SAGE
ENVIRONMENTAL

SITE INVESTIGATION REPORT (SIR) / SUPPLEMENTAL SIR SCOPE OF WORK

1135 Roosevelt Avenue
Pawtucket, Rhode Island

Submitted to:

Mr. Timothy Fleury
Rhode Island Department of Environmental Management
Office of Waste Management
235 Promenade Street
Providence, Rhode Island 02903

On Behalf of:

Ms. Jane P. Lin, AIA
Civic Builders
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Prepared by:

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***SAGE* Project No. S2226A**

July 2012

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July 30, 2012

SAGE
ENVIRONMENTAL

Mr. Timothy Fleury
Rhode Island Department of Environmental Management
Office of Waste Management
235 Promenade Street
Providence, Rhode Island 02903

RE: Site Investigation Report/Supplemental SIR Scope of Work
1135 Roosevelt Avenue
Pawtucket, Rhode Island
SAGE Project No. S2226A

Dear Mr. Fleury:

Enclosed please find a Site Investigation Report (SIR) for the referenced property (Site). Based on the results of subsurface investigations performed, it is concluded that additional work remains to complete the site investigation process. Accordingly, the following proposed scope of work to advance the Site investigation process has been developed by *SAGE* Environmental, Inc. (*SAGE*) for Rhode Island Department of Environmental Management (RIDEM) review and approval.

Soil Gas Survey/Soil Gas Analysis

Up to eleven additional soil gas points will be advanced at the Site. Soil gas points will be advanced with a ½-inch core bit to an approximate depth of one foot bgl. Field screening of newly-installed points will be performed using a photoionization detector (PID). Photoionizable compounds that might typically be detected include total volatile organic compounds (TVOCs) such as those found in petroleum and common solvents. Following screening of the soil gas points, samples will be collected in stainless steel, summa canisters which are first placed under high vacuum at the testing laboratory. The samples will then be submitted under proper chain-of-custody protocol to a State-certified laboratory for volatile organic compounds (VOC) analysis via EPA Method TO-15. Prior to collection of soil gas samples for laboratory analysis, a soil gas survey of the southern basement area will be performed in an effort to refine soil gas point installation locations. Temporary soil gas points will be installed and field screened with a PID. Semi-permanent soil gas points will be installed based on the outcome of the survey. Temporary points will be plugged with hydraulic cement upon completion of the survey.

Manhole Assessment

Drain assessment will include an inventory and inspection of floor drains located in the building and a further evaluation of a manhole associated with a potential drywell

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structure located on the southern portion of the property. *SAGE* will make efforts to snake the floor drain to ascertain its discharge location. If sediments are observed in the drains, a sample will be collected for laboratory analysis of total petroleum hydrocarbons (TPH) and VOCs. If discharge locations cannot be determined initially in the field, drain assessment may necessitate dye testing or other appropriate methods.

Report Preparation

The data obtained from the above investigation will supplement existing data and will be summarized in a Supplemental SIR. The Supplemental SIR will also include a Remedial Alternatives Analysis proposing a minimum of two remedial alternatives other than the no action/natural attenuation alternative. The SIR will be submitted in both hard copy and electronic format and be accompanied by a SIR checklist.

A detailed summary of site investigation activity conducted to date is provided in the report that follows.

Should you have any questions, comment or require additional information prior to final work scope approval, please do not hesitate to contact either of the undersigned.

Thank you in advance for your continued assistance and your prompt review and comment or approval of the site investigation scope of work.

Sincerely,
SAGE Environmental, Inc.

Jeffrey D'Arrigo
Environmental Scientist

Bruce W. Clark
Principal

JD/BWC:car

Attachment

c: Ms. Jane P. Lin, AIA, Civic Builders

TABLE OF CONTENTS

1.0 INTRODUCTION AND BACKGROUND 1

1.2 Previous Environmental Investigation 1

2.0 SITE SUBSURFACE INVESTIGATIONS 3

2.1 Pre-Drilling Activities 3

2.2 Soil Boring Installations 3

2.3 Soil Sampling and Laboratory Analysis 5

2.4 Additional Arsenic Sampling 9

2.5 Soil Gas Sampling 11

3.0 PUBLIC MEETING 13

4.0 CONCLUSIONS AND RECOMMENDATIONS 13

5.0 PROPOSED SCOPE OF WORK 14

5.1 Soil Gas Analysis 14

5.2 Manhole Assessment 14

5.3 Report Preparation 15

FIGURES

FIGURE 1 - SITE LOCATION MAP

FIGURE 2 - PAWTUCKET TAX ASSESSOR PLAT MAP

FIGURE 3 - BORING/SOIL GAS LOCATION PLAN

FIGURE 4 - PROPOSED SOIL GAS LOCATIONS

ATTACHMENTS

ATTACHMENT 1 – COPY OF SAGE'S 2011 PHASE I\LSI REPORT

ATTACHMENT 2 - BORING LOGS

ATTACHMENT 3 - LABORATORY ANALYTICAL REPORTS – SOIL

ATTACHMENT 4 - LABORATORY ANALYTICAL REPORTS – STONE

ATTACHMENT 5 - LABORATORY ANALYTICAL REPORTS – ADDITONAL SOIL

ATTACHMENT 6 - LABORATORY ANALYTICAL REPORTS – SOIL GAS

ATTACHMENT 7 – PUBLIC MEETING SUMMARY REPORT

1.0 INTRODUCTION AND BACKGROUND

A Site Investigation (SI) was performed by *SAGE* Environmental Inc. (*SAGE*) to evaluate subsurface soil and groundwater conditions that may be encountered during future redevelopment of the former Arbeka Webbing Company mill (hereinafter "Site") as a charter school. The Site is located at 1135 Roosevelt Avenue in Pawtucket, Rhode Island. The approximate center of the Site is located at 71°21′59″ north latitude and 41°53′38″ west longitude. A Site Location Plan depicting the Site on the United States Geological Survey (USGS), "Attleboro, Massachusetts Quadrangle Topographic Map" is attached as **Figure 1**. According to information obtained from the City of Pawtucket Assessor's Office, the Site is identified as Lot 407 on Plat 05 and occupies approximately 4.41 acres of land. A vacant industrial building with a footprint of approximately 58,000 square feet is situated on the western portion of the Site. The remainder of the property surrounding the building is comprised of paved parking lots, paved access ways, and small landscaped and grass-covered areas. The eastern portion of the Site is comprised of an undeveloped grass field/park comprising approximately 1.75 acres A portion of the City of Pawtucket Tax Assessor's Plat No. 05 depicting the Site is included as **Figure 2**.

