%	M = MEDIUM		B = 24-48 in.	H = 168-192 in.
LITTLE (LI)	10-20%	C = COARSE		C = 48-72 in.	I = 192-216 in.
SOME (SO)	20-35%	F/M = FINE TO MEDIUM		D = 72-96 in.	J = 216-240 in.
AND	35-50%	F/C = FINE TO COARSE		E = 96-120 in..	K = 240-264 in.
		M/C = MEDIUM TO COARSE		F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
272 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: A55
ESS Job No: P151-002	Date: 2/9/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVA
Well Diameter: N/A	Boring Depth: 10.0'
Drilling Method: Geoprobe	Depth to Water: 8.7'
Sample Method: 4' Acetate Sampler	Logged By: Jason Wiggin

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1340	0.0	(0-12") F brown sand, TR silt; dry; no odor. (12-24") F/M brown/tan sand, LI F gravel, TR silt; dry; no odor.
B	2-4	37/48		0.0	(35-47") F/M brown sand, LI gravel, TR silt, TR black staining throughout; dry; no odor. (47-72") F brown sand, TR F gravel, TR silt; moist; no odor.
C	4-6			0.0	
D	6-8	47/48	1350	0.0	(73-120") F/M brown sand, TR silt, TR black staining from 76-87"; wet at 104"; no odor.
E	8-10			0.0	
F	10-12				
G	12-14				

Comments:

PROPORTIONS USED	
TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS	Well Construction
F = FINE	N/A
M = MEDIUM	
C = COARSE	
F/M = FINE TO MEDIUM	
F/C = FINE TO COARSE	
M/C = MEDIUM TO COARSE	

DEPTH INTERVALS	
A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
2 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: C74
ESS Job No: P151-002	Date: 2/11/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
Well Diameter: N/A	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVM
Drilling Method: Geoprobe	Boring Depth: 10.0'
Sample Method: 4' Acetate Sampler	Depth to Water: 4.5'
	Logged By: Daryll Issa

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	0915		(0-8") F/C brown sand with SO gravel and SO small/M dull black cinders; dry; no odor. (8-24") F/M light brown sand with LI black stained sand and SO M dull black cinders; dry; no odor.
B	2-4	42/48	0940	0.0	(30-36") F/M brown sand and TR gravel; wet from surface puddle; no odor. (36-50") F light brown sand with TR gravel; dry; no odor. (50-54") F/C brown sand and gravel; damp; no odor. (54-72") F brown sand with SO silt; wet; no odor.
C	4-6			0.0	
D	6-8	42/48		0.0	(78-84") F light brown sand; wet; no odor. (84-88") F/M brown sand with SO gravel; wet; no odor. (88-111") F/C brown sand with LI gravel; wet; no odor. (111-120") F/M brown sand with SO gravel and SO TR silt; wet; no odor.
E	8-10			0.0	
F	10-12				
G	12-14				

Comments:

PROPORTIONS USED	
TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS	Well Construction
F = FINE	N/A
M = MEDIUM	
C = COARSE	
F/M = FINE TO MEDIUM	
F/C = FINE TO COARSE	
M/C = MEDIUM TO COARSE	

DEPTH INTERVALS	
A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
272 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: C75
ESS Job No: P151-002	Date: 2/10/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVM
Well Diameter: N/A	Boring Depth: 14.0'
Drilling Method: Geoprobe	Depth to Water: 11.8'
Sample Method: 4' Acetate Sampler	Logged By: Nicole Murry

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1348	0.0	(0-2") brown sand; M gravel; roots. (2-10") SO brown sand mixed with C bits of concrete. (10-14") brown sand with roots with coal ash stone. (14-24") loose light brown sand.
B	2-4	36/48		0.0	(36-40") brown sand with M bits of coal ash stone. (40-72") poorly graded M brown sand mixed with small/large gravel; dry.
C	4-6			0.0	
D	6-8	44/48		0.0	(76-96") F loose light brown sand. (96-100") cinder ash stone band. (100-120") F loose light brown sand with SO small rounded stones.
E	8-10		1415		
F	10-12	48/48			(120-168") M brown sand with M rounded stone; dense; Wet at 142".
G	12-14	48/48			

Comments:

PROPORTIONS USED	
TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS	Well Construction
F = FINE	N/A
M = MEDIUM	
C = COARSE	
F/M = FINE TO MEDIUM	
F/C = FINE TO COARSE	
M/C = MEDIUM TO COARSE	

DEPTH INTERVALS	
A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
2 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: **C76**
ESS Job No: P151-002	Date: 2/10/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
Well Diameter: N/A	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVM
Drilling Method: Geoprobe	Boring Depth: 14.0'
Sample Method: 4' Acetate Sampler	Depth to Water: 12.5'
	Logged By: Daryll Issa

