SENSIBLE SOLUTIONS

CES INC

INVESTIGATIONS SUMMARY REPORT
VOLUNTARY RESPONSE ACTION PROGRAM
34 KIDDER POINT ROAD
SEARSPORT, MAINE

Property Owner: GENERAL ALUM NEW ENGLAND CORP.
34 Kidder Point Road
Searsport, ME 04974

Prepared for: GAC CHEMICAL
34 Kidder Point Road
Searsport, ME 04974

Prepared by: CES, INC.
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NOVEMBER 2014
JN: 10060.007

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Engineers ◆ Environmental Scientists ◆ Surveyors

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FOR

GAC CHEMICAL
34 KIDDER POINT ROAD
SEARSPORT, MAINE

Prepared by: **CES, INC.**
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Denis St. Peter, PE

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INVESTIGATIONS SUMMARY REPORT
VOLUNTARY RESPONSE ACTION PROGRAM
GAC CHEMICAL

SECTION 1 | INTRODUCTION

This report summarizes the recent investigations completed by CES, Inc. (CES) for the property located at 34 Kidder Point Road in Searsport, Maine and identified by the Town of Searsport Tax Assessor's Office as Lots 82 and 83 of Tax Map 7 (the Site). These recent investigations were completed along the intertidal area and within an area of interest (Lot 83) as described below by CES for, and at the request of, GAC Chemical in support of their Voluntary Response Action Program (VRAP) application submitted to the Maine Department of Environmental Protection (MDEP) on August 27, 2014.

1.1 Purpose

The purpose of the investigations at the Site was to examine the nature and extent of impacts to soil, groundwater, and surface water in the vicinity of the historical sulfuric acid plant and potential low pH conditions in the tidal zone as identified in previous investigations.

1.2 Special Terms and Conditions

Special terms or conditions associated with the Site or CES' abilities to complete the investigations were not established or imposed by the Client/Owner during the completion of this investigation.

SECTION 2 | SITE BACKGROUND

2.1 Site Location and Legal Description

The Site is located at 34 Kidder Point Road, Searsport, Maine as shown on **Figure 1.** The Town of Searsport Tax Assessor's Map 7 identifies the Site as Lots 82 and 83 which consist of approximately 152 acres of land. The investigations summarized in this report were completed along the intertidal area and within an area of interest on Lot 83 of Tax Map 7. Refer to **Figure 2** for a Site Plan including a portion of the tax map showing the Site. The Waldo County Registry of Deeds has a legal description of the Site recorded on Page 294 of Book 1440.

2.2 Physical Setting

The U.S.G.S. 7.5 minute Quadrangle Map of Searsport, Maine shows that the Site is located to the east of Route 3 and is at an elevation between 0-120 feet above sea level. Lot 83 of the Site is bounded to the west by the Bangor and Aroostook Railroad and to the north, east, and south by tidal flats and Stockton Harbor.

2.3 Site Development

The Site is currently developed as a chemical manufacturing facility that produces a variety of chemicals such as: ammonium sulfate, liquid alum, aqua ammonia; and distributes sulfuric acid, specialty flocculants and coagulants, and customized chemical blends. The majority of the activities associated with the current use of the Site are conducted on Lot 82 of Tax Map 7.

Based on a review of municipal, regulatory, and historical records, the Site has been developed for commercial and/or industrial purposes since the early 1920s. Historical manufacturing activities were conducted on both Lot 82 and Lot 83 of Tax Map 7. The investigations summarized in this report were completed on Lot 83 of Tax Map 7. Historical activities on Lot 83 include a sulfuric acid manufacturing plant that ceased operations in 1989, a sulfur storage area, a fertilizer manufacturing facility, a superphosphate plant, storage buildings, and a maintenance garage.

Structures remaining on Lot 83 include the historical sulfuric acid plant, a maintenance garage, and a wastewater treatment plant. Underground structures include catch basins and storm drains that direct stormwater runoff from portions of Lot 82 and portions of Lot 83 into the wastewater treatment plant located on the eastern portion of Lot 83. Here the combined wastewater and stormwater are treated before being discharged to Stockton Harbor. The discharge from the wastewater treatment plant is managed in accordance with the site's Waste Discharge License (WDL) issued by MDEP.

2.4 Previous Investigations

Numerous investigations identifying soil, surface water, and groundwater contamination at the Site have been conducted since the 1980s and prior to GAC Chemical acquiring the Site in 1994. Reports describing the results of these investigations were provided to the MDEP previously and were readily available in the MDEP file room. CES prepared a table summarizing the previous investigations and provided the table as part of the VRAP Application (CES, 2014). The Historical Investigations Summary is also included as **Appendix F** to this report. Based on the findings of previous investigations at the Site, contaminated soil, groundwater, and surface water exist at the Site due to historical releases of contaminants associated with industrial activities at the Site.

As related to the potential for low pH in the tidal zone, documentation on file with the MDEP identifies multiple sulfuric acid spills that have occurred since 1981 in the area surrounding the historical sulfuric acid plant with varying levels of response and cleanup. Based on CES' review of the numerous investigations, the historical sulfuric acid spills that occurred prior to GAC acquiring the Site have the potential to impact the tidal zone (E.C Jordon Co., 1984). A 1998 memorandum from Marine Environmental Monitoring Program concluded the following:

"Habitat appears to be in a stage of recovery with marine life that is both reproducing and growing. Direct remediation would cause more harm than allowing natural processes to restore this area over time."

However, given GAC's environmental stewardship and commitment towards proactively addressing potential environmental concerns, GAC has proposed to further investigate this area of the Site.

2.5 Conceptual Site Model

The following table summarizes the Conceptual Site Model (CSM) based on previous investigations and current site conditions, but prior to the completion of additional onsite investigations and sampling.

POSSIBLE SOURCE AREAS	Areas of historic sulfuric acid spills (sulfuric acid plant)
PARAMETER	Low pH
POTENTIAL MEDIA AFFECTED	Soil, groundwater, surface water
POTENTIAL EXPOSURE ROUTES	Current exposure pathways: ◆ Dermal risk of decreased pH water in tidal zone Potential exposure pathways: ◆ Dermal contact with impacted soil/groundwater if disturbed.
POTENTIAL MIGRATION PATHWAYS	Migration pathways: ◆ Flow of low pH groundwater to Stockton Harbor ◆ Mobilization during future excavation activities
RECEPTORS	Potential receptors include: ◆ Current and future site workers

SECTION 3 | SITE INVESTIGATIONS

Investigations at the site were developed and conducted in coordination with MDEP VRAP through verbal discussions, meetings, and a site visit. As the site investigations progressed, the conceptual site model was adjusted based on observations and sampling results completed during the investigations. A summary of each investigation is included below.

3.1 Intertidal pH Sampling

CES and MDEP agreed to measure pH in the intertidal zone along GAC's entire shoreline as the first step in the investigation. On August 29, 2014 CES completed pH sampling within the intertidal areas of the Site. Sampling of pore water and surface water within the intertidal area was completed at low tide utilizing a handheld pH meter. Pore water sampling was completed by creating a small depression within the ground

surface of a dry intertidal area and allowing the depression to fill with pore water. A pH reading was then taken from the pore water that accumulated within the depression. Surface water sampling was completed in locations within the intertidal area that contained standing or flowing water at low tide. For both the pore water and the surface water sampling a handheld pH probe was inserted into the water and allowed to rest within the water until the probe maintained a steady pH reading. The pH meter was calibrated before completing field activities. The results of the intertidal pH sampling are depicted on **Figure 3**. Pore water sampling results are shown on **Table 1** and surface water sampling results are shown on **Table 2**.

Based on the distribution of pH sampling results, an area of interest was identified to the southeast of the historical sulfuric acid plant.

TABLE 1 | PORE WATER SAMPLING RESULTS

Sample ID	pH
PW-101	7.6
PW-102	7.5
PW-103	7.4
PW-104	7.3
PW-105	7.5
PW-106	7.5
PW-107	7.5
PW-108	7.4
PW-109	7.5
PW-110	7.6
PW-111	7.6
PW-112	7.6
PW-113	7.4
PW-114	7.4
PW-115	5.2
PW-116	7.0
PW-117	7.0
PW-118	3.1
PW-119	7.1

TABLE 1 | PORE WATER SAMPLING RESULTS (continued)

Sample ID	pH
PW-120	7.5
PW-121	6.7
PW-122	6.7
PW-123	6.8
PW-124	6.1
PW-125	4.6
PW-126	6.9
PW-127	7.1
PW-128	6.9
PW-129	3.0
PW-130	6.4
PW-131	6.9
PW-132	2.6
PW-133	2.4
PW-134	2.6
PW-135	2.2
PW-136	2.6
PW-137	4.6
PW-138	5.1
PW-139	5.6
PW-140	6.1
PW-141	6.6
PW-142	6.3
PW-143	6.7
PW-144	6.7
PW-145	6.8

TABLE 2 | SURFACE WATER SAMPLING RESULTS

Sample ID	pH (su)
SW-101	7.0
SW-102	7.5
SW-103	7.7
SW-104	7.1
SW-105	7.8
SW-106	7.7
SW-107	7.6
SW-108	7.4
SW-109	7.6
SW-110	7.6
SW-111	7.5
SW-112	7.4
SW-113	6.9
SW-114	7.3
SW-115	7.5
SW-116	7.2
SW-117	6.3
SW-118	5.6
SW-119	7.3
SW-120	7.3
SW-121	4.0
SW-122	4.2
SW-123	5.5
SW-124	5.9
SW-125	5.2
SW-126	2.3

3.2 Subsurface Sampling

A Subsurface Sampling Plan was developed for the area of interest and was verbally discussed over the telephone with MDEP prior to completion of the work. A copy of the plan is located in **Appendix A**. The objective of the Subsurface Sampling Plan was to gather information regarding the geologic setting, current soil and groundwater pH, and groundwater gradient near the historical sulfuric acid plant and the associated spill locations.

On September 10, 2014 CES mobilized to the site to complete a subsurface investigation in the area of interest near the historical sulfuric acid plant. Fifteen soil borings (SB-101; SB-115) were completed and spaced approximately 50 feet apart along the south-southeastern extent of Lot 83. Soil boring locations are depicted on **Figure 4**.

Soil borings were advanced utilizing a Geoprobe® 5410 Direct Push Unit equipped with MC5 soil sampling tooling. Soil samples were collected in four foot intervals until native clay was encountered or until refusal, whichever was shallower. Soils recovered from each boring were classified in the field and used to develop geologic cross sections through the area of interest. Soil boring logs are located in **Appendix A** and geologic cross sections are located in **Appendix C**.

To the east-southeast of the historical sulfuric acid plant structure varying amounts of yellow soil and/or sulfur was identified at varying depths and thicknesses in five soil borings: SB-101, SB-102, SB-103, SB-108, and SB-112. **Figure 5** depicts the location and thickness of sulfur observed within each soil boring. Soil samples from each geologic unit observed in the soil borings were hydrated with deionized water (to produce a liquid phase) and sampled for pH using a hand-held pH meter. A three point calibration was completed on the handheld pH meter before sampling began. Recalibration and calibration checks were completed periodically throughout the field effort. The results of the soil pH sampling are shown on the soil boring logs located in **Appendix A**.

Soils located to the west of the historical sulfuric acid plant between SB-113 and SB-109 generally consist of brown sand fill from the surface to a depth of up to five feet below ground surface (BGS) underlain by a sandy clay fill unit. The clay fill unit was underlain by a second sand unit followed by a native clay unit. Between borings SB-109 and SB-102 a sandy clay fill was observed from zero to a maximum depth of seven feet BGS in this area. This unit was followed by a medium sand unit approximately 1-2 feet in thickness. The deeper native clay unit identified between SB-113 and SB-109 was observed under this sand unit.

Soil borings in the area to the east of the historical sulfuric acid plant, between borings SB-102 and SB-101, contained a sandy clay fill from zero to a maximum depth of seven

feet BGS. A thin layer of sulfur was observed within this unit at depths ranging from one foot BGS in SB-102 to four feet BGS in SB-101 with a thickness ranging from 1.0 to 0.7 feet. Soil borings further to the east of the historical sulfuric acid plant consist generally of a rocky sand and clay fill followed by the same deep clay unit observed in the previous borings. Soil boring logs are included as **Appendix B.** A geologic cross section depicting sub-surface conditions at the Site is included as **Appendix C.**

Groundwater within each soil boring (if encountered) was sampled for pH using an in-situ (down-hole) pH meter. The down-hole pH meter was calibrated after each use. The results of the groundwater pH samples are shown on **Table 3** and depicted on **Figure 2**.

TABLE 3 | GROUNDWATER pH RESULTS

Sample ID	pH (su)
SB-101	3.77
SB-102	1.73
SB-103	*
SB-104	3.54
SB-105	4.30
SB-106	4.39
SB-107	5.46
SB-108	5.93
SB-109	5.35
SB-110	4.16
SB-111	**
SB-112	**
SB-113	6.61
SB-114	*
SB-115	5.12

*Groundwater not encountered.

** Refusal at shallow depths.

Temporary piezometers were installed in seven soil boring locations. Piezometers are designated with “PZ” and the corresponding soil boring number (i.e., PZ-102 was installed in soil boring SB-102) and were constructed of 1-inch diameter PVC with 5 foot

intervals of 0.010 inch slot well screen and solid riser to above ground surface. Bentonite was utilized to seal the borehole at ground surface. On September 24, 2014, ground surface and top of PVC elevations were surveyed utilizing a standard level loop. Ground surface and top of PVC elevations are presented on **Table 4**.