According to the information obtained from the City of Pawtucket and downloaded from the Vision Appraisal on-line database, the Site is zoned "MO" – manufacturing open space. Abutting property use is summarized in **Table 1**.

Table 1
Surrounding Property Usage
1135 Roosevelt Avenue
Pawtucket, Rhode Island

Plat	Lot	Usage	Orientation
5B	25, 26, 27, 28, 491, 492, 493, 494, 524, 528, 575	Residential	North
	240, 241, 244, 245, 248, 249, 252, 253, 256, 257, 260, 261, 264, 265, 268, 269, 272, 434	Residential	South
4A	Not Available	Residential	East
5A	Not Available	Residential	West

1.2 Previous Environmental Investigation

SAGE performed a Phase I Environmental Site Assessment (ESA) of the Site in 2011. This assessment was performed for a prior prospective purchaser contemplating redeveloping the property as a middle school. Specifically, the Phase I ESA was conducted in an effort to evaluate whether a recognized environmental condition (REC)

as defined by the American Society for Testing and Materials (ASTM) was present at the Site. Pursuant to ASTM E-1527, a REC is defined as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies."

A LSI was also performed concurrently with the Phase I ESA to evaluate potential petroleum residuals associated with the former underground storage tanks (USTs) and historic industrial chemical use in anticipation of potential future redevelopment. Significant findings of *SAGE*'s 2011 investigation of the Site are summarized below:

- Surficial soil testing identified two soil areas within a courtyard (CY-1 and CY-2) where concentrations of polynuclear aromatic hydrocarbons (PAHs) exceeded Rhode Island Department of Environmental Management (RIDEM) Method 1 Residential Direct Exposure Criteria (phenanthrene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoroanthene, benzo(k)fluoranthene, benzo[a]pyrene, indeno(1,2,3-cd)pyrene, dibenz[a,h]anthracene, and benzo(g,h,i)perylene) in both CY-1 and CY-2. Concentrations of benzo[a]anthracene, benzo[b]fluoroanthene, benzo[a]pyrene, indeno(1,2,3-cd)pyrene, and dibenz[a,h]anthracene identified through laboratory analysis of surficial soil samples CY-1 and CY-2 exceeded RIDEM Method 1 Industrial/Commercial Direct Exposure Criteria;

- Results of laboratory analysis of groundwater samples obtained from site monitor wells did not identify exceedances of applicable RIDEM Method 1 GB Groundwater Objectives;

- A number of floor drains were noted within the basement of the subject building which appear to run to the Pawtucket Sewer System. *SAGE* recommended confirming the discharge points associated with these floor drains via dye testing;

- A likely dry well and associated septic tank (a.k.a. underground injection control (UIC) structures) should be properly closed as is required by RIDEM regulations.

A copy of the 2011 Phase I\LSI report is included as **Attachment 1**.

2.0 SITE SUBSURFACE INVESTIGATIONS

In an effort to gain a more detailed understanding of surficial soil conditions at the Site, additional subsurface investigation was conducted in May of 2012. Specifically, soil samples from within two feet of grade level were collected to determine potential concerns related to direct exposure during redevelopment. In addition, sub-slab sampling was conducted throughout the floor of the central portion of the Site building which was originally the only portion of the facility proposed for reuse. Additional shallow soil samples were also obtained on June 14, 2012 as described in **Section 2.4**. A summary of the May and June 2012 subsurface investigation follows.

2.1 Pre-Drilling Activities

Pre-drilling activities included marking all proposed drilling locations, notifying DigSafe (Ticket no. 2012-1902897) and contacting local utilities.

Prior to soil sample collection from beneath the floor of the Site building, the floor areas at select sampling locations were cored to allow access to underlying soil.

2.2 Soil Boring Installations

Drilling activities were conducted on May 11, 2012. Borings were advanced by Martin GeoEnvironmental, LLC of Belchertown, Massachusetts utilizing a truck mounted direct push technology drill rig for borings SB-1 through SB-10 which were advanced along the exterior portions of the site. In addition *SAGE* personnel advanced 5 hand augered soil borings in the eastern and western interior portions of the building identified as SB-11 through SB-15. *SAGE* personnel were on-Site during all subsurface investigations to supervise and evaluate subsurface conditions. A Site Plan depicting locations of soil borings and monitor wells and other Site features is provided as **Figure 3**.

Recovered soils were screened in the field for the presence of total photoionizable compounds using an OVM 580B photoionization detector (PID) and the jar headspace technique. The PID was equipped with a 10.6 eV lamp and calibrated to an isobutylene standard. This screening method detects compounds associated with petroleum constituents and many common solvents. Field screening results and boring depths are summarized in **Table 2**.

As indicated above, soil sampling was conducted through the floor at five locations in the eastern and western portions of the two Site buildings originally proposed to be demolished during planned future redevelopment. Limited soil gas sampling was

performed through the floor of that portion of the building originally proposed for repurposing. Soil gas samples were obtained from the northern and southern basements and the central portion of the building and to evaluate concentrations of volatile organic compounds (VOCs) in soil gas beneath the central building.

Two of the hand augured soil sampling points, SB-11 and SB-12, were advanced in the eastern end of the building where soil samples were collected from beneath a concrete slab foundation. Soil borings SB-13 and SB-14 were advanced within the western portion of the Site building through a wooden floor beneath which a layer of black, crushed stone was encountered. SB-15 also obtained in the western portion of the building was collected from beneath the concrete slab in a former boiler room area. A maximum depth of two feet was attempted during hand augering.