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1315	0.0	(0-4") topsoil and gravel. (4-24") F/M brown sand with LI black stained sand throughout the interval; SO blue/green staining in 4-24"; SO black M/small dull cinders in interval; SO gravel throughout the interval; dry; no odor.
B	2-4	38/48		0.0	(34-55") F/M brown sand with SO gravel and LI small/M black cinders; dry; no odor. (55-72") large dull black cinders and cinder ash; dense; SO brown/dark brown/black stained sand and LI gravel; dry; light odor.
C	4-6			0.0	
D	6-8	25/48		0.0	(85-120") F/M brown/black stained sand and small/large shiny/dull black cinders with SO porous black/orange cinders and SO gravel; dry; light odor at 108-120".
E	8-10			0.0	
F	10-12	36/48	1338		(132-139") F/M brown/black sand with SO small black cinders; dry; no odor. (139-151") F loose black cinder ash with SO small/large black cinders; dry; no odor. (151-160") F light brown sand and silt; saturated with water; no odor. (160-168") F/C light brown sand; saturated with water; no odor.
G	12-14	36/48			

Comments:

PROPORTIONS USED	
TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS	Well Construction
F = FINE	N/A
M = MEDIUM	
C = COARSE	
F/M = FINE TO MEDIUM	
F/C = FINE TO COARSE	
M/C = MEDIUM TO COARSE	

DEPTH INTERVALS	
A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
272 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: C77
	Date: 2/10/00
ESS Job No: P151-002	Within 100' of Water: No
Driller.: Environmental Drilling, Inc.	Instrument: Thermo Environment Instruments, Inc., Model 580B OVM
Well Diameter: N/A	Boring Depth: 14.0'
Drilling Method: Geoprobe	Depth to Water: 12.0'
Sample Method: 4' Acetate Sampler	Logged By: Nicole Murry

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1310	0.0	(0-5") brown sand with roots and black stone; SO coal ash at 5". (5-10") concrete bits with white gravel and white/powder sand; loose. (10-24") M olive brown sand; soft; mixed with M rounded stone at 10-20"; iron stained soil at 18"; cinder ash stone at 20-24".
B	2-4	36/48		0.0	(36-48") dense brown sand; moist; large rounded gravel. (48-72") M brown and black sand mixed with brick; M/C cinder ash and cinder ash stone; brown wood chips at 68-70"; fibrous material (insulating material) at 72"
C	4-6			0.0	
D	6-8	24/48		0.0	(96-100") dense brown/black sand mixed with cinder ash, wood chips, and white fibrous material. (100-120") F black cinder ash mixed with M/large cinder ash stone; light loose yellow sand at 110-114".
E	8-10		1250	0.0	
F	10-12	24/48			(144-150") brown wet sand mixed with black cinder ash and cinder ash stone. (150-168") poorly sorted M/C brown sand with M/large rounded stone; large cobble at (160").
G	12-14	24/48			

Comments:

PROPORTIONS USED	
TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS	Well Construction
F = FINE	N/A
M = MEDIUM	
C = COARSE	
F/M = FINE TO MEDIUM	
F/C = FINE TO COARSE	
M/C = MEDIUM TO COARSE	

DEPTH INTERVALS	
A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
2 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: C78
ESS Job No: P151-002	Date: 2/9/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
Well Diameter: N/A	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVM
Drilling Method: Geoprobe	Boring Depth: 10.0'
Sample Method: 4' Acetate Sampler	Depth to Water: 7.75'
	Logged By: Daryll Issa

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1405	0.0	(0-4") dark brown topsoil. (4-8") F/M orange/brown sand with SO gravel; dry; no odor. (8-24") F/M brown sand with SO gravel/stones); dry; no odor.
B	2-4	48/48		0.0	(24-28") F/M brown sand with SO gravel; dry; no odor. (28-33") F black cinder ash and M dull black cinders; dry; no odor. (33-72") F/M brown sand with TR gravel; dry; no odor.
C	4-6			0.0	
D	6-8	46/48	1415	0.0	(74-88") F brown sand with SO silt and SO black stained sand/loose stones; damp; no odor. (88-120") F brown sand and silt with TR gravel; saturated with water; no odor.
E	8-10			0.0	
F	10-12				
G	12-14				

Comments:

PROPORTIONS USED	
TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS	Well Construction
F = FINE	N/A
M = MEDIUM	
C = COARSE	
F/M = FINE TO MEDIUM	
F/C = FINE TO COARSE	
M/C = MEDIUM TO COARSE	

DEPTH INTERVALS	
A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
72 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: C80
ESS Job No: P151-002	Date: 2/10/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
Well Diameter: N/A	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVM
Drilling Method: Geoprobe	Boring Depth: 14.0'
Sample Method: 4' Acetate Sampler	Depth to Water: not encountered
	Logged By: Nicole Murry