TABLE 4 | ELEVATIONS AND DEPTH TO GROUNDWATER

Location ID	Ground Surface (ft)	Top of PVC (ft)	Depth to Groundwater - Low Tide (ft)*	Depth to Groundwater - High Tide (ft)*
PZ-102	15.95	16.33	11.67	11.90
PZ-104	17.45	20.35	9.00	8.50
PZ-105	18.08	18.93	8.63	7.81
PZ-106	15.90	16.95	7.82	6.87
PZ-109	17.33	19.13	7.23	6.20
PZ-110	11.70	12.43	5.80	5.40
PZ-115	16.75	19.45	9.80	8.92

*Depth to groundwater measured from top of PVC.

Groundwater elevation measurements were collected from the temporary piezometers during a high tide (September 15, 2014 at 16:00) and a low tide (September 30, 2014 at 09:30) event. The groundwater elevation measurements were collected to characterize the extent of the tidal impact on groundwater levels. Depth to groundwater measurements were converted to groundwater elevations by subtracting depth to water from the top of PVC elevation. The groundwater elevations for each piezometer location are shown in **Table 5**.

TABLE 5 | GROUNDWATER ELEVATIONS

Location ID	Groundwater Elevation (ft)	
	Low Tide	High Tide
PZ-102	4.66	4.43
PZ-104	11.35	11.85
PZ-105	10.3	11.12
PZ-106	9.13	10.08
PZ-109	12.1	12.93
PZ-110	6.63	7.03
PZ-115	9.65	10.5

With the exception of piezometer PZ-102, each of the piezometers show a response to tidal fluctuation on the order of 0.4 to 0.9 feet (higher water table elevation corresponds to high tide). Water table elevations during the high tide cycle were used to interpret groundwater flow patterns. Refer to **Figure 6** for a groundwater contour map. As shown on **Figure 6** groundwater flow generally mimics topography with flow from the topographic highs of the peninsula toward Stockton Harbor. However, it should be noted that PZ-105 appears to be northeast of a groundwater divide with flow from PZ-105 interpreted to be northeasterly.

3.3 SURFACE SOIL SAMPLING

Three surface soil samples (SS-101, SS-102 and SS-103) were collected to the southeast of the historical sulfuric acid plant on September 30, 2014. Surface soil samples were collected as grab samples between 0.0 to 0.5 feet BGS from two locations (SS-101, SS-102) along the eroded slope located to the southeast of the historical sulfuric acid plant and one surface soil sample (SS-103) was collected from the gravel yard located to the east of the historical plants. The surface soil samples were hydrated with deionized water to produce a liquid phase that was sampled for pH using a hand-held pH meter. The results of the surface soil samples are shown on **Table 6** and the locations are depicted on **Figure 4**.

TABLE 6 | SURFACE SOIL SAMPLE RESULTS

Sample ID	pH
SS-101	4.1
SS-102	2.0
SS-103	3.8

3.4 Test Pit Excavations

Test pits were excavated in the area of interest to supplement soil boring data and gather information regarding the extent of the sulfur located below ground surface in the historical sulfur storage area. A Test Pitting Plan was discussed verbally on the telephone with MDEP prior to completion of the work. A copy of the plan is located in **Appendix D**.

Test pitting at the Site was conducted on October 10, 2014. Test pits were excavated by Kinney's Construction up to depths of seven feet BGS in some areas. Excavation of the test pits was overseen by CES and MDEP. Fifteen test pits were excavated and the soil encountered in each test pit was documented with photos and test pit logs. Copies of the test pit logs with photos are included in **Appendix E**. **Figure 5** and **Table 7** depict the sulfur observed within each test pit and soil boring at the Site.

TABLE 7 | SULFUR LOCATIONS AND THICKNESS

Location ID	Depth to Sulfur BGS (in)	Thickness of Sulfur (in)
SB-101	48	6
SB-102	12	8
SB-103	12	4
TP-101	12	8
TP-106	19	6
TP-108	4	3
TP-109	8	6
TP-110	7	8
TP-111	7	8
TP-113	13	16
TP-115	2	2
TP-115	7	16

SECTION 4 | FINDINGS AND CONCLUSIONS

Based upon the explorations and sampling completed during this investigation, low pH conditions were identified in the area south and southeast of the historical sulfuric acid plant. Sulfur was identified in several soil borings and test pits in this area. The occurrence and proximity of sulfur correlates well with low pH values measured in soil and groundwater. Other sources that would likely contribute to the low pH conditions identified in the area of interest were not encountered during this investigation.

The long term storage of bulk sulfur product within the historical sulfur storage area (to the south of the historical sulfuric acid plant) and the existence of sulfur beneath ground surface has resulted in conditions for soil bacteria to produce sulfuric acid which subsequently infiltrates to underlying soil and/or groundwater. The production of sulfuric acid within soils with high sulfur content is a well-known practice within agricultural industries as a method of intentionally lowering pH for vegetation that prefers acidic (low pH) soil. Sulfur is applied to agricultural land in which the soil bacteria use the sulfur to produce sulfuric acid thereby lowering the pH (Michigan State University Extension, 2012).

The pH measurements from groundwater and soil samples in the area of interest indicate that the low pH conditions are limited to areas of sulfur and areas immediately down gradient of the sulfur. The data also indicate that the underlying native clay unit provides a buffering effect for

pH and restricts downward movement of infiltrating water. As a result, low pH impacts are confined to fill materials in close proximity to the sulfur.

Groundwater flow in the area of the historical sulfur storage area is from northeast to southwest. pH measurements taken from groundwater encountered in the soil borings during the investigation are consistent with a southwesterly flow underneath the historical sulfur storage area with lowest pH values in the down gradient piezometer (PZ-102).

SECTION 5 | RECOMMENDATIONS

CES recommends the remediation of the inland area of interest consistent with the *Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soils* (Government of Alberta, 2011) including:

1. The removal of the visible sulfur to the extent practical and managed in accordance with applicable regulations; and
2. In-situ treatment (i.e., lime application or other soil amendment to increase pH).

A remediation plan should be prepared and submitted to the MDEP VRAP for review and approval.

SECTION 6 | REFERENCES

GAC VRAP Application, CES, Inc., 2014.

Guidelines for Landfill Disposal of Sulphur Waste and Remediation of Sulphur Containing Soils, Government of Alberta, September 12, 2011.

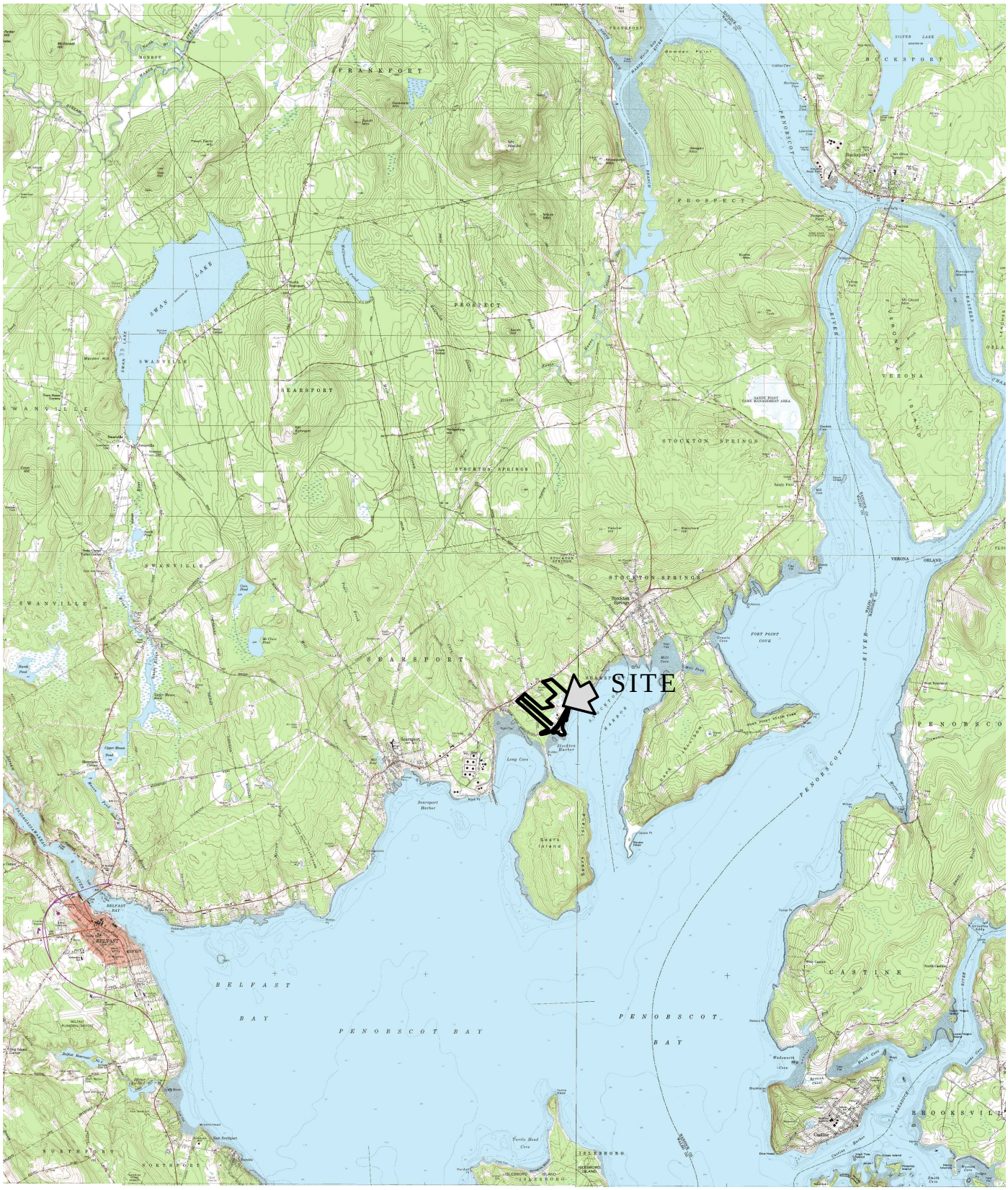
Lowering the Soil pH with Sulfur, Mark Longstroth, Extension Small Fruit Educator, Michigan State University Extension, December 14, 2012.

Marine Environmental Monitoring Program Memo - Field Investigation - General Alum, MDEP, 1998.

Soil and Groundwater Quality Assessment, E.C. Jordan Co., 1984.

FIGURE 1

SITE LOCATION MAP



SOURCE:
U.S.G.S. TOPOGRAPHIC QUADRANGLE
SEARSPORT
@ 1:24,000

CES INC

GAC CHEMICAL CORP.
SEARSPORT, MAINE

FIGURE 1 - LOCATION MAP

10/28/2014
10060.007

FIGURE 2

SITE PLAN

PROJECT TITLE: **GAC CHEMICAL CORP. SEARSPORT, MAINE**	DWG: **FIG. 2**	BY: BTH	CES INC
		DATE: 10/28/2014	ENGINEERING • SURVEYING • PLANNING • SCIENCES
SHEET TITLE: **FIGURE 2 SITE PLAN**	JN: 10060.007	REV:	
	SCALE:	REV DATE:	

FIGURE 3

INTERTIDAL SAMPLING LOCATION PLAN

FIGURE 3: Intertidal Sample Location Plan

N
W E
S
GRID

300 150 0 300
Feet

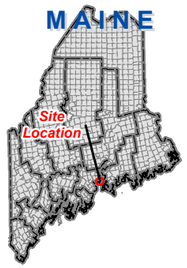
Legend

Surface Water pH Level:
- ≤ 4.0
- 4.1 - 6.0
- 6.1 - 7.8

Pore Water pH Level:
- ≤ 4.0
- 4.1 - 6.0
- 6.1 - 7.8

Historical Monitoring Well Locations

Historical Groundwater Sulfate Levels
- 1000 - 3000 mg/l
- 3000 - 3900 mg/l



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Project No.: 10060.007
Updated: 10/29/2014 [lladd]

MAP NOTES:

1: SITE DATA DEVELOPED BY CES, INC. MAPPING IS INTENDED FOR REFERENCE PURPOSES ONLY.

2: SAMPLES IDENTIFIED AS "SW" INDICATE SURFACE WATER SAMPLE LOCATIONS. COLLECTED 8/29/2014.

3: SAMPLES IDENTIFIED AS "PW" INDICATE PORE WATER SAMPLE LOCATIONS. COLLECTED 8/29/2014.

4: HISTORICAL GROUNDWATER SULFATE LEVELS FROM A HISTORIC EC JORDAN SAMPLING PLAN, 1984.

5: MAP IS PROJECTED USING MAINE STATE PLANE COORDINATES, EAST ZONE, LINEAR UNITS OF SURVEY FEET AND REFERENCES THE NORTH AMERICAN DATUM OF 1983 (NAD83).

6: NORTH ARROW IS REFERENCED TO GRID NORTH.