Table 2
Soil Screening Results
Jar Headspace Analysis (ppm)
1135 Roosevelt Avenue
Pawtucket, Rhode Island

Boring ID	Sample ID	Depth (feet)	Total Organic Vapors (ppm)
SB-1	S1	0-2	ND
SB-2	S1	0-2	ND
SB-3	S1	0-2	ND
SB-4	S1	0-2	ND
SB-5	S1	0-2	ND
SB-6	S1	0-2	ND
SB-7	S1	0-2	ND
SB-8	S1	0-2	ND
SB-9	S1	0-2	ND
SB-10	S1	0-2	ND
SB-11	S1	0-2	ND
SB-12	S1	0-2	ND
SB-13	STONE	0-.5	ND
SB-13	S1	.5-2	ND
SB-14	STONE	0-.5	ND
SB-14	S1	.5-2	ND
SB-15	S1	0-2	ND

All readings taken using an OVM 580B with 10.6 eV lamp
ND = None Detected

Soil borings indicate that on-Site soils consist predominantly of fine to medium sand, and some silt and gravel. Evidence of trace asphalt and potential urban fill like material were observed in select soil borings collected from the exterior portions of the property. Detailed classifications and descriptions of recovered soils, along with PID field

screening results, are depicted on the Soil Boring/Monitor Well Construction Logs included as **Attachment 2.**

During advancement of soil borings SB-13 and SB-14 which were hand augered beneath the western building's wooden floor, approximately a 4-6 inch layer of hard crushed stone was encountered directly beneath the wooden floor. This stone had a black, oily-like residue coating, was smooth to the touch, and exhibited an unidentifiable odor. A sample of the stone was collected and screened utilizing the OVM 580B PID; the stone exhibited a non-detect response on the PID.

2.3 Soil Sampling and Laboratory Analysis

A total of 15 soil samples were collected for laboratory analysis. Initially, 13 subsurface soil samples were collected and transported, utilizing chain-of-custody protocol, to a State-certified laboratory for PAHs via EPA Method 8270C, RCRA 8 Metals, and polychlorinated biphenyls (PCBs) via EPA Method 8082B. After obtaining preliminary data for the initial 13 samples, the two remaining samples (SB-1 S-1 and SB-6 S-1) were submitted for laboratory analysis of PAHs via EPA Method 8270C to further characterize the extent of suspect urban fill at the Site. Results of laboratory analysis for soil samples submitted on May 11, 2012 and May 21, 2012 are summarized in **Table 3**. Laboratory analytical reports including Chain-of-Custody documentation are included as **Attachment 3**.

As indicated in **Table 3**, PAH compounds exceeding RIDEM Method 1 Residential Direct Exposure Criteria were identified in soil samples SB-3 S1, SB-4 S1, SB-5 S1, SB-7 S1, SB-9 S1, SB-13 S1 and SB-14 S1. PAH compounds exceeding RIDEM Method 1 Industrial/Commercial Direct Exposure Criteria were identified in soil samples SB-3 S1, SB-4 S1, SB-5 S1, SB-13 S1, and SB-14 S1. In addition arsenic was detected in 3 of the 13 soil samples submitted for analysis, specifically SB-8 S1, SB-9 S1, and SB-10 S1 with concentrations ranging from 7.91 ppm to 8.46 ppm.

PAH concentrations detected in soil borings SB-3 S1, SB-4 S1, SB-5 S1, SB-7 S1 and SB-9 S1 appear to be consistent with evidence of urban fill material observed within soil boring cores extracted from the exterior building. Soil samples obtained from SB-8, SB-9 and SB-10 indicate soil in the eastern portion of the Site is compliant with applicable RIDEM Method 1 Residential and Industrial/Commercial Direct Exposure Criteria

It should be noted that asphalt was observed in surficial soil samples obtained from soil borings SB-7 S1 and SB-9 S1. Unlike remaining samples collected, no other fill evidence was observed in the samples. Prior to laboratory analysis, the laboratory was instructed to remove visible asphalt from the samples.

As indicated previously, soil samples SB-13 S1 and SB-14 S1 were collected beneath the wooden floor of the western side of the building where oily-like coated, black crushed stone was encountered within the first 4 to 6 inches of the soil borings. PAH compounds detected within soil samples collected from these two borings are composed of similar constituents and differ from soil samples collected elsewhere at the Site. According to the property owner who was present during installation of borings, the black stone material was commonly "utilized as a desiccant" in many old mill buildings where wooden floors were installed above underlying soil without the benefit of a concrete slab or other moisture barrier in-between. Consistent with the owner's comment, the black stone layer was uniform in thickness beneath the floor at the two boring locations and appeared to be an engineered fill material intentionally applied to the subsurface prior to the completion of the wooden floor. As a result of this finding, a composite sample of the black stone was collected from SB-13 and SB-14 and submitted on May 15, 2012 for laboratory analysis of PAHs via EPA Method 8270C. Laboratory analytical reports including Chain-of-Custody documentation are included as **Attachment 4**.

Laboratory analytical results of the stone PAH analysis are summarized in **Table 4**. The results of PAH analysis for the soil samples obtained beneath the stone from soil borings SB-13 and SB-14 are included in the table for comparison.

