MACTEC

engineering and constructing a better tomorrow

June 18, 2009

Project Number: 3410080343

Mr. Mark Shaw, Esquire
MacDonald, Illig, Jones & Britton, LLP
100 State Street
Suite 700
Erie, PA 16507

Subject: **Transmittal of Phase II Environmental Site Assessment**
Former GAF Facility
218 Bayfront Parkway
Erie, Pennsylvania 16507

Dear Mr. Shaw:

Enclosed, please find five copies of the subject document for your records and distribution. We have included our analytical data in the report in electronic format. The electronic data disk does not contain the VOC, SVOC and PCB data from the DNAPL sample because of a laboratory error in the original report. We will forward you the laboratory report for this sample as soon as the corrected version is delivered (expected June 19, 2009). Should you have any questions regarding this submittal, please feel free to contact us at (412) 279-6661.

Sincerely,

MACTEC ENGINEERING & CONSULTING, INC.

Robert E. Crowley
Senior Principal Scientist

Enclosures

REC/llg

PHASE II ENVIRONMENTAL SITE ASSESSMENT

GAF BUILDING MATERIALS CORPORATION, INC. SITE
218 West Bayfront Parkway
Erie, Pennsylvania 16507

Prepared for:

Erie County Convention Center Authority

Erie, Pennsylvania

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MACTEC Engineering and Consulting, Inc.
Pittsburgh PA 15106

June 18, 2009

Project 3410080643

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EXECUTIVE SUMMARY

The former GAF Building Materials Manufacturing Corporation, Inc. (GAF) facility is a 12.456-acre property located at 218 West Bayfront Parkway (herein referred to as the Site), City of Erie, Erie County, Pennsylvania 16507. The Site produced rolled roofing material for industrial and commercial applications and roofing shingles for residential applications.

MACTEC performed a Phase I ESA in November 2008 and subsequently identified a number of current Recognized Environmental Conditions (RECs) as well as one historic REC and two off-Site RECs. The current RECs include:

- The accumulation of tar near aboveground storage tanks (ASTs) and piping, on building structural components, and on the surface in the former lagoon area;
- A starting compensator containing Pyranol, (PCBs);
- Two former lagoons present in the area to the south of the Warehouse Building;
- Four underground storage tanks (USTs) that were reportedly present within the facility;
- Buried drums that were alleged to exist in the area north of the production area;
- Surface staining present in numerous areas of the facility;
- The fill materials present on the Site;
- The presence of regulated constituents in Site media above the Act 2 standard; and
- A number of releases of petroleum products onto the ground surface, into the unnamed stream on the east side of the Site, and to Presque Isle Bay.

Historic RECs include:

- A transformer formerly containing PCB oil was changed out with mineral oil.

Off Site RECs include:

- Two former manufactured gas facilities located immediately to the southeast of the Site.

In addition to the RECs, existing reports indicate that asbestos containing materials and lead paint are present on the Site. A 1983 Microbac report of the analysis of sludge collected from the Site outfalls indicated that asbestos fibers were likely present in the outfalls to the bay. Also, if roofing materials containing asbestos were produced on the Site, the fill material containing roofing material scraps may contain asbestos. Data gaps in the Phase I ESA included the lack of readily available historical aerial photographs, and the lack of historical knowledge of Site operations on the part of the Site contact.

In order to evaluate the RECs, MACTEC recommended a Phase II ESA be performed to supplement existing soil and groundwater data obtained by GAF consultants O'Brien & Gere and ER&R. MACTEC's Phase II ESA included the investigation of soil and groundwater through the installation of fourteen soil borings, three monitoring wells, and five test pits, as well as collection of wipe and waste samples on the Site. The soil borings indicated that the unconsolidated material on the Site consists of sandy fill material overlying clay. Significant amounts of roofing materials were present in the soil throughout the Site. Bedrock is present at depths between 8.2 feet and 21.6 feet below ground surface (ft-bgs). Groundwater elevations range from 573 to 581 feet.

MACTEC collected twenty-seven soil samples from the soil borings and test pits and one round of groundwater samples from the monitoring wells installed by MACTEC. Available soil and groundwater samples from both the MACTEC investigation and previous investigations were screened against the PA Act 2 residential and non-residential direct contact, and used aquifer soil to groundwater Statewide Health Standard Medium-Specific Concentrations (MSCs).

VOCs found to exceed the PA Act 2 MSCs in soil included: acetone, benzene, methylacetate, methylcyclohexane, toluene, xylenes, 1,1,1 trichloroethane, and trichloroethene. SVOCs found to exceed the PA Act 2 MSCs in soil included: benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, dibenz(a,h)anthracene, indeno(1,2,3,cd) pyrene, and naphthalene.

Constituents found to exceed the PA Act 2 MSCs in groundwater included VOCs (benzene), SVOCs [2-methylnapthalene, 4-methylphenol, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, and phenathrene], and metals (manganese and iron). A groundwater plume of polycyclic aromatic hydrocarbons (PAHs) is present on the Site extending from MW-2 on the western side of the process area, to MW-6 and MW-9 in the west and northwest directions, respectively. MW-3, which is at the northwest corner of the Site, appeared to be unaffected by PAHs at the time it was sampled in March of 2008.

Dense, non-aqueous phase liquid (DNAPL) was found to be present in well MW-5. The DNAPL was sampled and found to contain approximately 6 percent PAHs by weight. The remainder of the material appeared to be petroleum hydrocarbons in the C11-C34 range. The bedrock surface in the area of MW-5 slopes to the north-northeast. Given the nature of DNAPL, there is the potential for the DNAPL to be migrating down slope on the bedrock surface, which is approximately perpendicular to the groundwater flow direction.

Five sediment samples were collected in the Presque Isle Bay and unnamed creek on the north side of the Site. The sediment results were not compared to a standard because Act 2 does not publish sediment quality criteria. However, a number of PAHs, arsenic and iron, and PCBs were detected in the sediment samples. The PAH detections were similar to those detected on the Site.

During the sediment sampling, a number of areas were noted along the shoreline where tar was expressing from the fill into the bay. A sample of the tar was collected and found to contain PAHs. It will be necessary to mitigate the tar seeps to the bay in order to complete the remediation of the Site.

Three asbestos wipe samples were collected in the Site buildings. The results of the wipe samples indicated that heavy asbestos dust contamination is present in certain areas of the buildings. Decontamination of the some or all of the buildings may be necessary prior to demolition. Three soil samples were analyzed for asbestos. The selected soil samples contained roofing materials; however, the asbestos concentrations were found to be less than 1 percent by weight. One soil sample was collected from a roll of tarpaper protruding from the fill material on the western side of the Site. This material was found to contain nearly 50 percent asbestos. Materials containing asbestos in excess of 1 percent will need to be managed as asbestos containing material if excavated during redevelopment.

Two PCB wipe samples were collected in the buildings. No PCBs were detected in the wipe samples.

Tank inspection was only possible on several of the smaller tanks. The larger tanks are assumed to contain residual product, which is expected to be solidified. Two waste oil samples were collected from a tank and a drum with accumulations of oil. The oils were found to contain PAHs.

Four underground storage tanks (USTs) were noted to have been present on the Site prior to promulgation of the UST regulations. These USTs were reportedly closed in place. The location of the USTs is unknown. During the redevelopment effort, an attempt should be made to locate the USTs. In the event that the USTs are unearthed during the Site redevelopment, they should be removed.

1.0 INTRODUCTION

MACTEC Engineering and Consulting, Inc. (MACTEC) has prepared this Phase II Environmental Site Assessment (Phase II ESA) Report for the former GAF Building Materials Manufacturing Corporation (GAF) facility located at 218 West Bayfront Parkway, Erie, Erie County, Pennsylvania, (herein referred to as the Site) on behalf of the Erie County Convention Center Authority (ECCCA). Figure 1 provides the location of the Site on the US Geological Survey (USGS) Erie North, PA 7.5-minute topographic quadrangle map.

A Phase I ESA (MACTEC, 2008) was conducted on the Site in November 2008 in preparation for a potential acquisition of the property. The Phase I ESA indicated that Recognized Environmental Conditions (RECs) are present on the Site in the form of soil and groundwater contamination as well as obvious releases of potentially hazardous materials from on-site process equipment. In order to evaluate the RECs, MACTEC recommended performing a Phase II ESA to supplement the existing data and to evaluate the nature of the contamination on the Site.

This Report presents the findings of the Phase II ESA, as well as summarizing the findings of previous investigations. The purpose of this report is to provide as comprehensive a remedial investigation as possible within the approved available budget and with the available data. This report is not intended to fulfill the requirement for a remedial investigation under Pennsylvania's Land Recycling and Environmental Remediation Standards Act of 1995 (Act 2); however, it may serve as the basis for completing such an investigation.

1.1 SITE DESCRIPTION

The Site consists of approximately 12.456-acres located on the southern shore of Presque Isle Bay front, across from Presque Isle State Park. Sassafras Street forms the eastern border of the Site and the Bayfront Parkway is located to the south. Several rail spurs are located on the Site and a main rail line, apparently owned by Conrail, is located immediately to the south, but has been cut-off at the entrance to the Erie County Convention Center adjacent to the east of the Site. Approximately nine separate buildings occupy the GAF property. The office and raw product storage area is the southernmost building, which is subdivided into five distinct buildings under one roof. Likewise, the process area consists of approximately 12 distinct buildings under one roof. To the north of the process area are four separate buildings including (from west to east) a talc storage building, the

ground rock storage building, a transformer building and the Boiler House. To the north of the talc storage area are two former warehouse buildings and at the extreme northern end of the property is the finished product warehouse and shipping building. Figure 2 shows the locations of the salient features on the Site.

The northern portion of the GAF property, between the process buildings and Presque Isle Bay, is made land, which was reclaimed by successively placing fill on the northern end of the property through time. The approximate northern extent of the Site through time is shown on Figure 3. The Sanborn and historical topographic maps showing the progression are provided in Appendix A. The fill contains various materials, including soil, construction debris, tar, waste tarpaper, and shingle trimmings. The area south of the main warehouse (Building 1) once contained two settling ponds, which were used for clarification of process water prior to discharge to the bay.

A series of aboveground storage tanks (ASTs) are present to the north and east of the former process area. These include a 500,000-gallon tar storage tank, a 100,000-gallon resin storage tank, and numerous smaller tar storage and distillation tanks. Additionally, a number of aboveground hoppers, located in this area, were used for storage of stone, sand and talc products.

The Site was used from approximately 1903 through 2007 for the manufacture of residential and commercial asphalt roofing products. The Site contained two manufacturing lines; one for residential roofing shingles (Line 1) and one for rolled commercial roofing products (Line 2). Both lines used similar processes and equipment; however, the residential shingle line contained trimming equipment at the end, which was used to cut the shingles to size from the finished rolls. The process utilized tar, crushed stone, ground talc and paper products as the raw materials. A more detailed description of the Site processes is provided in Section 2.

1.2 OBJECTIVES AND SCOPE OF WORK

The objective of the Phase II ESA was to collect and analyze soil, groundwater, sediment, dust, waste, and wipe samples to supplement existing soil and groundwater data obtained by GAF consultants O'Brien & Gere and ER&R, in order to evaluate the presence of hazardous materials released into soil, groundwater or structures on the Site. Because the primary focus of a Phase II ESA is on the identification of hazardous materials, the extent of the detected compounds was not necessarily determined.

MACTEC's Phase II ESA consisted of drilling 15 soil borings, installing three monitoring wells in selected borings, excavating five test pits, collecting soil samples from the borings and test pits, collecting six samples of sediments from nearby surface water bodies, collecting wipe samples for PCBs, and collecting samples of dust in the buildings to test for the presence of asbestos. Prior to initiating the work, two soil borings, inspection of the Site ASTs, and collection of residual product samples was added to the scope of work. Once the field work was under way, collection of several samples of waste materials was also added to the scope of work. The scope of work was successfully executed between March 24 and April 3, with follow-up sample collection performed on April 24 and the Site survey completed on April 30.

1.3 REPORT ORGANIZATION

This report is organized into five sections and an Executive Summary. This section provides an introduction to the project. Section 2.0 provides the Site background and Section 3.0 summarizes the methodologies used for the Phase II ESA. Section 4.0 provides a summary of the findings of the investigation. Finally, Section 5 provides a summary and the conclusions that can be drawn at this point, as well as recommendations for future work on the Site.

1.4 LIMITATIONS OF USE

This document was prepared for the sole use of ECCCA, the only intended beneficiary of our work. No other party shall rely on the information contained herein without prior written consent of MACTEC.

The opinions presented in this report are based on the data obtained by MACTEC and others during completion of this project and were developed using our professional judgment, training, and experience. We believe that these opinions are reasonably supported by the results of the testing and application of professional standards of care that are generally accepted for completion of environmental site investigations. MACTEC has not undertaken a systematic investigation of every part of the property and has limited its investigation to the scope agreed upon with our client. MACTEC cannot attest to the quality or accuracy of the data collected by others, including O'Brien & Gere and ER&R.

2.0 BACKGROUND

2.1 SITE HISTORY

The Site and properties to the east and west have historically been utilized for industrial purposes or as municipal support facilities. The area to the south is the urbanized area of the City of Erie. In recent years, areas of the bay front have been redeveloped by the City and others into the Convention Center, tourist attractions, condominiums and marinas. To the north of the Site, across Presque Isle Bay is Presque Isle State Park.

County records indicate that the Site contains numerous buildings constructed between 1903 and 1990. The tax cards indicate that the southernmost buildings (Buildings 3, 4, 4A, 5 and 16) were constructed in 1903; the central buildings (Buildings 6, 6A, 7, 7A, 19, 8, 9, 10, 20, 21, 37, and 40) were constructed in 1910; a former warehouse (Building 45) was constructed in 1980; and a 30,000-square foot warehouse, located at the northern end of the Site (Building 1), was constructed in 1990. South of the central buildings is the aboveground tank farm and Buildings 13, 49, 45, and 39.

The vast majority of the Site area is asphalt or concrete-paved, or is within the footprint of buildings or aboveground ASTs. The only area of bare soil on the Site is located on the north side of the north Warehouse Building. In general, the Site layout has older buildings near the southern end and progressively newer buildings toward the north. An open, paved area is located north of the tank farm and south of the Warehouse Building. Figure 2 shows the layout of the Site; the following table provides a summary of the locations and uses of the Site buildings.

Building Number	Location	Former Use
1	Northern end of Site	Warehouse
3	Southeast corner of Site	Main Office
4	Southern portion of Site	Storage
5		
16		
6	South-central portion of Site, north of southern rail spur	Compressor Room
6A		Lunch Room
7		Storage/Breezeway
7A		Storage/Breezeway
19		Storage

Building Number	Location	Former Use
8	Northern portion of manufacturing area, south of Tank Farm	Old Tar Stills
9		Line 2 (Rolled Roofing) Mill
20		Storage
40		Stills
21		Line 1 (Residential Roofing) Mill
37		Line 1 Cutter
10		Line 1 Wrapper/Palatizer
11	West of 500,000-gallon AST	Limestone Silo
13	East of Tank Farm	Boiler House
--	West of Building 13	Main Transformer Building
39	Western side of central area	Shear Shop
45	North of 500,000 gallon AST	Main Storage
38	East of 500,000 gallon AST	Sand Silos
49	Immediately east of Building. 38	Sand Dryer

At least 26 large-capacity ASTs were utilized in the process in the recent past. The ASTs contained various products and were not necessarily in service at the time of the plant closure. The following table provides a summary of the ASTs listed in the records for the Site.

Tank Number	Capacity (gallons)	Contents
1	500,000	Asphalt
2	150,000	Asphalt*
4	30,000	Asphalt
5	97,000	Asphalt*
6	13,800	Asphalt*
9	Unknown	Cooling Water
13	12,000	Asphalt
14	6,000	Used Oil
15	2,100	Gas Well Brine
16	660	Asphalt
17	150	Asphalt
18	1,100	Asphalt
19	330	Asphalt
20	225	Asphalt
21	225	Asphalt
22	500	Hot Oil Transfer
23	500	Hot Oil Transfer
24	500	Diesel
1D	17,038	Asphalt*
2D	17,038	Asphalt*
3D	17,038	Asphalt*
4D	17,038	Asphalt
5D	17,038	Asphalt
6D	17,038	Asphalt*

Tank Number	Capacity (gallons)	Contents
--	275	Kerosene
--	1,000	Propane

"*" - indicates AST was out of service prior to plant closing in 2007.
"--" indicates no tank number assigned.

2.2 USE OF THE PROPERTY

The information provided in this section was gathered from GAF representatives, a PADEP file review, a review of documents from the Erie County Department of Health, and a review of data produced by GAF from previous Site investigations. Currently, the Site is unused; all manufacturing operations ceased in March of 2007. The Site was most recently used in the manufacture of asphalt roofing products for residential and commercial buildings. The two manufacturing lines used similar processes and equipment.

The production process began with a spool of felt paper or fiberglass sheet on the manufacturing line. The paper was uncoiled and fed as a strip through the mill. Heated asphalt was applied to the strip via spray heads and/or dip tanks and rolling equipment was used to assist in saturating the paper. The paper then passed through steam heated drums for drying. The asphalt saturated paper was then "filled" utilizing sand. Talc, soapstone, mica or sand was then applied to the back of the paper to prevent sticking. The saturated paper then passed through a granule applicator where pigmented granules were pressed into the strip. Drums in the mill line were fed with non-contact cooling water to cool the strip, solidifying the asphalt. At the end of the line, the paper was treated by applying self-seal glues and was either re-coiled into rolled roofing for commercial buildings (Line 2) or cut into shingles for residential applications (Line 1). The trimmings from the shingles were used on the Site as fill for a significant portion of the history of the operation. Given the materials produced on the Site, it is very likely that asbestos containing felt paper was used in the process for many years. Asbestos containing roofing materials were in common use in the United States from the mid-1930's through the late 1970's.

The process also contained a tar refining operation, whereby low-melting point (approximately 170º F) tar was heated in tanks and placed into an asphalt blowing drum to drive off light-end petroleum compounds. In the asphalt blowing drum, air bubbles were forced through the heated tar for a period of up to six hours. The refining process utilized a series of boilers located in the northern process buildings. Historically, some of the boilers were coal and wood-fired. Several of the coal/wood-fired

tar heating tanks were idled and the remaining tanks were converted to natural gas fuel and were in use when the plant was shut down in 2007. The tar was refined into a higher melting point (approximately 300º F) product, which was used in the process. The lighter end petroleum hydrocarbons were distilled, collected in Tank 14 and sent off-site for recycling. Non-condensable hydrocarbons were sent through an emission control device and the treated vapors were vented to the atmosphere.

Ancillary processes included receiving of raw materials via rail and truck, storage, management and distribution of raw materials to the processes, storage of finished products in warehouses, shipping of the finished products via trucks, maintenance activities and operation of a boiler house supplying steam to plant processes. The raw product receiving and warehousing was located primarily on the south end of the plant. Low melting point tar was contained in several large aboveground storage tanks located north of the main plant buildings. Various colors of roofing sand were also stored in silos in this area. Warehouses at the northern end of the Site were used primarily for storage and shipping of finished products. Maintenance facilities were present in various locations throughout the buildings at the Site. The Boiler House (Building 13) was located in the central portion of the east side of the Site.

2.3 **PREVIOUS ENVIRONMENTAL REPORTS**

Several previous environmental reports were reviewed to complete the Phase I and develop the scope of work for the Phase II. The following table provides a list of the reports pertinent to the Site investigation, followed by a discussion of the findings of each.

Report Title	Date	Preparer
Geophysical Survey	08/13/1993	Andrew Martin Associates
Geotechnical Borings – Warehouse Building (Attachment to Geophysical Survey)	September 1987	Urban Engineers
2003 Phase I ESA	April 2003	Environ
Summary Report – Access Road Pre-excavation Sampling	10/27/2006	ER&R
Preliminary Soil and Groundwater Investigation Report	02/06/2008	O'Brien & Gere
Phase I Environmental Site Assessment	11/06/2008	MACTEC

2.3.1 Geophysical Survey

GAF entered into a Consent Order and Agreement (COA) with PADEP (then PADER) on June 26, 1992. The COA required GAF to investigate allegations that drums containing various solid wastes, including flux waste and PCBs, were buried under the new warehouse and parking lot, new boiler house and parking lot, and in abandoned surface impoundments on the site. In order to meet the requirements of the COA, GAF retained Andrew Martin Associates in 1993 to conduct a geophysical survey. The geophysical survey used ground penetrating radar (GPR), electromagnetic (EM) detectors and a magnetic survey in an attempt to detect the alleged buried drums. Anomalies were detected in the northcentral portion of the Warehouse (Building 1), within the former lagoon area, in several known underground utility locations and west of the Boiler House. The Geophysical Report indicates that Andrew Martin and Associates did not believe any of the anomalies were consistent with buried drums. The anomaly in the Warehouse was believed to be a subsurface void or root ball; anomalies in the former lagoon area were believed to be construction debris; and the anomaly west of the boiler house was believed to be moisture in the soil.

Correspondence in the Geophysical Report indicated that PADEP did not have confidence in the utilization of only GPR in certain areas. Andrew Martin and Associates responded that due to the material present (rebar reinforced concrete), the EM and magnetic surveys could not be used. Andrew Martin Associates indicated that the only way to be assured that drums were not present was to implement a test pit program in the area. A memo authored by Joel Fair of PADEP, found during the PADEP file review conducted by MACTEC, outlined further concerns and stated that he did not believe the geophysical investigation could "conclusively confirm or exclude the presence of buried drums". He went on to say that "while I would like to have additional information in order to make a conclusive statement, I am currently not aware of other methods to detect the drums without causing a large amount of disturbance to the current site."

2.3.2 Geotechnical Borings – Warehouse Building

Attached to the Geophysical Report were five boring logs from geotechnical borings drilled for the Warehouse (Building 1) at the north end of the Site. The boring logs indicated that shale bedrock was present between approximately 19.5 and 22 feet below ground surface (ft-bgs). The majority of the material above bedrock to the ground surface was fill consisting of shingles, wood fragments, and other debris mixed with sand. A 10-foot bedrock core was collected from Boring B-3 at between

20.25 ft-bgs and 30.25 ft-bgs and consisted entirely of shale. The exact elevations of the fill and bedrock were not readily available because the borings utilized an arbitrary datum.

2.3.3 2003 Phase I ESA

A Phase I ESA was conducted for GAF by Environ under the 2000 ASTM Standard in April of 2003. The 2003 Phase I ESA noted a number of potential RECs in various areas of the Plant. These included:

- Numerous ASTs containing tar, asphalt, flux oil, and fuel oil;
- The outdoor storage of barrels of tar and asphalt;
- Loading dock operations consisting of loading/unloading of oil and ore;
- The former (1970s until 1983) presence of two unlined surface impoundments on the Site, used for settling sand from wastewater;
- The potential presence of buried drums on the Site;
- The presence of fill material throughout the northern portion of the Site;
- The former loading and unloading of rail cars containing petroleum products and other materials;
- The former presence of four USTs on-Site;
- Oil/tar staining in the plant buildings and on the outdoor ground surfaces;
- Asphalt leaking from the 500,000 gallon AST;
- Debris, empty drums wood pallets and trash stored in unpaved areas near Presque Isle Bay; and
- Drums marked “Hazardous Waste” were stored in the Boiler House.

The report noted that the on-Site USTs included one 4,500 gallon tank containing Varonolene, which is a trade name for mineral spirits, one 4,000-gallon tank containing fuel oil, one 500-gallon tank containing oil from the high efficiency air filters and one 500-gallon tank containing gasoline. The two larger tanks were reportedly closed in place in 1975 and the two 500-gallon tanks were reportedly closed in 1988. The location of the USTs is not known and they do not appear to have been registered; although registration was not required until 1989.

The report also noted various housekeeping issues and staining was present in numerous areas within the buildings and in the tank farms. The 2003 Phase I ESA recommended performing a Phase II ESA.