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1155	0.0	(0-12") F/M brown sand with small stones and roots throughout. (12-22") F white gravel with white sand/powder/cement; loose. (22-24") M brown sand with SO black ash.
B	2-4	40/48		0.0	(32-48") M light/dark brown sand; SO coal bits and orange porous cinders at 34-40". (48-72") M brown sand with bands of gravel at 50-52" and 64-66".
C	4-6			0.0	
D	6-8	40/48		0.0	(80-84") poorly sorted brown sand with M bits of gray gravel. (84-88") loose yellow sand. (88-120") dense light brown sand with SO silt; stones at 100".
E	8-10			0.0	
F	10-12	48/48	1215		(120-130") poorly sorted brown sand with M bits of gray gravel. (130-168") F/M loose brown sand.
G	12-14	48/48			

Comments:

PROPORTIONS USED

TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS

F = FINE
M = MEDIUM
C = COARSE
F/M = FINE TO MEDIUM
F/C = FINE TO COARSE
M/C = MEDIUM TO COARSE

Well Construction

N/A

DEPTH INTERVALS

A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

TEST BORING LOG

ESS
272 West Exchange Street, Suite 101
Providence, Rhode Island 02903
(401) 421-0398 Fax (401) 421-5731

Site: Providence Gas Company 642 Allens Avenue, Providence, RI	Boring No.: C81
ESS Job No: P151-002	Date: 2/10/00
Driller.: Environmental Drilling, Inc.	Within 100' of Water: No
Well Diameter: N/A	Instrument: Thermo Environmental Instruments, Inc., Model 580B OVM
Drilling Method: Geoprobe	Boring Depth: 14.0'
Sample Method: 4' Acetate Sampler	Depth to Water: not encountered
	Logged By: Nicole Murry

Depth (intervals)	Sample Depth (feet)	Recovery/ Penetration (in.)	Sample Time	PID (ppm)	Materials Description (size, grade, color, moisture)
A	0-2	24/24	1505	0.0	(0-12") M brown sand and roots mixed with small/M stone coal bits at 8"; SO black coal ash throughout. (12-22") concrete and white powder bits. (22-24") F/M brown silty sand, roots, and iron staining.
B	2-4	24/48		0.0	(48-50") brown sand with spots of black cinder ash and bits of coal. (50-52") dense gray silty sand. (52-72") M brown soil mixed with bits of coal; small/M gravel; heavy roots at 68-70"; cinder ash stone at 70-72".
C	4-6			0.0	
D	6-8	48/48		0.0	(72-76") brown sand with large cinder ash stone. (76-120) very F light yellow/brown silty sand.
E	8-10		1525	0.0	
F	10-12	48/48			(120-168) very fine, dense light yellow brown sand, silty.
G	12-14	48/48			

Comments:

PROPORTIONS USED	
TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS	Well Construction
F = FINE	N/A
M = MEDIUM	
C = COARSE	
F/M = FINE TO MEDIUM	
F/C = FINE TO COARSE	
M/C = MEDIUM TO COARSE	

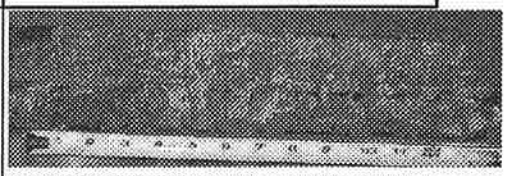
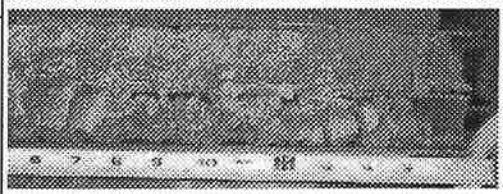
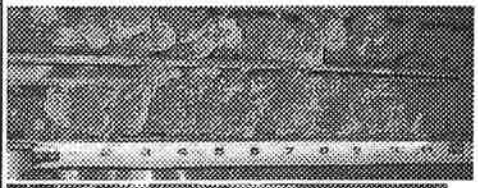
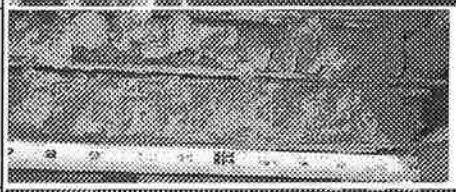
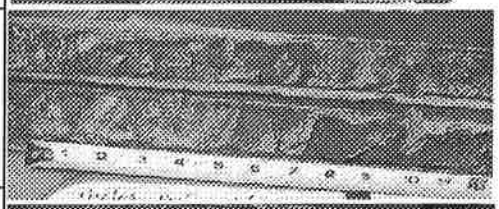
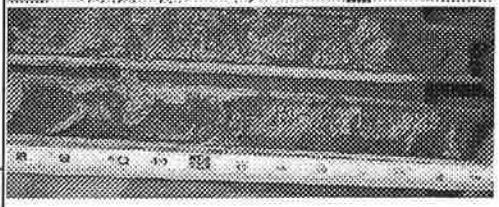
DEPTH INTERVALS	
A = 0-24 in.	G = 144-168 in.
B = 24-48 in.	H = 168-192 in.
C = 48-72 in.	I = 192-216 in.
D = 72-96 in.	J = 216-240 in.
E = 96-120 in..	K = 240-264 in.
F = 120-144 in.	L = 264-288 in.