Table 4
Summary of Soil Sample Analysis Compared to Stone Sample
1135 Roosevelt Avenue
Pawtucket, Rhode Island

Sample / Sample ID / Date	Concentration				RIDEM Method 1 Objective		
Analyte	SB-13 / S1 5/11/2012	SB-14 / S1 5/11/2012	SB-15 / S1 5/11/2012	Stone 5/15/2012	Direct Exposure (Residential)	Direct Exposure (Ind. / Comm.)	GB Leachability
Semivolatile Organic Compounds by 8270D (ug/kg):							
Naphthalene	<500	<490	<100	490	54000	10000000	NE
2-Methylnaphthalene	<500	<490	<100	710	123000	10000000	NE
Acenaphthylene	6800	6600	110	11000	23000	10000000	NE
Acenaphthene	<500	<490	<100	790	43000	10000000	NE
Dibenzofuran	5500	4300	140	9000	NE	NE	NE
Fluorene	2300	2600	<100	3600	28000	10000000	NE
Phenanthrene	**47000[a]**	**50000[a]**	310	**72000[a]**	40000	10000000	NE
Anthracene	13000	15000	<100	22000	35000	10000000	NE
Fluoranthene	7000	8900	<100	**57000[a]**	20000	10000000	NE
Pyrene	**38000[a]**	**51000[a]**	<100	**40000[a]**	13000	10000000	NE
Benzo(a)anthracene	**19000[ab]**	**25000[ab]**	<100	**23000[ab]**	900	7800	NE
Chrysene	**16000[a]**	**22000[a]**	<100	**18000[a]**	400	780000	NE
Benzo(b)fluoranthene	**19000[ab]**	**27000[ab]**	<100	**20000[ab]**	900	7800	NE
Benzo(k)fluoranthene	**6600[a]**	**8300[a]**	<100	**7200[a]**	900	78000	NE
Benzo(a)pyrene	**13000[ab]**	**19000[ab]**	<100	**15000[ab]**	400	800	NE
Indeno(1,2,3-cd)pyrene	**9100[ab]**	**13000[ab]**	<100	**11000[ab]**	900	7800	NE
Dibenz(a,h)anthracene	**2100[ab]**	**3000[ab]**	<100	**4100[ab]**	400	800	NE
Benzo(g,h,i)perylene	**7200[a]**	**10000[a]**	<100	**8100[a]**	800	10000000	NE
PCBs by 8082A (ug/kg):				NA			
Aroclor-1016	<100	<100	<100		—	—	—
Aroclor-1221	<100	<100	<100		—	—	—
Aroclor-1232	<100	<100	<100		—	—	—
Aroclor-1242	<100	<100	<100		—	—	—
Aroclor-1248	<100	<100	<100		—	—	—
Aroclor-1254	<100	<100	<100		—	—	—
Aroclor-1260	<100	<100	<100		—	—	—
Aroclor-1262	<100	<100	<100		—	—	—
Aroclor-1268	<100	<100	<100		—	—	—
Total PCB	<100	<100	<100		10000	10000	10000
Total Metals by 6010C (mg/kg):				NA			
Arsenic	4.25	4.22	1.59		7	7	NE
Barium	15.8	20.8	16.9		5500	10000	NE
Cadmium	<0.39	0.36	<0.3		39	1000	NE
Chromium	3.42	5.54	3.5		390	10000	NE
Lead	6.1	11.3	3		150	500	NE
Selenium	2.52	5.27	2.03		390	10000	NE
Silver	<0.39	<0.31	<0.3		200	10000	NE
Total Metals by 7471B (mg/kg):				NA			
Mercury	<0.078	<0.079	<0.068		23	610	NE

Where necessary, the RIDEM objectives, in ppm, have been converted to ppb to match the laboratory reporting method.
NE: No allowable limit is established for the substance
NA: Not analyzed
<x: Indicates analyte concentration not detected at or above specified laboratory quantitation limit (x)
Sample Results:
a-b: Analyte concentration in this sample exceeds the RIDEM objectives for:
a: Direct Exposure in a residential area
b: Direct Exposure in a commercial or industrial area
e: Although the analyte was not detected, the laboratory quantitation limit for this sample exceeds the RIDEM objectives for Direct Exposure in a residential area

As indicated in **Table 4**, PAH compounds identified in the stone sample are composed of similar constituents with relatively similar concentrations as soil samples SB-13 S1 and SB-14 S1 collected beneath the stone layer identified in SB-13 and SB-14. Additionally, as depicted in **Table 4**, soil sample SB-15 S1 which also was collected from the western side of the building, but was located beneath the concrete slab of the building where no black, crushed stone was observed, did not reveal any PAH compounds exceeding RIDEM Method 1 Direct Exposure Criteria.

According to the laboratory, the black, crushed stone pieces, after extraction, were no longer black in color but rather brown in color, suggesting a possible coal tar or other heavy distillate had been applied to the stone.

2.4 Additional Arsenic Sampling

In an effort to evaluate average arsenic concentrations site wide *SAGE* returned to the site on June 14, 2012 to collect an additional 10 surficial soil samples. Soil sample locations are depicted on **Figure 3**. Samples were collected from 0-2′ below grade level (bgl) stored in analyte specific containers and transported, utilizing chain-of-custody protocol, to a State-certified laboratory for Arsenic via EPA method 6010C. Results of arsenic sampling are summarized in **Table 5**.

Copies of laboratory analytical reports including chain of custody receipts are included in **Attachment 5**.

As indicated in **Table 5**, the average arsenic concentration for samples collected Site-wide is 5.89 ppm.

2.5 Soil Gas Sampling

As indicated previously, the central portion of the Site building was originally proposed for reuse, and therefore, 3 soil gas sampling points to evaluate soil gas for VOCs were proposed.

On May 11, 2012, *SAGE* advanced a ½-inch core bit to an approximate depth of one foot bgl. Field screening was performed using a PID. Photoionizable compounds that might typically be detected include total volatile organic compounds (TVOCs) such as those found in petroleum and common solvents. Soil gas locations are depicted on **Figure 3**. The results of soil gas screening are summarized in **Table 6**.

Table 6
Soil Gas Screening Results
1135 Roosevelt Avenue
Pawtucket, Rhode Island

Soil Gas Point ID	PID Results
1	ND
2	ND
3	ND

ND= None detected

A soil gas sample was collected from each point on May 11, 2012. The samples were collected in stainless steel summa canisters which were first placed under high vacuum at the testing laboratory. The samples were then submitted under proper chain-of-custody protocol to a State-certified laboratory for VOC analysis via EPA Method TO-15. Soil gas analytical results for samples collected on May 11, 2012 are summarized in **Table 7**. The laboratory analytical report, including Chain-of-Custody documentation, is included as **Attachment 6**.