2.3.4 Summary Report – Access Road Pre-Excavation Sampling

In 2006, ER&R collected surface soil samples from twelve locations at depths ranging from six to 24 inches in preparation for the installation of an access road on the Site. The purpose of the samples was to determine if waste soil generated during excavation could be classified as clean fill. The samples were analyzed for the diesel fuel, waste oil and fuel oil short list of compounds including five volatile organic compounds (VOCs), nine semivolatile organic compounds (SVOCs) and lead. The sample results indicated that SVOCs exceeded the clean fill standards in five of the 12 sample locations including SSB-1, SSB-2, SSB-4, SSB-5 and SSB-8. These samples were located south of the Boiler House and the 500,000-gallon tar tank (SSB-1, 2, 4 and 5) and on the west side of the Shear Shop (SSB-8). Lead and VOCs were found to meet the clean fill standards in all samples analyzed. ER&R concluded that the soil could not be used for clean fill due to the exceedance of the clean fill standards for three polycyclic aromatic hydrocarbon (PAH) compounds including benzo(a)anthracene, benzo(b)flouranthene, and benzo(a)pyrene. The locations of these samples are shown on Figure 4.

2.3.5 Preliminary Soil and Groundwater Investigation Report

In February of 2008, O'Brien & Gere issued a Preliminary Investigation Report of the initial soil and groundwater investigation performed on the Site. The report acknowledged the findings of the Phase I ESA; however, many of the potential issues identified in the Phase I were not addressed in the investigation. The investigation focused primarily on subsurface soil and groundwater. During the investigation, eight borings were drilled on the Site, six of which were completed as monitoring wells. Figure 4 shows the locations of the wells and borings drilled by O'Brien and Gere. The Preliminary Investigation Report indicates that bedrock was encountered between 14 and 28 ft-bgs, with the shallower bedrock present on the southern portion of the Site and deepening to the north. The groundwater occurs between 4.5 and 10.5 ft-bgs with an apparent northwesterly flow direction.

Subsurface soil samples were collected from the borings ranging from 5.5 ft-bgs to 27.5 ft-bgs and were analyzed for VOCs, SVOCs and metals. Surface soil samples were not collected during the investigation. Soil sample results from borings MW-1, MW-3 and SB-8, the shallow samples collected from MW-6 (8.0-8.5 ft-bgs) and SB-7 (and the deep sample collected from MW-4 (12-12.5 ft-bgs) had no exceedences of the Act 2 non-residential subsurface soil MSCs. Both soil samples from MW-2 and MW-5, the shallower sample from MW-4 (8.0-8.5 ft-bgs), and the deeper samples from MW-6 (13-13.5 ft-bgs) and SB-7 (27-27.5 ft-bgs) exceeded the Act 2 MSC for at least one of the

PAHs in each sample. PAHs that exceeded the standard included benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene and naphthalene. It should be noted that the deeper soil samples collected from MW-3, MW-4, MW-6, SB-7, SB-8 and possibly MW-5 were collected from beneath the surface of the water table. A discussion of the laboratory results from these samples is included in Section 4.

2.3.6 2008 MACTEC Phase I ESA

In November of 2008, MACTEC completed a Phase I ESA for the Site. The MACTEC Phase I ESA identified a number of current RECs as well as one historic REC and two off-Site RECs. The current RECs include:

- The accumulation of tar near ASTs and piping, on building structural components, and on the surface in the former lagoon area;
- A starting compensator containing Pyranol, (PCBs);
- Two former lagoons present in the area to the south of the Warehouse Building;
- Four USTs that were reportedly present within the facility;
- Buried drums that were alleged to exist in the area north of the production area.
- Surface staining present in numerous areas of the facility;
- The fill materials present on the Site;
- The presence of regulated constituents in Site media above the Act 2 standard; and
- A number of releases of petroleum products onto the ground surface, into the unnamed stream on the east side of the Site, and to the bay.

The historic RECs include:

- A transformer formerly containing PCB oil was changed out with mineral oil.

The off-Site RECs include:

- Two former manufactured gas facilities located immediately to the southeast of the Site.

In addition to the RECs, existing reports indicate that asbestos containing materials and lead paint are present on the Site. A 1983 Microbac report of the analysis of sludge collected from the Site outfalls indicated that asbestos fibers were likely present in the outfalls to the bay. Also, if roofing materials containing asbestos were produced on the Site, the fill material containing roofing material scraps may contain asbestos.

Data gaps in the Phase I ESA included the lack of readily available historical aerial photographs, and the lack of historical knowledge of Site operations on the part of the Site contact.

2.4 SITE PHYSICAL SETTING

MACTEC examined the USGS 7.5 minute topographic quadrangle map entitled Erie North, PA, dated 1996 (Figure 1). The Site is located at approximate latitude/longitude coordinates 42° 08' 1.0" north and 80° 05' 35.9" west. The Site elevation is approximately 583 feet above mean sea level (ft-amsl). The regional topography is gently sloping to the north toward Lake Erie; however, the Site is relatively flat, sloping to drainage points in the center. The Site has an elevation change of less than five feet throughout the developed portions and no more than seven feet near the northeast corner, which rises in elevation due to fill placed in the area.

2.4.1 Regional Geology and Hydrogeology

The Geologic map of Pennsylvania produced by the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) Geologic Survey indicates that the region is underlain by shale and siltstone of Devonian age. Unconsolidated material overlying bedrock is sand, gravel and silt that is glacial and alluvial in origin.

Shallow groundwater exists in the unconsolidated material. The bedrock in the vicinity of the Site is not likely to be a significant source of groundwater as shale and siltstone typically transmit groundwater poorly. Groundwater movement in these bedrock types would be expected to be primarily in fractures and bedding planes. According to the US Geologic Survey's Groundwater Atlas of the United States (USGS, 1998), no principal aquifers lie within the Central Lowlands Physiographic Province in the area of the Site.

2.4.2 Geology

Erie is located within the Eastern Lake Section of the Central Lowlands Physiographic Province. Within this area, the Central Lowland Province consists of a narrow sliver, approximately five to eight miles wide, parallel to the Lake Erie shoreline, and is characterized as flat lowland underlain by gently sloping sedimentary rock. The Central Lowland Province is separated from the Appalachian Plateau Province by a northwestern facing scarp; the boundary between the two provinces being the base of

the escarpment. This area is glaciated and generally consists of a thin layer of unconsolidated sediments overlying bedrock. The depth to the top of bedrock in the City of Erie is generally less than 25 feet, and commonly less than 10 feet. Unconsolidated sediments overlying bedrock along Lake Erie consist of a thin layer of glacio- and lacustrian sediments. These deposits include sand, gravel, silt, and clay derived from glacial beach and lacustrian sources. In some areas along the Erie bay front, these deposits have been overlain by various materials used to fill low-lying areas for development. Bedrock in the Central Lowlands Physiographic Province near Erie consists of flat to gently folded Paleozoic sedimentary rocks. Bedrock beneath the Site is identified as the Devonian, Northeast Shale, which is a medium gray shale with some thin, light gray siltstone interbeds.

2.4.3 Hydrogeology

The Northeast Shale is described as a generally poor aquifer due to relatively low yields and high concentrations of iron, chloride, and dissolved solids (McCoy; 1987). According to a report authored by Richards (1987), "the Northeast Shale does not have the potential for a good potable water supply due to generally poor water-bearing characteristics and poor water quality".

The on-Site monitoring wells have groundwater levels ranging from 1.3 ft-bgs on the southwestern portion of the Site to approximately 10 ft-bgs on the northern end of the Site. The groundwater flow is apparently to the northwest, based on the water level measurements. Groundwater at the northern end of the Site is approximately equal to the water level in the bay.

2.4.4 Surface Water

An unnamed tributary to Lake Erie borders the Site to the east. The unnamed tributary is tubed for approximately 2/3 of the length of the Site. This tributary collects storm water runoff and NPDES permitted outfalls from the Site as well as storm water from upgradient of the Site. To the immediate northwest and north of the Site is Presque Isle Bay on Lake Erie. Approximately 25 percent of the perimeter of the Site adjoins Presque Isle Bay.

In January 1991, Presque Isle Bay was designated as the 43rd Great Lakes Area of Concern (AOC) by the U.S. Department of State in response to concerns raised by local citizens. Through the Remedial Action Plan (RAP) process, PADEP and the Presque Isle Bay Public Advisory Committee identified two beneficial uses as being impaired: Fish Tumors or Other Deformities and Restrictions on

Dredging Activities. Based upon the impaired uses evaluation, the pollutants of concern identified in the sediment were heavy metals and PAHs. Fish impairments, if environmentally caused, were believed to be related to the sediment contamination. The 2002 RAP Update recommended that the Presque Isle Bay AOC be designated in the Recovery Stage. The RAP Update document summarizes the results of studies on the two beneficial use impairments and the work done by numerous organizations in the Bay and its watershed that led to the recommendation for a change in designation. Current priorities for Presque Isle Bay AOC include addressing contaminated sediment, understanding and reducing the number of fish lesion incidences, and developing long-term monitoring plans for the Bay and its watershed.

3.0 INVESTIGATION METHODOLOGIES

This section provides a summary of the methodologies used to complete MACTEC's Phase II ESA, which included excavation of five test pits, drilling of 14 soil borings, collection of surface and subsurface soil samples, installation of three monitoring wells, and collection of one round of groundwater samples from the three newly installed wells. In addition, five sediment samples and two samples of waste materials protruding from the bank on the bay front were collected. Asbestos dust samples and PCB wipe samples were collected from suspect areas in the buildings and the ASTs were inventoried and waste oil samples were also collected. The following subsections provide the methods used for each of these activities.

3.1 SITE PREPARATION

On March 23, 2009, Terra Testing of Washington, Pennsylvania mobilized to the Site to begin work. Initially, the sampling locations were marked on the ground surface and the locations were verified by both Terra Testing and MACTEC. Upon completing the marking, a concrete saw was used to saw through the concrete in test pit and boring locations where concrete was present. The concrete was then drilled with a hammer drill and pieces were removed so the backhoe could access the soil beneath. Three test pit locations and six boring locations required concrete sawing. Boring locations inside the buildings also contained concrete; however, because the drill rig did not have access to the building interior, the concrete was not cut and removed. In the buildings, a concrete coring tool was used to drill a 4-inch diameter hole in the concrete for access to the soil beneath.

3.2 TEST PITS AND SOIL SAMPLING

On March 24, 2009, five test pits were advanced in the locations shown on Figure 4. Test pits allowed for a better visual observation of the subsurface than soil borings and were advanced in areas such as the former lagoons, the location of the surface tar expression, and east of the former lagoons.

3.2.1 Test Pit Excavation

MACTEC subcontracted Terra Testing, Inc. of Washington, Pennsylvania to provide a backhoe and operator for excavating test pits for this project. The test pits were approximately five feet long, by approximately three feet wide, by approximately six feet deep. Groundwater was encountered only at

test pit TP-4 at a depth of approximately 5.5 ft-bgs. After completion of the field work, the test pit locations were surveyed by a Pennsylvania professional land surveyor for horizontal location and ground surface elevation. The test pit observations are presented in Section 4.

3.2.2 Test Pit Soil Sample Collection

One soil sample was collected from each of test pits TP-4 and TP-5 at a depth of five to six ft-bgs. The soil samples were collected from the bottom of the pit with the excavator bucket and brought to the surface. The two sample locations were selected by visual observations, with the samples being biased toward more highly impacted soils. The selected soil interval was then transferred into sample containers provided by the laboratory. Samples to be analyzed for VOCs were collected using Terra Core sampling kits in accordance with USEPA SW-846 Method 5035. The Terra Core sampler consists of a syringe-like sampler that is used to collect a plug of soil. The soil plug is then transferred to a pre-preserved glass jar. Three jars were collected in this manner; two preserved with methanol and one preserved with water and sodium bisulfate. Soil samples collected for the remaining parameters were collected by placing the soil directly into unpreserved glass sample jars. The samples were then logged onto a chain of custody form and placed in coolers on ice for shipment to the laboratory.

3.2.3 Test Pit Soil Sample Analysis

The samples were shipped under chain-of-custody to TestAmerica, Inc. in Pittsburgh, Pennsylvania, which is a Pennsylvania-registered laboratory. The soil samples from the test pits were analyzed by the laboratory for Target Compound List (TCL) VOCs by USEPA SW-846 Method 8260, TCL SVOCs by USEPA SW-846 Method 8270, Target Analyte List (TAL) metals by USEPA SW-846 Methods 6010 and 7471 (mercury), and PCBs by USEPA SW-846 Method 8082. The soil analytical results are discussed in Section 4.2.

3.3 SOIL BORINGS AND SOIL SAMPLING

A soil boring program was designed to evaluate the nature of the fill materials, particularly the waste roofing materials across the Site. MACTEC drilled eleven shallow soil borings at the locations shown on Figure 4 using hollow stem auger drilling techniques. Terra Testing provided the drilling support services for the project and mobilized a truck-mounted CME-75 drill rig to advance soil borings.

Approximately half of the borings were advanced to groundwater and terminated. Six of the borings were advanced to bedrock, including those converted to monitoring wells. Soil borings S-1, S-9, and S-12 were advanced to bedrock, which was encountered at approximate depths of 12.4, 17.2, and 21.6 ft.-bgs, respectively. The three borings advanced inside the Site buildings were advanced using a concrete coring tool and hand-driven split spoons.

The borehole drilling was performed using 3-inch inside diameter (ID), 4.25-inch outside diameter (OD) augers. Soil samples from the borings were collected using two foot-long split spoon core barrels driven with a 140 pound hammer according to the American Society for Testing and Materials (ASTM) Standard Method D-1586-74, "*Standard Test Method for Penetration Test and Split-barrel Sampling*". Blow counts were recorded for each six inches of split spoon penetration. Upon retrieval, the split spoons were opened, visually logged and scanned with a photoionization detector (PID). Particular attention was paid to soil color and odor that may indicate the presence of organic contaminants. PID screening was used to assist in the selection of soil sampling depths for subsurface samples by locating zones with elevated PID concentrations. The soil was logged in accordance with the Unified Soil Classification System (USCS). Soil descriptions and classification are provided on the boring logs (Appendix B). Once the boring was completed, it was backfilled with cuttings and a cement patch was applied in areas covered with concrete.

The borings were visually logged for the presence of roofing materials or potential contamination, and representative samples were collected and analyzed for TCL VOCs, TCL SVOCs, PCBs, geotechnical analyses, and asbestos. Fifteen samples were collected from the 0-2' soil interval; one from each boring/well location. Subsurface soil samples were selected from eight of the 15 soil borings based on PID readings or the presence of suspect material (e.g. tar, roofing material, etc) above the saturated zone.

The VOCs, SVOCs, and PCBs were analyzed by TestAmerica using the same methodologies as for the test pit samples. Soil samples were collected at changes in the vertical interval of geology or from suspected waste material in five different zones for geotechnical analyses. The geotechnical samples were submitted to MACTEC's geotechnical laboratory in Atlanta, Georgia for grain size analysis and Atterberg limits. The asbestos samples were analyzed by R. J. Lee Group in Monroeville, Pennsylvania by ashing and analyzing the ash using transmission electron microscopy (TEM). The findings of the boring program are provided in Section 4. After completion of the field work, the

boring and well locations were surveyed horizontally and vertically by subcontracted professional land surveyors.

3.4 MONITORING WELL INSTALLATION

Three monitoring wells were installed during MACTEC's Phase II ESA. MW-7, an upgradient monitoring well, was installed on the west side of Building 16 to evaluate the quality of upgradient groundwater. MW-8 was installed on the north side of Building 45 (north of the 500,000-gallon tar AST) to determine if groundwater impacts exist from the western end of the Tank Farm Area. MW-9 was drilled in the former Lagoon Area to evaluate groundwater impacts associated with the former lagoons. During drilling, saturated soil was observed between 7.0 feet at MW-7 and 12.5 feet at MW-9.

3.4.1 Monitoring Well Construction

Monitoring wells MW-8 and MW-9 were set in the borehole such that the top of the screened interval was above the surface of the water table so that light non-aqueous phase liquid (LNAPL) could be detected if it were present. Due to the shallow nature of the water level in MW-7 (less than 2 ft-bgs), the well screen had to be set beneath the surface of the water table to ensure the proper placement of the sand pack and seal. The monitoring wells were constructed inside of the hollow stem augers using two-inch diameter, polyvinyl chloride (PVC) well materials with 10-foot lengths of 0.010-inch machine-slotted PVC screen and flush-threaded end caps. The riser portion of each well was constructed of flush-threaded Schedule 40 PVC riser pipe. The well casing was assembled and placed into the auger to the bottom of the borehole. While removing the augers from the borehole, the annular space around the well screen was backfilled with a filter pack consisting of medium-grained Best 430 sand. The filter pack extended to approximately two feet above the top of the well screen. A one to two-foot thick neat bentonite seal was then placed above the sand pack. While continuing to remove the augers, the annular space above the bentonite seal was filled with a concrete seal to ground surface. The PVC riser pipe was cut slightly below the ground surface and the wells were finished with a flush-mount cover, set in the concrete. A watertight, locking well cap was placed into the PVC riser pipe.

3.4.2 Monitoring Well Development

After allowing the grout to cure for at least 48 hours, the monitoring wells were developed to remove fines from the wells that may have been liberated during drilling. Development began with measurement of the water level and total depth of the well. The standing water column was then calculated by subtracting the water level from the well total depth. The standing volume of water was subsequently calculated using the well diameter and the water column. The development proceeded using a dedicated bailer to hand-bail groundwater from the wells until at least three to five well volumes were removed or the wells were bailed dry.

3.5 WATER LEVEL MEASUREMENT

MACTEC measured groundwater levels in all Site monitoring wells on April 10, 2009. Water levels were measured and recorded to evaluate the depth to groundwater and direction of groundwater flow. Upon arriving at the Site, the wells were opened and the water levels and total well depths were measured and recorded in the field logbook. The water levels were measured using an oil/water interface probe. The oil/water interface probe was used in case separate phase liquid was present.

The groundwater measurements identified the presence of dense, non-aqueous phase liquid (DNAPL) in well MW-5. This well was installed prior to the MACTEC Phase I ESA by O'Brien & Gere. MACTEC's measurements indicated that approximately 5 feet of DNAPL was present at the bottom of the well. The available sampling information from O'Brien & Gere regarding MW-5 did not identify DNAPL; however, O'Brien & Gere indicated that black staining was present on the pump used to sample the well.

A summary of the water level measurements and calculated water elevations is provided on Table 1. Figure 5 is a groundwater elevation contour map with the groundwater elevations for the April 10, 2009 measurement event.

3.6 GROUNDWATER SAMPLING

MACTEC collected one round of groundwater samples from the newly installed groundwater monitoring wells. Sampling was initiated by measuring the water level and total depth of the well. The water level data was used to calculate a standing water volume for each well to be sampled. The

wells were then purged with a bailer until three well volumes had been removed. The groundwater was monitored during purging for pH, temperature and conductivity. Once the purging was complete, the bailer was used to collect the groundwater samples. The samples were placed into pre-preserved, laboratory supplied sample jars. The samples were collected for analysis of TCL VOCs, TCL SVOCs, TAL metals, and PCBs using USEPA SW-846 Methods 8260, 8270, 6010/7471 and 8082, respectively. The samples for metals were filtered through a 0.45 µm filter by the laboratory and, therefore, were not preserved until after filtering was complete. The groundwater samples were placed in a cooler on ice and logged onto chain-of-custody forms for hand delivery to the laboratory. Strict chain of custody procedures were followed at all times throughout sample collection handling, shipment and analysis. TestAmerica of Pittsburgh, a Pennsylvania-registered laboratory, analyzed the samples.

3.7 **SEDIMENT SAMPLING**

Five sediment samples were collected from Presque Isle Bay and from the unnamed stream to the east of the Site. The bay samples were collected using an Eckman dredge. For samples near the shoreline (SED-1 and SED-4), the Eckman dredge was bolted to a sampling staff containing a trip mechanism for the dredge. The sample locations were accessed by wading to an area containing fine sediments and the dredge was pushed into the sediment. The trip mechanism was used to release the dredge buckets and close the dredge. Samples were carried to shore and placed into a stainless steel bowl prior to placement into sample jars. In deeper water, a boat was used to access the sample locations (SEDIMENT-3). The Eckman dredge was lowered to the bottom on a rope. A metal messenger was placed on the rope and dropped to the dredge to trip the buckets. The dredge was then pulled back on board and opened to retrieve the sample. The sediment samples from the unnamed stream (SED-5 and SED-6) were collected by scooping the sediment directly into a stainless steel bowl prior to placement into sample jars. In all cases, any large rocks were removed from the sample and the sample was placed into an unpreserved 8-ounce glass sample jar for shipment to the laboratory. The samples were placed into a cooler on ice and logged onto a chain of custody for delivery to the laboratory. The sediment samples were delivered to TestAmerica in Pittsburgh, Pennsylvania for analysis of TCL SVOCs, PCBs, and TAL metals, by USEPA SW-846 Methods 8270, 8082 and 6010/7471, respectively, and for total organic carbon (TOC) using the Lloyd-Kahn method.

3.8 ASBESTOS SAMPLING

MACTEC collected six samples for asbestos analysis. The samples were collected by Nicole Feczko of MACTEC, who is a licensed Asbestos inspector in the Commonwealth of Pennsylvania.

Three asbestos wipe samples (ASB-1, ASB-2 and ASB-3) were collected from areas with an accumulation of dust. The selected locations included the former raw product storage warehouse, near the coiler at the end of the residential roofing production line, and from an area above the boiler tanks in Building 40. The samples were collected from an approximate 10cm x 10cm area using a damp gauze cloth. Once collected, the gauze cloth was placed into a sealable plastic bag and delivered under chain of custody to R. J. Lee Group in Monroeville, Pennsylvania (R. J. Lee) for analysis. Dust samples were collected for asbestos using ASTM Method D-5755-03 and analyzed using transmission electron microscopy (TEM). The locations of the dust samples are shown on Figure 6.

One asbestos sample (ASB-OUT-1) was collected from a roll of tar paper found protruding from the fill on the western bank of the property. This material was identified during the sediment sampling effort. The sample was collected by cutting several pieces of the material off and placing them in a sealable plastic bag. The sample was sent to R. J. Lee for analysis by polarized light microscopy (PLM). The location of the sample ASB-OUT-1 is shown on Figure 6.

Three samples were collected from the soil/fill materials for asbestos analysis. These samples were collected from the materials returned from the split spoons in borings S-11, S-12 and MW-8. The samples for asbestos in soil were analyzed by R. J. Lee by ashing and analyzing the ash using transmission electron microscopy (TEM).

3.9 TANK INVENTORY AND SAMPLING

It is assumed that most of the ASTs contain some amount of residual product. Therefore, MACTEC attempted to evaluate tanks to determine the nature and amount of product present. In cases where the ASTs contained labeling or other readily available information to identify the contents, MACTEC noted the labeling to determine the nature of the material in the tank. Most of the tanks were inaccessible due to their height. In smaller tanks that were not labeled, MACTEC determined if product was present and collected a sample if feasible. Two samples were collected by lowering a bailer into the product and retrieving the sample from outside the AST. The samples were submitted

to TestAmerica in Pittsburgh for analysis of VOCs, SVOCs, and PCBs. The results of the tank inventory and analyses are included in Sections 4.11 and 4.12, respectively.

3.10 **TAR EXPRESSING FROM SHORELINE**

During the investigation, tar was noted expressing from the bank along the north and west shorelines on Presque Isle Bay. A photograph of this material on the western shoreline is provided in Appendix C. A sample of the tar was collected by chipping pieces off and placing them into a glass sample jar. The sample, numbered EMBANKMENT was submitted to TestAmerica in Pittsburgh, PA for VOCs, SVOCs PCBs and metals.

4.0 SITE CHARACTERIZATION RESULTS

This section presents the results of the Phase II ESA. The data from the O'Brien & Gere GAF Site investigation and the ER&R surface soil sampling have been incorporated into the Phase II ESA data set. The data were screened against both the residential and non-residential MSCs because the end use of the Site is not known at this time. Some end uses (e.g. hotels, parks, condominiums, etc.) will likely need to be initially compared to the residential standards, whereas end uses that are industrial or commercial may use the non-residential criteria. Even though the City of Erie has an ordinance prohibiting the use of groundwater for drinking or agricultural purposes, we compared groundwater results to used aquifer MSCs since site groundwater is discharging to Presque Isle Bay, an identified Area of Concern under the Great Lakes Legacy Act.