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MXD: P:\10\60\GAC Chemical Corp\007-VRAP_IAP\07-GIS Data\MXD\102914 closeout\FIGURE3.mxd

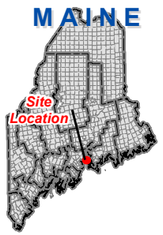
Location	pH (stu)
PW-101	7.6
PW-102	7.5
PW-103	7.4
PW-104	7.3
PW-105	7.5
PW-106	7.5
PW-107	7.5
PW-108	7.4
PW-109	7.5
PW-110	7.6
PW-111	7.6
PW-112	7.6
PW-113	7.4
PW-114	7.4
PW-115	5.2
PW-116	7.0
PW-117	7.0
PW-118	3.1
PW-119	7.1
PW-120	7.5
PW-121	6.7
PW-122	6.7
PW-123	6.8
PW-124	6.1
PW-125	4.6
PW-126	6.9
PW-127	7.1
PW-128	6.9
PW-129	3.0
PW-130	6.4
PW-131	6.9
PW-132	2.6
PW-133	2.4
PW-134	2.6
PW-135	2.2
PW-136	2.6
PW-137	4.6
PW-138	5.1
PW-139	5.6
PW-140	6.1
PW-141	6.6
PW-142	6.3
PW-143	6.7
PW-144	6.7
PW-145	6.8
SW-101	7.0
SW-102	7.5
SW-103	7.7
SW-104	7.1
SW-105	7.8
SW-106	7.7
SW-107	7.6
SW-108	7.4
SW-109	7.6
SW-110	7.6
SW-111	7.5
SW-112	7.4
SW-113	6.9
SW-114	7.3
SW-115	7.5
SW-116	7.2
SW-117	6.3
SW-118	5.6
SW-119	7.3
SW-120	7.3
SW-121	4.0
SW-122	4.2
SW-123	5.5
SW-124	5.9
SW-125	5.2
SW-126	2.3

FIGURE 4

AREA OF INTEREST SAMPLE LOCATION PLAN

FIGURE 4: Area of Interest Sample Location Plan

N
W E
S
100 50 0 100
Feet



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MXD: P:\10060-GAC Chemical Corp\007-VRAP-IAP\07-GIS_Data\MXD\102914_closeout\FIGURE4.mxd

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PW-112	7.6
PW-113	7.4
PW-114	7.4
PW-115	5.2
PW-116	7.0
PW-117	7.0
PW-118	3.1
PW-119	7.1
PW-120	7.5
PW-121	6.7
PW-122	6.7
PW-123	6.8
PW-124	6.1
PW-125	4.6
PW-126	6.9
PW-127	7.1
PW-128	6.9
PW-129	3.0
PW-130	6.4
PW-131	6.9
PW-132	2.6
PW-133	2.4
PW-134	2.6
PW-135	2.2
PW-136	2.6
PW-137	4.6
PW-138	5.1
PW-139	5.6
PW-140	6.1
PW-141	6.6
PW-142	6.3
PW-143	6.7
PW-144	6.7
PW-145	6.8
SW-101	7.0
SW-102	7.5
SW-103	7.7
SW-104	7.1
SW-105	7.8
SW-106	7.7
SW-107	7.6
SW-108	7.4
SW-109	7.6
SW-110	7.6
SW-111	7.5
SW-112	7.4
SW-113	6.9
SW-114	7.3
SW-115	7.5
SW-116	7.2
SW-117	6.3
SW-118	5.6
SW-119	7.3
SW-120	7.3
SW-121	4.0
SW-122	4.2
SW-123	5.5
SW-124	5.9
SW-125	5.2
SW-126	2.3

Boring ID	Groundwater pH
SB-101	3.77
SB-102	1.73
SB-103	DRY
SB-104	3.54
SB-105	4.3
SB-106	4.39
SB-107	5.46
SB-108	5.93
SB-109	5.35
SB-110	4.16
SB-111	REFUSAL
SB-112	REFUSAL
SB-113	6.61
SB-114	DRY
SB-115	5.12

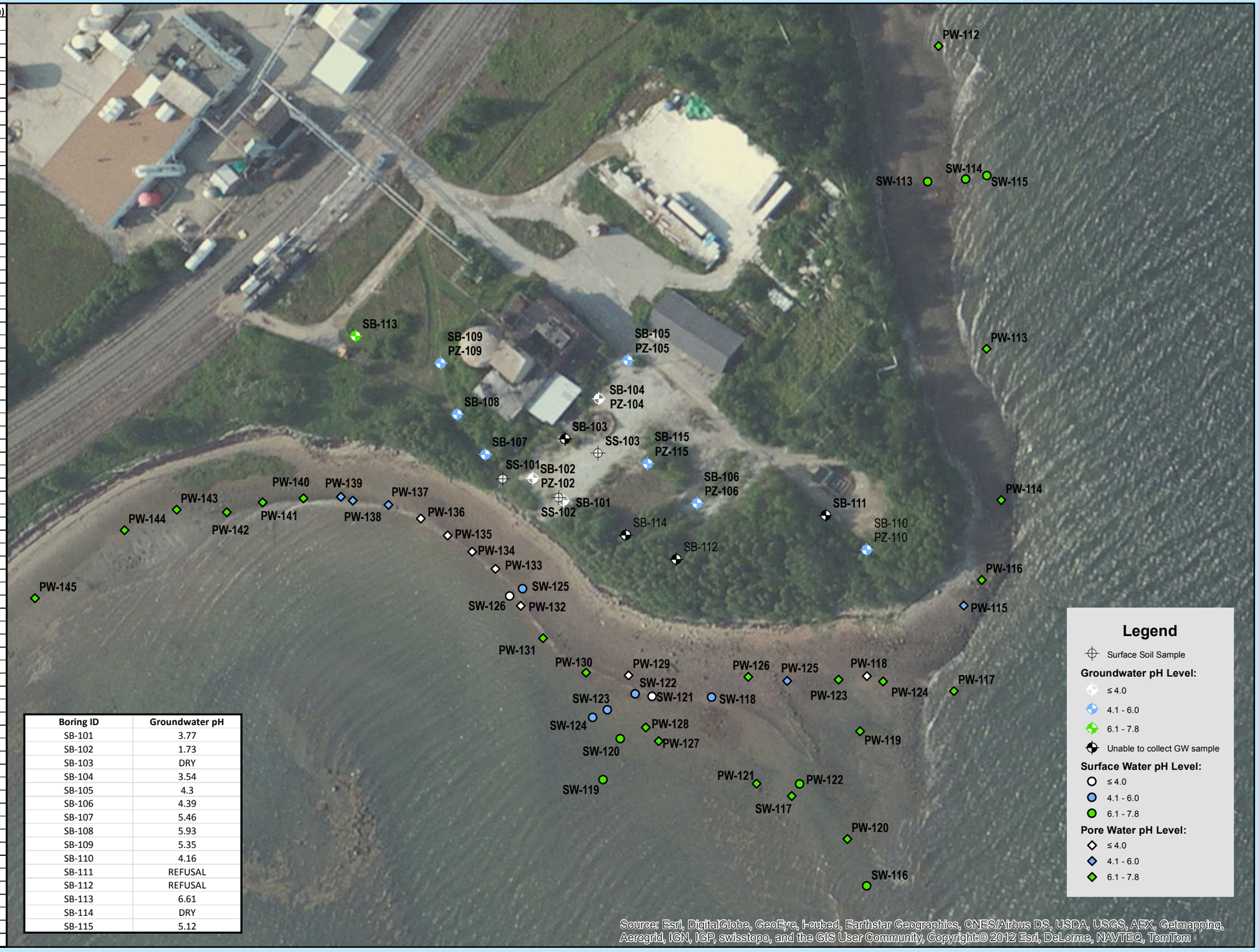


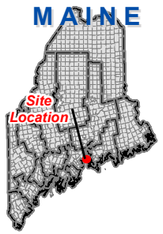
FIGURE 5

TEST PIT LOCATION PLAN

FIGURE 5: Test Pit Location Plan

N
W E
S
GRID

50 25 0 50
Feet



Legend

- Test Pit Location (Sulfur Present)
- Test Pit Location (Sulfur Not Present)
- Soil Boring Location (Sulfur Present)
- Soil Boring Location (Sulfur Not Present)
- Historic Sulfur Storage Area
- Geologic Profile Cross Section

GAC Chemical Corp.
Project No.: 10060.007
Updated: 10/29/2014 [lladd]

MAP NOTES:

1: SITE DATA DEVELOPED BY CES, INC. MAPPING IS INTENDED FOR REFERENCE PURPOSES ONLY.

2: SAMPLES IDENTIFIED AS "SW" INDICATE SURFACE WATER SAMPLE LOCATIONS. COLLECTED 8/29/2014.

3: SAMPLES IDENTIFIED AS "PW" INDICATE PORE WATER SAMPLE LOCATIONS. COLLECTED 8/29/2014.

4: HISTORICAL GROUNDWATER SULFATE LEVELS FROM A HISTORIC EC JORDAN SAMPLING PLAN, 1984.

5: MAP IS PROJECTED USING MAINE STATE PLANE COORDINATES, EAST ZONE, LINEAR UNITS OF SURVEY FEET AND REFERENCES THE NORTH AMERICAN DATUM OF 1983 (NAD83).

6: NORTH ARROW IS REFERENCED TO GRID NORTH.

CES INC
Engineers • Environmental Scientists • Surveyors

MXD: P:\10060-GAC Chemical Corp\007-VRAP-IAP\07-GIS Data\MXD\102914 closeout\FIGURE5.mxd

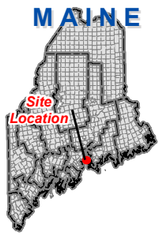
SULFUR LOCATION AND THICKNESS		
Location ID	Depth to Sulfur BGS (in)	Thickness of sulfur (in)
SB-101	48	6
SB-102	12	8
SB-103	12	4
TP-101	12	8
TP-106	19	6
TP-108	4	3
TP-109	8	6
TP-110	7	8
TP-111	7	8
TP-113	13	16
TP-115	2	2
TP-115	7	16

FIGURE 6

GROUNDWATER CONTOUR MAP

FIGURE 6: Groundwater Contour Map

N
W E
S
25 12.5 0 25 50
Feet



Legend

- Groundwater Contours

Groundwater pH Level:

- ≤ 4.0
- 4.1 - 6.0
- 6.1 - 7.8
- Unable to collect GW sample

GAC Chemical Corp.
Project No.: 10060.007
Updated: 10/29/2014 [lladd]

MAP NOTES:

1: SITE DATA DEVELOPED BY CES, INC. MAPPING IS INTENDED FOR REFERENCE PURPOSES ONLY.

2: GROUNDWATER ELEVATIONS FOR A GIVEN PIEZOMETER LOCATION ARE INDICATED IN PARENTHESES.

3: ALL GROUNDWATER ELEVATIONS ARE BASED ON MEAN HIGH WATER ELEVATIONS OBSERVED ON SEPT. 24, 2014 (SEE INVESTIGATION SUMMARY REPORT SECTION 3.2).

4: MAP IS PROJECTED USING MAINE STATE PLANE COORDINATES, EAST ZONE, LINEAR UNITS OF SURVEY FEET AND REFERENCES THE NORTH AMERICAN DATUM OF 1983 (NAD83).

5: NORTH ARROW IS REFERENCED TO GRID NORTH.

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MXD: P:\10\R\GAC Chemical Corp\007-VRAP_IAP\07-GIS_Data\MXD\102914 closeout\FIGURE6.mxd

APPENDIX A

SUBSURFACE SAMPLING PLAN

SENSIBLE SOLUTIONS

CES INC

SUBSURFACE SAMPLING PLAN
VOLUNTARY RESPONSE ACTION PROGRAM
34 KIDDER POINT ROAD
SEARSPORT, MAINE

Property Owner: GENERAL ALUM NEW ENGLAND CORP.
34 Kidder Point Road
Searsport, ME 04974

Prepared for: GAC CHEMICAL
34 Kidder Point Road
Searsport, ME 04974

Prepared by: CES, INC.
465 South Main Street
Brewer, Maine 04412

October 2014
JN: 10060.007

Corporate Office
465 South Main Street
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Report Prepared By:

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Engineers ◆ Environmental Scientists ◆ Surveyors

SUBSURFACE SAMPLING PLAN
VOLUNTARY RESPONSE ACTION PLAN (VRAP)
GAC CHEMICAL

CES, Inc. (CES) has developed the following subsurface sampling plan for the General Alum New England Corporation (dba GAC Chemical) property located at 34 Kidder Point Road in Searsport, Maine (the Site). The Site consists of approximately 152 acres of land and is currently developed as a chemical manufacturing facility. This subsurface sampling plan was developed in support of the VRAP for the Site that was applied for on August 27, 2014. The objective of this subsurface sampling plan is to gather information regarding the geologic profile, groundwater pH, and groundwater gradient near historical sulfuric acid spill locations.

Site Background

The Site is currently developed as a chemical manufacturing facility that produces a variety of chemicals such as: ammonium sulfate, liquid alum, aqua ammonia; and distributes sulfuric acid, specialty flocculants and coagulants, and customized chemical blends. Based on a review of municipal, regulatory, and historical records, the Site has been developed for commercial and/or industrial purposes since the early 1920s.

Numerous investigations identifying soil, surface water and groundwater contamination at the Site have been conducted since the 1980s and prior to GAC Chemical acquiring the Site in 1994. Reports describing the results of these investigations were provided to the MDEP previously. Based on the findings of the historical investigations at the Site, contaminated soil, groundwater, and surface water exist at the Site due to historical releases of contaminants associated with industrial activities at the Site.

In February 2003, the Maine Department of Environmental Protection (MDEP) signed the "Commissioner's Certification of Completion of Remedial Actions under a Voluntary Response Action Plan" for the Site relating to chlorinated hydrocarbons in soil and groundwater.

A Phase I ESA completed for the Site by CES in 2002 and a partial review of the RCRA enforcement documents on file at the MDEP in 2014 documented the following sulfuric acid spills and responses at the Site.

1981: HMI–B-17 documents that on August 17, 1981, approximately 2,000 gallons of stormwater with a pH around 2 was pumped from an underground holding tank to the ground surface. Approximately 200 gallons of the low pH liquid remained pooled on the ground and the remaining low pH liquid either infiltrated into the ground or ran off into the nearby Stockton Harbor. Approximately 200 gallons of low pH liquid pooled on the ground surface and was neutralized with soda ash.