As indicated in **Table 7**, the results of analysis identified elevated levels of total VOCs, specifically 1,1,1-trichloroethane, in soil gas point SG-1.

3.0 PUBLIC MEETING

In accordance with as Section 7.00, Rule 7.07.A.iii of the Rhode Island Department of Environmental Management's (RIDEM's) Remediation Regulations a public meeting was held on June 27, 2012. During the public comment period, no comments regarding environmental conditions at the Site and/or the environmental history at the Site were received by the RIDEM's Office of Waste Management (OWM). A copy of the meeting summary report is included as **Attachment 7**.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on data obtained during the course of this assessment:

- Evidence of urban fill-like material (brick, asphalt, glass and soil) was observed in select borings located throughout the exterior of the property. Laboratory analysis of this material identified polynuclear aromatic hydrocarbons (PAH) compounds exceeding RIDEM Method 1 Residential and Industrial/Commercial Direct Exposure Criteria;

- Soil borings advanced beneath the wooden floor of the western side of the building (SB-13 and SB-14) revealed the presence of a 4"-6" layer of black crushed stone with an oil/tar-like coating. Laboratory analysis of the stone and soil samples collected from soil borings SB-13 and SB-14 identified similar PAH constituents exceeding RIDEM Method 1 Residential and Industrial/Commercial Direct Exposure Criteria According to the laboratory, the oil–like coating was essentially dissolved away from the stone during the extraction process utilized to prepare the sample for analysis. Given the above findings, it appears that the stone layer observed beneath the wooden floor on the western side of the building is likely the source of contamination identified in SB-13 and SB-14;

- The Site-wide average arsenic concentration obtained from the 23 samples tested is 5.89 mg/kg; and

- Soil gas sample SG-1 obtained from the southern basement (see **Figure 2**) yielded elevated levels of total VOCs, specifically 1,1,1-Trichloroethane, in soil gas.

Given the above, the SI process remains incomplete, and *SAGE* recommends additional Site investigation be conducted to fill in data gaps. Data gaps identified include further evaluation of soil gas, analysis of basement floor drains to verify discharge points as well as further evaluation of an exterior manhole associated with a potential dry well located on the southern portion of the property. Accordingly, the following scope of work has been developed in an effort to complete field activity associated with the SI process.

5.0 PROPOSED SCOPE OF WORK

5.1 Soil Gas Survey/Soil Gas Analysis

Up to eleven additional soil gas points will be advanced at the Site. Locations of these proposed soil gas points are depicted on **Figure 4** and include locations in the eastern portion of the building, as it is *SAGE*'s understanding that current development plans include use of this portion of the building in addition to the central portion as originally proposed. Soil gas points will be advanced with a ½-inch core bit to an approximate depth of one foot bgl. Field screening of newly-installed points will be performed using a PID. Photoionizable compounds that might typically be detected include TVOCs such as those found in petroleum and common solvents. Following screening of the soil gas points, samples will be collected in stainless steel, summa canisters which are first placed under high vacuum at the testing laboratory. The samples will then be submitted under proper chain-of-custody protocol to a State-certified laboratory for VOC analysis via EPA Method TO-15. Prior to collection of soil gas samples for laboratory analysis, a soil gas survey of the southern basement area will be performed in an effort to refine soil gas point installation locations. Temporary soil gas points will be installed and field screened with a PID. Semi-permanent soil gas points will be installed based on the outcome of the survey. Temporary points will be plugged with hydraulic cement upon completion of the survey.

5.2 Manhole Assessment

Drain assessment will include an inventory and inspection of floor drains located in the building and a further evaluation of a manhole associated with a potential drywell structure located on the southern portion of the property. *SAGE* will make efforts to snake the floor drain to ascertain its discharge location. If sediments are observed in the drains, a sample will be collected for laboratory analysis of total petroleum hydrocarbons (TPH) and VOCs. If discharge locations cannot be determined initially in the field, drain assessment may necessitate dye testing or other appropriate methods.

5.3 Report Preparation

The data obtained from the above investigation will supplement existing data and will be summarized in a Supplemental Site Investigation Report (SIR). The Supplemental SIR will also include a Remedial Alternatives Analysis proposing a minimum of two remedial alternatives other than the no action/natural attenuation alternative. The SIR will be submitted in both hard copy and electronic format and be accompanied by a SIR checklist.

NELAC LAB

Analytical Results
Method TO-15

Case Number: Y0511-13
Sample ID: SG-1

Date Analyzed: 5/14/2012
Date Sampled: 5/11/2012

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Propylene	ND	ND	0.5	0.9
Dichlorodifluoromethane	ND	ND	0.5	2.5
Chloromethane	ND	ND	0.5	1.0
Freon-114	ND	ND	0.5	3.5
Vinyl Chloride	ND	ND	0.5	1.3
1,3-Butadiene	ND	ND	0.5	1.1
Bromomethane	ND	ND	0.5	1.9
Trichlorofluoromethane	ND	ND	0.5	2.8
Chloroethane	ND	ND	0.5	1.3
Ethanol	ND	ND	1.0	1.9
Acetone	6.4	15.2	1.0	2.4
Isopropanol	ND	ND	1.0	2.5
1,1-Dichloroethene	ND	ND	0.5	2.0
Methylene Chloride	ND	ND	40.0	138.8
Freon-113	3.7	28.2	0.5	3.8
TBME	ND	ND	0.5	1.8
Carbon Disulfide	ND	ND	0.5	1.6
trans-1,2 Dichloroethene	ND	ND	0.5	2.0
1,1-Dichloroethane	4.6	18.6	0.5	2.0
Vinyl Acetate	ND	ND	0.5	1.8
2-Butanone	ND	ND	0.5	1.5
cis-1,2-Dichloroethene	ND	ND	0.5	2.0
Hexane	1.3	4.5	0.5	1.8
Chloroform	0.6	2.8	0.5	2.4
1,1,1-Trichloroethane	307.0	1673.8	10.0	54.5
Carbon Tetrachloride	ND	ND	0.5	3.1
Tetrahydrofuran	ND	ND	0.5	1.5
Benzene	ND	ND	0.5	1.6
1,2-Dichloroethane	ND	ND	0.5	2.0
Trichloroethene	ND	ND	0.5	2.7
Heptane	ND	ND	0.5	2.0
1,2-Dichloropropane	ND	ND	0.5	2.3
Bromodichloromethane	ND	ND	0.5	3.3
1,4-Dioxane	ND	ND	0.5	1.8
MIBK	ND	ND	0.5	2.0
cis-1,3-Dichloropropene	ND	ND	0.5	2.3
Toluene	1.8	6.9	0.5	1.9
trans-1,3-Dichloropropene	ND	ND	0.5	2.3