4.1 GEOLOGY

The geology of the Site was assessed by visually logging the borings and test pits according to the USCS. The boring/test pit logs as well as the monitoring well construction diagrams are included in Appendix B. Based on review of the historical topographic maps and the Sanborn Maps, the majority of the Site is comprised of made land, reclaimed from Presque Isle Bay. At the time of the initial construction (1903-1910), the property extended to just north of the current Tank Farm Area (Figure 3). The reclamation appears to have continued through the mid-1980's when the Warehouse Building (Building 1) was constructed. The material used for fill on the Site appears to have been a mixture of construction debris, soil, tar, and waste roofing materials. Inspection of the materials returned in the split spoons showed roofing material, cinders and brick in the subsurface soil in MACTEC borings S-4, S-5, S-6, and S-7, which are located at the northern end of the production buildings. All of the borings to the north of these borings contained similar fill materials throughout the soil column.

Well MW-7 and boring S-1 were the only borings that apparently contained native material throughout. Boring S-3, which is near S-1, hit refusal at 3.0 ft-bgs and native material was not observed. The boring at MW-7 contained brown sandy clay from the surface to approximately 8.2 ft-bgs. Bedrock was encountered at 8.2 ft-bgs in this boring. Boring S-1 contained brown silty sand to approximately 7.0 ft-bgs, brown clayey sand to approximately 11 ft-bgs, gray sandy clay to 12.0 ft-bgs and bedrock at 12.4 ft-bgs.

Borings S-1, S-5, S-6, S-9, S-12, and MW-7 were all drilled to the bedrock surface. The bedrock in the area was confirmed to be a gray shale. The depth to bedrock ranged from 8.2 ft-bgs (574.16 ft-amsl) in MW-7 to 21.5 ft-bgs (561.70 ft-amsl) in boring S-12. The bedrock surface at boring S-1 is 12.4 ft-bgs (566.40 ft-amsl). Evaluation of the boring logs indicates that the bedrock surface slopes downward in the north-northeast direction at approximately 0.013 feet per foot (ft/ft) from the high point at well MW-7 to the low points at borings S-1 on the eastern side of the Site and S-12 on the northeastern corner of the Site. A bedrock contour map is included as Figure 7.

4.2 SOIL BORING OBSERVATIONS

Seventeen soil borings were drilled at the Site during the Phase II ESA. Monitoring wells were installed in three of the boring locations. The soils were logged during drilling in accordance with the USCS.

The borings S-1 through S-14 (Figure 4) were located as follows:

- S-1 (SW corner of building #10);
- S-2 (inside building #9);
- S-3 (between building #10 and building #3) ;
- S-4 (north of building #40);
- S-5 (along railroad spurs);
- S-6 (along railroad spurs);
- S-7 (along railroad spurs);
- S-8 (near former location of tank #10 and north of tank #9);
- S-9 (between fence and Sassafras Street) ;
- S-10 (south of warehouse);
- S-11 (south of warehouse);
- S-12 (NE corner of warehouse near creek);
- S-13 (inside building #21); and
- S-14 (inside building #7).

The boring logs are included in Appendix B. Generally, the soil beneath the Site is fill material that contains bricks and roofing materials mixed with sand, silt, and clay. The majority of the borings were advanced until groundwater was encountered at approximately 7 to 8 feet bgs. As discussed above, six of the borings were advanced to bedrock. Native materials appear to dominate in the southern portion of the Site; however, fill materials are present throughout the soil column north of the production buildings.

4.3 SOIL BORING SOIL SAMPLE ANALYTICAL RESULTS

Twenty-five soil samples were collected from the seventeen soil borings at the Site. Surface soil samples were collected from immediately beneath the concrete or pavement, and were collected at all boring/monitoring wells locations. The remaining soil samples were collected just above the water table at locations that were potentially impacted based on PID readings and/or field observations. The three monitoring well locations had a second soil sample collected above the saturated zone. The boring logs in Appendix B include PID readings. Table 2 and 3 summarize the compounds detected in the surface and subsurface soil samples collected at the Site, respectively; the laboratory analytical results are provided in Appendix D. Figure 8 shows the constituents in soil that exceeded an Act 2 MSC in the Phase II ESA.

The ER&R investigation included the collection of surface soil samples from twelve locations at depths ranging from six to 24 inches. The purpose of the samples was to determine if waste soil generated during a planned road installation could be classified as clean fill. The samples were analyzed for the diesel fuel, waste oil and fuel oil short list of compounds including five VOCs (benzene, toluene, ethylbenzene, xylene [BTEX], isopropylbenzene and naphthalene), nine SVOCs (fluorine, phenanthrene, anthracene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd) pyrene, and benzo(g,h,i)perylene), and lead. A summary of the ER&R data is provided in Appendix E.

The O'Brien & Gere investigation included collection of soil samples from monitoring wells MW-1 through MW-6 and from soil borings SB-07 and SB-08. Subsurface soil samples were collected from all of the boring and monitoring well locations. Soil samples collected from MW-02, MW-05, MW-06 and SB-07 contained PAHs exceeding the non-residential soil to groundwater MSCs, and soil samples collected at MW-05 contained benzene and 1,3,5-trimethylbenzene in concentrations exceeding the non-residential soil to groundwater MSCs. The O'Brien & Gere analytical data is provided in Appendix E. A summary of the non-residential MSC exceedances from the O'Brien and Gere data is provided on Figure 9.

4.3.1 VOCs

VOCs exceeded the Act 2 MSC in three of the soil borings. Benzene was detected in MW-8-0305, collected from 3 to 5 ft-bgs in the MW-8 boring, at 40 mg/kg and trichloroethylene was detected at

0.91 mg/kg in S-13-005025, collected from boring S-13 at 0.5 to 2.5 feet-bgs. These concentrations exceed the soil to groundwater MSCs for both residential and non-residential soils. The ER&R samples met the Act 2 MSCs for VOCs in all samples analyzed. O'Brien and Gere samples from MW-05, collected at 6 to 6.5 feet and 9 to 9.5 feet, contained benzene (2.2 and 2.1 mg/kg, respectively) and 1,3,5-trimethylbenzene (8.0 mg/kg and 6.7 mg/kg, respectively), which exceed the residential and non-residential soil to groundwater MSCs.

4.3.2 SVOCs

SVOCs in surface soil exceeded the Act 2 MSCs at S-1, S-3, S-4, S-9, MW-7, and MW-8. SVOCs in subsurface soils exceeded the Act 2 MSCs at S-9 and S-13. The majority of the SVOC exceedances were PAHs. The highest concentrations of SVOCs were at boring S-4 at 1 to 3 ft-bgs (Figure 8). This sample contained the PAHs benzo(a)anthracene at 520 mg/kg, benzo(a)pyrene at 520 mg/kg, benzo(b)fluoranthene at 790 mg/kg, benzo(g,h,i)perylene at 370 mg/kg, chrysene at 500 mg/kg, dibenz(a,h)anthracene at 120 mg/kg, indeno(1,2,3,cd) pyrene at 360 mg/kg, and naphthalene at 300 mg/kg. Additionally, this sample contained carbazole at 70 mg/kg. It should be noted the sample collected from S-4 at 1-3 ft-bgs contains all of the compounds in similar concentrations to the O'Brien & Gere sample from MW-5 at 9-9.6 ft-bgs. This may be indicative of NAPL close to the surface in S-4, or S-4 may be near the source of the DNAPL that was detected in MW-5. All of the samples that contained exceedances had concentrations of benzo(a)pyrene above the MSCs.

The ER&R investigation sample results indicated that SVOCs exceeded the Act 2 residential MSCs in five of the 12 sample locations including SB-1, SB-2, SB-4, SB-5 and SB-8. These samples were located south of the Boiler House and the 500,000-gallon tar tank (SB-1, 2, 4 and 5) and on the west side of the Shear Shop (SB-8). The samples exceeded the Act 2 MSCs for benzo(a)anthracene, benzo(b)flouranthene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene.

The O'Brien & Gere data had seven subsurface soil samples collected from MW-2, MW-4, MW-5, MW-6 and SB-07 that contained SVOCs above the MSCs. The highest concentrations of SVOCs were in the sample collected from monitoring well location MW-5 at 9 to 9.6 ft-bgs. This sample corresponds to the zone where DNAPL is known to presently exist. This sample contained the PAHs anthracene (780 mg/kg) benzo(a)anthracene (880 mg/kg), benzo(a)pyrene (670 mg/kg),

benzo(b)fluoranthene (680 mg/kg), benzo(g,h,i)perylene (380 mg/kg), chrysene (770 mg/kg), and naphthalene (5,600 mg/kg). Additionally, this sample contained carbazole at 620 mg/kg.

4.3.3 PCBs

PCB Aroclors did not exceed the residential or non-residential MSCs in any of the surface or subsurface soil samples.

4.3.4 Metals

The ER&R Samples were analyzed for lead. Lead was not detected in the ER&R samples above the residential or non-residential MSCs.

4.4 TEST PIT OBSERVATIONS

Five test pits were excavated to visually inspect the soils at the Site. Test pits TP-1 and TP-2 were excavated north of the warehouse (Building 1) to inspect the fill materials. Both of these test pits contained brown, silty sand with very little other material such as construction debris. The test pit logs are provided in Appendix B. Photographs of the material excavated from the test pits are provided in Appendix C.

Test Pit 3 was located on the southeastern corner of the warehouse. This test pit also contained mostly silty material with no debris observed.

Test Pit 4 was located in the area of the former lagoons. This test pit was excavated to a depth of approximately 6 ft-bgs. Groundwater was encountered at a depth of approximately 5.5 ft-bgs. The material in test pit TP-4 contained obvious waste materials such as construction debris, hoses, etc.

Test Pit 5 was located on the east side of the Site and was also excavated to approximately 6 ft-bgs. The material in test pit TP-5 contained a significant amount of solidified tar and material that appeared to be cinders.

4.5 TEST PIT SOIL SAMPLE ANALYTICAL RESULTS

Soil samples were collected by MACTEC during installation of the five test pits. Table 3 of this report summarizes the results of analyses of soil samples collected at the bottom of the test pits and above the top of the zone of saturation.

Two soil samples were collected: one from TP-4 and one from TP-5 at a depth of five to six ft-bgs. Soil samples were collected at depths just above the saturated zone, or from the most visually impacted material in the test pit. The only constituent detected above the Act 2 non-residential MSC in the test pit samples was benzo(a)pyrene at a concentration of 11,000 µg/kg in TP-5. No VOCs, PCBs, or metals exceeded the residential or non-residential MSCs.

4.6 GROUNDWATER ELEVATIONS AND FLOW DIRECTION

The monitoring well screens were installed such that the top of the screen was either approximately at or slightly above the surface of the water table in order to determine of floating separate phase liquid (SPL) is present. The top of the well screen in MW-7 is below the surface of the water table due to the shallow nature of groundwater (1.3 ft-bgs) in this area. Groundwater measurements were made on April 10, 2009 and indicated that the groundwater table is between 573 and 581 ft-amsl as shown on Table 1. The groundwater contour map of the Site is shown as Figure 5. Groundwater appears to flow northward near the southern corner of the Site, but turns to a westerly flow direction in the central portion of the Site. As mentioned previously, DNAPL was detected in MW-5 at a depth of approximately 9 ft-bgs. This well and others were also measured on April 24, 2009 for the presence of DNAPL. Only MW-5 contained detectable DNAPL; groundwater at MW-5 was measured at 7.11 ft-bgs and DNAPL was measured at 8.3 ft-bgs. The approximate total depth of the well is 13 ft-bgs. Therefore, the thickness of DNAPL is approximately 5 feet. The DNAPL was observed to be a very thick dark brown to black product with a distinct naphthalene odor. The DNAPL was sampled on April 24 and analyzed for VOCs, SVOCs and hydrocarbon fingerprinting.

4.7 GROUNDWATER ANALYTICAL RESULTS

Groundwater samples were collected from three new monitoring wells on April 2, 2009. All samples collected were analyzed for VOCs, SVOCs, PCBs and dissolved metals as described in

Section 3.4. The laboratory results were compared to the residential and non-residential Act 2 MSCs for Used Aquifers. The results of the groundwater samples are provided on Table 4 and shown on Figure 10. The analytical reports are provided in Appendix D. Groundwater samples were collected from each of the six previously installed wells (MW-1 through MW-6) by O'Brien & Gere on March 31, 2008. The O'Brien and Gere groundwater data were used as representative of the groundwater conditions in wells MW-1 through MW-6. Detections from the O'Brien & Gere data are shown on Figure 10; the available O'Brien & Gere data are provided in Appendix E.

4.7.1 VOCs

Benzene was detected above the groundwater MSC in well MW-8 at a concentration of 17 µg/l. This detection was flagged "J" by the laboratory, indicating that the value is estimated due to detection below the reporting limit. Cyclohexane was detected in a concentration of 8 ug/l in the sample from MW-7. No MSC is published for cyclohexane, however, the value does exceed 5 ug/l which is the Threshold of Regulation value shown on Table 6 of 25 PA Code 250 . No other VOCs were detected above a PADEP Act 2 residential or non-residential MSC for Used Aquifers in wells MW-7 or MW-9.

Groundwater samples collected by O'Brien & Gere from wells MW-5 and MW-6 also contained benzene above the groundwater MSC. MW-5 contained benzene at 170 µg/l and MW-6 contained benzene at 13 µg/l.

4.7.2 SVOCs

SVOCs were detected above the PADEP Act 2 groundwater MSCs for Used Aquifers at all three monitoring wells installed by MACTEC. These results are shown on Table 4 and Figure 10. MW-8 had the highest concentrations with 4-methylphenol at 230 µg/l, l, benzo(a)anthracene at 63µg/l, benzo(a)pyrene at 40 µg/l, benzo(b)fluoranthene at 39 µg/l, benzo(g,h,i)perylene at 18µg/l, benzo(k)fluoranthene at 22 µg/l, carbazole at 95 µg/l, chrysene at 48 µg/l, dibenz(a,h)anthracene at 7.1 µg/l, . indeno(1,2,3-cd)pyrene at 17 µg/l, and naphthalene at 13,000 µg/l, . Dibenzofuran was detected in a concentration of 100 ug/l in the sample from MW-8. No MSC is published for dibenzofuran, however, the value does exceed 5 ug/l which is the Threshold of Regulation value shown on Table 6 of 25 PA Code 250

In the wells installed by O'Brien and Gere, MW-2, MW-4, MW-5, and MW-6, also contained SVOCs above the Act 2 residential and non-residential standards. MW-5 was the most highly impacted of the group with 2,4-dimethylphenol at 2,700 µg/l, 4-methylphenol at 1,300 µg/l, and naphthalene at 5,800 µg/l. Elevated concentrations of PAHs were also present at wells MW-2 and MW-6.

A groundwater plume containing SVOCs exceeding the Act 2 Residential and Non-residential used aquifer MSCs appears to be present in the shallow groundwater on the Site beginning near MW-2, extending west through MW-5, and continuing through MW-8 and MW-6. The plume also appears to be moving laterally northward through MW-9. MW-3, located at the northwestern corner of the Site, was not affected by the plume as of the time it was sampled in March of 2008. The most prevalent contaminant in the groundwater plume is naphthalene, likely due to its greater solubility compared to other PAHs. A plume map of the naphthalene in groundwater is provided as Figure 11.

4.7.3 PCBs

None on the groundwater samples collected from MW-7, MW-8 and MW-9 contained detectable concentrations of any of the PCB Aroclors.

4.7.4 Metals

The detected metals concentrations in samples from monitoring wells MW-7, MW-8, and MW-9 did not exceed the Act 2 MSCs. Dissolved manganese was detected in samples from each of the wells in concentrations exceeding the Secondary Maximum Contaminant Limit (SMCL) of 50ug/l. The maximum manganese concentration was 520 ug/l detected in the sample from MW-8.

The O'Brien & Gere groundwater samples contained exceedances of the Act 2 MSCs for iron and/or manganese in all of the monitoring wells. Iron was present above the MSC in wells MW-1 (2,240 µg/l), MW-2 (2,520 µg/l), MW-3 (1,420 µg/l), MW-4 (43,100 µg/l), and MW-5 (6,500 µg/l). Manganese exceeded the MSC in all wells, ranging from 116 µg/l in well MW-6 to 775 µg/l in well MW-4. It is not clear from the O'Brien & Gere data whether or not the samples were filtered for metals analysis.

4.8 DNAPL SAMPLE RESULTS

The sample of DNAPL collected from well MW-5 was numbered MW5-NAPL-0409 and was analyzed for VOCs, SVOCs and hydrocarbon fingerprinting. The hydrocarbon fingerprinting was performed by TestAmerica in Pensacola, Florida using a modified SW-846 Method 8015. The results were compared to a library of petroleum products in order to identify the product. The results of the VOC and SVOC analyses are provided on Table 5; all of the analytical results are provided in Appendix D. The following provides a summary of the analytical results.

4.8.1 VOCs

Seven VOCs were detected in the NAPL sample. These included benzene (3.0 mg/kg), toluene (4.2 mg/kg), ethylbenzene (6.4 mg/kg), xylenes (25 mg/kg), isopropylbenzene (1.1 J mg/kg), methylcyclohexane (1.1 J mg/kg), and tetrachloroethene (0.45 J mg/kg). Of the detected VOCs, only benzene was detected in groundwater above the Act 2 groundwater MSC. All of the VOCs detected in the DNAPL were also detected in groundwater except for tetrachloroethene and isopropylbenzene. Several degradation products of tetrachloethene were present in the O'Brien & Gere groundwater samples. Isopropylbenzene was not analyzed in the O'Brien & Gere samples.

4.8.2 SVOCs

Twenty three SVOCs were detected in the NAPL sample. Seventeen of these were PAHs, which accounted for approximately 6 percent of the product by weight. The remaining detected SVOCs included 1,1'-biphenyl (990 mg/kg), 2,4-methylphenol (38 J mg/kg), 2,4-dinitrotoluene (62 J mg/kg), acetophenone (5.4 J mg/kg), carbazole (1,200 mg/kg), and dibenzofuran (3,200 mg/kg). The results of groundwater analyses indicate that a number of the PAHs, particularly those that are more soluble (e.g. naphthalene, 2-methylnaphthalene, acenaphthalene, acenaphthene, phenanthrene, fluoranthene), are present in groundwater.

4.8.3 Hydrocarbon Fingerprinting

Because most petroleum products are a mixture of numerous compounds, the hydrocarbon fingerprint attempts to identify the compounds in the mixture and determine if the mixture generally matches that of any known petroleum formulations (e.g. gasoline, kerosene, etc.). The

results of the hydrocarbon fingerprinting indicated that the NAPL is an unknown hydrocarbon mixture in the C12 to C34 range and does not match any of the known petroleum mixtures. It should be noted that the majority of the compounds detected in the SVOC analysis of the NAPL fall into the C12 to C34 range, and that the balance of the compounds present are likely aromatic and aliphatic hydrocarbons that are not included on the target compound list.

4.9 ASBESTOS SAMPLING

Three asbestos wipe samples were collected from an approximate 100 square centimeter area in Site buildings shown on Figure 6. These samples were collected from areas that contained accumulations of dust, and were likely to have been areas where asbestos containing materials were managed. These areas included a horizontal surface above the boilers in Building 40, a horizontal surface near the end of the production line in Building 9 and a horizontal surface on a building support in Building 10.

One bulk asbestos sample was collected from a roll of roofing material found protruding from the fill on the west bank of the Site on Presque Isle Bay. This material consisted of a flat roll of black paper containing white, fibrous materials in the matrix. Several of these rolls were noted at this location. These materials appeared to have been present in the fill and were encased with mature Cottonwood tree roots. Photographs of this material are included in Appendix C.

Three soil samples containing waste roofing material were collected from soil borings S-11, S-12 and MW-8 at 5-7 ft-bgs for asbestos analysis. These materials consisted of flat roofing material and heavily tar-laden roofing materials.

The asbestos samples were analyzed by the R. J. Lee. The results of the asbestos samples are provided in Appendix F.

4.9.1 Dust Sample Results

The dust samples collected from Buildings 9 (ASB-1) and 40 (ASB-3) contained chrysotile asbestos structures in concentrations of 290,000 structures per square centimeter (S/cm^2) and 660,000 S/cm^2, respectively. The dust sample collected from Building 10 contained less than 41,000 S/cm^2, which is the method detection limit. The two samples with detectable asbestos

structures are characterized as heavy asbestos contamination on a scale of: none, slight, moderate, heavy, and extreme, based upon industry guidelines.

4.9.2 Bulk Sample Results

The bulk sample collected from the roll of roofing material contained 46.51 percent chrysotile asbestos by weight. As such, the material would need to be managed as asbestos containing material, if disturbed, by utilizing appropriately trained personnel, wrapping, marking and properly disposing of it where it is encountered.

4.9.3 Soil Sample Results

The three soil samples, S-11-0507, S-12-0507, and MW-8-0507 were non-detect, 0.25 percent asbestos by weight and 0.32 percent asbestos by weight, respectively. Chrysotile was the asbestos type identified in the two positive samples. These concentrations are less than the 1 percent criterion, above which, a material must be managed as an asbestos containing material.

4.9.4 PCB Wipe Sample results

The PCB wipe samples were collected from areas where oil staining was present on the floors. The wipe samples did not contain detectable amounts of PCBs.

4.10 TANK INVENTORY RESULTS

The tanks evaluated in the site walkthrough survey on March 24, 2009 were as follows:

- Tank #9 – Kendex Resin (alternative material to tar);
- Tanks #2 – Tar distillation tower;
- Tank #14 – Waste Oil (condensed from tar distillation process);
- Tank #1 - R.F. 400 Flux P.C. (140º melting point tar);
- Tank #12 – Self Seal #241 (glue-type tar for shingles);
- Tank #38 – Dry Storage (various rock products); and
- Tank #5 – Blow coating cap 145,000 gel, P.C. 552 FG (Tar distillation tower).

Tanks 1, 2, 5, 9, and 12 are large ASTs that have no access from the ground level. Due to safety concerns, MACTEC did not attempt to climb onto the tanks to determine if access ports were

present on the top. These tanks are assumed to contain at least several inches of residual product. The residual material in these tanks is likely solidified since these tanks had to be heated to keep the product fluid. The series of tanks (hoppers) labeled as #38 contained dry rock products that are not hazardous. These hoppers were likely emptied when the plant operations ceased.

Tank #14 contained waste oil from the tar distillation process. This tank was inspected and found to be empty except for several inches of residual product. The product in this tank is the same as that in a small (<100 gallon) tank that is housed east of Tank #5. The small tank also contained several inches of waste oil, which was sampled (sample number OIL-1) for VOCs, SVOCs and PCBs.

While performing the tank inspection, a 55-gallon drum of oil was identified outside of the north wall of the process building, near the transformer area. A hose was in the drum and ran up to the overhead pipe rack. The GAF representative on the Site indicated that the oil was likely heat tracing oil that runs through tubing wrapped around process pipes to keep them hot. The oil was sampled (sample number OIL-2) for VOCs, SVOCs, and PCBs.

4.11 TANK WASTE ANALYTICAL RESULTS

Two oil samples were collected, OIL-1 and OIL-2 for VOC, SVOC, and PCB analysis. The locations of these samples are shown on Figure 6. Sample OIL-1 did not contain detectable concentrations of VOCs or PCBs. SVOCs were detected in the sample including 2-methylnaphthalene (25 mg/kg), acenaphthene (17 mg/kg), acenaphthalene (9.5J mg/kg), anthracene (21 mg/kg), benzo(a)anthracene (27 mg/kg), chrysene (60 mg/kg), di-n-butyl phthalate (8,4 mg/kg), fluoranthene (43 mg/kg), fluorine (64 mg/kg), naphthalene (8.1 mg/kg), phenanthrene (140 mg/kg), pyrene (48 mg/kg). Sample OIL-2 did not contain any detectable VOCs or PCBs. SVOCs detected in sample OIL-2 included acenaphthene (14 mg/kg) and naphthalene (4.1 mg/kg). The results of these samples are included on Table 5.