Soil Boring Report

PROJECT	Report of Boring No.	VHB-11
New England Gas Company 642 Allens Avenue Providence, Rhode Island	Well ID:	VHB-11
	Job Number: 71274	Sheet 1 of 2

Drilling Company:	Subsurface Drilling and Remediation	Boring Location:	Entrance to cement plant		
Driller:	Jim Goldthwaite / Josh Downing	Elevation:	NA	Datum:	NA
Inspector:	Keith Sullivan / Adam Rosenblatt	Start Date:	1/16/2002	End Date:	1/16/2002

The borings were drilled by hollow-stem auger. Unless otherwise noted, the soil samples were collected using a 2' split-spoon driven with a 140-lb. hammer falling 30".

Depth (ft)	PID Reading	Sample No.	Pen/Rec	Blows/6"	SAMPLE DESCRIPTION	Boring Photo
0 - 2	ND	S1	24 / 16	1 - 3 5 - 9	Light brown, loose, fine SAND some silt, moist, no sheen or odors.	
						
2 - 4	ND	S2	24 / 18	8 - 12 12 - 13	Light brown, medium dense, fine SAND, some silt, moist, no sheen or odors.	
						
4 - 6	ND	S3	24 / 19	9 - 10 12 - 15	Light brown, medium dense, fine SAND, some silt, wet @ 5', no sheen or odors.	
						

GRANULAR SOILS BLOWS/FT	DENSITY
0 - 4	V. Loose
4 - 10	Loose
10 - 30	M. Dense
30 - 50	Dense
>50	V. Dense

COHESIVE SOILS BLOWS/FT	DENSITY
<2	V. Soft
2 - 4	Soft
4 - 8	M. Stiff
8 - 15	Stiff
15 - 30	V. Stiff
>30	Hard

PROPORTIONS	
Trace	0 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

Notes

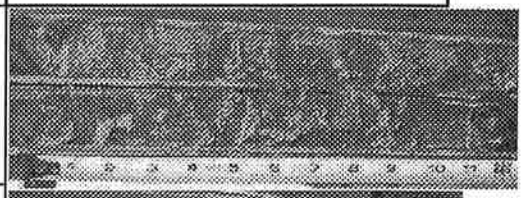
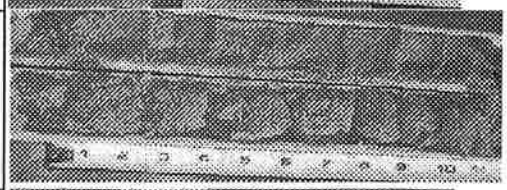
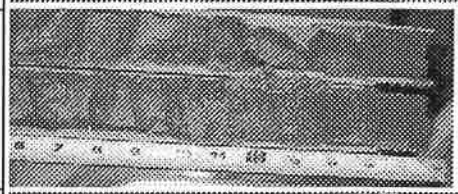
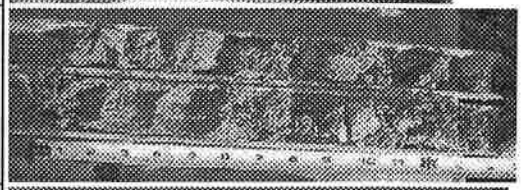
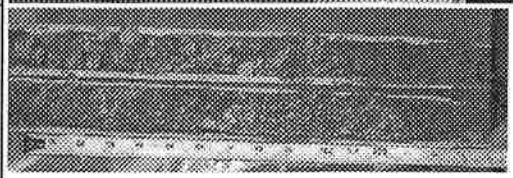
1) Soil stratification lines represent a graphical depiction of changes in soil type and grainsize. Actual changes may be gradual.
2) Bedrock was not encountered.
3) Water levels may fluctuate due to ocean tides, season, and precipitation rates.
4) All soil samples were screened in the field for VOCs using a ThermoEnvironmental Instruments model 580B 10.eV photoionization detector (PID).