Analytical Results
Method TO-15

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: SG-1 Date Sampled: 5/11/2012

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,1,2-Trichloroethane	ND	ND	0.5	2.7
Ethylene Dibromide	ND	ND	0.5	3.8
2-Hexanone	ND	ND	0.5	2.0
Tetrachloroethene	ND	ND	0.5	3.4
Chlorodibromomethane	ND	ND	0.5	4.2
Chlorobenzene	ND	ND	0.5	2.3
Ethylbenzene	ND	ND	0.5	2.2
m & p-Xylene	ND	ND	1.0	4.3
o-Xylene	ND	ND	0.5	2.2
Styrene	ND	ND	0.5	2.1
Bromoform	ND	ND	0.5	5.2
1,1,2,2-Tetrachloroethane	ND	ND	0.5	3.4
4-Ethyl Toluene	ND	ND	0.5	2.5
1,3,5-Trimethylbenzene	ND	ND	0.5	2.5
1,2,4-Trimethylbenzene	ND	ND	0.5	2.5
Benzyl Chloride	ND	ND	0.5	2.6
1,3-Dichlorobenzene	ND	ND	0.5	3.0
1,4-Dichlorobenzene	ND	ND	0.5	3.0
1,2-Dichlorobenzene	ND	ND	0.5	3.0
1,2,4-Trichlorobenzene	ND	ND	0.5	3.7
Hexachlorobutadiene	ND	ND	0.5	5.3
Surrogate Recovery (BFB)	86%			

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit

Analytical Results
Method TO-15

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: SG-2 Date Sampled: 5/11/2012

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Propylene	1.7	3.0	0.5	0.9
Dichlorodifluoromethane	1.3	6.3	0.5	2.5
Chloromethane	0.7	1.4	0.5	1.0
Freon-114	ND	ND	0.5	3.5
Vinyl Chloride	ND	ND	0.5	1.3
1,3-Butadiene	ND	ND	0.5	1.1
Bromomethane	ND	ND	0.5	1.9
Trichlorofluoromethane	ND	ND	0.5	2.8
Chloroethane	ND	ND	0.5	1.3
Ethanol	1.2	2.3	1.0	1.9
Acetone	14.2	33.7	1.0	2.4
Isopropanol	1.1	2.6	1.0	2.5
1,1-Dichloroethene	ND	ND	0.5	2.0
Methylene Chloride	ND	ND	40.0	138.8
Freon-113	ND	ND	0.5	3.8
TBME	ND	ND	0.5	1.8
Carbon Disulfide	ND	ND	0.5	1.6
trans-1,2 Dichloroethene	ND	ND	0.5	2.0
1,1-Dichloroethane	ND	ND	0.5	2.0
Vinyl Acetate	ND	ND	0.5	1.8
2-Butanone	ND	ND	0.5	1.5
cis-1,2-Dichloroethene	ND	ND	0.5	2.0
Hexane	0.6	1.9	0.5	1.8
Chloroform	ND	ND	0.5	2.4
1,1,1-Trichloroethane	1.8	9.8	0.5	2.7
Carbon Tetrachloride	ND	ND	0.5	3.1
Tetrahydrofuran	ND	ND	0.5	1.5
Benzene	ND	ND	0.5	1.6
1,2-Dichloroethane	ND	ND	0.5	2.0
Trichloroethene	ND	ND	0.5	2.7
Heptane	ND	ND	0.5	2.0
1,2-Dichloropropane	ND	ND	0.5	2.3
Bromodichloromethane	ND	ND	0.5	3.3
1,4-Dioxane	ND	ND	0.5	1.8
MIBK	ND	ND	0.5	2.0
cis-1,3-Dichloropropene	ND	ND	0.5	2.3
Toluene	ND	ND	0.5	1.9
trans-1,3-Dichloropropene	ND	ND	0.5	2.3

Analytical Results
Method TO-15

NELAC LAB

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: SG-2 Date Sampled: 5/11/2012

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,1,2-Trichloroethane	ND	ND	0.5	2.7
Ethylene Dibromide	ND	ND	0.5	3.8
2-Hexanone	ND	ND	0.5	2.0
Tetrachloroethene	ND	ND	0.5	3.4
Chlorodibromomethane	ND	ND	0.5	4.2
Chlorobenzene	ND	ND	0.5	2.3
Ethylbenzene	ND	ND	0.5	2.2
m & p-Xylene	ND	ND	1.0	4.3
o-Xylene	ND	ND	0.5	2.2
Styrene	ND	ND	0.5	2.1
Bromoform	ND	ND	0.5	5.2
1,1,2,2-Tetrachloroethane	ND	ND	0.5	3.4
4-Ethyl Toluene	ND	ND	0.5	2.5
1,3,5-Trimethylbenzene	ND	ND	0.5	2.5
1,2,4-Trimethylbenzene	ND	ND	0.5	2.5
Benzyl Chloride	ND	ND	0.5	2.6
1,3-Dichlorobenzene	ND	ND	0.5	3.0
1,4-Dichlorobenzene	ND	ND	0.5	3.0
1,2-Dichlorobenzene	ND	ND	0.5	3.0
1,2,4-Trichlorobenzene	ND	ND	0.5	3.7
Hexachlorobutadiene	ND	ND	0.5	5.3