4.12 SEDIMENT SAMPLING OBSERVATIONS

Five sediment samples were collected; three from Presque Isle Bay and two from the unnamed stream to the east of the Site. The bay samples were collected at the existing shoreline on the western and northern portions of the Site, except for sample SEDIMENT-3, which was collected

from a boat off the western corner of the Site (Figure 6). Samples SED-5 (downstream location) and SED-6 (upstream location) were collected from the unnamed tributary stream on the northeastern side of the Site. Samples SED-1 and SED-4 were collected near the water line from coarse sand and gravel materials. No fine sediments were present in these locations. Sample SEDIMENT-3 was collected further into the bay and consisted of a black, fine-grained material. Samples SED-5 and SED-6 consisted of sandy material that contained pieces of colored, crushed rock that likely originated on the Site as the crushed rock that was placed on the shingles. The sediment samples were analyzed for TCL VOCs, TCL SVOCs, PCBs, TAL metals, and total organic carbon (TOC).

4.13 SEDIMENT SAMPLE RESULTS

The sediment sample results are included on Table 6. The locations of the sediment samples are shown on Figure 6. Because the Act 2 MSCs do not contain sediment quality criteria, the results of the sediment samples were not compared to a published standard.

The only VOC detected in the sediment samples was methylene chloride detected in sample SEDIMENT-3 at a concentration of 1.7J µg/kg. This detection is likely a laboratory artifact as low detections of methylene chloride are often associated with laboratory contamination. All of the sediment samples contained PAHs. Sediment samples SED-1 and SED-4 contained the lowest concentrations of PAHs (14-360 µg/kg), likely due to the coarse-grained nature of the material. The samples collected from the unnamed stream (SED-5 and SED-6) contained PAHs ranging from 24 to 1,900 µg/kg. Sample SEDIMENT-3 contained the highest concentrations of PAHs, ranging from 100 to 5,700 µg/kg. PCBs were detected in two of the sediment samples. Sample SED-1 contained 840 µg/kg of Aroclor 1254, and sample SEDIMENT-3 contained 83 µg/kg of Aroclor 1242. A number of metals were also detected in the sediment samples. TOC in the sediment samples ranged from 3,880 mg/kg in SED-6 to 46,300 mg/kg in Sample SED-1.

4.14 TAR EXPRESSING FROM SHORELINE

One sample, labeled EMBANKMENT, was submitted of the tar expressing from the western bank of the bay for VOCs, SVOCs, PCBs and metals. The results of this sample are provided in Table 5. The only VOC detected in the sample was methylene chloride, which was detected at a concentration of 0.0013 J mg/kg. This detection is likely a laboratory artifact as low detections of

methylene chloride are often associated with laboratory contamination. Concentrations of eleven PAHs were detected in the tar sample ranging from 0.66 mg/kg of indeno(1,2,3-cd)pyrene to 10 mg/kg of benzo(b)fluoranthene. The PAHs that were detected in the sample appear to be the least water soluble of the PAHs and the more soluble PAHs, such as naphthalene and 2-methylnaphthalene, were not detected. PCB Aroclor 1242 was detected in the sample at 0.085 mg/kg; no other PCBs were detected in the sample. Metals were also detected in the tar sample; however, none of the metals appear to be present in concentrations that would be of concern.

4.15 GEOTECHNICAL SAMPLE RESULTS

Five samples were analyzed by MACTEC in Alpharetta, GA for geotechnical parameters. All of the samples were analyzed for grain size by ASTM D422-63 and four were analyzed for liquid and plastic limits by ASTM D4318. There was not enough sample volume to analyze the liquid and plastic limits in sample S-11-0507.

In order to analyze the samples, the geotechnical laboratory sorted the larger waste materials (tar paper, etc.) from the samples. Once cleaned of waste materials, the samples were subjected to testing. The following table provides the results of the geotechnical analyses. The results of the Geotechnical analyses are provided in Appendix G.

Sample	% Gravel		% Sand			Fines	Classification	NM	LL	PL
	Coarse	Fine	Coarse	Med.	Fine	%		%		
MW-9-0711	0	48.6	11.5	16.2	15.1	8.6	GW-GM	--	NV	NP
S-10-0307	9.1	23.4	6.2	10.9	15.5	34.9	SM	20.6	35	26
S-10-1113	33.5	12.6	9.8	9.2	6.9	28	GC	16.3	37	23
S-11-0507	0	22.8	16.1	14.2	15.9	31	SM	NA	NA	NA
S-11-1113	15.2	32.9	6.6	25	12.8	7.5	GP-GM	--	NV	NP

The materials encountered on the Site range from predominantly gravels to predominantly silt. However, because a large portion of the soil matrix consists of waste roofing material, the geotechnical results may not be indicative of the actual soil conditions. Given the character of the fill on the Site and the depth to bedrock, future construction of buildings would likely need to be either on H pilings or on caissons keyed to bedrock. In the event that the Site is used as a parking area, construction could be accomplished through placement of an engineered cover on the Site prior to paving.

5.0 SUMMARY AND CONCLUSIONS

MACTEC's Phase II activities included the investigation of soil and groundwater at the Site through the installation of fourteen borings, three monitoring wells, and five test pits. The soil borings indicated that the unconsolidated material on the Site consists of sandy fill material overlying clay. Roofing materials were present in the soil throughout the site. Bedrock is present at a depth between 8.2 feet and 21.6 ft-bgs. Groundwater elevations range from 573 to 581 feet. Twenty-seven soil samples were collected from the soil borings and test pits and one round of groundwater samples were collected from the newly installed monitoring wells. The results of the soil and groundwater samples were screened against the PA Act 2 residential and non-residential Used Aquifer Statewide Health Standard MSCs. Following is a summary of the most significant environmental concerns:

- Tar is present in the soil matrix at numerous locations on the Site. The tar is expressing both to the surface on-Site and from the banks into the bay, and is known to contain PAHs. The tar will likely require remedial action to mitigate migration to the surface and the bay.

- VOCs found to exceed the PA Act 2 MSCs in soil included: Acetone, benzene methylacetate, methylcyclohexane, toluene, xylenes, 1,1,1-trichloroethane and trichloroethene. SVOCs found to exceed the PA Act 2 MSCs in soil included: benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, dibenz(a,h)anthracene, indeno(1,2,3,cd) pyrene, and naphthalene. Impacted soils may require remediation in order to mitigate exposure and/or leaching to groundwater.

- Constituents found to exceed the PA Act 2 MSCs in groundwater were SVOCS and included: 2-methylnapthalene, 4-methylphenol, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, and phenathrene. Groundwater remediation may be necessary to mitigate exposure concerns and migration to the bay.

- Five sediment samples were collected in the Presque Isle Bay and unnamed creek. PAHs, one VOC, metals and PCBs were present in these samples. The PAHs appear to be similar to those detected on the Site. The sediment samples were not screened since PA Act 2 does not include sediment quality criteria. The presence of PAHs in sediments that are similar to those present on the Site could potentially result in remedial action within the bay, a listed Area of Concern under the Great Lakes Legacy Act.

- Three asbestos wipe samples were collected in the site buildings. Two of the three samples contained heavy asbestos contamination and decontamination of the building surfaces may be required prior to demolition of the buildings.

- The soil samples collected for asbestos analysis contained less than 1 percent asbestos; however, rolls of tar paper in the soil matrix contained nearly 50 percent asbestos. If these materials are encountered during excavation activities at the Site, trained personnel would be necessary to carry out the excavation and the material would need to be wrapped, labeled and

disposed of in a landfill. As such, the presence of these materials could present a hazard to workers and significantly increase the cost associated with Site earthwork.

- Two waste oil samples were collected from oil products remaining on the Site. Some minor PAHs were detected in the oils; however, they may likely be sent off-site for recycling.

- Approximately five feet of DNAPL was observed in one of the monitoring wells onsite. MW-5 had DNAPL beginning at approximately eight feet deep, and extending to the bottom of the well at 13 feet. Samples of this material indicate that it contains approximately 6 percent PAHs by weight and some VOCs. A groundwater plume of PAHs, particularly naphthalene, is present beginning in the tar distillation area near the DNAPL and extending west toward MW-8 and the bay. However, given the nature of DNAPL and the slope of the bedrock to the northeast, it is possible that the actual DNAPL is migrating to the northeast along the bedrock surface, which is perpendicular to groundwater flow. Remediation of the DNAPL may be required to mitigate groundwater contamination concerns.

Given the nature of the contamination in soil, groundwater, and bay sediments, and the uncontrolled migration of Site-related constituents, significant remedial measures will likely be required. The remedial measures will need to address source materials as well as contaminants that are currently migrating in groundwater and expressing as tar and, likely, dissolved phase constituents into the bay. Mitigation of the direct contact pathway to surface soils containing elevated levels of PAHs will need to be accomplished during redevelopment of the Site. Additionally, the asbestos containing materials that were used as fill on the Site could potentially present a significant excavation and disposal cost, should site soil need to be excavated during redevelopment.

TABLES

Table 1
Groundwater Elevations April 10, 2009
GAF Site
Erie, Pennsylvania
Project # 3410080643

Location	Measuring Point Elevation (ft-amsl)	Depth to Water (feet)	Groundwater Elevation (ft-amsl)
MW-1	581.50	6.22	575.28
MW-2	579.84	4.54	575.30
MW-3	582.95	9.55	573.40
MW-4	583.12	9.22	573.90
MW-5*	578.41	4.19	574.22
MW-6	579.73	6.24	573.49
MW-7	582.36	1.80	580.56
MW-8	579.53	5.79	573.74
MW-9	582.63	8.86	573.77

ft-amsl indicates feet above mean sea level.
*-DNAPL at depth of approximately 8 feet.

Table 2
Surface Soil Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	Residential Direct Contact MSC	Residential Soil to GW	Non-Residential Surface Direct Contact	Non-Residential Soil to GW	MW-7-0002	MW-8-0103	MW-9-0103	S-10-0103	S-1-0103	S-11-0103	S-12-0103	S-13-005025	S-14-005025
VOCs														
1,1,1-Trichloroethane	mg/kg	10000	20	10000	20	ND	0.24 J	ND	ND	ND	ND	ND	0.021	ND
1,1-Dichloroethane	mg/kg	200	2.7	1000	11	ND	0.2 J	ND	ND	ND	ND	ND	0.0046 J	ND
Benzene	mg/kg	41	0.5	210	0.5	ND	0.24 J	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	mg/kg	10000	190	10000	410	ND	ND	ND	ND	ND	ND	ND	0.0048 J	ND
cis-1,2-Dichloroethene	mg/kg	670	7	1900	7	ND	ND	ND	ND	ND	ND	ND	0.014 J	ND
Ethylbenzene	mg/kg	10000	70	10000	70	0.045 J	0.24 J	ND	ND	ND	ND	ND	ND	ND
Methyl acetate	mg/kg	10000	3700	10000	10000	ND	0.16 J	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	mg/kg	680	0.5	3500	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	mg/kg	7600	100	10000	100	0.13 J	1	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	mg/kg	190	0.5	970	0.5	ND	ND	ND	ND	ND	ND	ND	0.91	ND
Xylenes (total)	mg/kg	8000	1000	10000	1000	0.47 J	2.4	ND	ND	ND	ND	ND	ND	ND
SVOCs														
1,1'-Biphenyl	mg/kg	11000	790	140000	2200	0.1 J	ND	ND	ND	3.6 J	ND	ND	0.12 J	0.034 J
2,4-Dimethylphenol	mg/kg	4400	0	10000	0	ND	ND	ND	ND	ND	ND	ND	ND	0.018 J
2-Methylnaphthalene	mg/kg	4400	2900	10000	8000	0.56	2.1 J	ND	0.3 J	9.9	0.035 J	0.3 J	1.2	0.39
4-Methylphenol	mg/kg	1100	18	14000	51	NA	ND	ND	ND	ND	ND	ND	ND	0.024 J
Acenaphthene	mg/kg	13000	2700	170000	4700	0.72	7.1	ND	ND	23	ND	ND	ND	0.043 J
Acenaphthylene	mg/kg	13000	2500	170000	6900	5.9	3.8	0.071 J	ND	2.1	ND	0.35 J	0.048 J	ND
Acetophenone	mg/kg	10000	370	10000	1000	ND	ND	ND	ND	ND	ND	ND	0.11 J	0.032 J
Anthracene	mg/kg	66000	350	190000	350	4.2	29	0.082 J	ND	100	0.033 J	0.23 J	0.047 J	0.31
Benzo(a)anthracene	mg/kg	25	79	110	320	21	51	0.18	0.15 J	140	0.093	0.74 J	0.24	0.42
Benzo(a)pyrene	mg/kg	2.5	46	11	46	19	41	0.2	0.15 J	91	0.056 J	0.81 J	0.17	0.2
Benzo(b)fluoranthene	mg/kg	25	120	110	170	27	66	0.44	0.59	86	0.19	3.5	0.39	0.43
Benzo(ghi)perylene	mg/kg	13000	180	170000	180	12	30	0.17	0.17 J	54	0.018 J	0.67 J	0.12	0.12
Benzo(k)fluoranthene	mg/kg	250	610	1100	610	ND	ND	ND	ND	46	ND	0.39 J	0.091	0.075 J
bis(2-Ethylhexyl) phthalate	mg/kg	1300	130	5700	130	ND	ND	0.4 J	ND	ND	ND	ND	ND	0.035 J
Carbazole	mg/kg	900	21	4000	83	1.2	12	0.026 J	ND	44	ND	ND	0.052 J	0.15
Chrysene	mg/kg	2500	230	11000	230	18	49	0.18	0.15 J	120	0.089	0.86	0.35	0.37
Dibenz(a,h)anthracene	mg/kg	2.5	41	11	160	3.9	8.9	ND	ND	21	ND	ND	0.05 J	0.038 J
Diethyl phthalate	mg/kg	10000	500	10000	500	ND	ND	ND	ND	ND	ND	0.35 J	ND	ND
Fluoranthene	mg/kg	8800	3200	110000	3200	38	120	0.31	0.17 J	290	0.15	1.1	0.29	0.64
Fluorene	mg/kg	8800	3000	110000	3800	0.72	13	ND	ND	41	0.017 J	ND	ND	0.067 J
Indeno(1,2,3-cd)pyrene	mg/kg	25	7000	110	28000	11	29	0.39	0.8	49	0.17	0.55 J	0.082	0.068 J
Naphthalene	mg/kg	4400	25	56000	25	0.74	2.4 J	0.068 J	0.17 J	12	0.017 J	0.31 J	0.54	0.23
Phenanthrene	mg/kg	66000	10000	190000	10000	8.9	100	0.17	0.33 J	290	0.12	0.69 J	0.98	1.2
Phenol	mg/kg	130000	400	190000	400	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	mg/kg	6600	2200	84000	2200	28	81	0.28	0.19 J	200	0.14	0.88	0.29	0.59
PCBs														
Aroclor 1242	mg/kg	36	16	160	62	ND	ND	0.19	ND	ND	ND	0.043 J	ND	ND
Aroclor 1254	mg/kg	4.4	75	44	280	ND	ND	0.1 J	ND	ND	0.0054 J	ND	ND	ND
Aroclor 1260	mg/kg	30	500	130	1900	ND	ND	ND	ND	ND	ND	0.047 J	ND	ND

"mg/kg" indicates milligrams per kilogram or parts per million.
"ND" indicates not detected.
"J" indicates estimated value.

Exceeds MSC.

Created by: CH
Checked by :LLG

Table 2
Surface Soil Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	Residential Direct Contact MSC	Residential Soil to GW	Non-Residential Surface Direct Contact	Non-Residential Soil to GW	S-2-005045	S-3-0103	S-4-0103	S-5-0103	S-6-0103	S-7-0103	S-8-0002	S-9-0103	S-9-0507
VOCs														
1,1,1-Trichloroethane	mg/kg	10000	20	10000	20	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	mg/kg	200	2.7	1000	11	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	mg/kg	41	0.5	210	0.5	ND	ND	ND	ND	ND	ND	ND	ND	0.5
Carbon disulfide	mg/kg	10000	190	10000	410	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	mg/kg	670	7	1900	7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	mg/kg	10000	70	10000	70	ND	ND	ND	ND	ND	ND	ND	ND	0.24 J
Methyl acetate	mg/kg	10000	3700	10000	10000	ND	ND	ND	ND	ND	ND	ND	ND	0.4
Methylene chloride	mg/kg	680	0.5	3500	0.5	ND	ND	0.0014 J	ND	ND	ND	0.0013 J	ND	ND
Toluene	mg/kg	7600	100	10000	100	ND	ND	ND	ND	ND	ND	ND	ND	0.63
Trichloroethene	mg/kg	190	0.5	970	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	mg/kg	8000	1000	10000	1000	ND	ND	ND	ND	ND	ND	ND	ND	2.5
SVOCs														
1,1'-Biphenyl	mg/kg	11000	790	140000	2200	ND	ND	12 J	0.91 J	0.076 J	ND	0.74	8.8	6.5 J
2,4-Dimethylphenol	mg/kg	4400	0	10000	0	ND	ND	ND	ND	ND	ND	ND	6.1 J	2.4 J
2-Methylnaphthalene	mg/kg	4400	2900	10000	8000	0.29 J	0.73 J	41	3.3	0.65	0.47	2.6	49	35
4-Methylphenol	mg/kg	1100	18	14000	51	ND	ND	8.2 J	ND	ND	ND	0.098 J	15	5.4 J
Acenaphthene	mg/kg	13000	2700	170000	4700	ND	0.29 J	22	1.7 J	0.089 J	0.11 J	0.6	8.8	10
Acenaphthylene	mg/kg	13000	2500	170000	6900	0.15 J	4	210	34	0.25	1.5	1.1	30	3.9
Acetophenone	mg/kg	10000	370	10000	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	mg/kg	66000	350	190000	350	0.14 J	2.4	200	36	0.22	0.98	2.5	39	19
Benzo(a)anthracene	mg/kg	25	79	110	320	0.32 J	7.5	520	130	1	2.1	4.5	65	20
Benzo(a)pyrene	mg/kg	2.5	46	11	46	0.26 J	8.4	520	120	0.85	1.8	4.6	48	13
Benzo(b)fluoranthene	mg/kg	25	120	110	170	1.5	13	790	200	1.6	3.5	7	50	14
Benzo(ghi)perylene	mg/kg	13000	180	170000	180	0.23 J	8.5	370	100	0.72	1.5	4.1	22	6.7
Benzo(k)fluoranthene	mg/kg	250	610	1100	610	0.21 J	3.7	ND	ND	ND	ND	ND	11	6.8
bis(2-Ethylhexyl) phthalate	mg/kg	1300	130	5700	130	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	mg/kg	900	21	4000	83	ND	0.48 J	70	4.6	0.086 J	0.23 J	0.59	21	12
Chrysene	mg/kg	2500	230	11000	230	0.39 J	7.6	500	130	0.95	1.9	4	51	17
Dibenz(a,h)anthracene	mg/kg	2.5	41	11	160	ND	2.3	120	32	0.2	0.45	1.2	7	2.3
Diethyl phthalate	mg/kg	10000	500	10000	500	0.16 J	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	mg/kg	8800	3200	110000	3200	0.61	9.3	1100	180	1.4	3.6	7.3	160	52
Fluorene	mg/kg	8800	3000	110000	3800	ND	0.34 J	120	4.4	ND	ND	0.51	56	38
Indeno(1,2,3-cd)pyrene	mg/kg	25	7000	110	28000	0.15 J	6.5	360	93	0.87	2	3.6	21	5.7
Naphthalene	mg/kg	4400	25	56000	25	0.23 J	0.98 J	300	6.5	0.45	0.47	14	230	170
Phenanthrene	mg/kg	66000	10000	190000	10000	0.54	3.7	710	47	0.95	1.6	8.4	170	83
Phenol	mg/kg	130000	400	190000	400	ND	ND	6.9 J	ND	ND	ND	0.34	10	2.1
Pyrene	mg/kg	6600	2200	84000	2200	0.5	6.9	710	150	1.1	2.6	5.3	98	31
PCBs														
Aroclor 1242	mg/kg	36	16	160	62	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1254	mg/kg	4.4	75	44	280	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1260	mg/kg	30	500	130	1900	ND	ND	0.1 J	ND	ND	0.21	ND	0.23	ND

"mg/kg" indicates milligrams per kilogram or parts per million.

"ND" indicates not detected.

"J" indicates estimated value.

Exceeds MSC.

Created by: CH
Checked by :LLG

Table 3
Subsurface Soil Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	Residential Direct Contact MSC	Residential Soil to GW	Non-Residential Subsurface Direct Contact	Non-Residential Soil to GW	MW-7-0406	MW-8-0305	MW-9-1113	S-11-0911	S-12-1113	S-13-045065	S-14-045065	S-9-0507	TP4-0506	TP5-0506
VOCs															
1,1,1-Trichloroethane	mg/kg	10000	20	10000	20	ND	ND	ND	ND	ND	0.012	ND	ND	ND	ND
1,1-Dichloroethane	mg/kg	200	2.7	1200	11	ND	ND	ND	ND	ND	0.0013 J	ND	ND	ND	ND
Acetone	mg/kg	10000	370	10000	1000	ND	ND	ND	0.0079 J	0.031	ND	ND	ND	ND	ND
Benzene	mg/kg	41	0.5	240	0.5	ND	40	0.0012 J	ND	ND	ND	ND	0.5	ND	ND
Carbon disulfide	mg/kg	10000	190	10000	410	ND	ND	ND	ND	0.0025 J	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	mg/kg	670	7	2100	7	ND	ND	ND	ND	ND	0.0022 J	ND	ND	ND	ND
Ethylbenzene	mg/kg	10000	70	10000	70	ND	12	0.0017 J	ND	ND	ND	ND	0.24 J	ND	ND
Isopropylbenzene	mg/kg	7300	780	10000	1600	ND	1.4 J	0.012	ND	ND	ND	ND	ND	ND	ND
Methyl acetate	mg/kg	10000	3700	10000	10000	ND	ND	ND	ND	ND	ND	ND	0.4	ND	ND
Methylene chloride	mg/kg	680	0.5	4000	0.5	ND	ND	0.0013 J	ND	ND	ND	ND	ND	ND	ND
Styrene	mg/kg	10000	24	10000	24	ND	12	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	mg/kg	7600	100	10000	100	ND	39	0.0047 J	ND	ND	ND	ND	0.63	ND	ND
Trichloroethene	mg/kg	190	0.5	1100	0.5	ND	ND	ND	ND	ND	0.28	ND	ND	ND	ND
Xylenes (total)	mg/kg	8000	1000	10000	1000	ND	61	0.019 J	ND	ND	ND	ND	2.5	ND	ND