1982: HMI–B-15 documents that on October 14, 1982, a fitting on a sulfuric acid tank failed and released between 400–500 gallons of 93% sulfuric acid. According to the document reviewed, 400-500 gallons entered Stockton Harbor. Soda ash was utilized to neutralize pooled acid to a pH of 3 on the ground near the spill. The area was covered with soil and according to site personnel the pH had been raised to at least 5 in this area.

1983: Spill Number B-257-83 documents that on October 14, 1983, approximately 50 gallons of 93% sulfuric acid was spilled when employees accidentally overfilled a rail tank car. Most of the acid was neutralized on site with limestone and water. An estimated 6 cubic yards of soil was also removed and disposed of off-site.

1983: Spill Number B-271-83 documents that on November 9, 1983, 375 gallons of sulfuric acid was spilled. The acid was neutralized in place and flushed to the harbor. No recovery method was used.

1984: Spill Number B-101-84 documents that on May 26, 1984, approximately100-200 gallons of sulfuric acid spilled onto the ground with reportedly 2-3 gallons reached Stockton Harbor. Powdered lime was used to adjust the soil pH; approximately 40 cubic yards was then removed and placed in the landfill on site. DEP had concern that Delta made a practice of reporting all spills to the DEP 23 hours after they happen which may allow Delta wash out the worst of the spill prior to DEP or the Coast Guard responding.

1984: Spill Number B-206-84 documents that on September 21, 1984, during an acid meter flow calibration test, a valve on a line which supplies acid to the wash tank was left open, allowing acid from the main line to enter the washing tank unknown to the operator. It was discovered only when the tank overflowed onto the ground. Approximately 200 gallons of 93% sulfuric acid was spilled. The acid was neutralized with soda ash. An interceptor trench was dug to prevent the acid from flowing into the site drainage ditch. The neutralized soil was then removed and placed in the landfill on site.

1984: Spill Number B-262-84 documents that on December 11, 1984, approximately 50 gallons of sulfuric acid was spilled when a 4" pipeline to the facility's dilution system sheared off. The acid was neutralized with soda ash, excavated, and placed in the landfill on site.

1985: Spill Number B-10-85 documents that on January 24, 1985, approximately 150 gallons of 98% sulfuric acid was spilled when a high level alarm failure caused a 2,000 gallon tank to be overfilled. The acid was neutralized with soda ash. It was to be excavated and placed in the facility waste pond at a later date.

1985: Spill Number B-121-85 documents that on June 21, 1985, approximately 25-30 tons of liquid sulfur was spilled when the overflow alarm on the facility meter failed. The liquid sulfur solidified on the ground. Approximately 90% of the solidified sulfur was to be recycled.

1987: Spill Number B-402-87 documents that on October 28, 1987, approximately 1,000 gallons of 98% sulfuric acid was spilled when a pipe elbow corroded through at the acid plant and acid leaked out from the tank. The area was bermed immediately and approximately 700-800 gallons of acid was pumped into a truck. The contaminated soil from the spill was excavated and placed in the landfill on site.

1988: Spill Number B-250-88 documents that on June 20, 1988, approximately 100 gallons of sulfuric acid was spilled due to a leak in the 100,000 gallon storage tank. The spilled acid was pumped into tanker trucks. The contaminated soil was neutralized and placed in the landfill on site.

1988: Spill Number B-255-88 documents that on June 22, 1988, approximately 100 gallons of 98% sulfuric acid was spilled when a T-fitting broke. Contaminated soil was neutralized with soda ash; approximately six yards was excavated and placed in the landfill on site.

1988: Spill Number B-579-88 documents that on November 25, 1988, approximately 30 gallons of 98% sulfuric acid was spilled due to a leak at the base of the #1 Acid Plant drying tower. The contaminated soil was neutralized with soda ash, excavated and placed in the landfill on site.

1988: Spill Number B-580-88 documents that on November 26, 1988, during the re-start of the acid production facility, a bottom valve on the cooler banks was left open, allowing 617 gallons of 98% sulfuric acid to spill. The acid production had been shut down due to Spill Number B-579-88, which allowed 30 gallons to spill. Spill Number B-580-88 allowed another 40 gallons to spill onto the ground, where it was neutralized, excavated and placed in the landfill on site. The remaining 577 gallons went down the drain and into Penobscot Bay. Spill Numbers B-579-88 and B-580-88 occurred on November 25-26, 1988; however, were not reported to the Maine DEP until December 9, 1988.

1988: Spill Number B-610-88 documents that on December 30, 1988, approximately 485 gallons of 98% sulfuric acid was spilled due to a leak in a cooling coil in the #1 Acid Plant. Approximately 475 gallons of acid discharged directly into the facility salt water cooling system and subsequently into Penobscot Bay where it was unrecoverable. Approximately 10 gallons was spilled onto the soil, which was neutralized, excavated and placed in the landfill on site. DEP noted that nine hours had passed before they were notified of the spill.

1989: Spill Number B-107-89 documents that on March 11, 1989, approximately 40-50 gallons of sulfuric acid was spilled when a leak developed in a pipe line at the facility's #2 acid plant. Contaminated soil was neutralized with soda ash and excavated. Approximately 2-3 cubic yards were placed in the landfill on site.

1989: Spill Number B-241-89 documents that on May 12, 1989, approximately 40 gallons of sulfuric acid was spilled on the ground due to a gasket failure at a flanged joint in the piping for the #1 Acid Plant dilution system. The acid was neutralized with soda ash. The material was then excavated and placed in the landfill on site.

1989: Spill Number B-353-89 documents that on June 27, 1989, approximately 122 gallons of sulfuric acid was spilled when a cooling tube corroded. Approximately 40 gallons was sprayed onto bare dirt; the other 82 gallons fell into the cooling tower and discharged to Stockton Harbor. Approximately 1 yard of contaminated soil was neutralized with soda ash, excavated and placed in the landfill on site.

1989: Spill Number B-604-89 documents that on October 11, 1989, approximately 25 gallons of sulfuric acid was spilled. Facility employees had been pumping one of the bulk storage tanks dry for repairs and pump vibration had caused a small crack in the piping. Soil was to be neutralized with soda ash and placed in the landfill on site.

1991: Spill Number B-136-91 documents that on March 20, 1991, approximately 20 gallons of sulfuric acid was spilled due to a tank truck overfill. The acid was neutralized with soda ash. Less than a yard of material was excavated and placed in the facility land fill.

1991: Spill Number B-249-91 documents that on April 23, 1991, approximately 242 gallons of 98% sulfuric acid was spilled due to a pinhole leak in the facility's 5,000 ton acid tank. The tank was pumped dry, cleaned and repaired. Approximately 101 yards of contaminated material was removed and placed in the facility land fill.

1993: Spill Number B-398-93 documents that on July 22, 1993, approximately 20-40 gallons of diluted sulfuric acid was spilled when catch pans used in tank car unloading overflowed with product and rainwater. The material was neutralized with two bags of soda ash and left in place. No further remediation efforts were documented.

1996: Spill Number B-383-96 documents that on July 19, 1996, approximately 100 gallons of sulfuric acid spilled when a flange on the transfer system was not properly tightened. The

area was neutralized with soda ash and lime. Approximately 12 yards of contaminated material was stock piled on site; it was to be disposed of at Sawyer Environmental. No further remediation efforts were documented.

1997: Spill Number B-573-997 documents that on October 7, 1997, approximately 200-300 gallons of sulfuric acid was spilled at the tank car rack due to a check valve failure which caused a tank car overfill. Most of the material was neutralized soda ash; approximately two yards were also scraped off the ground. It was suggested that the material be neutralized and placed in the landfill on site.

Conceptual Site Model

The following table summarizes the Conceptual Site Model (CSM) for the site.

POSSIBLE SOURCE AREAS	Areas of historic sulfuric acid spills (sulfuric acid plant)
PARAMETER	Low pH
POTENTIAL MEDIA AFFECTED	Soil, groundwater, surface water
POTENTIAL EXPOSURE ROUTES	Current exposure pathways for contaminants: ◆ Dermal risk of decreased pH water in tidal zone Potential exposure pathways for contaminants: ◆ Dermal contact with contaminated soil/groundwater if disturbed.
POTENTIAL MIGRATION PATHWAYS	Migration pathways for contaminants: ◆ Flow of low pH groundwater to Stockton Harbor ◆ Mobilization during any future excavation activities
RECEPTORS	Potential receptors include: ◆ Current and future site workers

The Site structures are served by a municipal water supply provided by an off-site source. Wastewater is managed via a private wastewater treatment and disposal facility and is monitored in accordance with a Stormwater Pollution Prevention Plan and a Waste Discharge License for the Site.

The U.S.G.S. 7.5 minute Quadrangle Map of Searsport, Maine shows that the subject property is located to the east of Kidder Point Road, on Kidder Point, to the west of Stockton Harbor, and is approximately 20 feet above mean sea level. The Site is generally level with local topography sloping to the south and east toward Stockton Harbor.

The Reconnaissance Surficial Geology of the Searsport Quadrangle, Open File 13-5, by Woodrow B. Thompson identifies the subject property as Pp, Presumpscot Formation. These glacial marine deposits consist of mostly silt, clay and sand deposited on the one time sea floor.

Based upon the above conditions and previous investigations completed at the Site, a layer of marine clay soils with low water permeability exists across the Site. Due to multiple discharges of

sulfuric acid in the area of the former “Sulfuric Acid Plant”, the pH of shallow groundwater (above the identified clay layer) may be decreased prior to migration into Stockton Harbor.

A proposed sampling location plan is attached and depicts subsurface sampling locations within the area of interest.

Sampling Objective

The objective of the subsurface sampling is to gather information regarding the geologic profile, groundwater pH, and groundwater gradient near historical sulfuric acid spill locations. To complete this objective we are proposing to complete up to twenty-two soil borings spaced approximately 50 feet apart along accessible areas located on the south-southwestern extent of Kidder Point, east of the rail road bed.

Soil borings will be completed utilizing a Geoprobe® 5410 Direct Push Unit equipped with MC5 soil sampling tooling. Soil samples will be collected in four foot intervals, to a depth of consistent clay material. The soils recovered from the subsurface profile will be visually classified and documented by a field geologist. A temporary well screen will be utilized in the boring location to collect an in-situ (down-hole) pH reading of groundwater if encountered. In areas where low pH readings are identified or expected, soils from above the encountered groundwater table may be hydrated with deionized water to reproduce a liquid phase for pH readings. In addition, up to five soil samples from within the underlying clay material (greater than 12 inches below the clay interface) will be collected from the borings, hydrated with deionized water and a pH reading will be collected to determine the magnitude and extent of decreased pH that may have been the result of a historical discharge on-site. Approximately five of the soil borings will be completed with piezometers for future water level monitoring at the Site. An elevation survey will be completed for the ground surface elevation at all of the boring locations and the constructed piezometers.

GAC Chemical Proposed Subsurface Sampling Plan

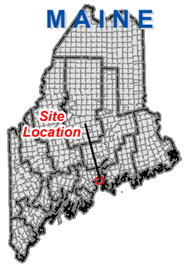
Sept., 2014

N
W E
S
GRID

50 25 0 50
Feet

Legend

- Boring Location (11)
- Potential Access Restriction (6)
- Short-term Groundwater Monitoring Location (5)
- Historical Monitoring Well Locations



GAC Chemical Corp.
Project No.: 10060.007
Updated: 9/9/2014 [lladd]

MAP NOTES:

1: SITE DATA DEVELOPED BY CES, INC. MAPPING IS INTENDED FOR REFERENCE PURPOSES ONLY.

2: SAMPLES IDENTIFIED AS "SW" INDICATE SURFACE WATER SAMPLE LOCATIONS. COLLECTED 8/29/2014.

3: SAMPLES IDENTIFIED AS "PW" INDICATE PORE WATER SAMPLE LOCATIONS. COLLECTED 8/29/2014.

4: HISTORICAL GROUNDWATER SULFATE LEVELS FROM A HISTORIC EC JORDAN SAMPLING PLAN, 1984.

5: MAP IS PROJECTED USING MAINE STATE PLANE COORDINATES, EAST ZONE, LINEAR UNITS OF SURVEY FEET AND REFERENCES THE NORTH AMERICAN DATUM OF 1983 (NAD83).

6: NORTH ARROW IS REFERENCED TO GRID NORTH.