Soil Boring Report

PROJECT	Report of Boring No.	VHB-11
New England Gas Company	Well ID:	VHB-11
642 Allens Avenue	Job Number: 71274	Sheet 2 of 2
Providence, Rhode Island		

Drilling Company:	Subsurface Drilling and Remediation	Boring Location:	Entrance to cement plant		
Driller:	Jim Goldthwaite / Josh Downing	Elevation:	NA	Datum:	NA
Inspector:	Keith Sullivan / Adam Rosenblatt	Start Date:	1/16/2002	End Date:	1/16/2002

The borings were drilled by hollow-stem auger. Unless otherwise noted, the soil samples were collected using a 2' split-spoon driven with a 140-lb. hammer falling 30".

Depth (ft)	PID Reading	Sample No.	Pen/Rec	Blows/6"	SAMPLE DESCRIPTION	Boring Photo
6 - 8	ND	S4	24 / 18	15 - 15 15 - 15	Light brown, dense, fine SAND, some silt, wet, no sheen or odors.	
						
8 - 10	ND	S5	24 / 17	15 - 15 17 - 22	Light brown, dense, fine SAND, some silt, wet, no sheen or odors.	
						
10 - 12	ND	S6	24 / 14	8 - 17 23 - 21	Light brown, dense, fine SAND, some silt, wet, no sheen or odors.	
12 - 14	ND	S7	24 / 16	21 - 25 17 - 15	Light brown, dense, fine SAND, some silt, little gravel, trace root matter, wet, no sheen or odors.	
						Bottom of exploration 14' below grade.

GRANULAR SOILS BLOWS/FT	DENSITY
0 - 4	V. Loose
4 - 10	Loose
10 - 30	M. Dense
30 - 50	Dense
>50	V. Dense

COHESIVE SOILS BLOWS/FT	DENSITY
<2	V. Soft
2 - 4	Soft
4 - 8	M. Stiff
8 - 15	Stiff
15 - 30	V. Stiff
>30	Hard

PROPORTIONS	
Trace	0 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

Notes

1) Soil stratification lines represent a graphical depiction of changes in soil type and grainsize. Actual changes may be gradual.
2) Bedrock was not encountered.
3) Water levels may fluctuate due to ocean tides, season, and precipitation rates.
4) All soil samples were screened in the field for VOCs using a ThermoEnvironmental Instruments model 580B 10.eV photoionization detector (PID).

APPENDIX C

Air Emissions Evaluation

APPENDIX C

Tables

Table C-1 Analytical Soil Data

Holcim Driveway
STRAP Addendum
Providence, Rhode Island

	RIDEM GB Leachability Criteria	RIDEM I/C DEC	RIDEM UCL	Units	Range Detected		A54	A55	C74	C75		C76		C77		C78	C79	C80	C81
							0-2 FT	0-2 FT	0-2 FT	0-2 FT	8-10 FT	0-2 FT	10-12 FT	0-2 FT	8-10 FT	0-2 FT	0-2 FT	0-2 FT	0-2 FT
					Minimum	Maximum	2/10/2000	2/9/2000	2/11/2000	2/10/2000		2/10/2000		2/10/2000		2/9/2000	2/10/2000	2/10/2000	2/10/2000
Volatile Organic Compounds (VOCs)																			
Acetone	NE	10,000	10,000	mg/kg	0.55	2.1	1.95	1.9	0.6	0.55	0.55	0.65	0.75	0.8	0.85	2.1	1.3	0.75	0.76
Chloroform	NE	940	10,000	mg/kg	0.23	1.95	1.95	0.26	0.6	0.23	0.55	0.65	0.75	0.33	0.85	0.26	0.8	0.75	0.65
Naphthalene	NE	10,000	10,000	mg/kg	0.1	2.7	1.4	0.6	0.6	0.55	0.55	0.65	0.1	0.8	0.85	0.55	0.8	0.75	2.7
Toluene	54	10,000	10,000	mg/kg	0.55	0.88	0.88	0.6	0.6	0.55	0.55	0.65	0.75	0.8	0.85	0.55	0.8	0.75	0.65
Xylenes (Total)	NE	10,000	10,000	mg/kg	0.55	1.5	1.5	0.6	0.6	0.55	0.55	0.65	0.75	0.8	0.85	0.55	0.8	0.75	0.65
Semi-Volatile Organic Compounds (SVOCs)																			
Naphthalene	NE	10,000	10,000	mg/kg	0.61	15	1.4	1.95	1.7	1.95	1.75	1.85	1.5	2	0.61	2.1	2.1	2	15