Table 3
Subsurface Soil Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	Residential Direct Contact MSC	Residential Soil to GW	Non-Residential Subsurface Direct Contact	Non-Residential Soil to GW	MW-7-0406	MW-8-0305	MW-9-1113	S-11-0911	S-12-1113	S-13-045065	S-14-045065	S-9-0507	TP4-0506	TP5-0506
SVOCs															
1,1'-Biphenyl	mg/kg	11000	790	190000	2200	0.03 J	ND	ND	ND	ND	ND	ND	6.5 J	ND	ND
2,4-Dimethylphenol	mg/kg	4400	0	10000	0	ND	ND	ND	ND	ND	ND	ND	2.4 J	ND	ND
2-Methylnaphthalene	mg/kg	4400	2900	10000	8000	0.096	ND	1 J	0.6 J	ND	1.8	0.13	35	0.15 J	0.34 J
2-Methylphenol	mg/kg	10000	180	10000	510	ND	ND	ND	ND	ND	ND	ND	1.6 J	ND	ND
4-Methylphenol	mg/kg	1100	18	190000	51	ND	ND	ND	ND	ND	ND	ND	5.4 J	ND	ND
Acenaphthene	mg/kg	13000	2700	190000	4700	0.03 J	ND	2.2 J	1.2	0.16 J	1.8	ND	10	0.19 J	1.3
Acenaphthylene	mg/kg	13000	2500	190000	6900	0.049 J	ND	0.75 J	0.42 J	ND	16	ND	3.9	0.5	1.5
Anthracene	mg/kg	66000	350	190000	350	0.068 J	ND	2.6	0.94	0.082 J	31	0.048 J	19	0.61	7.4
Benzo(a)anthracene	mg/kg	25	79	190000	320	0.13	ND	3	2.2	ND	70	0.17	20	1.1	13
Benzo(a)pyrene	mg/kg	2.5	46	190000	46	0.1	ND	2 J	1.7	ND	47	0.18	13	1.4	11
Benzo(b)fluoranthene	mg/kg	25	120	190000	170	0.24	ND	5.5	3.7	1.5	47	0.39	14	1.8	16
Benzo(ghi)perylene	mg/kg	13000	180	190000	180	0.078 J	ND	1.1 J	1.5	0.11 J	23	0.11	6.7	1.6	8.2
Benzo(k)fluoranthene	mg/kg	250	610	190000	610	ND	ND	ND	ND	ND	22	0.053 J	6.8	ND	ND
bis(2-Ethylhexyl) phthalate	mg/kg	1300	130	10000	130	0.24 J	ND	ND	ND	0.34 J	ND	ND	ND	ND	ND
Carbazole	mg/kg	900	21	190000	83	0.036 J	ND	1.3 J	0.16 J	0	5.6	0.022 J	12	0.12 J	1.9
Chrysene	mg/kg	2500	230	190000	230	0.12	ND	3.2	2.3	0.19 J	56	0.16	17	0.98	12
Dibenz(a,h)anthracene	mg/kg	2.5	41	190000	160	0.03 J	ND	ND	0.27 J	ND	7.1	0.042 J	2.3	0.3 J	2.2
Fluoranthene	mg/kg	8800	3200	190000	3200	0.26	ND	5.6	3.3	0.37 J	150	0.22	52	2	40
Fluorene	mg/kg	8800	3000	190000	3800	0.071 J	ND	3.7	1.5	0.22 J	12	0.019 J	38	0.28 J	3.2
Indeno(1,2,3-cd)pyrene	mg/kg	25	7000	190000	28000	0.22	ND	5	2.5	0.061 J	22	0.074 J	5.7	1.1	7
Naphthalene	mg/kg	4400	25	190000	25	0.31	ND	4.8	4.9	0	2.4	0.086	170	0.44	0.63 J
Phenanthrene	mg/kg	66000	10000	190000	10000	0.29	ND	7.9	1.9	0.27 J	120	0.2	83	1.1	23
Phenol	mg/kg	130000	400	190000	400	ND	ND	ND	ND	ND	ND	ND	2.1	ND	ND
Pyrene	mg/kg	6600	2200	190000	2200	0.19	ND	4.5	3.1	0.3 J	110	0.19	31	1.3	25
PCBs															
Aroclor 1242	mg/kg	36	16	10000	62	ND	ND	ND	ND	0.087 J	ND	ND	ND	ND	ND

Table 3
Subsurface Soil Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	Residential Direct Contact MSC	Residential Soil to GW	Non-Residential Subsurface Direct Contact	Non-Residential Soil to GW	MW-7-0406	MW-8-0305	MW-9-1113	S-11-0911	S-12-1113	S-13-045065	S-14-045065	S-9-0507	TP4-0506	TP5-0506
Metals															
Aluminum	mg/kg	190000	0	190000	0	NA	NA	NA	NA	NA	NA	NA	NA	3250	4140
Antimony	mg/kg	88	27	190000	27	NA	NA	NA	NA	NA	NA	NA	NA	ND	0.39 B
Arsenic	mg/kg	12	150	190000	150	NA	NA	NA	NA	NA	NA	NA	NA	6.7	10.4
Barium	mg/kg	15000	8200	190000	8200	NA	NA	NA	NA	NA	NA	NA	NA	22 B	48.7
Beryllium	mg/kg	440	320	190000	320	NA	NA	NA	NA	NA	NA	NA	NA	0.19 B	0.36 B
Cadmium	mg/kg	47	38	190000	38	NA	NA	NA	NA	NA	NA	NA	NA	0.68 J	0.89 J
Cobalt	mg/kg	4400	73	190000	200	NA	NA	NA	NA	NA	NA	NA	NA	5.1 BE	8.1
Copper	mg/kg	8200	36000	190000	36000	NA	NA	NA	NA	NA	NA	NA	NA	17.4	34.5
Iron	mg/kg	66000	0	190000	0	NA	NA	NA	NA	NA	NA	NA	NA	10900 J	29100 J
Lead	mg/kg	500	450	190000	450	NA	NA	NA	NA	NA	NA	NA	NA	24.7	45.2
Manganese	mg/kg	31000	0	190000	0	NA	NA	NA	NA	NA	NA	NA	NA	188 J	245 J
Mercury	mg/kg	66	10	190000	10	NA	NA	NA	NA	NA	NA	NA	NA	0.13	0.073
Nickel	mg/kg	4400	650	190000	650	NA	NA	NA	NA	NA	NA	NA	NA	19.5	19
Selenium	mg/kg	1100	26	190000	26	NA	NA	NA	NA	NA	NA	NA	NA	0.33 B	0.79
Silver	mg/kg	1100	84	190000	84	NA	NA	NA	NA	NA	NA	NA	NA	0.14 B	0.2 B
Vanadium	mg/kg	1500	26000	190000	72000	NA	NA	NA	NA	NA	NA	NA	NA	13	17.4
Zinc	mg/kg	66000	12000	190000	12000	NA	NA	NA	NA	NA	NA	NA	NA	91.8	65.4

"mg/kg" indicates milligrams per kilogram or parts per million.

"ND" indicates not detected.

"NA" indicates not analyzed

"J" in organics indicates estimated value; in metals, indicates detected in blank.

"B" in metals indicates estimated value.

Exceeds MSC.

Table 4
Groundwater Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	Residential Used Aquifer MSC	Non-Residential Used Aquifer MSC	MW-7	MW-8	MW-8 DUPLICATE	MW-9
VOCs							
2-Butanone	µg/l	2800	5800	2.6 J	ND	NS	ND
Acetone	µg/l	3700	10000	5.7	ND	NS	ND
Benzene	µg/l	5	5	1.6	17 J	NS	ND
Carbon disulfide	µg/l	1900	4100	0.4 J	ND	NS	ND
Cyclohexane	µg/l	5	5	8	ND	NS	ND
Ethylbenzene	µg/l	700	700	1.6	6.3 J	NS	ND
Isopropylbenzene	µg/l	1100	2300	0.22 J	ND	NS	ND
Methylcyclohexane	µg/l	--	--	9.2	ND	NS	ND
Toluene	µg/l	1000	1000	3.6	7.7 J	NS	ND
Xylenes (total)	µg/l	10000	10000	9.6	ND	NS	ND
SVOCs							
1,1'-Biphenyl	µg/l	1800	5100	0.38 J	10	10 J	14
2,4-Dimethylphenol	µg/l	730	2000	1.1	35	50	150
2-Methylnaphthalene	µg/l	730	2000	3.1	190	170	110
2-Methylphenol	µg/l	1800	5100	1.1	42	77	36
4-Methylphenol	µg/l	180	510	3.1	120	230	150
Acenaphthene	µg/l	2200	3800	0.26	56	52	12
Acenaphthylene	µg/l	2200	6100	0.35	21	23	15
Acetophenone	µg/l	3700	10000	0.22 J	ND	1 J	ND
Anthracene	µg/l	66	66	0.4	49	49	13
Benzo(a)anthracene	µg/l	0.9	3.6	0.34	59	63	6.2
Benzo(a)pyrene	µg/l	0.2	0.2	0.21	38	40	3.5
Benzo(b)fluoranthene	µg/l	0.9	1.2	0.86	35	39	6.6
Benzo(ghi)perylene	µg/l	0.26	0.26	0.1 J	17	18	1.4
Benzo(k)fluoranthene	µg/l	0.55	0.55	0.11 J	21	22	1.5
bis(2-Ethylhexyl) phthalate	µg/l	6	6	0.43 J	ND	ND	ND
Caprolactam	µg/l	--	--	1.4 J	ND	ND	ND
Carbazole	µg/l	33	130	1.4	100	95	75
Chrysene	µg/l	1.9	1.9	0.32	44	48	5.3
Dibenz(a,h)anthracene	µg/l	0.09	0.36	0.034 J	6.6	7.1	0.5 J
Dibenzofuran	µg/l	5	5	1.2	100	97	40
Diethyl phthalate	µg/l	5000	5000	0.077 J	ND	ND	ND
Di-n-butyl phthalate	µg/l	3700	10000	0.12 J	ND	ND	ND
Di-n-octyl phthalate	µg/l	730	2000	ND	ND	0.24 J	ND
Fluoranthene	µg/l	260	260	0.95	140	140	24
Fluorene	µg/l	1500	1900	1.3	110	110	46
Indeno(1,2,3-cd)pyrene	µg/l	0.9	3.6	0.1 J	16	17	1.3
Naphthalene	µg/l	100	100	25	12000	13000	3200
Phenanthrene	µg/l	1100	1100	2.6	230	230	72
Phenol	µg/l	4000	4000	2.7	120	250	16
Pyrene	µg/l	130	130	0.69	110	100	17

Table 4
Groundwater Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	Residential Used Aquifer MSC	Non-Residential Used Aquifer MSC	MW-7	MW-8	MW-8 DUPLICATE	MW-9
Metals							
Aluminum-DISS	µg/l	200	200	9.7 B	6 B	5.1 B	122
Antimony-DISS	µg/l	6	6	0.94 B	0.52 B	0.53 B	97
Arsenic-DISS	µg/l	50	50	1.4	2.8	2.9	88
Barium-DISS	µg/l	2000	2000	51.4	268	252	96
Beryllium-DISS	µg/l	4	4	ND	ND	ND	112
Cadmium-DISS	µg/l	5	5	ND	ND	ND	100
Chromium-DISS	µg/l	100	100	2.6 J	3.6 J	3.6 J	103
Cobalt-DISS	µg/l	730	2000	0.68	1.1	1	1.1
Copper-DISS	µg/l	1000	1000	1.9 B	0.83 B	1.4 B	88 B
Iron-DISS	µg/l	300	300	ND	96.3 J	30.9 B J	104
Lead-DISS	µg/l	5	5	0.25 B J	0.27 B J	0.25 B J	107
Manganese-DISS	µg/l	50	50	59.5	520	490	100
Mercury-DISS	µg/l	2	2	ND	ND	ND	0.04 B J
Nickel-DISS	µg/l	100	100	1.1	3.6	3.6	90
Selenium-DISS	µg/l	50	50	3.3 B J	0.74 B J	0.35 B J	92 B J
Silver-DISS	µg/l	100	100	ND	ND	ND	101
Thallium-DISS	µg/l	2	2	0.058 B	0.12 B	0.054 B	0.019
Vanadium-DISS	µg/l	260	720	1.4	0.45 B	1.5	0.4
Zinc-DISS	µg/l	2000	2000	9.9	6.1	7.6	91

"µg/l" indicates micrograms per liter or parts per billion.
"J" in organics indicates estimated value; in metals, indicates detected in blank.
"NS" indicates no sample submitted.
"ND" indicated not detected.
"B" in metals indicates estimated value.
"--" indicates no Act 2 MSC published.
Exceeds MSC.

Table 5
Waste Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	EMBANKMENT	MW5-NAPL-0409	OIL-1	OIL-2
VOCs					
Benzene	mg/kg	ND	3	ND	ND
Ethylbenzene	mg/kg	ND	6.4	ND	ND
Isopropylbenzene	mg/kg	ND	1.1 J	ND	ND
Methylcyclohexane	mg/kg	ND	1.1 J	ND	ND
Methylene chloride	mg/kg	0.0013 J	ND	ND	ND
Tetrachloroethene	mg/kg	ND	0.45 J	ND	ND
Toluene	mg/kg	ND	4.2	ND	ND
Xylenes (total)	mg/kg	ND	25	ND	ND
SVOCs					
1,1'-Biphenyl	mg/kg	ND	990	ND	ND
2,4-Dimethylphenol	mg/kg	ND	38 J	ND	ND
2,4-Dinitrotoluene	mg/kg	ND	62 J	ND	ND
2-Methylnaphthalene	mg/kg	ND	4700	25	14
Acenaphthene	mg/kg	ND	2200	17	ND
Acenaphthylene	mg/kg	0.68 J	470	9.5 J	ND
Acetophenone	mg/kg	ND	5.4 J	ND	ND
Anthracene	mg/kg	ND	3000	21	ND
Benzo(a)anthracene	mg/kg	0.75 J	2500	27	ND
Benzo(a)pyrene	mg/kg	1.2 J	1800	ND	ND
Benzo(b)fluoranthene	mg/kg	10	1700	ND	ND
Benzo(ghi)perylene	mg/kg	1.5 J	820	ND	ND
Benzo(k)fluoranthene	mg/kg	ND	630	ND	ND
Carbazole	mg/kg	0.82 J	1200	ND	ND
Chrysene	mg/kg	1.8 J	2100	60	ND
Dibenz(a,h)anthracene	mg/kg	ND	330	ND	ND
Dibenzofuran	mg/kg	ND	3200	ND	ND
Di-n-butyl phthalate	mg/kg	ND	ND	8.4 J	ND
Fluoranthene	mg/kg	1.4 J	5600	43	ND
Fluorene	mg/kg	ND	3700	64	ND
Indeno(1,2,3-cd)pyrene	mg/kg	0.66 J	770	ND	ND
Naphthalene	mg/kg	ND	24000 E	8.1 J	4.1 J
Phenanthrene	mg/kg	0.34 J	9600 E	140	ND
Pyrene	mg/kg	1.9 J	4000	48	ND
PCBs					
Aroclor 1242	mg/kg	0.085 J	ND	ND	ND
Metals					
Antimony	mg/kg	0.66 B	NA	NA	NA
Aluminum	mg/kg	2830	NA	NA	NA
Arsenic	mg/kg	7.2	NA	NA	NA
Barium	mg/kg	129	NA	NA	NA
Beryllium	mg/kg	0.16 B	NA	NA	NA
Cadmium	mg/kg	0.83 J	NA	NA	NA
Calcium	mg/kg	23000 J	NA	NA	NA
Chromium	mg/kg	25.9	NA	NA	NA
Cobalt	mg/kg	5.5	NA	NA	NA
Copper	mg/kg	16.7	NA	NA	NA
Iron	mg/kg	8930 J	NA	NA	NA
Lead	mg/kg	83.5	NA	NA	NA
Magnesium	mg/kg	7570	NA	NA	NA
Manganese	mg/kg	226 J	NA	NA	NA
Mercury	mg/kg	0.057	NA	NA	NA
Nickel	mg/kg	38.2	NA	NA	NA
Potassium	mg/kg	315 B	NA	NA	NA
Selenium	mg/kg	0.23 B	NA	NA	NA
Silver	mg/kg	0.43 B	NA	NA	NA
Sodium	mg/kg	244 B	NA	NA	NA
Vanadium	mg/kg	28.3	NA	NA	NA
Zinc	mg/kg	116	NA	NA	NA

"mg/kg" indicates milligrams per kilogram or parts per million.

"ND" indicates not detected.

"NA" indicates not analyzed

"J" in organics indicates estimated value; in metals, indicates detected in blank.

"B" in metals indicates estimated value.

Table 6
Sediment Analytical Results
GAF Site
Erie, Pennsylvania
Project # 3410080643

Parameter	Units	SED-1	SEDIMENT 3	SED-4	SED-5	SED-6
VOCs						
Methylene chloride	mg/kg	ND	0.0017 J	ND	ND	ND
SVOCs						
2-Methylnaphthalene	mg/kg	ND	0.17 J	ND	0.024 J	ND
Acenaphthene	mg/kg	0.045 J	0.1 J	ND	0.048 J	0.069 J
Acenaphthylene	mg/kg	ND	0.24 J	0.023 J	0.27	ND
Anthracene	mg/kg	0.053 J	0.48 J	0.025 J	0.32	0.12 J
Benzo(a)anthracene	mg/kg	0.14	2	0.041 J	0.61	0.52
Benzo(a)pyrene	mg/kg	0.11 J	2.1	0.046 J	0.5	0.64
Benzo(b)fluoranthene	mg/kg	0.16	4.4	0.049 J	0.72	1.2
Benzo(ghi)perylene	mg/kg	0.09 J	1.6	ND	0.29	0.75
Benzo(k)fluoranthene	mg/kg	ND	0.9	0.025 J	ND	ND
bis(2-Ethylhexyl) phthalate	mg/kg	ND	0.9 J	0.036 J	0.055 J	0.46 J
Butyl benzyl phthalate	mg/kg	ND	ND	ND	ND	0.2 J
Carbazole	mg/kg	ND	0.26 J	ND	0.06 J	0.16 J
Chrysene	mg/kg	0.12 J	2.6	0.046 J	0.5	0.84
Dibenz(a,h)anthracene	mg/kg	ND	0.41 J	ND	0.073 J	0.12 J
Fluoranthene	mg/kg	0.36	5.7	0.097	1.3	1.9
Fluorene	mg/kg	0.026 J	0.25 J	ND	0.18	ND
Indeno(1,2,3-cd)pyrene	mg/kg	0.059 J	1.3	0.015 J	0.27	0.54
Naphthalene	mg/kg	ND	0.21 J	0.014 J	0.073 J	ND
Phenanthrene	mg/kg	0.18	2	0.057 J	0.9	0.81
Pyrene	mg/kg	0.26	3.5	0.057 J	0.77	1.2
PCBs						
Aroclor 1242	mg/kg	ND	0.083 J	ND	ND	ND
Aroclor 1254	mg/kg	0.84	ND	ND	ND	ND
Metals						
Aluminum	mg/kg	5110	3640	7040	5350	5300
Antimony	mg/kg	1.2 B	ND	ND	ND	ND
Arsenic	mg/kg	24.6	5.5	8	8.6	6
Barium	mg/kg	61.4	51	35.9	27.7	26
Beryllium	mg/kg	0.25 B	0.2 B	0.15 B	0.18 B	0.28 B
Cadmium	mg/kg	0.71 B J	2.1 J	0.52 B J	0.45 B J	0.53 B J
Cobalt	mg/kg	13	4.9 B	10.9	8	4.3 B
Copper	mg/kg	23.1	34.3	25.4	13.3	18.6
Iron	mg/kg	101000 J	12200 J	17800 J	14700 J	16900 J
Lead	mg/kg	35.9	41	6	12.3	23.9
Manganese	mg/kg	643 J	257 J	473 J	379 J	318 J
Mercury	mg/kg	ND	0.11	ND	ND	ND
Nickel	mg/kg	22.2	23.1	25.8	22.5	12.6
Selenium	mg/kg	ND	0.38 B	ND	ND	ND
Silver	mg/kg	0.28 B	0.63 B	0.23 B	0.19 B	0.12 B
Vanadium	mg/kg	17 B	9.9	24	20.7	10.1
Zinc	mg/kg	132	140	68.7	51	100
Total Organic Carbon	mg/kg	46300	NA	10800	25800	3880

"mg/kg" indicates milligrams per kilogram or parts per million
"ND" indicated not detected.
"J" in organics indicates estimated value; in metals, indicates detected in blank.
"B" in metals indicates estimated value.

FIGURES

DRAWN BY: NEL 5-6-2009 APPROVED BY: REC

SCALE 1:24000

1 0.5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET

ERIE QUADRANGLE

GAF MATERIALS
ERIE, PENNSYLVANIA

Project No.: 3410080643

MACTEC
Engineering & Consulting Inc.
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Pittsburgh, PA 15106

SITE LOCATION MAP
PHASE II INVESTIGATION

FIGURE: 1

1

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\FIG 1 Site Map.dwg

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LEGEND

MW-9 MONITORING WELL

SASSAFRAS STREET

60'

BAYFRONT PARKWAY - S.R. 4034
Section A00 R/W – Variable Width R/W

MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9

Creek
48" Conc Pipe
Walled Pit
Stock
Equipment
Tanks
Ramp
Elevated Concrete Loading Dock
Loading
Concrete Loading Dock
Bituminous & Conc. Drive Over
Bituminous Walkway
Existing Curbing
New Pavement

WAREHOUSE

PRESQUE ISLE BAY

100 0 100
SCALE: 1"=100'

Reference: Base map obtained from site survey

GAF MATERIALS
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Project No.: 3410080643

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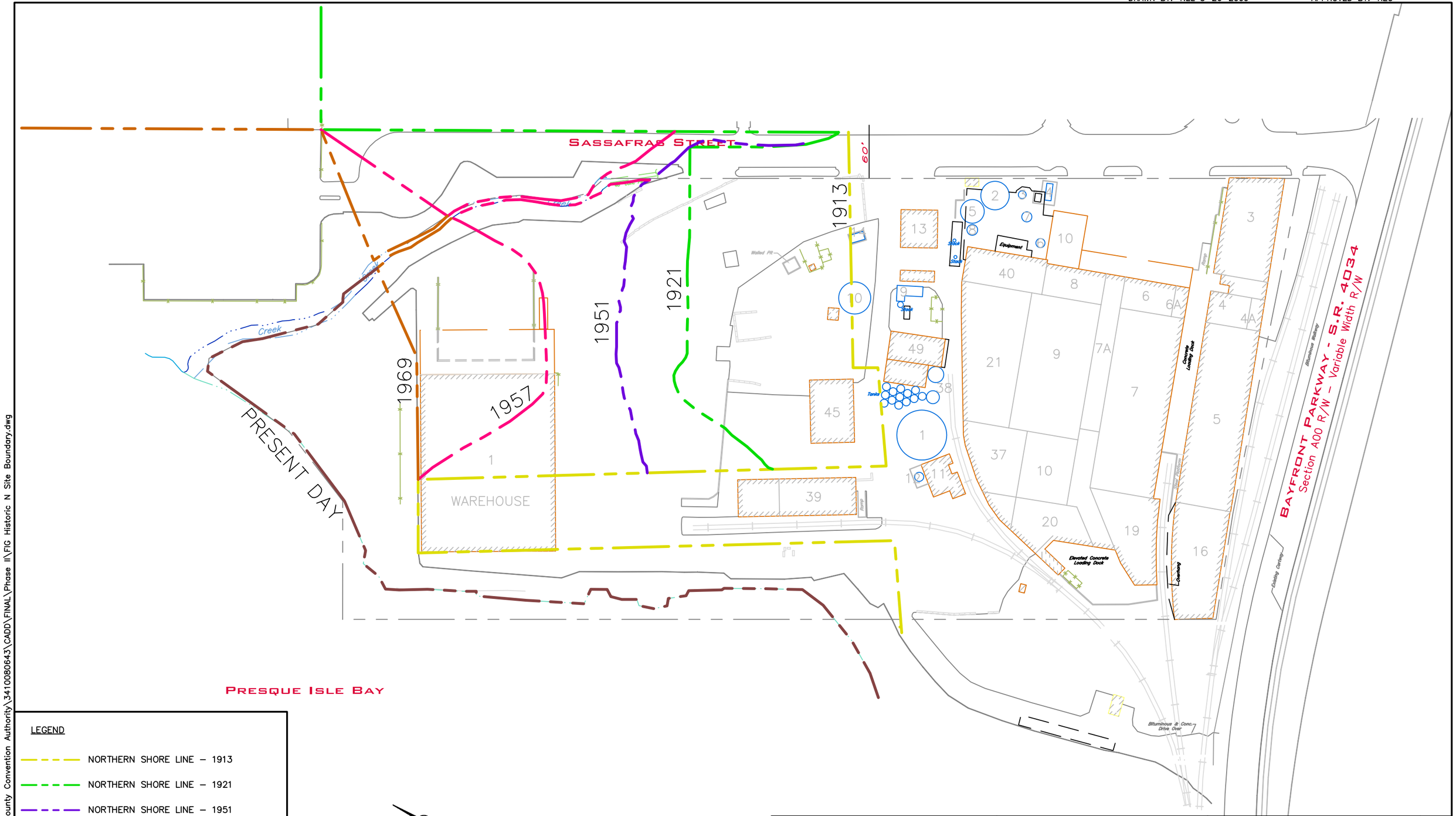
SITE PLAN
PHASE II INVESTIGATION
FIGURE: 2

2

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\FIG 2 Site Plan.dwg

DRAWN BY: NEL 5-26-2009 APPROVED BY: REC



LEGEND

- NORTHERN SHORE LINE – 1913
- NORTHERN SHORE LINE – 1921
- NORTHERN SHORE LINE – 1951
- NORTHERN SHORE LINE – 1957
- NORTHERN SHORE LINE – 1969
- NORTHERN SHORE LINE – PRESENT DAY

100 0 100
SCALE: 1"=100'

Reference: Base map obtained from site survey

GAF MATERIALS
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Project No.: 3410080643