Surrogate Recovery (BFB)	91%

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit

NELTLAB

Analytical Results
Method TO-15

Case Number: Y0511-13
Sample ID: SG-3

Date Analyzed: 5/14/2012
Date Sampled: 5/11/2012

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Propylene	ND	ND	0.5	0.9
Dichlorodifluoromethane	0.7	3.5	0.5	2.5
Chloromethane	ND	ND	0.5	1.0
Freon-114	ND	ND	0.5	3.5
Vinyl Chloride	ND	ND	0.5	1.3
1,3-Butadiene	ND	ND	0.5	1.1
Bromomethane	ND	ND	0.5	1.9
Trichlorofluoromethane	ND	ND	0.5	2.8
Chloroethane	ND	ND	0.5	1.3
Ethanol	3.2	6.1	1.0	1.9
Acetone	24.4	57.8	1.0	2.4
Isopropanol	ND	ND	1.0	2.5
1,1-Dichloroethene	ND	ND	0.5	2.0
Methylene Chloride	ND	ND	40.0	138.8
Freon-113	ND	ND	0.5	3.8
TBME	ND	ND	0.5	1.8
Carbon Disulfide	ND	ND	0.5	1.6
trans-1,2 Dichloroethene	ND	ND	0.5	2.0
1,1-Dichloroethane	ND	ND	0.5	2.0
Vinyl Acetate	ND	ND	0.5	1.8
2-Butanone	ND	ND	0.5	1.5
cis-1,2-Dichloroethene	ND	ND	0.5	2.0
Hexane	1.6	5.8	0.5	1.8
Chloroform	ND	ND	0.5	2.4
1,1,1-Trichloroethane	ND	ND	0.5	2.7
Carbon Tetrachloride	ND	ND	0.5	3.1
Tetrahydrofuran	ND	ND	0.5	1.5
Benzene	ND	ND	0.5	1.6
1,2-Dichloroethane	ND	ND	0.5	2.0
Trichloroethene	ND	ND	0.5	2.7
Heptane	ND	ND	0.5	2.0
1,2-Dichloropropane	ND	ND	0.5	2.3
Bromodichloromethane	ND	ND	0.5	3.3
1,4-Dioxane	ND	ND	0.5	1.8
MIBK	ND	ND	0.5	2.0
cis-1,3-Dichloropropene	ND	ND	0.5	2.3
Toluene	3.1	11.6	0.5	1.9
trans-1,3-Dichloropropene	ND	ND	0.5	2.3

Analytical Results
Method TO-15

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: SG-3 Date Sampled: 5/11/2012

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,1,2-Trichloroethane	ND	ND	0.5	2.7
Ethylene Dibromide	ND	ND	0.5	3.8
2-Hexanone	ND	ND	0.5	2.0
Tetrachloroethene	ND	ND	0.5	3.4
Chlorodibromomethane	ND	ND	0.5	4.2
Chlorobenzene	ND	ND	0.5	2.3
Ethylbenzene	ND	ND	0.5	2.2
m & p-Xylene	ND	ND	1.0	4.3
o-Xylene	ND	ND	0.5	2.2
Styrene	ND	ND	0.5	2.1
Bromoform	ND	ND	0.5	5.2
1,1,2,2-Tetrachloroethane	ND	ND	0.5	3.4
4-Ethyl Toluene	ND	ND	0.5	2.5
1,3,5-Trimethylbenzene	ND	ND	0.5	2.5
1,2,4-Trimethylbenzene	ND	ND	0.5	2.5
Benzyl Chloride	ND	ND	0.5	2.6
1,3-Dichlorobenzene	ND	ND	0.5	3.0
1,4-Dichlorobenzene	ND	ND	0.5	3.0
1,2-Dichlorobenzene	ND	ND	0.5	3.0
1,2,4-Trichlorobenzene	ND	ND	0.5	3.7
Hexachlorobutadiene	ND	ND	0.5	5.3

Surrogate Recovery (BFB) 89%

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit

Analytical Results Method TO-15

NELLLAB

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: BLK051412 Date Sampled: N/A

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
Propylene	ND	ND	0.5	0.9
Dichlorodifluoromethane	ND	ND	0.5	2.5
Chloromethane	ND	ND	0.5	1.0
Freon-114	ND	ND	0.5	3.5
Vinyl Chloride	ND	ND	0.5	1.3
1,3-Butadiene	ND	ND	0.5	1.1
Bromomethane	ND	ND	0.5	1.9
Trichlorofluoromethane	ND	ND	0.5	2.8
Chloroethane	ND	ND	0.5	1.3
Ethanol	ND	ND	1.0	1.9
Acetone	ND	ND	1.0	2.4
Isopropanol	ND	ND	1.0	2.5
1,1-Dichloroethene	ND	ND	0.5	2.0
Methylene Chloride	ND	ND	5.0	17.3
Freon-113	ND	ND	0.5	3.8
TBME	ND	ND	0.5	1.8
Carbon Disulfide	ND	ND	0.5	1.6
trans-1,2 Dichloroethene	ND	ND	0.5	2.0
1,1-Dichloroethane	ND	ND	0.5	2.0
Vinyl Acetate	ND	ND	0.5	1.8
2-Butanone	ND	ND	0.5	1.5
cis-1,2-Dichloroethene	ND	ND	0.5	2.0
Hexane	ND	ND	0.5	1.8
Chloroform	ND	ND	0.5	2.4
1,1,1-Trichloroethane	ND	ND	0.5	2.7
Carbon Tetrachloride	ND	ND	0.5	3.1
Tetrahydrofuran	ND	ND	0.5	1.5
Benzene	ND	ND	0.5	1.6
1,2-Dichloroethane	ND	ND	0.5	2.0
Trichloroethene	ND	ND	0.5	2.7
Heptane	ND	ND	0.5	2.0
1,2-Dichloropropane	ND	ND	0.5	2.3
Bromodichloromethane	ND	ND	0.5	3.3
1,4-Dioxane	ND	ND	0.5	1.8
MIBK	ND	ND	0.5	2.0
cis-1,3-Dichloropropene	ND	ND	0.5	2.3
Toluene	ND	ND	0.5	1.9
trans-1,3-Dichloropropene	ND	ND	0.5	2.3