CES INC
Engineers • Environmental Scientists • Surveyors

MXD: P:\10060-GAC Chemical Corp\007-VRAP-JAP\07-GIS Data\MXD\ProposedSamplingPlan_092014.mxd

APPENDIX B

SOIL BORING LOGS

CES INC	SOIL BORING LOG	Page 1 of 15

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/10/14

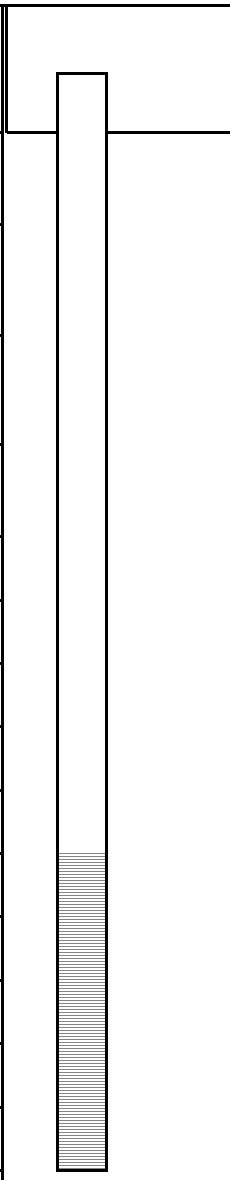
Boring: SB-101	Driller: BDS	Geologist: WEH	Notes:

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/2	0-2: SAND, brown, medium to fine, some clay, rocky, sulfur @ 4'. **pH=1.07***	
4-8	4/2.1	0-.5: SAND, brown, medium to fine, some clay, rocky, some sulfur. 0.5-1.5: SAND, brown, fine, silty, rocky, dry. **pH=2.35*** 1.5-2.1: CLAY, gray, sandy, some rocks, firm, wet. **pH=3.34*, dup pH=3.5***	
8-12	4/1.9	0-1: CLAY, gray, sandy, some rocks, firm, wet 1-1.8: SAND, fine to medium, wood chips, damp. **pH=3.01*** 1.8-1.9: CLAY, gray, sandy, roots, soft, wet. **pH=5.06***	
12-16	4/1.1	0-1.1: CLAY, gray, sandy, roots, soft, wet	
		END OF BORING @16' BGS *soil sample hydrated with deionized water to reproduce a liquid phase	Groundwater pH=3.77

CES INC	SOIL BORING LOG	Page 2 of 15
Project: GAC pH Investigation	**Project No: 10060.007**	**Date: 9/10/14**
Boring: SB-102	**Driller: BDS**	**Geologist: WEH**	**Notes: Installed PZ-102 @ 15' BGS**

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils
0-4	4/2.2	0-1: SAND, medium to fine, gray, rocky, dry. **pH=2.60*** 1-1.7: Granular material, yellow, sulfur odor, dry. **pH=2.40*** 1.7-2.2: CLAY, gray, sandy, few rocks, dry. **pH=2.20***
4-8	4/2.6	0-1: CLAY, gray, sandy, few rocks, dry 1-2.6: CLAY, brown, sandy, rocky, damp. **pH=1.86***
8-12	4/2	0-1.5: CLAY, gray, sandy, rocky, organic, wet. **pH=1.95*** 1.5-2: SAND, medium, gray, few rocks, loose, saturated. **pH=2.12***
12-16	3/1.1	0-0.3: SAND, medium, gray, few rocks, loose saturated. 0.3-1.1: CLAY, gray, sandy, soft, saturated. **pH=5.03***
		END OF BORING @ 15' BGS Groundwater pH-1.73 *soil sample hydrated with deionized water to reproduce a liquid phase

Piezometer Construction Details



Ground Elevation=15.95 ft
TOC Elevation= 16.33 ft
Casing= 1" PVC
Screen=0.010" slot PVC

CES INC	SOIL BORING LOG	Page 3 of 15

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/10/14

Boring: SB-103	Driller: BDS	Geologist: WEH	Notes:

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/2.7	0-0.1: SAND, medium to fine, gray, trace CLAY, rocky. **pH=3.85*** 1-1.2: Granular material, yellow, sulfur odor, dry. **pH=2.46*** 1.2-2: CLAY, gray, sandy, rocky, dense, dry. **pH=2.21*** 2-2.7: CLAY, brown, sandy, dense, dry. **pH=2.53***	
4-8	4/2.5	0-1.2: SAND, brown, fine, some clay, rocky, dry. **pH=4.16*** 1.2-2: CLAY, brown, soft, sandy, rocky. **pH=3.56*** 2-2.5: CLAY, gray, trace SAND, dense, damp. **pH=4.42***	
8-12	4/4	0-4: CLAY, gray, trace SAND, dense, damp. **pH=4.47*** @9.1' BGS	
		END OF BORING @ 12' BGS *soil sample hydrated with deionized water to reproduce a liquid phase	NO GROUNDWATER

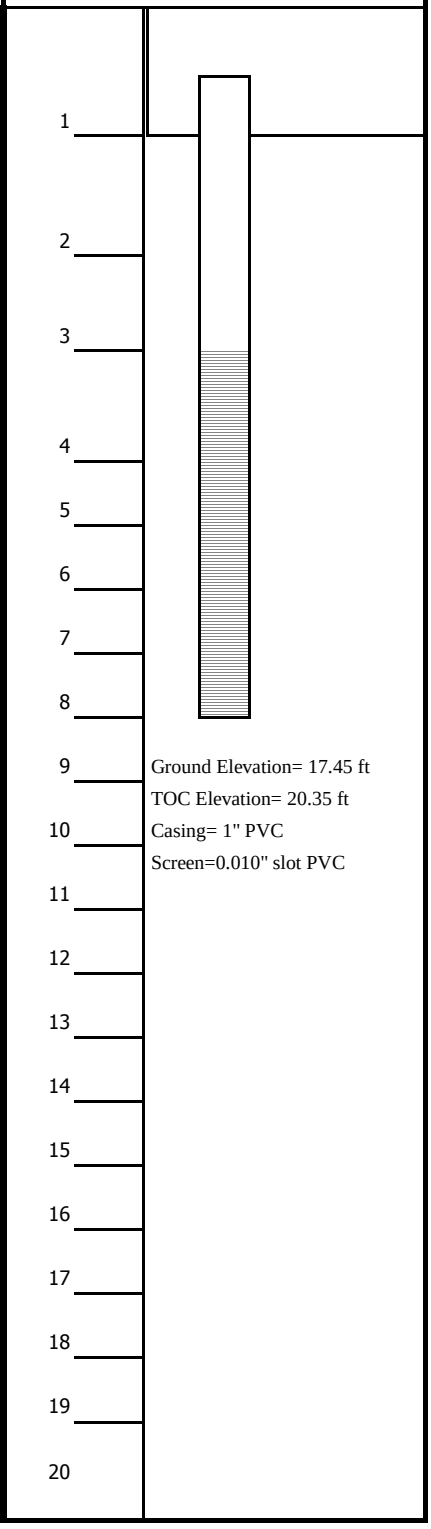
SOIL BORING LOG

Project: GAC pH Investigation | **Project No: 10060.007** | **Date: 9/10/14**

Boring: SB-104 | **Driller: BDS** | **Geologist: WEH** | **Notes: Installed PZ-104 @ 8' BGS**

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils
0-4	4/1.2	0-1.2: SAND, gray, medium to fine, rocky, trace clay, loose, dry. **pH=2.37***
4-8	4/2.1	0-1.2: SAND, gray, medium to fine, rocky, trace clay, loose, dry. 1.2-1.9: SAND, gray, medium to fine, loose, saturated @ 6'. **pH=2.73*** 1.9-2.1: CLAY, gray, dense, few rocks, dry. **pH=3.73***
		END OF BORING @ 8' BGS Groundwater pH=3.54 *soil sample hydrated with deionized water to reproduce a liquid phase

Piezometer Construction Details



Ground Elevation= 17.45 ft
TOC Elevation= 20.35 ft
Casing= 1" PVC
Screen=0.010" slot PVC

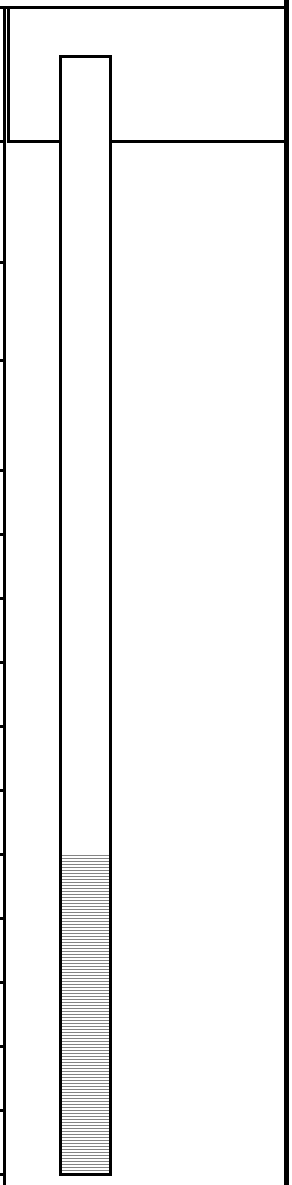
SOIL BORING LOG

Project: GAC pH Investigation	**Project No: 10060.007**	**Date: 9/10/14**
Boring: SB-105	**Driller: BDS**	**Geologist: WEH**

Notes: Installed PZ-105 @ 15' BGS

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils
0-4	4/0.5	0-0.5: SAND, fine, brown, loose. **pH=5.04*;** Rock obstructed sampler
4-8	4/2.3	0-2.3: SAND, medium to fine, rocky, some CLAY, saturated @ 8'. **pH=3.06* at 4', pH=3.16* at 8'**
8-12	4/2.8	0-1.7: SAND, medium to fine, gray, few rocks, some CLAY, saturated @8'. **pH=3.80*** 1.7-2.8: SAND, fine, brown, loose, silty, saturated. **pH=3.94***
12-15	3/2.8	SAND, fine brown, loose, silty, saturated. **pH=4.66* @ 12', pH=6.17* @ 15'**
		END OF BORING @ 15' BGS Groundwater pH=4.30
		*soil sample hydrated with deionized water to reproduce a liquid phase

Piezometer Construction Details



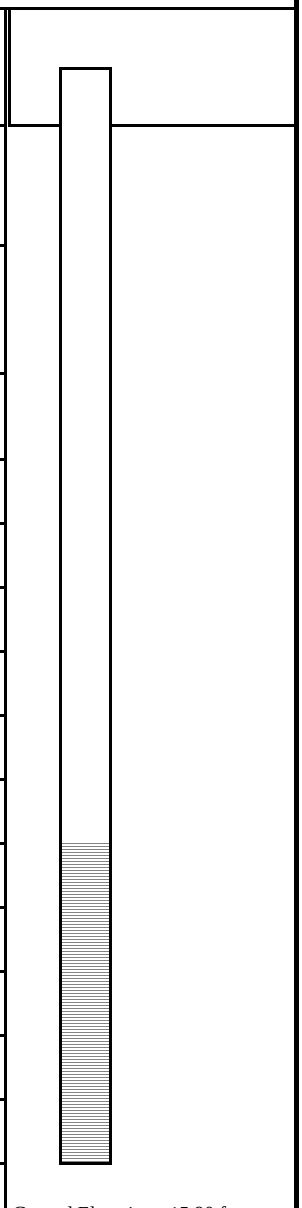
Ground Elevation= 18.08 ft
TOC Elevation= 18.93 ft
Casing= 1" PVC
Screen=0.010" slot PVC

SOIL BORING LOG

Project: GAC pH Investigation		**Project No: 10060.007**	**Date: 9/10/14**
Boring: SB-106	**Driller: BDS**	**Geologist: WEH**	**Notes: Installed PZ-106 @ 15' BGS**

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils
0-4	4/2.5	0-1.2: SAND, fine, gray, trace CLAY, rocky, dry. **pH=4.12*** 1.2-2.5: SAND, brown, fine, silty, rocky, damp. **pH=3.28***
4-8	4/2.9	0-1: SAND, brown, fine, silty, rocky, damp. **pH=3.29*** 1-2.9: SAND, fine, gray, silty, rocky, saturated. **pH=3.75***
8-12	4/1	0-1: SAND, fine, gray, silty, rocky, saturated. **pH=3.93***
12-15	3/2.6	0-2.6: SAND, fine, gray, silty, rocky, saturated. **pH=6.23***
		END OF BORING @ 15' BGS Groundwater pH=4.39 *soil sample hydrated with deionized water to reproduce a liquid phase

Piezometer Construction Details



Ground Elevation= 15.90 ft
TOC Elevation= 16.95 ft
Casing= 1" PVC
Screen=0.010" slot PVC

CES INC	SOIL BORING LOG	Page 7 of 15

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/10/14

Boring: SB-107	Driller: BDS	Geologist: WEH	Notes:

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/2.2	0-2.2: SAND, medium to fine, brown, rocky, dry. **pH=5.71***	
4-8	4/3.6	0-1: SAND, medium to fine, brown rocky, dry 1-3.6: SAND, fine, brown, some CLAY, few rocks, damp. **pH=5.75***	
8-12	4/0.8	0-0.7: SAND, fine, brown, some CLAY, few rocks, damp 0.7-0.8: SAND, gray, medium, loose, saturated. **pH=1.92***	
12-16	4/1.5	0-1: SAND, gray, medium, loose, saturated. **pH=2.25*** 1-1.5: CLAY, gray, trace SAND, organic, soft, saturated. **pH=5.57***	Red stain @ 0.5'
		END OF BORING @ 16' BGS *soil sample hydrated with deionized water to reproduce a liquid phase	Groundwater pH= 5.46

CES INC	SOIL BORING LOG	Page 8 of 15

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/11/14

Boring: SB-108	Driller: BDS	Geologist: WEH	Notes:

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/2	0-0.8: SAND, fine, brown, silty, rocky, loose, dry. **pH=3.62*** 0.8-2.0: CLAY, gray, sandy, rocky, damp. **pH=5.67***	
4-8	4/1.7	0-0.5: CLAY, gray, sandy rocky, trace sulfur, damp. **pH=4.12*** 0.5-0.7: Wood 0.7-1.6: CLAY, gray, sandy, soft, saturated. **pH=3.45*** 1.6-1.7: CLAY, gray, dense, sandy, dry. **pH=3.19***	Trace sulfur @ 8'
8-12		Wood	
12-16	4/2.5	0-2.5: CLAY, gray, sandy, rocky, soft, saturated. **pH=5.19***	
		END OF BORING @ 16' BGS *soil sample hydrated with deionized water to reproduce a liquid phase	Groundwater pH=5.93