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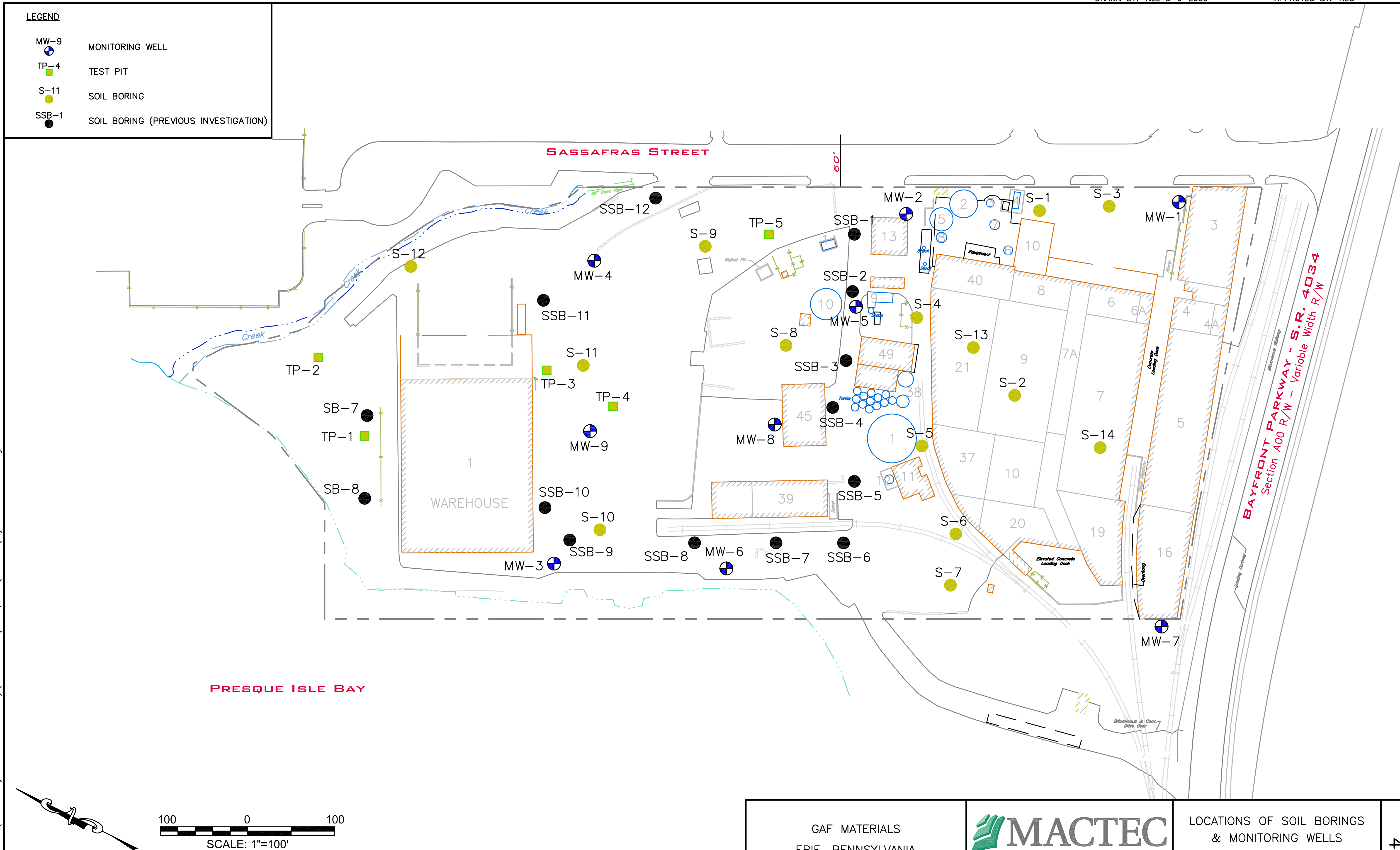
HISTORIC NORTHERN
SITE BOUNDARY
PHASE II INVESTIGATION
FIGURE: 3

3

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\FIG Historic N Site Boundary.dwg

DRAWN BY: NEL 5-6-2009 APPROVED BY: REC



Reference: Base map obtained from site survey

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\Fig 4 SBs & MWs.dwg

GAF MATERIALS
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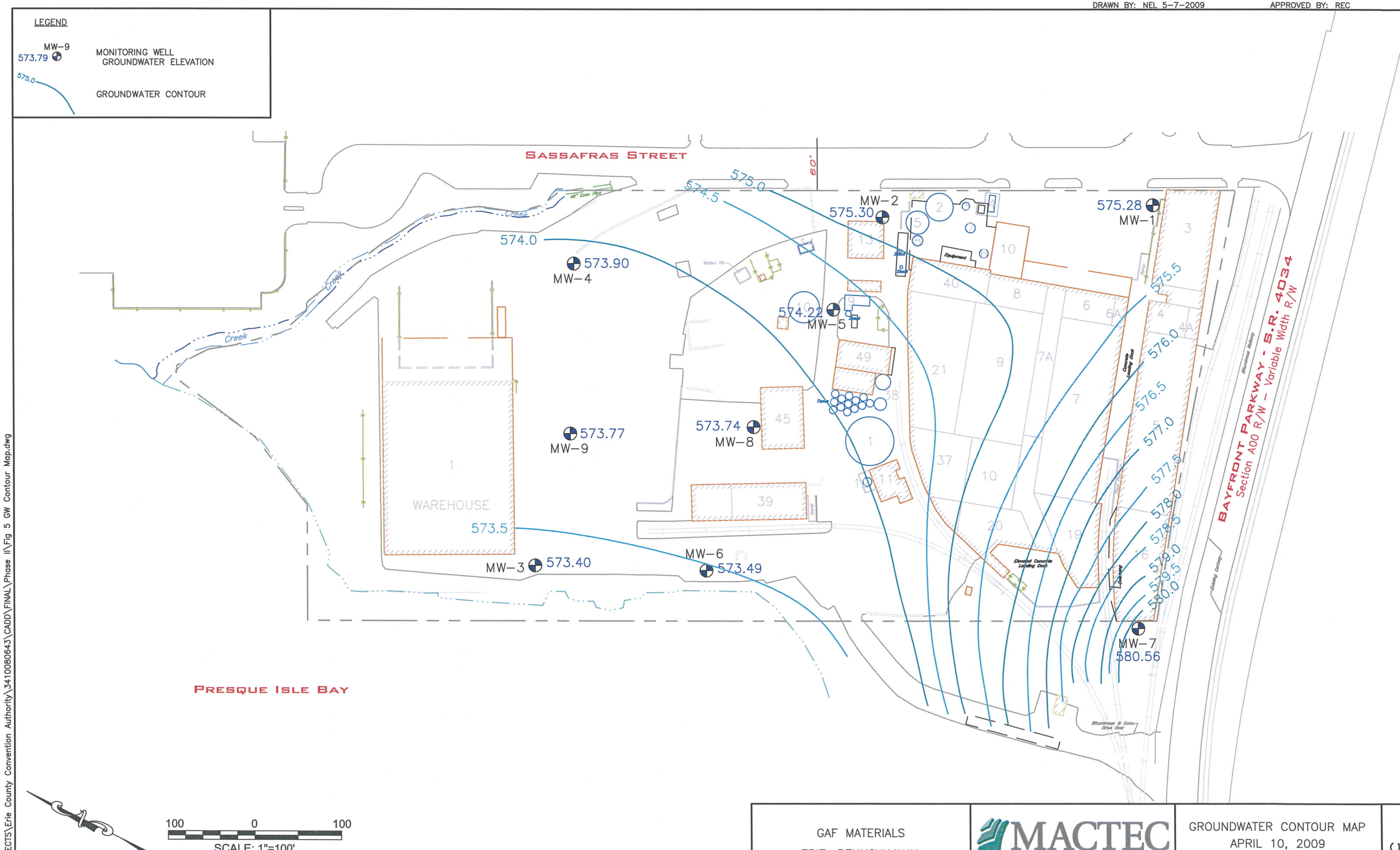
LOCATIONS OF SOIL BORINGS & MONITORING WELLS PHASE II INVESTIGATION

FIGURE: 4

4

DRAWN BY: NEL 5-7-2009 APPROVED BY: REC



P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\Fig 5 GW Contour Map.dwg

Reference: Base map obtained from site survey

GAF MATERIALS
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GROUNDWATER CONTOUR MAP
APRIL 10, 2009
PHASE II INVESTIGATION
FIGURE: 5

5

DRAWN BY: NEL 5-6-2009 APPROVED BY: REC

LEGEND

- MW-9 — MONITORING WELL
- WIPE-1 — PCB WIPE & ASBESTOS DUST SAMPLING LOCATIONS
- OIL-1 — WASTE OIL SAMPLING LOCATION
- ASB-1 — EMBANKMENT & TARPAPER SAMPLING LOCATIONS
- SED-3 — SEDIMENT SAMPLING LOCATIONS

SASSAFRAS STREET

60'

BAYFRONT PARKWAY - S.R. 4034
Section A00 R/W – Variable Width R/W

SED-6

MW-4

MW-2

MW-1

OIL-1

OIL-2

MW-5

ASB-3

SED-5

SED-4

MW-9

MW-8

ASB-1

WIPE-1

WIPE-2

ASB-2

EMBANKMENT

SED-3

MW-3

MW-6

ASB-OUT-4

SED-1

MW-7

WAREHOUSE

PRESQUE ISLE BAY

Creek

Equipment

Tanks

Elevated Concrete Loading Dock

Bituminous & Conc. Drive Over

Railway

100 0 100

SCALE: 1"=100'

Reference: Base map obtained from site survey

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\FIG 6 Sampling Locations.dwg

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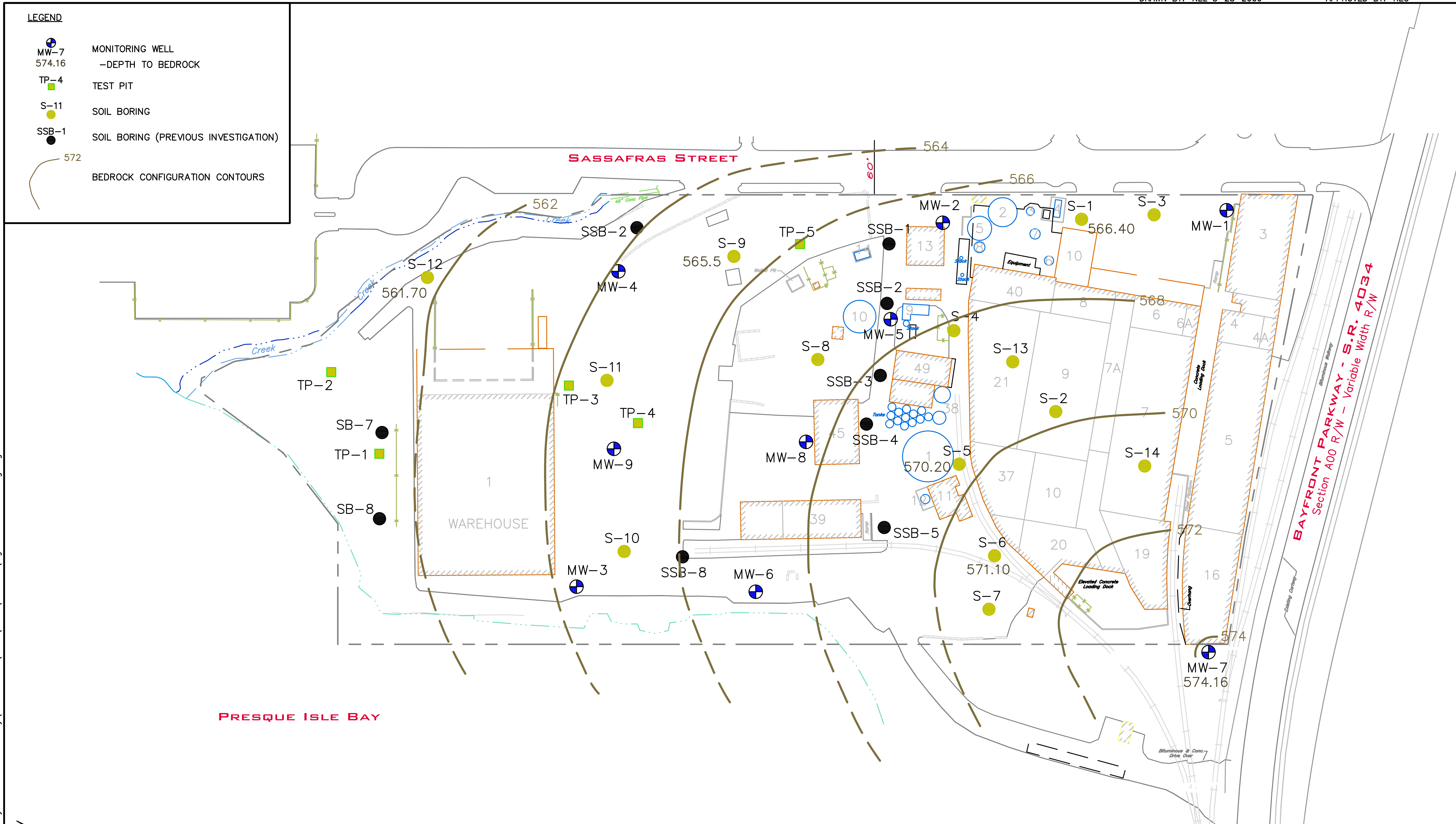
ASBESTOS, OIL, EMBANKMENT & SEDIMENT SAMPLING LOCATIONS
PHASE II INVESTIGATION
FIGURE: 6

6

DRAWN BY: NEL 5-28-2009 APPROVED BY: REC



100 0 100

SCALE: 1"=100'

Reference: Base map obtained from site survey

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\Fig 7 Bedrock Config.dwg

GAF MATERIALS

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BEDROCK SURFACE CONFIGURATION PHASE II INVESTIGATION

FIGURE: 7

DRAWN BY: NEL 5-7-2009 APPROVED BY: REC

LEGEND

MW-9 MONITORING WELL

TP-4 TEST PIT

S-11 SOIL BORING

SSB-1 SOIL BORING

TP-5-0506	mg/kg
BENZO(A)PYRENE	11

SOIL SAMPLE & RESULTS EXCCEEDING ACT 2 RESIDENTIAL STANDARD.

TP-5-0506	mg/kg
BENZO(A)PYRENE	11

S-9-0103	mg/kg
BENZO(A)ANTHRACENE	6.5
BENZO(A)PYRENE	48
BENZO(B)FLUORANTHENE	50
CARBAZOLE	21
DIBENZ(A,H)ANTHRACENE	7
NAPTHALENE	230

S-9-0507	mg/kg
BENZO(A)PYRENE	13
NAPHTHALENE	170

S-4-0103	mg/kg
BENZO(A)ANTHRACENE	520
BENZO(A)PYRENE	520
BENZO(B)FLUORANTHENE	790
BENZO(G,H,I)PERYLENE	370
CARBAZOLE	70
CHRYSENE	500
DIBENZ(A,H)ANTHRACENE	120
INDENO(1,2,3-CD)PYRENE	360
NAPHTHALENE	300

S-3-0103	mg/kg
BENZO(A)PYRENE	8.4

S-1-0103	mg/kg
BENZO(A)PYRENE	91
DIBENZ(A,H)ANTHRACENE	21
INDENO(1,2,3-CD)PYRENE	49

S-8-002	mg/kg
BENZO(A)PYRENE	4.6

MW-8-0103	mg/kg
BENZO(A)ANTHRACENE	51
BENZO(A)PYRENE	41
BENZO(B)FLUORANTHENE	66
DIBENZ(A,H)ANTHRACENE	8.9
INDENO(1,2,3-CD)PYRENE	29

S-13-045065	mg/kg
BENZO(A)ANTHRACENE	70
BENZO(A)PYRENE	47
DIBENZ(A,H)ANTHRACENE	7.1

S-13-005025	mg/kg
TRICHLOROETHENE	1.2

MW-7-0002	mg/kg
BENZO(A)PYRENE	19
BENZO(B)FLUORANTHENE	27
DIBENZ(A,H)ANTHRACENE	3.9

SASSAFRAS STREET

PRESQUE ISLE BAY

BAYFRONT PARKWAY - S.R. 4034 Section 400 R/W - Variable Width R/W

MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7 MW-8 MW-9

TP-1 TP-2 TP-3 TP-4 TP-5

S-1 S-2 S-3 S-4 S-5 S-6 S-7 S-8 S-9 S-10 S-11 S-12 S-13 S-14

WAREHOUSE

100 0 100

SCALE: 1"=100'

Reference: Base map obtained from site survey

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\Fig 8 Soil Exceedances.dwg

GAF MATERIALS
ERIE, PENNSYLVANIA
Project No.: 3410080643

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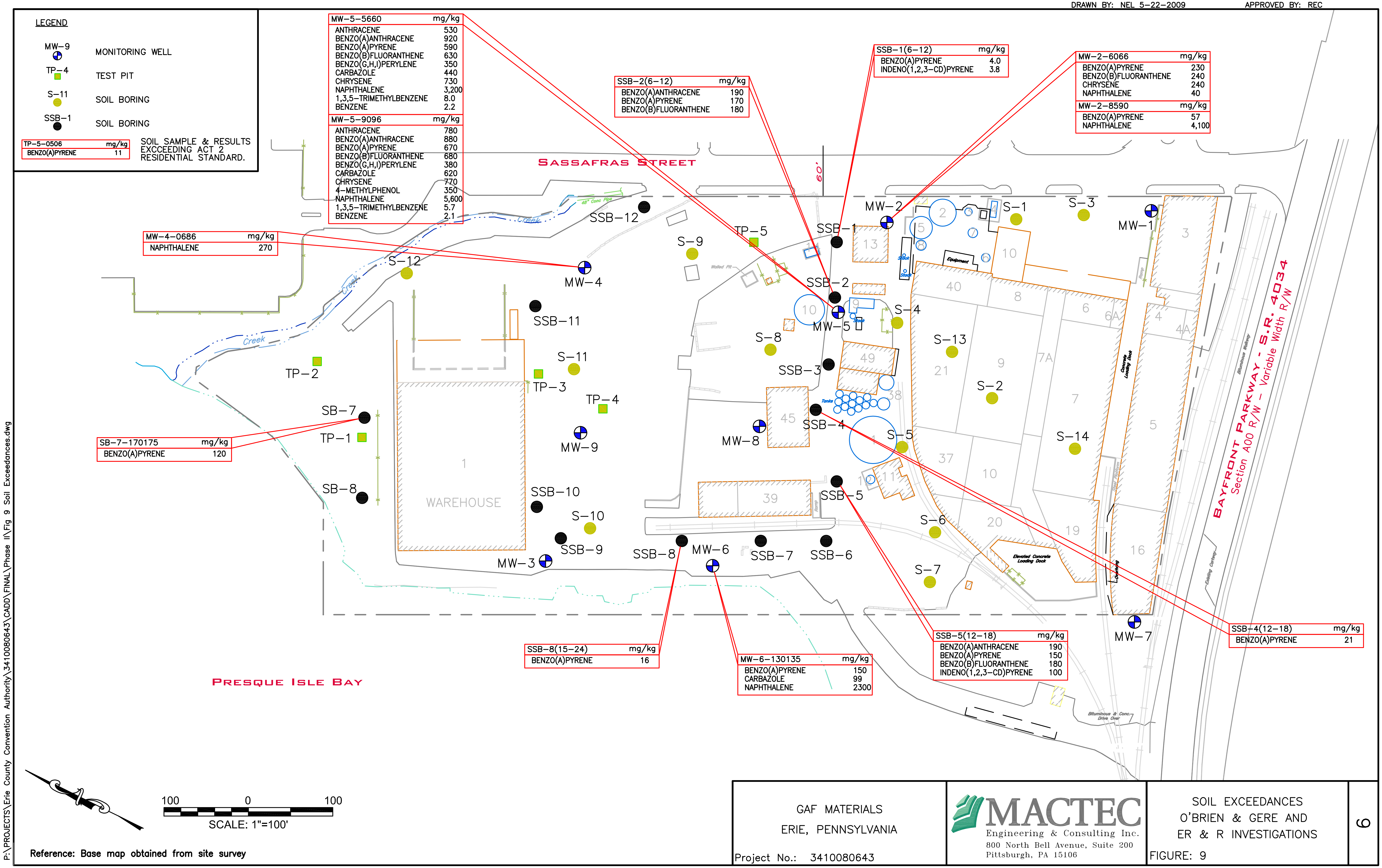
SOIL EXCEEDANCES
RESULTS IN mg/kg
PHASE II INVESTIGATION
FIGURE: 8

8


DRAWN BY: NEL 5-22-2009
APPROVED BY: REC
LEGEND
MW-9 MONITORING WELL
TP-4 TEST PIT
S-11 SOIL BORING
SSB-1 SOIL BORING
TP-5-0506 mg/kg BENZO(A)PYRENE 11
SOIL SAMPLE & RESULTS EXCCEEDING ACT 2 RESIDENTIAL STANDARD.
MW-5-5660 mg/kg
ANTHRACENE 530
BENZO(A)ANTHRACENE 920
BENZO(A)PYRENE 590
BENZO(B)FLUORANTHENE 630
BENZO(G,H,I)PERYLENE 350
CARBAZOLE 440
CHRYSENE 730
NAPHTHALENE 3,200
1,3,5-TRIMETHYLBENZENE 8.0
BENZENE 2.2
MW-5-9096 mg/kg
ANTHRACENE 780
BENZO(A)ANTHRACENE 880
BENZO(A)PYRENE 670
BENZO(B)FLUORANTHENE 680
BENZO(G,H,I)PERYLENE 380
CARBAZOLE 620
CHRYSENE 770
4-METHYLPHENOL 350
NAPHTHALENE 5,600
1,3,5-TRIMETHYLBENZENE 5.7
BENZENE 2.1
SSB-2(6-12) mg/kg
BENZO(A)ANTHRACENE 190
BENZO(A)PYRENE 170
BENZO(B)FLUORANTHENE 180
SSB-1(6-12) mg/kg
BENZO(A)PYRENE 4.0
INDENO(1,2,3-CD)PYRENE 3.8
MW-2-6066 mg/kg
BENZO(A)PYRENE 230
BENZO(B)FLUORANTHENE 240
CHRYSENE 240
NAPHTHALENE 40
MW-2-8590 mg/kg
BENZO(A)PYRENE 57
NAPHTHALENE 4,100
MW-4-0686 mg/kg
NAPHTHALENE 270
SB-7-170175 mg/kg
BENZO(A)PYRENE 120
SSB-8(15-24) mg/kg
BENZO(A)PYRENE 16
MW-6-130135 mg/kg
BENZO(A)PYRENE 150
CARBAZOLE 99
NAPHTHALENE 2300
SSB-5(12-18) mg/kg
BENZO(A)ANTHRACENE 190
BENZO(A)PYRENE 150
BENZO(B)FLUORANTHENE 180
INDENO(1,2,3-CD)PYRENE 100
SSB-4(12-18) mg/kg
BENZO(A)PYRENE 21
SASSAFRAS STREET
60'
PRESQUE ISLE BAY
BAYFRONT PARKWAY - S.R. 4034
Section A00 R/W - Variable Width R/W
Creek
WAREHOUSE
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
SSB-1
SSB-2
SSB-3
SSB-4
SSB-5
SSB-6
SSB-7
SSB-8
SSB-9
SSB-10
SSB-11
SSB-12
S-1
S-2
S-3
S-4
S-5
S-6
S-7
S-8
S-9
S-10
S-11
S-12
S-13
S-14
TP-1
TP-2
TP-3
TP-4
TP-5
SB-7
SB-8
100 0 100
SCALE: 1"=100'
Reference: Base map obtained from site survey
P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\Fig 9 Soil Exceedances.dwg