Analytical Results Method TO-15

NELLLAB

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: BLK051412 Date Sampled: N/A

Analyte	Sample Results PPBv	Sample Results ug/m^3	MDL PPBv	MDL ug/m^3
1,1,2-Trichloroethane	ND	ND	0.5	2.7
Ethylene Dibromide	ND	ND	0.5	3.8
2-Hexanone	ND	ND	0.5	2.0
Tetrachloroethene	ND	ND	0.5	3.4
Chlorodibromomethane	ND	ND	0.5	4.2
Chlorobenzene	ND	ND	0.5	2.3
Ethylbenzene	ND	ND	0.5	2.2
m & p-Xylene	ND	ND	1.0	4.3
o-Xylene	ND	ND	0.5	2.2
Styrene	ND	ND	0.5	2.1
Bromoform	ND	ND	0.5	5.2
1,1,2,2-Tetrachloroethane	ND	ND	0.5	3.4
4-Ethyl Toluene	ND	ND	0.5	2.5
1,3,5-Trimethylbenzene	ND	ND	0.5	2.5
1,2,4-Trimethylbenzene	ND	ND	0.5	2.5
Benzyl Chloride	ND	ND	0.5	2.6
1,3-Dichlorobenzene	ND	ND	0.5	3.0
1,4-Dichlorobenzene	ND	ND	0.5	3.0
1,2-Dichlorobenzene	ND	ND	0.5	3.0
1,2,4-Trichlorobenzene	ND	ND	0.5	3.7
Hexachlorobutadiene	ND	ND	0.5	5.3

Surrogate Recovery (BFB) 100%

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit

Analytical Results Method TO-15

NELAC LAB

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: LCS051412 Date Sampled: N/A

Analyte	Amount Spiked PPBv	Sample Results PPBv	Percent Recovery	Recovery Limits
Propylene	5.00	5.14	103	60-140%
Dichlorodifluoromethane	5.00	5.89	118	60-140%
Chloromethane	5.00	5.25	105	60-140%
Freon-114	5.00	5.17	103	60-140%
Vinyl Chloride	5.00	5.38	108	60-140%
1,3-Butadiene	5.00	5.03	101	60-140%
Bromomethane	5.00	5.37	107	60-140%
Trichlorofluoromethane	5.00	5.86	117	60-140%
Chloroethane	5.00	5.26	105	60-140%
Ethanol	5.00	5.74	115	60-140%
Acetone	5.00	4.62	92	60-140%
Isopropanol	5.00	5.11	102	60-140%
1,1-Dichloroethene	5.00	6.23	125	60-140%
Methylene Chloride	5.00	6.48	130	60-140%
Freon-113	5.00	6.48	130	60-140%
TBME	5.00	4.44	89	60-140%
Carbon Disulfide	5.00	6.83	137	60-140%
trans-1,2 Dichloroethene	5.00	3.90	78	60-140%
1,1-Dichloroethane	5.00	5.17	103	60-140%
Vinyl Acetate	5.00	3.81	76	60-140%
2-Butanone	5.00	3.79	76	60-140%
cis-1,2-Dichloroethene	5.00	4.74	95	60-140%
Hexane	5.00	4.25	85	60-140%
Chloroform	5.00	4.71	94	60-140%
1,1,1-Trichloroethane	5.00	4.63	93	60-140%
Carbon Tetrachloride	5.00	4.68	94	60-140%
Tetrahydrofuran	5.00	3.99	80	60-140%
Benzene	5.00	4.22	84	60-140%
1,2-Dichloroethane	5.00	4.81	96	60-140%
Trichloroethene	5.00	4.08	82	60-140%
Heptane	5.00	3.68	74	60-140%
1,2-Dichloropropane	5.00	4.14	83	60-140%
Bromodichloromethane	5.00	4.14	83	60-140%
MIBK	5.00	3.61	72	60-140%
Toluene	5.00	3.76	75	60-140%

Analytical Results Method TO-15

Case Number: Y0511-13 Date Analyzed: 5/14/2012
Sample ID: LCS051412 Date Sampled: N/A

Analyte	Amount Spiked PPBv	Sample Results PPBv	Percent Recovery	Recovery Limits
1,1,2-Trichloroethane	5.00	4.77	95	60-140%
Ethylene Dibromide	5.00	3.91	78	60-140%
2-Hexanone	5.00	5.32	106	60-140%
Tetrachloroethene	5.00	4.14	83	60-140%
Chlorodibromomethane	5.00	4.42	88	60-140%
Chlorobenzene	5.00	4.26	85	60-140%
Ethylbenzene	5.00	4.09	82	60-140%
m & p-Xylene	10.00	8.17	82	60-140%
o-Xylene	5.00	3.83	77	60-140%
Styrene	5.00	4.04	81	60-140%
Bromoform	5.00	4.21	84	60-140%
1,1,2,2-Tetrachloroethane	5.00	3.88	78	60-140%
4-Ethyl Toluene	5.00	3.69	74	60-140%
1,3,5-Trimethylbenzene	5.00	3.67	73	60-140%
1,2,4-Trimethylbenzene	5.00	3.60	72	60-140%
Benzyl Chloride	5.00	4.74	95	60-140%
1,3-Dichlorobenzene	5.00	3.68	74	60-140%
1,4-Dichlorobenzene	5.00	3.64	73	60-140%
1,2-Dichlorobenzene	5.00	3.99	80	60-140%
1,2,4-Trichlorobenzene	5.00	3.66	73	60-140%
Hexachlorobutadiene	5.00	4.75	95	60-140%

Surrogate Recovery (BFB)	97%

MDL = Minimum Detection Limit
ND = Not Detected
PPBv = Parts Per Billion By Volume
E = Exceeds calibration limit