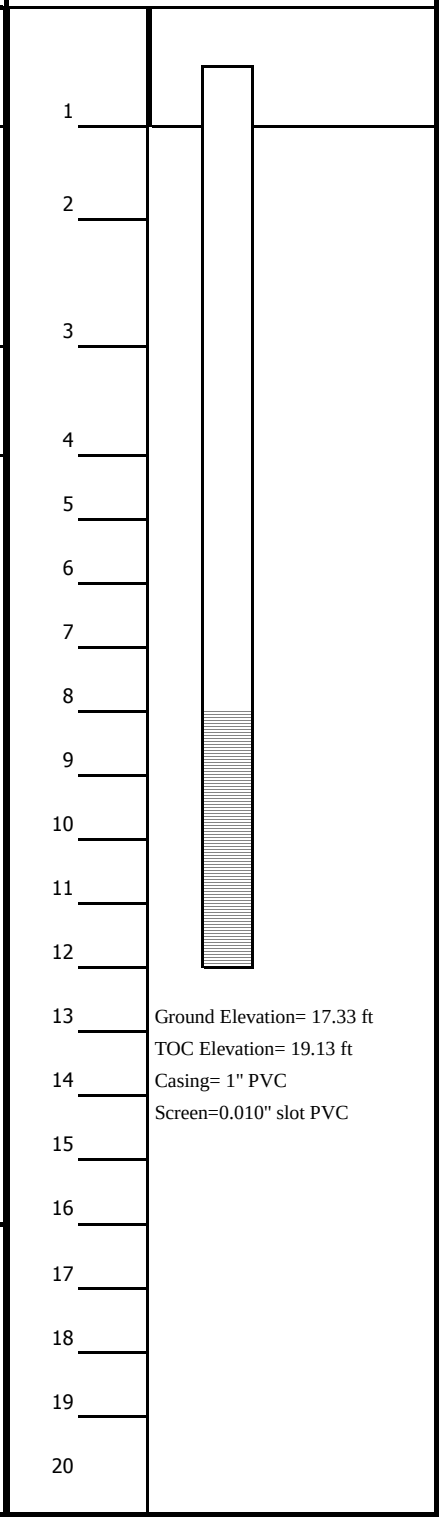
SOIL BORING LOG

Project: GAC pH Investigation	**Project No: 10060.007**	**Date: 9/11/14**
Boring: SB-109	**Driller: BDS**	**Geologist: WEH**

Notes: Installed PZ-109 @ 12' BGS

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils
0-4	4/2.6	0-2.3: SAND, medium to fine, rocky, loose, dry. **pH=4.98*** 2.3-2.6: CLAY, gray, rocky, sandy, dense, dry. **pH=5.83***
4-8	4/3	0-1.5: CLAY, gray, sandy, rocky, dry. **pH=5.43*** 1.5-1.8: CLAY, silty, rocky, soft, damp. 1.8-2.5: SAND, brown, clayey, rocky, dry. 2.5-3: CLAY, gray, very dense, damp. **pH=6.04***
8-12	4/2.7	0-1.2: CLAY, gray, sandy, rocky, soft, loose, saturated. 1.2-2.7: CLAY, gray, few rocks, very dense, dry. **pH=5.69***
		END OF BORNG @ 12' BGS Groundwater pH=5.35 *soil sample hydrated with deionized water to reproduce a liquid phase

Piezometer Construction Details



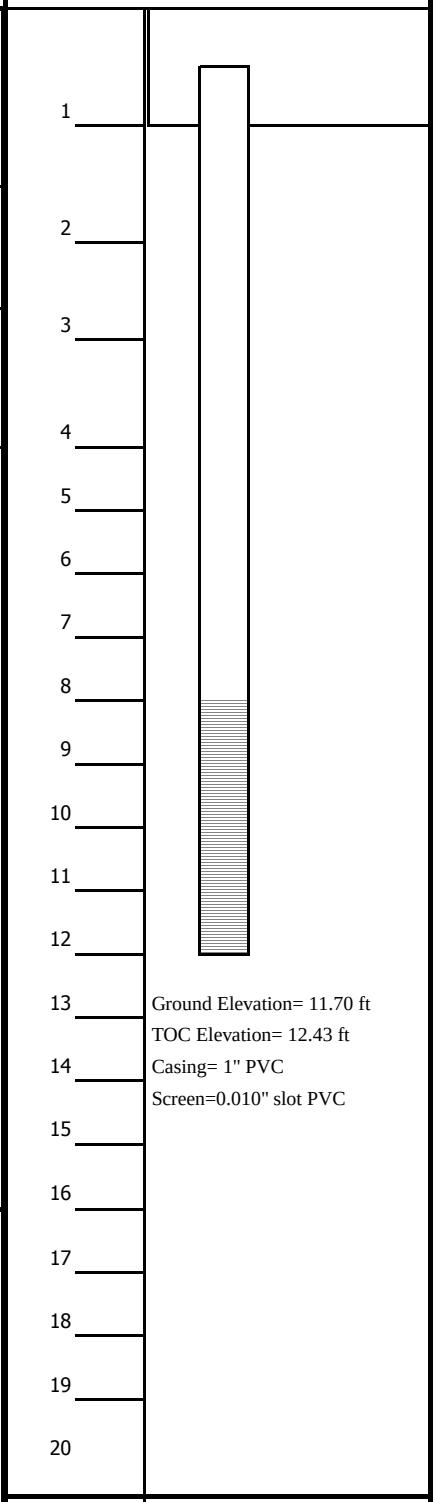
Ground Elevation= 17.33 ft
TOC Elevation= 19.13 ft
Casing= 1" PVC
Screen=0.010" slot PVC

SOIL BORING LOG

Project: GAC pH Investigation	**Project No: 10060.007**	**Date: 9/11/14**
Boring: SB-110	**Driller: BDS**	**Geologist: WEH**
Notes: Installed PZ-110 @ 12' BGS		

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils
0-4	4/2.5	0-0.9: SAND, medium to fine, brown, rocky, loose. **pH=5.07*** 0.9-1.9: CLAY, sandy, gray, rocky, damp. 1.9-2.5: SAND, medium to fine, gray, some CLAY, rocky, damp. **pH=4.10***
4-8	4/2.4	0-1.4: CLAY, sandy, very rocky, damp. **pH=3.80*** 1.4-2.4: CLAY, gray, organic, soft, rocky, damp. **pH=4.87***
8-12	4/2.3	0-0.9: CLAY, gray, organic, soft, rocky, damp. 0.9-1.5: SAND, medium, rocky, shell fragments, saturated. **pH=4.06*** 1.5-2.3: CLAY, sandy, brown, rocky, dense, damp. **pH=5.14***
		END OF BORING @ 12' BGS Groundwater pH=4.16 *soil sample hydrated with deionized water to reproduce a liquid phase

Piezometer Construction Details



Ground Elevation= 11.70 ft
TOC Elevation= 12.43 ft
Casing= 1" PVC
Screen=0.010" slot PVC

CES INC	SOIL BORING LOG	Page 11 of 15

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/11/14

Boring: SB-111	Driller: BDS	Geologist: WEH	Notes:

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/1.4	0-0.7: SAND, fine, gray, few rocks, trace CLAY, loose, damp. **pH=3.72*** 0.7-1.4: CLAY, gray, soft, sandy, rocky, damp. **pH=3.67***	
		END OF BORING @ 4' BGS (REFUSAL)	NO GROUNDWATER
		*soil sample hydrated with deionized water to reproduce a liquid phase	

CES INC	SOIL BORING LOG	Page 12 of 15

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/11/14

Boring: SB-112	Driller: BDS	Geologist: WEH	Notes:

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/2.8	0-2.8: SAND, medium to fine, brown, some CLAY, few rocks, dry. **pH=3.86***	
4-8	4/3.2	0-0.8: SAND, medium to fine, brown, some CLAY, few rocks, dry. 0.8-3.2: SAND, medium to fine, gray, trace CLAY, some sulfur. **pH=3.52***	
8-10.6	2.6/2.2	0-2.2: SAND, fine, silty, brown, rocky, damp. **pH=3.60***	
		END OF BORING @ 10.6' BGS (REFUSAL) *soil sample hydrated with deionized water to reproduce a liquid phase	NO GROUNDWATER

SOIL BORING LOG

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/11/14

Boring: SB-113	Driller: BDS	Geologist: WEH	Notes:

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/3.5	0-1.1: SAND, fine, brown, loose, rocky, dry. **pH=4.57*** 1.1-1.8: SAND, coarse to medium, rocky, loose, damp. 1.8-2.8: SAND, fine, brown, some CLAY, rocky, dry. 2.8-3.2: Rock fragments 3.2-3.5: SAND, fine, silty, brown, rocky, wet. **pH=4.95***	
4-8	4/4	0-3.2: SAND, fine, silty, brown, rocky, saturated. 3.2-3.7: CLAY, brown, sandy, dense, dry. **pH=5.45*** 3.7-4: SAND, fine, brown, rocky, trace CLAY, dry	
8-12	4/2	0-0.5: SAND, fine, brown rocky trace CLAY, dry 0.5-2: CLAY, dense, gray, trace SAND, few rocks, dry. **pH=5.43***	
		END OF BORING @ 12' BGS *soil sample hydrated with deionized water to reproduce a liquid phase	Groundwater pH=6.61

CES INC	SOIL BORING LOG	Page 14 of 15

Project: GAC pH Investigation	Project No: 10060.007	Date: 9/11/14

Boring: SB-114	Driller: BDS	Geologist: WEH	Notes:

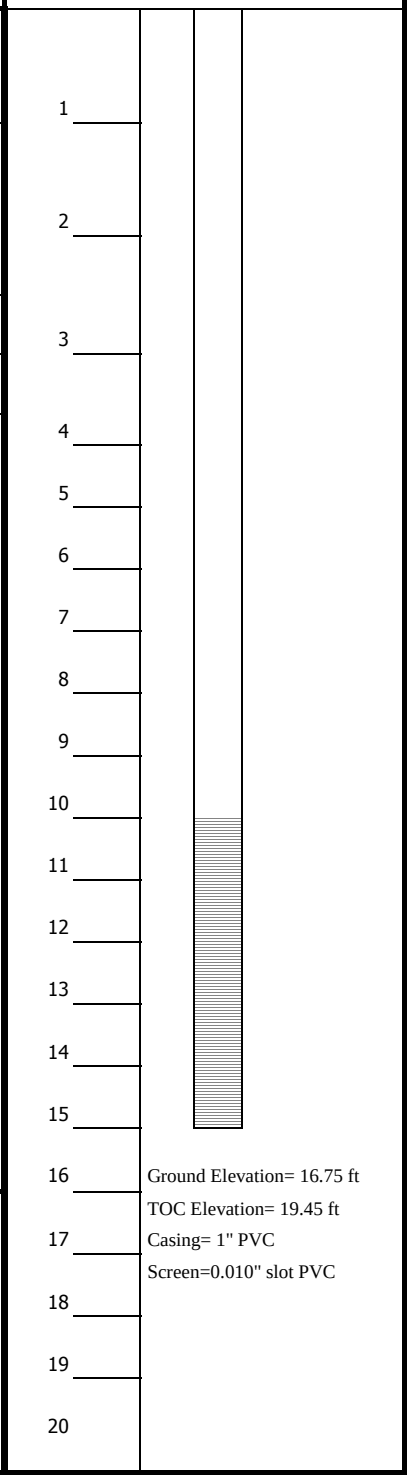
Depth (ft)	Penetration/ Recovery (ft)	Description of Soils	Comments
0-4	4/2	0-1.2: SAND, medium to fine, brown, rocky, loose, dry. **pH=7.96*** 1.2-2: SAND, fine, silty, brown, rocky, dry. **pH=6.44***	
4-8	4/3.2	0-0.7: SAND, fine, silty, brown, rocky, dry. 0.7-1.2: SAND, medium to fine, gray, rocky, damp. **pH=4.86*** 1.2-2.0: SAND, fine, silty, tan, few rocks, dry. 2.0-3.2: CLAY, gray, dense, dry. **pH=5.36***	
		END OF BORING @8' BGS *soil sample hydrated with deionized water to reproduce a liquid phase	NO GROUNDWATER

SOIL BORING LOG

Project: GAC pH Investigation	**Project No: 10060.007**	**Date: 9/11/14**
Boring: SB-115	**Driller: BDS** / **Geologist: WEH**	**Notes: Installed PZ-115 @ 15' BGS**

Depth (ft)	Penetration/ Recovery (ft)	Description of Soils
0-4	4/2.6	0-1.3: SAND, medium, brown, rocky, loose, dry. **pH=5.93*** 1.3-2.6: SAND, medium to fine, gray, some CLAY, rocky, wet. **pH=5.06***
4-8	4/4	0-1.2: SAND, medium to fine, gray, some CLAY, rocky, wet. 1.2-2: CLAY, gray, some SAND, rocky, dense, damp. **pH=4.63*** 2-4: SAND, fine, silty, brown, rocky, wet. **pH=5.08***
8-12	4/4	0-4: SAND, fine, silty, brown, rocky, saturated @ 10'. **pH=5.01***
12-15	3/3	0-3: SAND, fine, silty, brown rocky, saturated. **pH=4.64***
		END OF BORING @ 15' BGS Groundwater pH=5.12 *soil sample hydrated with deionized water to reproduce a liquid phase