GAF MATERIALS
ERIE, PENNSYLVANIA
Project No.: 3410080643

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SOIL EXCEEDANCES
O'BRIEN & GERE AND
ER & R INVESTIGATIONS
FIGURE: 9

9

DRAWN BY: NEL 5-8-2009 APPROVED BY: REC

LEGEND

MW-9 MONITORING WELL

TP-4 TEST PIT

S-11 SOIL BORING

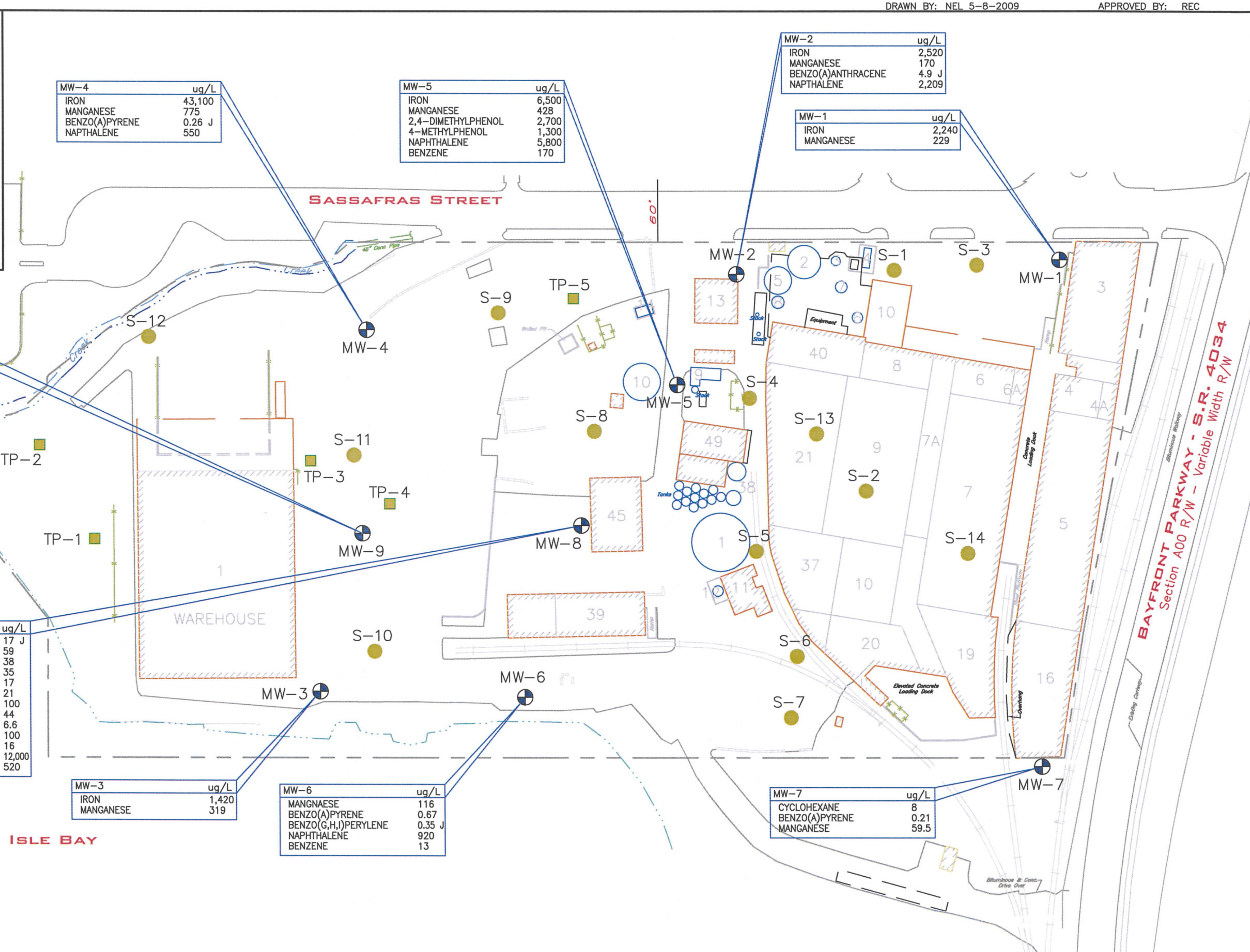
SSB-1 SOIL BORING

MW-7	ug/L
BENZO(A)PYRENE	0.21

GROUNDWATER SAMPLE RESULTS EXCEEDING ACT 2 RESIDENTIAL STATEWIDE HEALTH STANDARD FOR USED AQUIFERS.

NOTE

MONITORING WELLS MW-1 THROUGH MW-6 SAMPLED DECEMBER 2007
MONITORING WELLS MW-7 THROUGH MW-9 SAMPLED APRIL 2009



MW-1	ug/L
IRON	2,240
MANGANESE	229

MW-2	ug/L
IRON	2,520
MANGANESE	170
BENZO(A)ANTHRACENE	4.9 J
NAPTHALENE	2,209

MW-3	ug/L
IRON	1,420
MANGANESE	319

MW-4	ug/L
IRON	43,100
MANGANESE	775
BENZO(A)PYRENE	0.26 J
NAPTHALENE	550

MW-5	ug/L
IRON	6,500
MANGANESE	428
2,4-DIMETHYLPHENOL	2,700
4-METHYLPHENOL	1,300
NAPHTHALENE	5,800
BENZENE	170

MW-6	ug/L
MANGNAESE	116
BENZO(A)PYRENE	0.67
BENZO(G,H,I)PERYLENE	0.35 J
NAPHTHALENE	920
BENZENE	13

MW-7	ug/L
CYCLOHEXANE	8
BENZO(A)PYRENE	0.21
MANGANESE	59.5

MW-8 DUPLICATE	ug/L	MW-8	ug/L
4-METHYLPHENOL	230	BENZENE	17 J
BENZO(A)ANTHRACENE	63	BENZO(A)ANTHRACENE	59
BENZO(A)PYRENE	40	BENZO(A)PYRENE	38
BENZO(B)FLUORANTHENE	39	BENZO(B)FLUORANTHENE	35
BENZO(G,H,I)PERYLENE	18	BENZO(G,H,I)PERYLENE	17
BENZO(K)FLUORANTHENE	22	BENZO(K)FLUORANTHENE	21
CARBAZOLE	95	CARBAZOLE	100
CHRYSENE	48	CHRYSENE	44
DIBENZ(A,H)ANTHRACENE	7.1	DIBENZ(A,H)ANTHRACENE	6.6
DIBENZOFURAN	97	DIBENZOFURAN	100
INDENO(1,2,3-CD)PYRENE	17	INDENO(1,2,3-CD)PYRENE	16
NAPHTHALENE	13,000	NAPHTHALENE	12,000
MANGANESE	490	MANGANESE	520

MW-9	ug/L
BENZO(A)ANTHRACENE	6.2
BENZO(A)PYRENE	3.5
BENZO(B)FLUORANTHENE	6.6
BENZO(G,H,I)PERYLENE	1.4
BENZO(K)FLUORANTHENE	1.5
CARBAZOLE	75
CHRYSENE	5.3
DIBENZ(A,H)ANTHRACENE	0.5 J
DIBENZ(A,H)ANTHRACENE	40
INDENO(1,2,3-CD)PYRENE	13
NAPHTHALENE	3,200
MANGANESE	462

100 0 100
SCALE: 1"=100'

Reference: Base map obtained from site survey

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\Fig 10 GW Exceedances.dwg

GAF MATERIALS
ERIE, PENNSYLVANIA

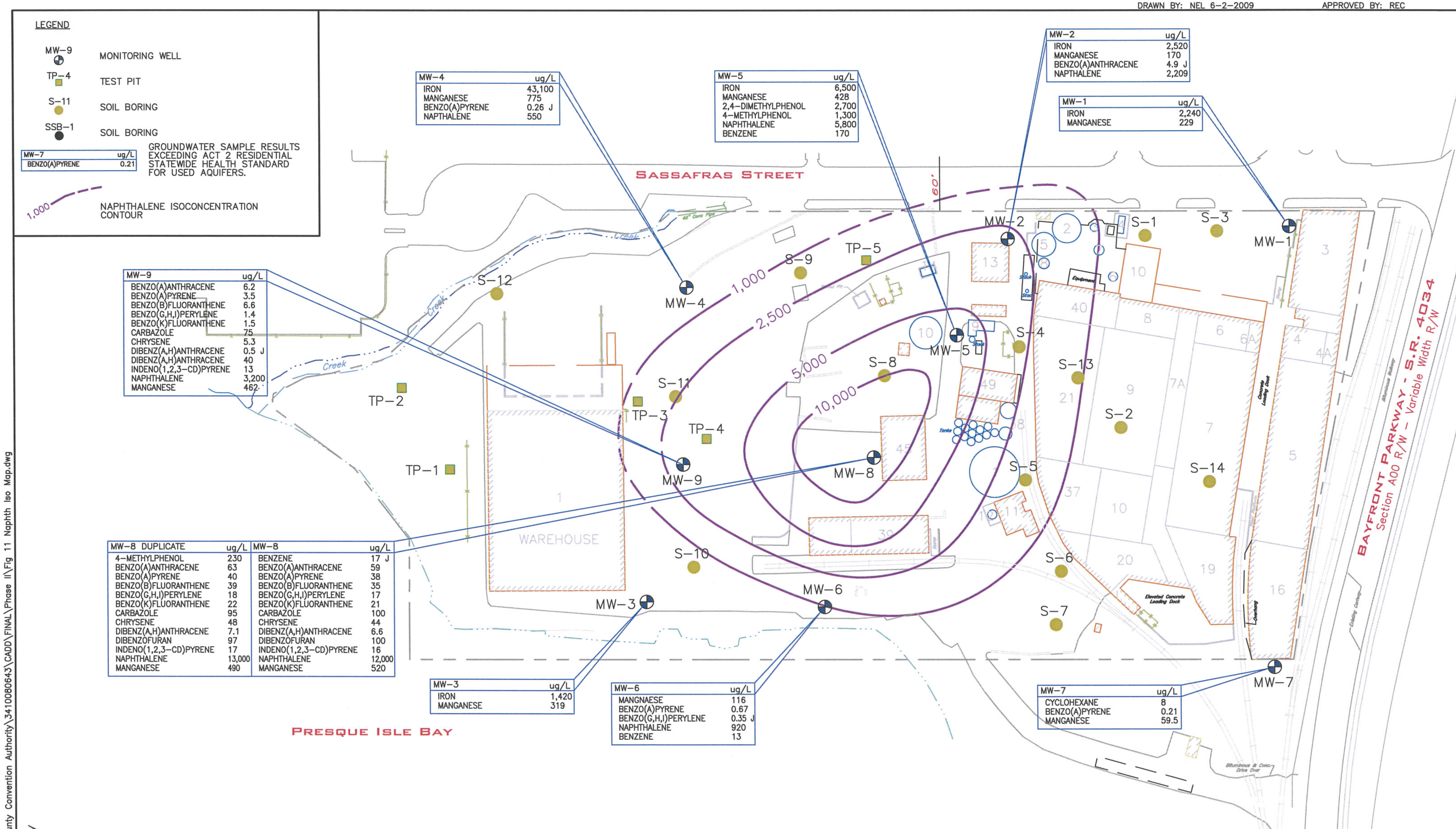
Project No.: 3410080643

MACTEC Engineering & Consulting Inc.
800 North Bell Avenue, Suite 200
Pittsburgh, PA 15106

GROUNDWATER EXCEEDANCES RESULTS IN ug/L
PHASE II INVESTIGATION

FIGURE: 10

10



MW-7	ug/L
BENZO(A)PYRENE	0.21

MW-4	ug/L
IRON	43,100
MANGANESE	775
BENZO(A)PYRENE	0.26 J
NAPTHALENE	550

MW-5	ug/L
IRON	6,500
MANGANESE	428
2,4-DIMETHYLPHENOL	2,700
4-METHYLPHENOL	1,300
NAPHTHALENE	5,800
BENZENE	170

MW-2	ug/L
IRON	2,520
MANGANESE	170
BENZO(A)ANTHRACENE	4.9 J
NAPTHALENE	2,209

MW-1	ug/L
IRON	2,240
MANGANESE	229

MW-9	ug/L
BENZO(A)ANTHRACENE	6.2
BENZO(A)PYRENE	3.5
BENZO(B)FLUORANTHENE	6.6
BENZO(G,H,I)PERYLENE	1.4
BENZO(K)FLUORANTHENE	1.5
CARBAZOLE	75
CHRYSENE	5.3
DIBENZ(A,H)ANTHRACENE	0.5 J
DIBENZ(A,H)ANTHRACENE	40
INDENO(1,2,3-CD)PYRENE	13
NAPHTHALENE	3,200
MANGANESE	462

MW-8 DUPLICATE	ug/L	MW-8	ug/L
4-METHYLPHENOL	230	BENZENE	17 J
BENZO(A)ANTHRACENE	63	BENZO(A)ANTHRACENE	59
BENZO(A)PYRENE	40	BENZO(A)PYRENE	38
BENZO(B)FLUORANTHENE	39	BENZO(B)FLUORANTHENE	35
BENZO(G,H,I)PERYLENE	18	BENZO(G,H,I)PERYLENE	17
BENZO(K)FLUORANTHENE	22	BENZO(K)FLUORANTHENE	21
CARBAZOLE	95	CARBAZOLE	100
CHRYSENE	48	CHRYSENE	44
DIBENZ(A,H)ANTHRACENE	7.1	DIBENZ(A,H)ANTHRACENE	6.6
DIBENZOFURAN	97	DIBENZOFURAN	100
INDENO(1,2,3-CD)PYRENE	17	INDENO(1,2,3-CD)PYRENE	16
NAPHTHALENE	13,000	NAPHTHALENE	12,000
MANGANESE	490	MANGANESE	520

MW-3	ug/L
IRON	1,420
MANGANESE	319

MW-6	ug/L
MANGNAESE	116
BENZO(A)PYRENE	0.67
BENZO(G,H,I)PERYLENE	0.35 J
NAPHTHALENE	920
BENZENE	13

MW-7	ug/L
CYCLOHEXANE	8
BENZO(A)PYRENE	0.21
MANGANESE	59.5

Reference: Base map obtained from site survey

P:\PROJECTS\Erie County Convention Authority\3410080643\CADD\FINAL\Phase II\Fig 11 Naphth Iso Map.dwg

GAF MATERIALS
ERIE, PENNSYLVANIA
Project No.: 3410080643

MACTEC
Engineering & Consulting Inc.
800 North Bell Avenue, Suite 200
Pittsburgh, PA 15106

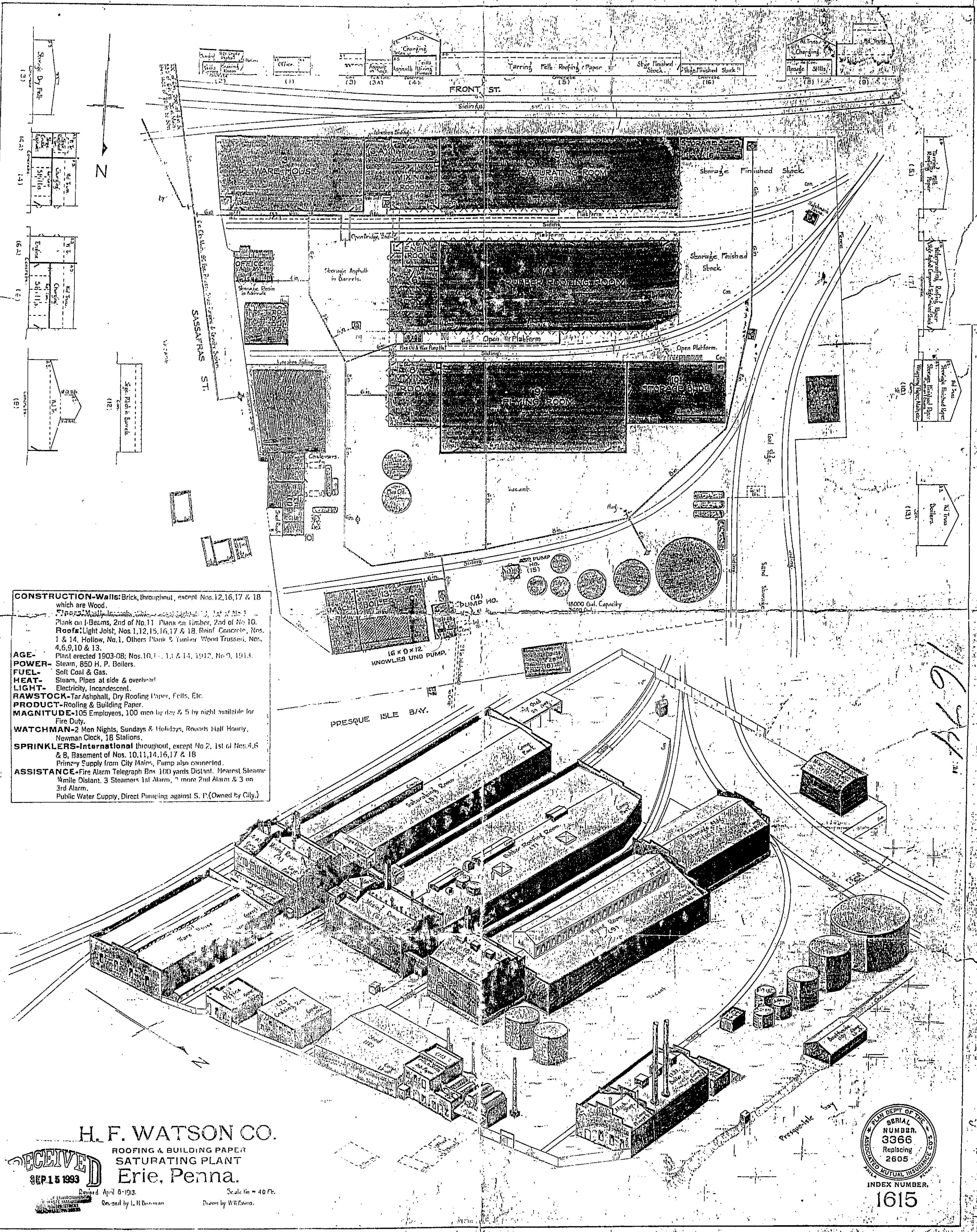
NAPHTHALENE ISOCONCENTRATION MAP
RESULTS IN ug/L
PHASE II INVESTIGATION

FIGURE: 11

11

APPENDIX A

HISTORICAL SANBORN AND TOPOGRAPHIC MAPS



CONSTRUCTION-Walls: Brick, throughout, except Nos.12,16,17 & 18 which are Wood.
Floors: Mostly Incomb. [illegible] 1st of No. 1 Plank on I-Beams, 2nd of No.11 Plank on Timber, 2nd of No 10.
Roofs: Light Joist, Nos. 1,12,15,16,17 & 18. Reinf. Concrete, Nos. 1 & 14. Hollow, No.1. Others Plank & Timber. Wood Trussed, Nos. 4,6,9,10 & 13.

AGE- Plant erected 1903-08; Nos.10,[illegible], 13 & 14, 1912, No 9, 1913.

POWER- Steam, 850 H. P. Boilers.

FUEL- Soft Coal & Gas.

HEAT- Steam, Pipes at side & overhead

LIGHT- Electricity, Incandescent.

RAWSTOCK-Tar Ashphalt, Dry Roofing Paper, Felts, Etc.

PRODUCT-Roofing & Building Paper.

MAGNITUDE-105 Employees, 100 men by day & 5 by night available for Fire Duty.

WATCHMAN-2 Men Nights, Sundays & Holidays, Rounds Half Hourly, Newman Clock, 18 Stations.

SPRINKLERS-International throughout, except No.2, 1st of Nos.4,6 & 8, Basement of Nos. 10,11,14,16,17 & 18
Primary Supply from City Mains, Pump also connected.

ASSISTANCE-Fire Alarm Telegraph Box 100 yards Distant. Nearest Steamer ¼mile Distant. 3 Steamers 1st Alarm, 2 more 2nd Alarm & 3 on 3rd Alarm.
Public Water Supply, Direct Pumping against S. P.(Owned by City.)

H. F. WATSON CO.

ROOFING & BUILDING PAPER
SATURATING PLANT
Erie, Penna.

Revised April 8-1913. Scale 1in = 40 Ft.
Revised by L. H. Bowman. Drawn by W.H.Evans.

PLAN DEPT OF THE ASSOCIATED MUTUAL INSURANCE CO'S. PHILA. PENNA.
SERIAL NUMBER. 3366 Replacing 2605
INDEX NUMBER. 1615

EDR Historical Topographic Map Report

GAF Site
218 West Bayfront Parkway
Erie, PA 16507

Inquiry Number: 1917818.4

May 03, 2007

EDR® Environmental Data Resources Inc

The Standard in Environmental Risk Information

440 Wheelers Farms Rd
Milford, Connecticut 06461

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

EDR Historical Topographic Map Report

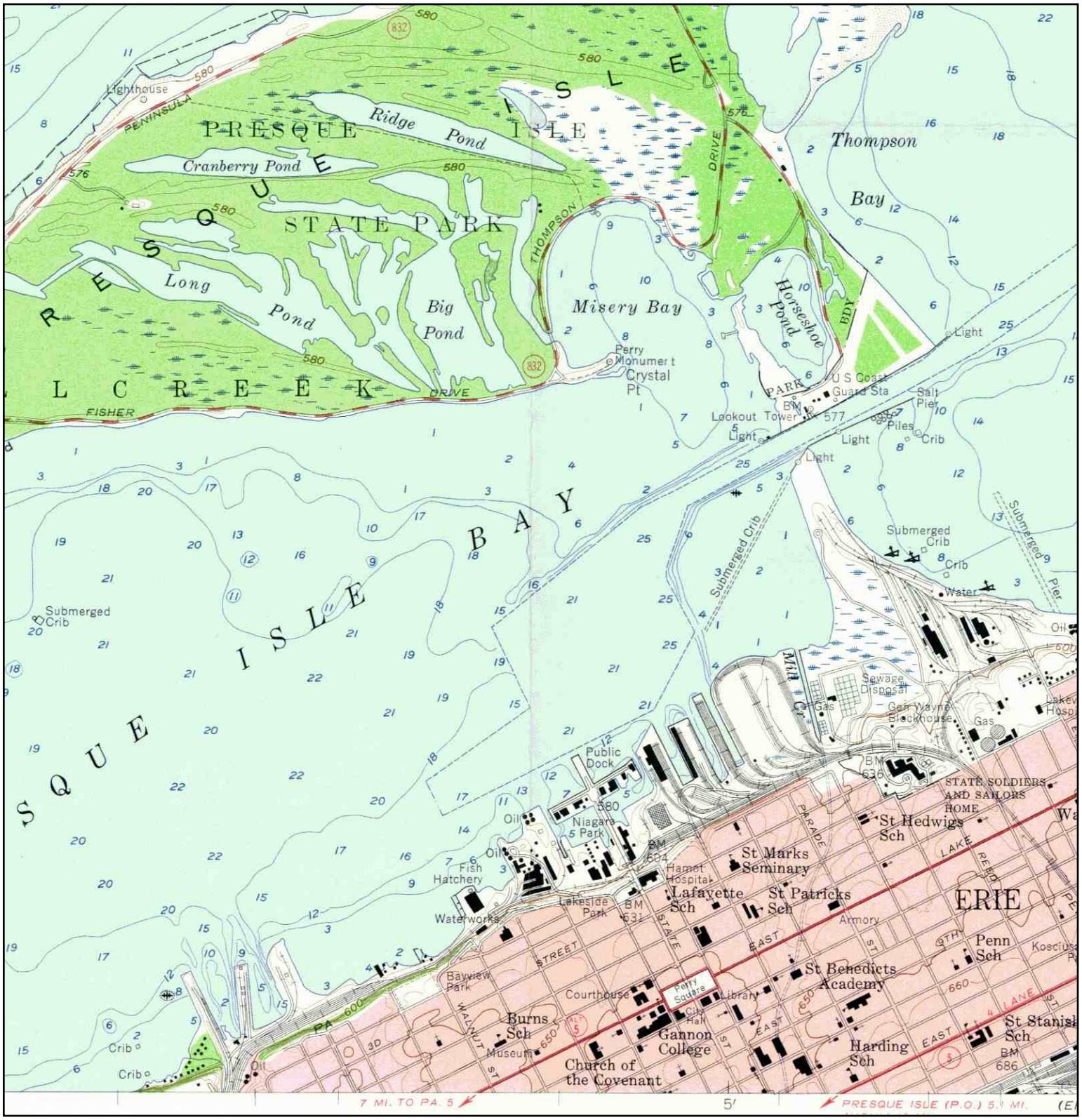
Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map