Notes:
Table only indicates the compounds that were detected and have a RIDEM Minimum Quantity, other compounds were analyzed for, but not detected.
ND - Not Detectec NA - Not Analyzed NE - Not Established
Sample depths noted here are from original grade. This table presents data that has since been disturbed or regraded. As such, the final grades are unknown and as such the modified sampling depths are unknown.
Blue shading indicates compound was not detected - value shown is half the detection limit.
Table only shows explorations within a cut area of the STRAP Addendum Area
Averages presented in the table include half the detection limit (if reported)

Table C-2 Excavation Emissions Potential

Holcim Driveway
STRAP Addendum
Providence, Rhode Island

Site-Specific		
Volume of Soil - Excavation	1,100	(cy)
Volume of Soil Moved	1,100	(cy)
Volume of Soil Moved	827	(m^3)

Constants			
Typical Bulk Density	1.5	(g/cm^3)	Eklund 1997 Default

Conversion Factors	
ft/m	3.3
ft^3/cy	27
g/lb	454
g/kg	1000

Analyte	Average Measured Concentration in Soil (µg/g)	Maximum Measured Concentration in Soil (µg/g)	Total Excavation Emissions Potential[1] (lb)	Total Excavation Emissions Potential[2] (lb)	RIDEM Annual Minimum Quantity (lb)
Acetone	0.55	2.1	1.50E+00	5.74E+00	2.00E+04
Chloroform	0.23	1.95	6.28E-01	5.33E+00	2.00E+01
Naphthalene	0.61	15	1.67E+00	4.10E+01	3.00E+00
Toluene	0.55	0.88	1.50E+00	2.40E+00	1.00E+03
Xylenes (Total)	0.55	1.5	1.50E+00	4.10E+00	3.00E+03

Notes:
1. Total Excavation Emissions Potential based on Average Measured Concentration in Soil.
2. Total Excavation Emissions Potential based on Maximum Measured Concentration in Soil.
3. Only detected analytes with Rhode Island Department of Environmental Management (RIDEM) minimum quanitity values are shown.
4. Naphthalene concentrations presented in this model are the maximum of napthalene analyzed as a VOC or as a PAH
5. cm = centimeter; m = meter; g = gram; µg = microgram; ft = feet, lb = pound; kg = kilogram; cy = cubic yard.
6. Yellow Highlighting indicates model inputs.
7. Orange Highlighting indicates the calculated Total Excavation Emissions Potential exceeds the RIDEM Minimum Quantity.

Table C-3 Predicted Excavation Emissions

Holcim Driveway

STRAP Addendum

Providence, Rhode Island

GZA Job 03.0033554.90

5/23/2017

Assumptions		
Assumed Average MW of NAPL	250	(g/mol)
Assumed NAPL Temperature	15	(°C)

Initial Estimate		
Average Regrading Surface Area	12,000	(ft^2)
Average Excavation Average Depth	2.5	(ft)
Excavation Surface Area	1,202	(m^2)
Stockpile Surface Area	1,202	(m^2)
Emitting Surface Area	2,403	(m^2)
Volume of Soil Moved	1,100	(cy)
Volume of Soil Moved	826	(m^3)

Constants			
Typical Bulk Density	1.5	(g/cm^3)	Eklund 1997 Default
R	8.21E-05	(m^3*atm/K/mol)	
R	8.31E-03	(kJ/K/mol)	
R	62,361	(mm Hg*cm^3/mol/K)	
Soil Gas to Atmosphere Exchange Constant (Dry, uncompacted Soils)	0.33	(%/100)	Eklund 1997 Default
Air-Filled Porosity (Dry, uncompacted Soils)	0.55		Eklund 1997 Default
Total Porosity (Uncompacted Soils)	0.55		Eklund 1997 Default
Gas-Phase Mass Transfer Coefficient	0.15	cm/s	Eklund 1997 Default
Time since Start of Excavation of Soil of Interest	60	s	Eklund 1997 Default
Time Period Excavated Soil are Emitting Contaminants	0.1	(hr)	Eklund 1997 Default
TOC of Soil	0.002	(g OC/g soil)	USEPA 1996 Default

Analyte	Average Measured Concentration in Soil (ug/g)	Partial Pressure[1] (atm)	Equilibrium Coefficient	Effective Diffusivity in Air (cm^2/s)	Total Excavation Emissions Potential[2] (lb)	Total Excavation Emissions (lb)	RIDEM Annual Minimum Quantity (lb)
Naphthalene	0.61	3.31E-08	1.08E-04	2.66E-02	1.67E+00	0.0005	3

Notes:

1. The Partial Pressure was calculated using Raoult's Law.
2. If the calculated Total Excavation Emissions exceeds the Total Excavation Emissions Potential, the Total Excavation Emissions Potential was used as the Total Excavation Emissions.
3. All constants for total xylenes are the average of the individual constants for m-xylene, o-xylene, and p-xylene.
4. Only detected analytes with RIDEM minimum quanitity values are shown with Total Excavation Emissions Potentials above RIDEM minimum quantities.
5. Concentration units are in ug/g, which is equal to ppm.
6. MW = molecular weight; atm = atmosphere; kJ = kilojoules; mol = moles; NAPL = non-aqueous phase liquid; ppm = parts per million; mm Hg = millimeter mercury; cm = centimeter; m = meter; g = gram; ug = microgram; ft = feet, lb = pound; s = second; yr = year; hr = hour; < = less than the reporting limit; TOC = total organic carbon.
7. Yellow Highlighting indicates model inputs.
8. Purple Highlighting indicates the Total Excavation Emissions exceeds the Rhode Island Department of Environmental Management (RIDEM) Minimum Quantity.

APPENDIX C

Excavation Emission Calculations

APPENDIX C
EXCAVATION EMISSIONS CALCULATIONS
Holcim Driveway
STRAP Addendum
Providence, Rhode Island

To estimate potential volatile emissions associated with planned remediation activities at the 642 Allens Avenue Property ("the Site"), GZA GeoEnvironmental, Inc. (GZA) used the following modified versions of the equations given in Appendix D of "Air Emissions from the Treatment of Soils Contaminated with Petroleum Fuels and Other Substances" (Eklund 1997):

First, the total excavation emissions potential is calculated as a benchmark:

Total Excavation Emissions Potential:

$$E_{Potential} = C_{i,Soil} \times S_v \times \beta$$

Where,
$E_{Potential}$ = Total Mass of Component i in a given volume of soil in grams (g);
$C_{i,Soil}$ = Concentration of Component i in the Soil in micrograms of Component i per gram of Soil (ug/g);
β = Typical Bulk Density in grams per cubic centimeter (g/cm^3) (assumed to be 1.5 g/cm^3 – Eklund 1997); and
S_v = Total Volume of Soil Moved in cubic meters (m^3).

Average Total Emissions (detailed model):
If the Average Total Emissions calculated by this detailed model (Eklund 1997) exceeds the calculated Total Excavation Emissions Potential, the Total Excavation Emissions Potential will be used.

$$E = E_{PS} + E_{DIFF}$$

$$E_{PS} = \frac{P_i \, MW \, 10^6 \, E_a \, S_v \, ExC}{R \, T}$$

$$E_{DIFF} = \frac{(C)(10{,}000)(SA)(t_v)}{\left(\frac{E_a}{K_{eq} k_g}\right) + \left(\frac{\pi t}{D_e K_{eq}}\right)^{1/2}}$$

Where,
E = Total Emissions from Excavation of Soil in g;
E_{PS}= Total Emissions due to Soil Pore Space Gas in g;
E_{DIFF} = Total Emissions due to Diffusion in g;
P_i = Partial Pressure of Component i in millimeters of mercury (mm Hg)[1];
MW = Molecular Weight in grams per mole (g/mol);

[1] Note that because the impacts at the Site are primarily not separate phase, we have used the partial pressure as opposed to the vapor pressure of the pure component.

10^6 = Conversion Factor of cm^3/m^3;
E_a= Air-Filled Porosity (0.35 for wet, or compacted soil; 0.55 for dry, uncompacted soil – Eklund (1997));
S_v = Total Volume of Soil Moved in m^3;
ExC = Soil-Gas to Atmosphere Exchange Constant (0.10 for wet or high-clay content soils; 0.33 for dry, sandy soils from Eklund - 1997);
R = Universal Gas Constant in mm-Hg*cm^3/mol/K (62,361 mm-Hg*cm^3/mol/K);
T = Temperatures in K (assumed to be 15°C);
C = Mass Loading of Component i in soil in g/cm^3;
$10{,}000$ = Conversion Factor of square centimeters per square meter (cm^2/m^2); and
SA = Total Emitting Surface Area in square meters (m^2). GZA assumed the Total Emitting Surface Area to be the sides and bottom of the excavation and the sides and top of the stockpile.
D_e = Effective Diffusivity in Air in square centimeter per second (cm^2/s);
K_{eq} = Equilibrium Coefficient;
t_v = Time the Volume of Soil Moved is emitting in seconds (s) (360 s – Eklund (1997));
k_g = Gas-Phase Mass Transfer Coefficient in centimeter per second (cm/s) (Default of 0.15 cm/s – Eklund (1997)); and
t = Time that the Instantaneous Emission Rate approximates the Average Emission Rate over the 360 second period that Emissions from Freshly Excavated Soil are assumed to be Significant in s (60 s – Eklund (1997)).

P_i is calculated by:

For this scenario, the partial pressure was estimated using Raoult's Law assuming the constituents are in a mixture with the other organic matter in the soil.