Piezometer Construction Details



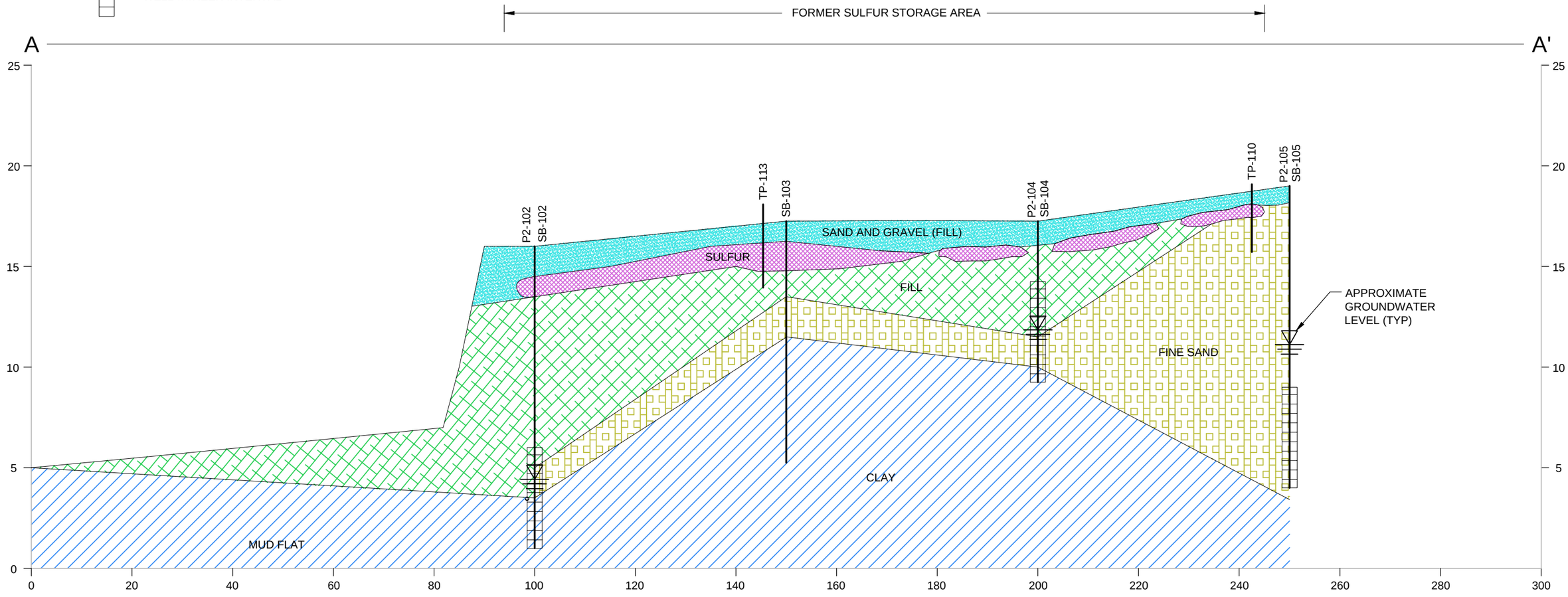
Ground Elevation= 16.75 ft
TOC Elevation= 19.45 ft
Casing= 1" PVC
Screen=0.010" slot PVC

APPENDIX C

GEOLOGIC PROFILES

LEGEND

- SAND AND GRAVEL (FILL)
- SULFUR
- FILL
- CLAY
- FINE SAND
- WELL SCREEN INTERVAL



SECTION A-A
SCALE: H = 1:20 / V = 1:5

PROJECT TITLE: **GAC CHEMICAL CORPORATION SEARSPORT, MAINE**	DWG: 1	BY: WAB	REV:	DESCRIPTION:	CES INC Engineers • Environmental Scientists • Surveyors
		DATE: 2014-10-17	REV DATE:		
SHEET TITLE: **GENERALIZED GEOLOGIC CROSS SECTION A-A**	JN: 10060.007	APPROVED BY: MAD	ISSUE:	DESCRIPTION:	
	SCALE: AS NOTED	CHECKED BY: DSP	ISSUE DATE:		

APPENDIX D

TEST PITTING PLAN

SENSIBLE SOLUTIONS

CES INC

TEST PIT PLAN
VOLUNTARY RESPONSE ACTION PROGRAM
34 KIDDER POINT ROAD
SEARSPORT, MAINE

Property Owner: GENERAL ALUM NEW ENGLAND CORP.
34 Kidder Point Road
Searsport, ME 04974

Prepared for: GAC CHEMICAL
34 Kidder Point Road
Searsport, ME 04974

Prepared by: CES, INC.
465 South Main Street
Brewer, Maine 04412

October 2014
JN: 10060.007

Report Prepared By:
CES, Inc.
PO Box 639
465 South Main Street
Brewer, Maine 04412
207.989.4824

Corporate Office
465 South Main Street
PO Box 639
Brewer, Maine 04412
207.989.4824

www.ces-maine.com

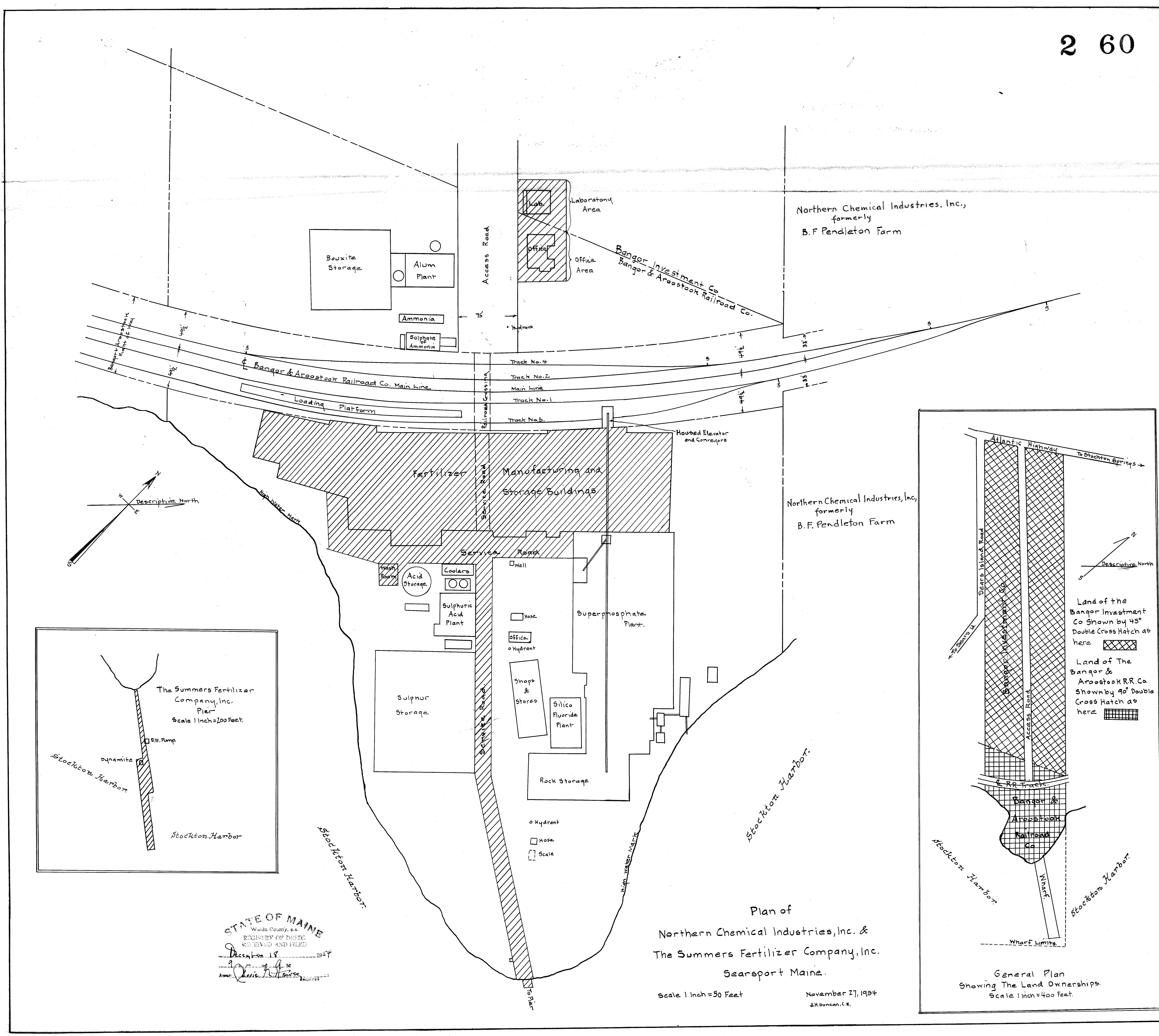
Engineers ◆ Environmental Scientists ◆ Surveyors

TEST PIT PLAN
VOLUNTARY RESPONSE ACTION PLAN (VRAP)
GAC CHEMICAL

CES, Inc. (CES) has developed the following test pit plan for the General Alum New England Corporation (dba GAC Chemical) property located at 34 Kidder Point Road in Searsport, Maine (the Site). The Site consists of approximately 152 acres of land and is currently developed as a chemical manufacturing facility. This test pit plan was developed in support of the VRAP for the Site that was applied for on August 27, 2014.

The objective of this test pit plan is to gather information regarding the extent of the residual sulfur below ground surface in the former sulfur storage area. To complete this objective, we are proposing to complete up to ten test pits spaced approximately 50 feet apart within the former sulfur storage area as shown on the attached November 27, 1954, Plan of Northern Chemical Industries, Inc. & The Summers Fertilizer Company, Inc. The locations of the test pits will be based on the results of the September 11, 2014, subsurface sampling activities and observations made during the test pitting activities. Test pits will be completed utilizing an excavator from a local construction company. Soil will be removed within each test pit in eight to twelve inch increments until the extent of sulfur is observed or to four feet below ground surface, whichever is deepest. Observations from each test pit will be documented (i.e. photo and test pit log) and will include sulfur presence/absence, depth of sulfur from ground surface, and thickness of sulfur within each test pit. Test pit locations will be located with a GPS to aid in future planning efforts.

The test pitting will occur during dry weather. The material removed from each test pit will be returned to the location where they were removed before beginning the next test pit. Surface gravel will be placed on top of the area to restore the area to current conditions. Based on discussions with you, permits are not required for this type of investigation activity located within 75 feet of the shoreland.


2 60
Northern Chemical Industries, Inc., formerly B.F. Pendleton Farm
Laboratory Area
Lab.
Office
Office Area
Bauxite Storage
Alum Plant
Access Road
Bangor Investment Co
Bangor & Aroostook Railroad Co.
Ammonia
Sulphate of Ammonia
Hydrant
75'
Bangor & Aroostook R.R. Right of Way
Track No. 4
Track No. 2
Main Line
Track No. 1
Track No. 3
℄ Bangor & Aroostook Railroad Co. Main Line
Loading Platform
Railroad Crossing
Housed Elevator and Conveyors
Fertilizer Manufacturing and Storage Buildings
Service Road
Descriptive North
High Water Mark
Northern Chemical Industries, Inc., formerly B.F. Pendleton Farm
Wash Room
Acid Storage
Coolers
Well
Sulphuric Acid Plant
Hose
Office
Hydrant
Superphosphate Plant.
Sulphur Storage
Shops & Stores
Silico Fluoride Plant
Rock Storage
Hydrant
Hose
Scale
Stockton Harbor.
Stockton Harbor.
High Water Mark
To Pier
The Summers Fertilizer Company, Inc. Pier
Scale 1 Inch = 200 Feet.
S.W. Pump
Dynamite
Stockton Harbor.
Stockton Harbor
STATE OF MAINE
Waldo County, s.s.
REGISTRY OF DEEDS
RECEIVED AND FILED
December 18 1954
Plan of
Northern Chemical Industries, Inc. &
The Summers Fertilizer Company, Inc.
Searsport Maine.
Scale 1 Inch = 50 Feet
November 27, 1954
J.H. Duncan, C.E.
Atlantic Highway
To Stockton Springs
Sears Island Road
To Sears Id.
Bangor Investment Co.
Access Road
Descriptive North
Land of the Bangor Investment Co Shown by 45° Double Cross Hatch as here
Land of The Bangor & Aroostook R.R. Co. Shown by 90° Double Cross Hatch as here
℄ R.R. Track
Bangor & Aroostook Railroad Co.
Wharf
Stockton Harbor.
Stockton Harbor
Wharf Limits
General Plan Showing The Land Ownerships.
Scale 1 Inch = 400 Feet.