Raoult's Law:

$$P_i = P_i^* x_i$$

Where,
P_i = Partial Pressure of the Component i in the Mixture;
P_i^* = Vapor Pressure of the pure Component i; and
x_i = Mole Fraction of the Component i in the Mixture (moles component/total moles).

$$x_i = \frac{10^{-6}\, C_{i,Mixture}\, MW_{Mixture}}{MW_i}$$

Where,
10^{-6} = Conversion Factor of kilogram per milligram (kg/mg);
$MW_{Mixture}$ = Molecular Weight of Mixture in g/mol (assumed to be 250 g/mol);
MW_i = Molecular Weight of Component i in g/mol; and
$C_{i,Mixture}$ = Concentration of Component i in the Mixture in milligrams of Component i per kilogram of Mixture (mg/kg).

$$C_{i,Mixture} = \frac{C_{i,Soil}}{TOC}$$

Where,
$C_{i,Mixture}$ = Concentration of Component i in the Mixture in milligrams of Component i per kilogram of Mixture (mg/kg);

$C_{i,Soil}$ = Concentration of Component i in the Soil in micrograms of Component i per gram of Soil (ug/g); and TOC = Fraction of Total Organic Carbon in the Soil (g/g). Because Site-specific TOC data was not available, the default value of 0.002 from the USEPA's Soil Screening Guidance: User's Guide (1996) was used to be conservative.

We've assumed a soil temperature of 15°C in our calculations. We have therefore utilized the Clausius-Clapeyron equation to calculate vapor pressures at 15°C from those in the literature (typically 25°C):
Clausius-Clapeyron Equation:

$$\ln\left(\frac{P_1}{P_2}\right) = \left(\frac{\Delta H_{vap}}{R}\right)\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

Where,
P_1 = Vapor Pressure at a Known Point;
P_2 = Vapor Pressure at a Given Point;
T_1 = Temperature at a Known Point in Kelvin (K);
T_2 = Temperature at a Given Point in K;
ΔH_{vap} = Enthalpy of Vaporization of Component i in kilojoules per mole (kJ/mol); and
R = Universal Gas Constant in kilojoules per Kelvin per mole (8.314E-03 kJ/K/mol).

C (Mass Loading of Component i in soil in g/cm^3) is calculated by:

$$C = 10^{-6}\, C_{i,Soil}\, \beta$$

Where,
10^{-6} = Conversion Factor of gram per microgram (g/ug);
$C_{i,Soil}$ = Concentration of Component i in the Soil in micrograms of Component i per gram of Soil (ug/g); and
β = Typical Bulk Density in g/m^3; (assumed to be 1.5 g/m^3 – Eklund (1997)).

K_{eq} is calculated by:

$$K_{eq} = \frac{P_i\, MW_i\, E_a}{R\, T\, C}$$

Where,
P_i = Partial Pressure of the Component i in the Mixture in mm Hg;
MW_i = Molecular Weight of Component i in g/mol;
E_a = Air-Filled Porosity (0.35 for wet, or compacted soil; 0.55 for dry, uncompacted soil – Eklund (1997));
R = Universal Gas Constant in mm-Hg*cm^3/mol/K (62,361 mm-Hg*cm^3/mol/K);
T = Temperatures in K (assumed to be 15°C);
C = Mass Loading of Component i in soil in g/cm^3;

D_e is calculated by:

$$D_e = \frac{D_a\, (E_a)^{3.33}}{(E_T)^2}$$

Where,
D_a = Diffusivity in Air of Component i in cm^2/s (Default of 0.1 was used when chemical-specific values could not be found.);

E_a = Air-Filled Porosity (0.35 for wet, or compacted soil; 0.55 for dry, uncompacted soil – Eklund (1997)); and
E_T = Total Porosity (0.35 for compacted soil; 0.55 for uncompacted soil – Eklund (1997)).

For impacted soils to be managed on-Site (e.g., if it is not directly loaded into a truck but is first stockpiled), an additional Total Emissions due to Soil Pore Space Gas factor will be included in the Average Total Emissions to account for the additional emissions during soil handling and stockpiling. As a conservative measure, for losses during management of materials, GZA will utilize the Total Emissions due to Soil Pore Space Gas that was calculated above for losses during excavation. This is conservative since the concentrations in the re-handled soil will be lower than in the soil during excavation.

References:

Eklund, et al. 1997. Air Emissions from the Treatment of Soils Contaminated with Petroleum Fuels and Other Substances. Prepared for U.S. Environmental Protection Agency Office of Air and Radiation and Office of Research and Development Washington, D.C. EPA-600/R-97-116. October.

RIDEM. 2009. Air Pollution Control Regulation No. 9: Air Pollution Control Permits. December.

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