APPENDIX E

TEST PIT LOGS

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-101	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-12”	Gray gravel coarse sand	
12-20"	Sulfur material	
20-34"	Gray gravel silt fine sand	
34-44”	Sulfur material	
44-58”	Gray gravel silt	
58-88”	Brown fine sand silt	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-102	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-22”	Brown medium sand	
22-26"	Orange medium sand	
26-32”	Brown silt clay	Small block of sulfur
		Observed at silt clay interface

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-103	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-2”	Orange coarse sand	
2-16"	Brown medium sand	
16-26”	Brown silt clay	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-104	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-4”	Gray light brown gravel medium sand	
4-16"	Brown sand silt	
16-24”	Dark brown sand silt	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-105	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-14”	Brown coarse sand	
14-16"	Orange coarse sand	
16-18”	Gray coarse sand	Block of sulfur observed
18-24”	Light brown silt fine sand	
24-38”	Brown silt fine sand	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-106	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-4”	Gray gravel coarse sand	
4-18"	Brown gravel coarse sand	
16-18”	Gray coarse sand	Block of sulfur observed
18-19”	Gray gravel sand	
19-25”	Yellow sulfur/rock	
25-26”	Gray gravel sand	
26-42”	Dark brown fine to medium sand	
42-54”	Brown gravel coarse sand	
54-60”	Brown silt fine sand	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-107	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-4”	Brown gravel coarse sand	
4-14"	Gray gravel coarse sand	
14-18”	Gray gravel coarse sand	Cementicious
18-22”	Dark gray gravel coarse sand	
-	Refusal	Cementicious

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-108	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-4”	Gray gravel coarse sand	
4-7"	Yellow gravel coarse sand	Sulfur
7-24”	Gray gravel coarse sand	
24-28”	Gray gravel coarse sand	Cementicious
28-42”	Dark brown black silt clay	
42-50”	Blue/brown/green clay	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-109	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-5”	Brown gravel coarse sand	
5-8"	Gray gravel coarse sand	
8-14”	Yellow gravel coarse sand	Sulfur
14-22”	Gray gravel coarse sand	
22-28”	Rock /gravel	Cementicious
28-38”	Black silt sand	
38-50”	Brown silt clay	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-110	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-4”	Brown gravel coarse sand	
4-7"	Gray gravel coarse sand	
7-15”	Yellow gravel coarse sand	Sulfur
15-18”	Gray gravel coarse sand	
18-24”	Rock /gravel	Cementicious
24-34”	Brown gravel coarse sand	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-111	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-3”	Brown gravel coarse sand	
3-7"	Gray gravel coarse sand	
7-15”	Light brown yellow gravel coarse sand	Sulfur
15-31”	Gray gravel coarse sand	
31-35”	Rock /gravel	Cementicious
35-37”	Black fine sand silt	
37-47”	Brown gray green clay	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-112	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-24”	Brown gravel coarse sand	
24-37"	Dark brown silt clay	
37-55”	Gray gravel coarse sand	
55-57”	Gray brown gravel coarse sand	Cementicious

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-113	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-3”	Brown gravel coarse sand	
3-13"	Gray gravel coarse sand	
13-29”	Yellow gravel coarse sand	Sulfur
29-37”	Dark brown gravel sand silt	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-114	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-10”	Dark brown loam silt sand	
10-72”	Brown loam silt sand	

TEST PIT LOG

Project No: 10060.007	**Project Description:** GAC – Test Pitting	**Date:** 10/10/2014
Test Pit No: TP-115	**Contractor/Operator:**	**Logged by:** BS
Location / Notes: See figure for test pit locations		

Depth	Description of Soils	Comments
0-2”	Brown gravel coarse sand	
2-4”	Yellow gravel coarse sand	Sulfur
4-7”	Dark gray gravel coarse sand	
7-23”	Gray yellow gravel coarse sand	Sulfur
23-57”	Brown loam silt sand	

APPENDIX F

HISTORICAL INVESTIGATIONS SUMMARY

Copy*	Document Title	Company/Agency	Mo.	Year	Purpose	Media**	Analysis	# of Borings Completed	# of Samples Field Screened	# of Samples Analyzed	Locations	Summary	Conclusion
P	Hydrogeologic Study and Ground Water Quality Assessment	Normandeau Associates, Inc.	7	1984	Not included in portions of report received.	GW, SW	Aluminum, sulfate, pH, conductivity	6	Not included in portions of report received.	Not included in portions of report received.	M-1:M-4; TB-1:TB-2; Well #4; 4 SW locations	Thirteen monitoring wells were installed at six stations all west of the railroad tracks. Three are bedrock, deep overburden, and shallow overburden (M-1:M-3). M-4 is deep and shallow overburden, and TB-1:TB-2 are shallow overburden. Sample collected from abandoned Well #4 and from four surface water locations. Boring logs and water level measurements also completed.	Not included in portions of report received. Results of analysis indicate pH from 1.29 to 6.05 for SW and 4.41 to 8.42 for GW, conductivity from 180 to 8,000 for SW and 295 to 1650 for GW, aluminum from ND to 23.7 ppm, and sulfate from 13 to 36,000 ppm. Ref in VRAP summary (SME 1995) - bedrock core samples from four borings with near vertical fractures parallel to the foliation of the sulfidic slate. Seven bedrock water supply wells at facility abandoned prior to 1984 due to salt water intrusion.
P	Soil and Groundwater Quality Assessment	E.C. Jordan Co.	11	1984	Assess hydrologic conditions, determine groundwater flow, determine sulfuric acid distribution in soil and groundwater, assess potential for off-site migration of sulfuric acid.	GW	Sulfate, pH, specific conductance	6	Not included in portions of report received.	Not included in portions of report received.	M-5:M-10	Six soil borings were completed east of the railroad tracks, and subsequently were used as monitoring wells. Boring logs and water levels were also completed.	High sulfate and low pH in MW-6 downgradient of plant. Results of analysis indicate pH from 1.7 to 6.9, specific conductance of 484 to 5,250, and sulfate from 110 to 3,900 ppm.
N	Hydrogeologic Evaluation and Landfill Closure Plan for Delta Chemicals, Inc., Volume I, Part 1 - Hydrogeologic Evaluation	Seevee & Maher Engineers, Inc.	11	1991	Not available for review at this time.								Ref. in VRAP summary - glaciomarine deposits with 84% finer than #200 sieve and moisture content from 19 to 22%. Dep not seen west of polymers bldg. Glacial till fines from 36-58 % and moisture content from 9 to 17%. Till layer up to 55 feet thick.
N	Hydrogeologic Evaluation and Landfill Closure Plan for Delta Chemicals, Inc., Volume II, Part 1 - Landfill Closure Plan	Seevee & Maher Engineers, Inc.	11	1991	Not available for review at this time.								
Y	Preliminary Field Investigation in the Vicinity of the Polymers Building and Ammonia Plant at Delta Chemicals, Inc.	Seevee & Maher Engineers, Inc.	10	1992	Evaluate the presence and distribution of halogenated VOCs at 6 potential source areas of solvent use within an approximate 10 acres area.	S, GW	TCA, TCE, associated degradation products; field screened with PID	20	119	47	B-1:B-20	Twenty borings were completed in six areas of concern. One hundred and nineteen soil samples were field screened with a PID. Forty-seven soil samples were analyzed by EPA Method 8010. GW analyzed by EPA Method 8010. B16 and B20 were also analyzed by EPA Method 8240 for petroleum compounds. Boring logs also completed.	PID results ranged from 1.0 to 101. Soil samples were below detection limit except at borings B2, B3, and B5. PID and lab results did not correlate well, low concentrations of halogenated VOCs in soil samples. GW samples showed trace levels of TCE to a high of 6.8 mg/L at B9. Degradation products of TCE were found in lesser concentrations. Concentrations of some chemicals in GW exceeded MCLs. Expected GW is SE so no apparent threat to human health. Borings indicate 12 feet of till overlying clay and clayey till.
Y	Preliminary Field Investigation in the Vicinity of the Polymers Building and Ammonia Plant at Delta Chemicals, Inc., Supplement I	Seevee & Maher Engineers, Inc.	1	1993	Supplemental data from six new locations.	S, GW	Field screened with PID; EPA Method 8240	6	62	5	B-21:B-26	Six borings were completed and 62 samples were field screened with a PID. Five soil samples were analyzed by EPA Method 8240. Six GW samples were analyzed by EPA Method 8240. Boring logs were completed.	Soil samples were below detection limit except at B-24 14-ft sample with trace levels of TCE. GW from B-21:B-23 were below detection limit. GW from B-24:B-26 had TCE and degradation products from trace levels to 190 micrograms/L at B-24. Conclusions are the same as 1992 report.
Y	Phase 2 Field Investigation in the Vicinity of the Polymers Building and Ammonia Plant at Delta Chemicals, Inc.	Seevee & Maher Engineers, Inc.	12	1993	Further delineate the potential sources of the halogenated VOCs.	S	EPA Method 8010 for VOCs; GC for 9 compounds; field screening with PID	55	309	101	B-101:B-155	Fifty-five borings were completed and 309 samples collected from the six potential source areas. Ninety samples were analyzed by an off-site field lab GC, and eleven confirmation samples were analyzed by EPA Method 8010. Boring logs were completed.	Soil samples had total halogenated VOCs up to 887 ppb. Black-stained soil 6-12 inches thick found in borings near heat exchanger cleaning area. Recommended additional delineation sampling in 2 suspected source areas and the installation of several long-term monitoring wells downgradient of suspected source areas to monitor VOCs. Holding times exceeded for 11 soil samples prior to fixed lab analysis.
N	Supplemental Landfill Closure Plan (revised)	Seevee & Maher Engineers, Inc.	12	1993	Not available for review at this time.								
Y	Phase 3 Field Investigation in the Vicinity of the Polymers Building and Ammonia Plant at Delta Chemicals, Inc.	Seevee & Maher Engineers, Inc.	7	1994	Confirm results from Phase 2 using fixed lab and EPA Method 8240.	S	EPA Method 8240 for VOCs; field screening with PID	7	34	21	B-201-B-207	Seven shallow (20 ft.) borings were completed and 34 samples field screened and 21 samples were analyzed by EPA Method 8240. Locations were chosen based on locations in suspected source areas with highest VOCs from Phase 2. Boring logs were completed.	Total VOCs up to 3,354 ppb near preheater degreasing area. VOCs other than TCE detected. Confirmed results of Phase 2 and results consistent with predicted GW flow of W to E. VOCs will degrade over time.
Y	Voluntary Response Action Program Summary Report Volume I - Report	Seevee & Maher Engineers, Inc.	7	1995	Summarize data from four previous investigations.	NA	NA	NA	NA	NA	NA	Eighty-seven borings in six areas of potential solvent use (Fig. 2-1). Five hundred and eighteen soil samples for field screening and boring logs. GW from 25 borings and existing MWs (M-2A, M-2B, and M-2C). Eighty-four soil and 28 GW samples analyzed for VOCs by a fixed lab. Section 4.0 states 174 soil and 28 GW samples analyzed for VOCs.	Fill up to 10 ft. in areas, occasional metal, asphalt, and wood along with black carbon deposits mixed into fill. Fill not encountered west of trailer shop. GW flow SE to ESE under horizontal hydraulic gradient of 0.03-0.04.
Y	Voluntary Response Action Program Summary Report Volume II - Appendices	Seevee & Maher Engineers, Inc.	7	1995	Appendices	NA	NA	NA	NA	NA	NA	Boring Logs, PID analysis, headspace screening, field GC results, soil & GW analytical results, select appendices from EC Jordan and NAI reports (1984), select appendices from SME report (1991).	NA
Y	Marine Environmental Monitoring Program Memo - Field Investigation - General Alum	MDEP	4	1998	Assess the health of the intertidal zone in front of General Alum.	NA	Qualitative Survey	NA	NA	NA	Various	Presence-absence survey conducted and a review of a 1996 clam study was completed.	Intertidal zone is not supporting a biological community typical of a mixed substrate habitat. Habitat appears to be in a stage of recovery with marine life that is both reproducing and growing. Direct remediation would cause more harm than allowing natural processes to restore this area over time. Recommendations to prevent further degradation were provided.

*N - No, P - Partial, Y - Yes
** GW - Groundwater, SW - Surface Water, S - Soil, NA - Not Applicable, Sed - Sediment

CES INC

Copy*	Document Title	Company/Agency	Mo.	Year	Purpose	Media**	Analysis	# of Borings Completed	# of Samples Field Screened	# of Samples Analyzed	Locations	Summary	Conclusion
Y	Soil and Groundwater Sampling and Analysis Plan - Sulfuric Acid Truck Loading Area - Revised	Acheron Engineering, Environmental and Geologic Consultants	12	2002	To comply with Item J of Consent Order. "...assess the potential presence of sulfuric acid hot spots between the sulfuric acid truck loading area and Outfall 001." Investigate the nature and extent of abnormal pH conditions in soil and groundwater.	NA	NA	NA	NA	NA	NA	NA	NA
Y	Groundwater and Soil Sampling pH Analysis	CES, Inc.	8	2003	To comply with Item J of Consent Order. "...assess the potential presence of sulfuric acid hot spots between the sulfuric acid truck loading area and Outfall 001." Investigate the nature and extent of abnormal pH conditions in soil and groundwater.	GW, S	pH, conductivity	10	NA	49	GP-GAC-2;GP-GAC-9; GP-GAC-10A; GP-GAC-11; Existing MW	Investigation completed east of the railroad tracks. Forty-nine soil samples were collected from ten borings and analyzed for pH. Three GW locations were analyzed for pH and conductivity. Fill/till interface observed 4.3 bgs at GP-GAC-07.	Results of the soil analysis indicate pH from 4.56 to 8.95, and the results of the groundwater analysis indicate pH from 3.21 to 6.49.
N	Stockton Harbor Study	Woodard & Curran	4	2007	Document conditions for the Harbor Management Plan and to investigate potential characteristics affecting the shellfish population.	Not available for review at this time.							
N	Clam Study	Dr. Beal	NA	NA	Referenced in Stockton Harbor Study but not included. Stated that it was submitted under a separate cover prior to the 2008 harbor study.	Not available for review at this time.							
Y	Stockton Harbor Study	Woodard & Curran	4	2008	Provide a baseline of sediment and SW conditions in the harbor. Determine if there are any environmental impediments to developing a healthy shellfish population, and if there are any anthropogenic causes for a decline in the shellfish population.	Sed, SW	Sed: priority pollutant metals, SVOCs, grain size, TOC; SW: metals, ammonia, hardness, pH	NA	NA	14	Various	Four studies completed: harbor sediment study (12 sed and 2 SW samples), bathymetric study, water quality and fecal coliform source tracking study, and clam study.	Two sediment samples taken near GAC. Mercury and arsenic above NOAA standards. No SVOCs identified.
Y	Department of Environmental Protection Memorandum - Complaint Investigation	MDEP	10	2013	To investigate complaints received from concerned citizens.	NA	NA	NA	NA	NA	NA	Site visit completed by Karen Knuuti, Susanne Miller, and Wilkes Harper from the MDEP along with CES. Areas of concern were assessed and documented in memo.	Large quantities of phosphogypsum were not observed. Small slumped areas observed along shore, portions of wood cribwork have fallen. Gradual erosion observed.
							TOTAL BORINGS & SAMPLES	**110**	**524**	**237**			

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