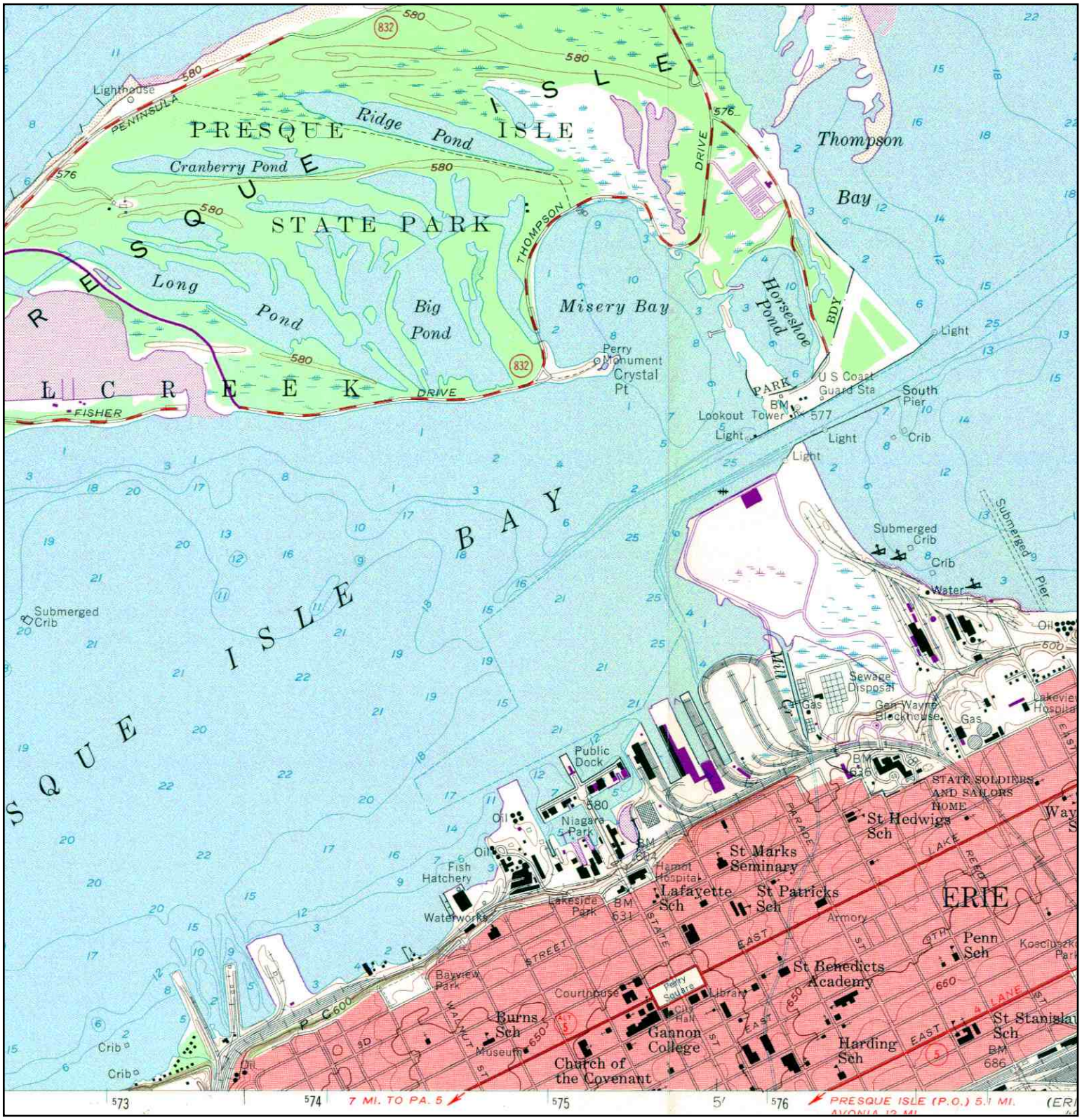
N	TARGET QUAD NAME: ERIE MAP YEAR: 1899 SERIES: 15 SCALE: 1:62500	SITE NAME: GAF Site ADDRESS: 218 West Bayfront Parkway Erie, PA 16507 LAT/LONG: 42.1336 / 80.0933	CLIENT: MACTEC, Inc. CONTACT: Pat Pontoriero INQUIRY#: 1917818.4 RESEARCH DATE: 05/03/2007

Historical Topographic Map



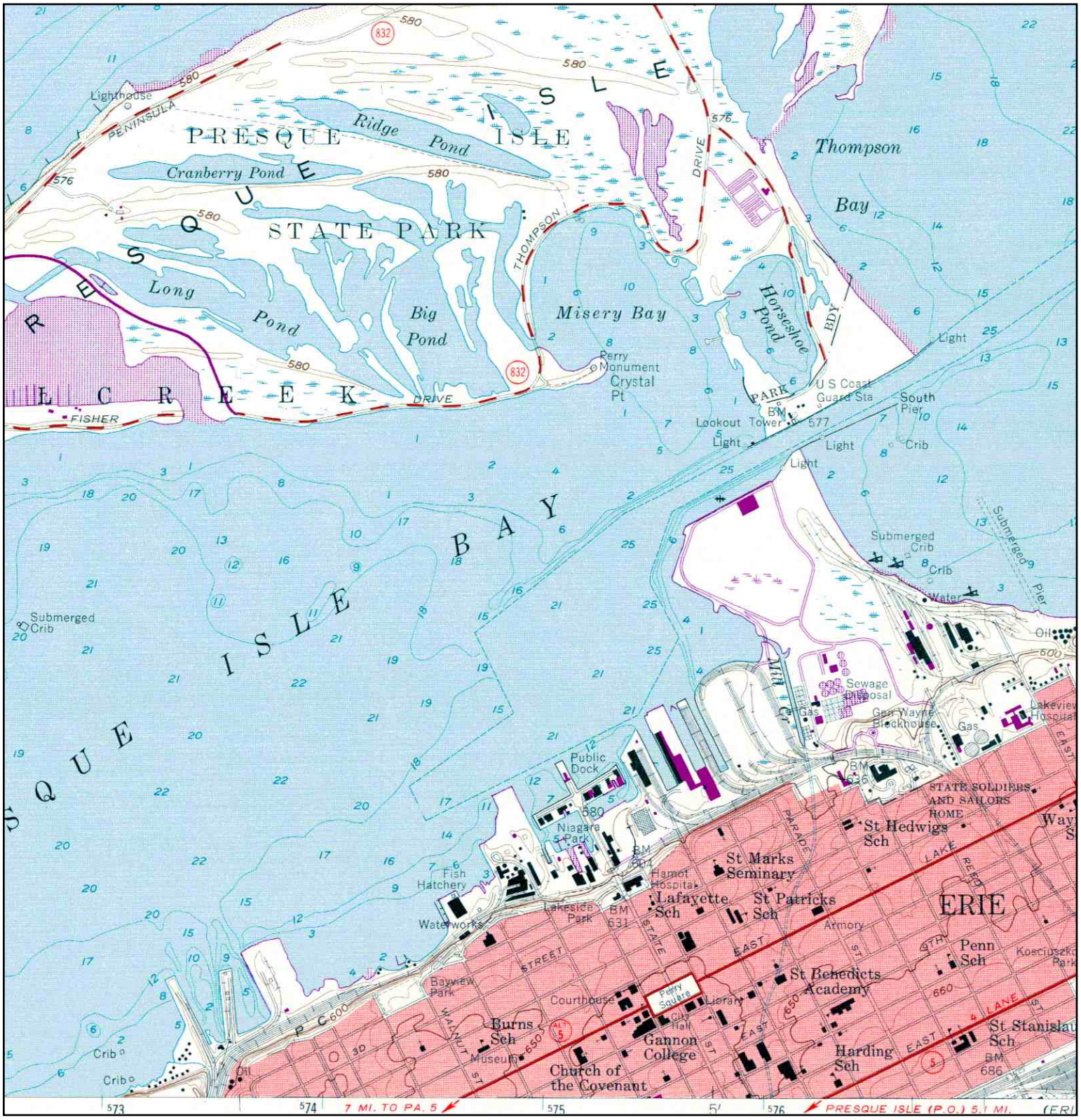
N	TARGET QUAD NAME: ERIE NORTH MAP YEAR: 1957 SERIES: 7.5 SCALE: 1:24000	SITE NAME: GAF Site ADDRESS: 218 West Bayfront Parkway Erie, PA 16507 LAT/LONG: 42.1336 / 80.0933	CLIENT: MACTEC, Inc. CONTACT: Pat Pontoriero INQUIRY#: 1917818.4 RESEARCH DATE: 05/03/2007

Historical Topographic Map



N	TARGET QUAD NAME: ERIE NORTH MAP YEAR: 1969 PHOTOREVISED FROM:1957 SERIES: 7.5 SCALE: 1:24000	SITE NAME: GAF Site ADDRESS: 218 West Bayfront Parkway Erie, PA 16507 LAT/LONG: 42.1336 / 80.0933	CLIENT: MACTEC, Inc. CONTACT: Pat Pontoriero INQUIRY#: 1917818.4 RESEARCH DATE: 05/03/2007

Historical Topographic Map

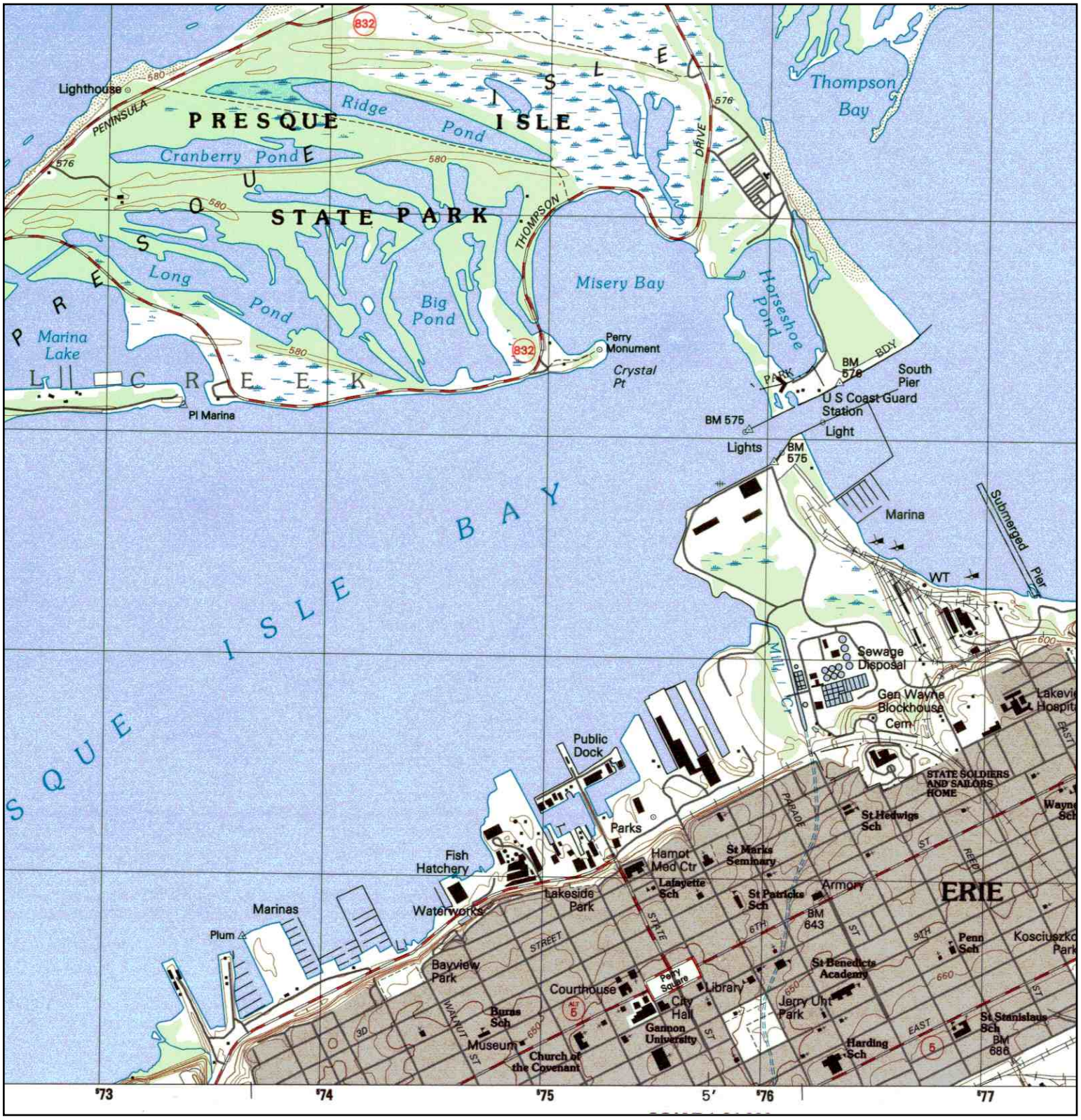


N	TARGET QUAD NAME: ERIE NORTH MAP YEAR: 1975 PHOTOREVISED FROM:1957 SERIES: 7.5 SCALE: 1:24000	SITE NAME: GAF Site ADDRESS: 218 West Bayfront Parkway Erie, PA 16507 LAT/LONG: 42.1336 / 80.0933	CLIENT: MACTEC, Inc. CONTACT: Pat Pontoriero INQUIRY#: 1917818.4 RESEARCH DATE: 05/03/2007

Historical Topographic Map

N	TARGET QUAD NAME: ERIE NORTH MAP YEAR: 1977 PHOTOINSPECTED FROM: 1957 SERIES: 7.5 SCALE: 1:24000	SITE NAME: GAF Site ADDRESS: 218 West Bayfront Parkway Erie, PA 16507 LAT/LONG: 42.1336 / 80.0933	CLIENT: MACTEC, Inc. CONTACT: Pat Pontoriero INQUIRY#: 1917818.4 RESEARCH DATE: 05/03/2007

Historical Topographic Map



N	TARGET QUAD NAME: ERIE NORTH MAP YEAR: 1996 SERIES: 7.5 SCALE: 1:24000	SITE NAME: GAF Site ADDRESS: 218 West Bayfront Parkway Erie, PA 16507 LAT/LONG: 42.1336 / 80.0933	CLIENT: MACTEC, Inc. CONTACT: Pat Pontoriero INQUIRY#: 1917818.4 RESEARCH DATE: 05/03/2007

"Linking Technology with Tradition"®

Sanborn® Map Report

Ship To: Pat Pontoriero
MACTEC, Inc.
700 N. Bell Avenue
Pittsburgh, PA 15106

Order Date: 5/4/2007 **Completion Date:** 5/4/2007
Inquiry #: 1920512.1s
P.O. #: NA
Site Name: GAF Site
Address: 218 West Bayfront Parkway
City/State: Erie, PA 16507
Cross Streets:

Customer Project: GAF
3171565KFG 412-279-6661

Based on client-supplied information, fire insurance maps for the following years were identified

1921 - 2 Maps
1950 - 2 Maps
1951 - 2 Maps
1965 - 2 Maps
1970 - 2 Maps

Limited Permission to Photocopy Total Maps: 10

USER'S GUIDE

This User's Guide provides guidelines for accessing Sanborn Map® images and for transferring them to your Word Processor.

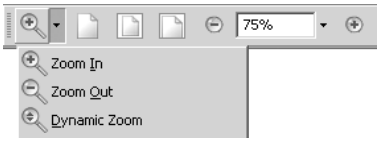
Reading Sanborn Maps

- Sanborn Maps document historical property use by displaying property information through words, abbreviations, and map symbols. The Sanborn Map Key provides information to help interpret the symbols and abbreviations used on Sanborn Maps. The Key is available from EDR's Web Site at: http://www.edrnet.com/reports/samples/key.pdf

Organization of Electronic Sanborn Image File

- Sanborn Map Report, listing years of coverage
- User's Guide
- Oldest Sanborn Map Image
- Most recent Sanborn Map Image

Navigating the Electronic Sanborn Image File



1. Open file on screen.
2. Identify TP (Target Property) on the most recent map.
3. Find TP on older printed images.
4. Using Acrobat® Reader®, zoom to 250% in order to view more clearly. (200-250% is the approximate equivalent scale of hardcopy Sanborn Maps.)
   A. On the menu bar, click "View" and then "Zoom to..."
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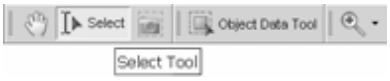
Printing a Sanborn Map From the Electonic File

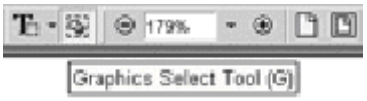
- EDR recommends printing images at 300 dpi (300 dpi prints faster than 600 dpi)
- To print only the TP area, cut and paste from Acrobat to your word processor application.

Acrobat Versions 6 and 7



1. Go to the menu bar
2. Click the "Select Tool"
3. Draw a box around the area selected
4. "Right click" on your mouse
5. Select "Copy Image to Clipboard"
6. Go to Word Processor such as Microsoft Word, paste and print.

Acrobat Version 5



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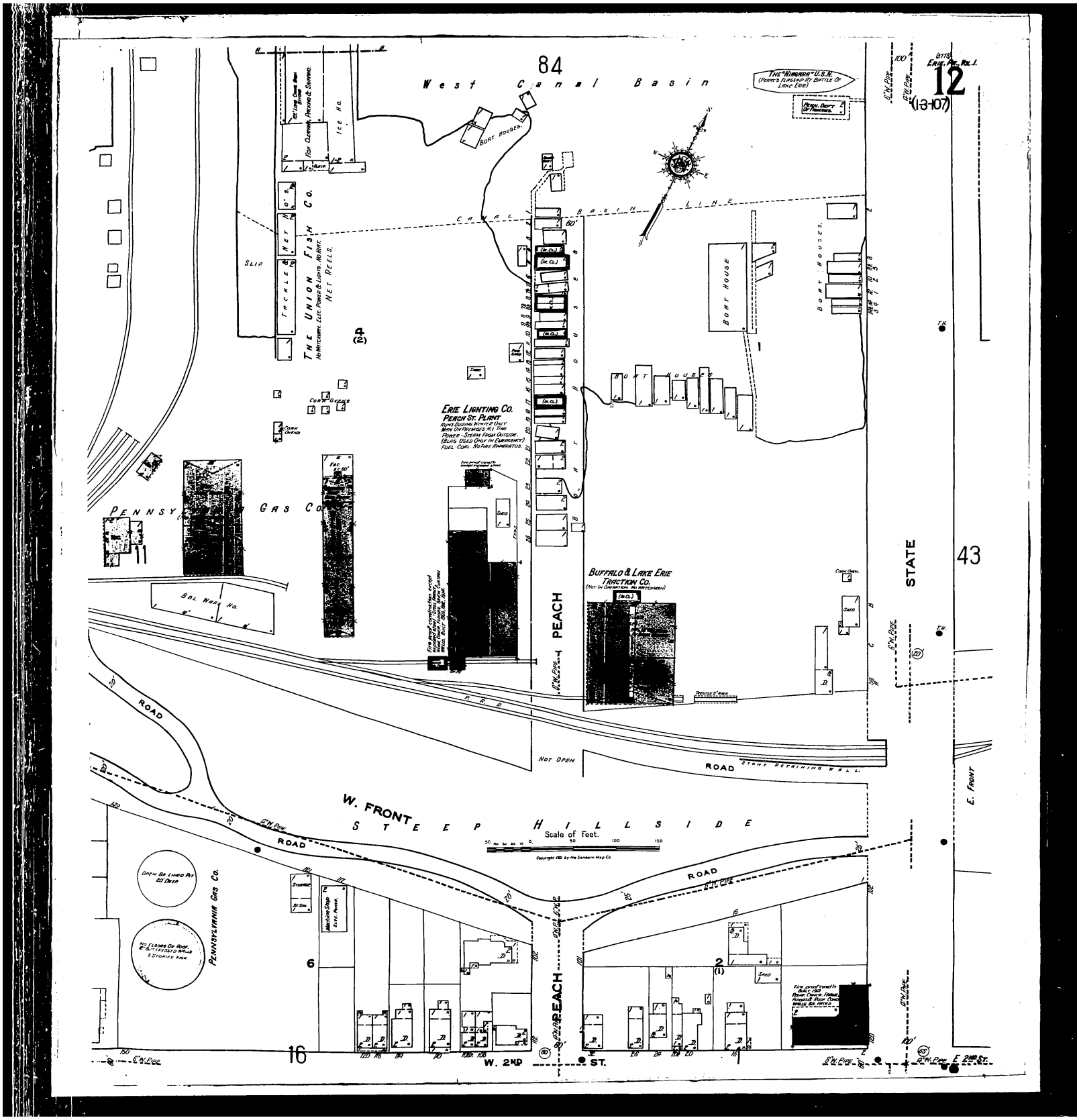

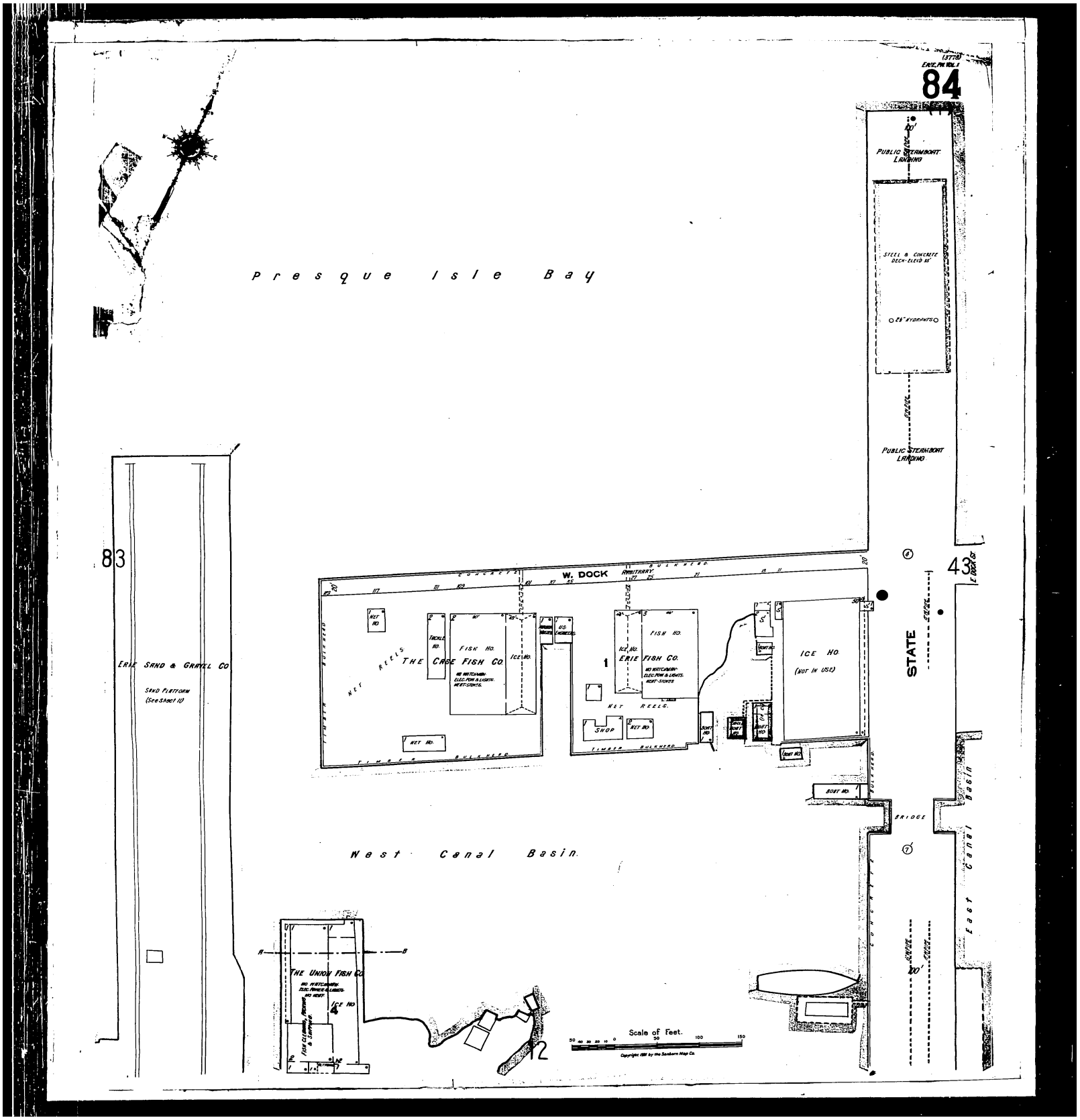

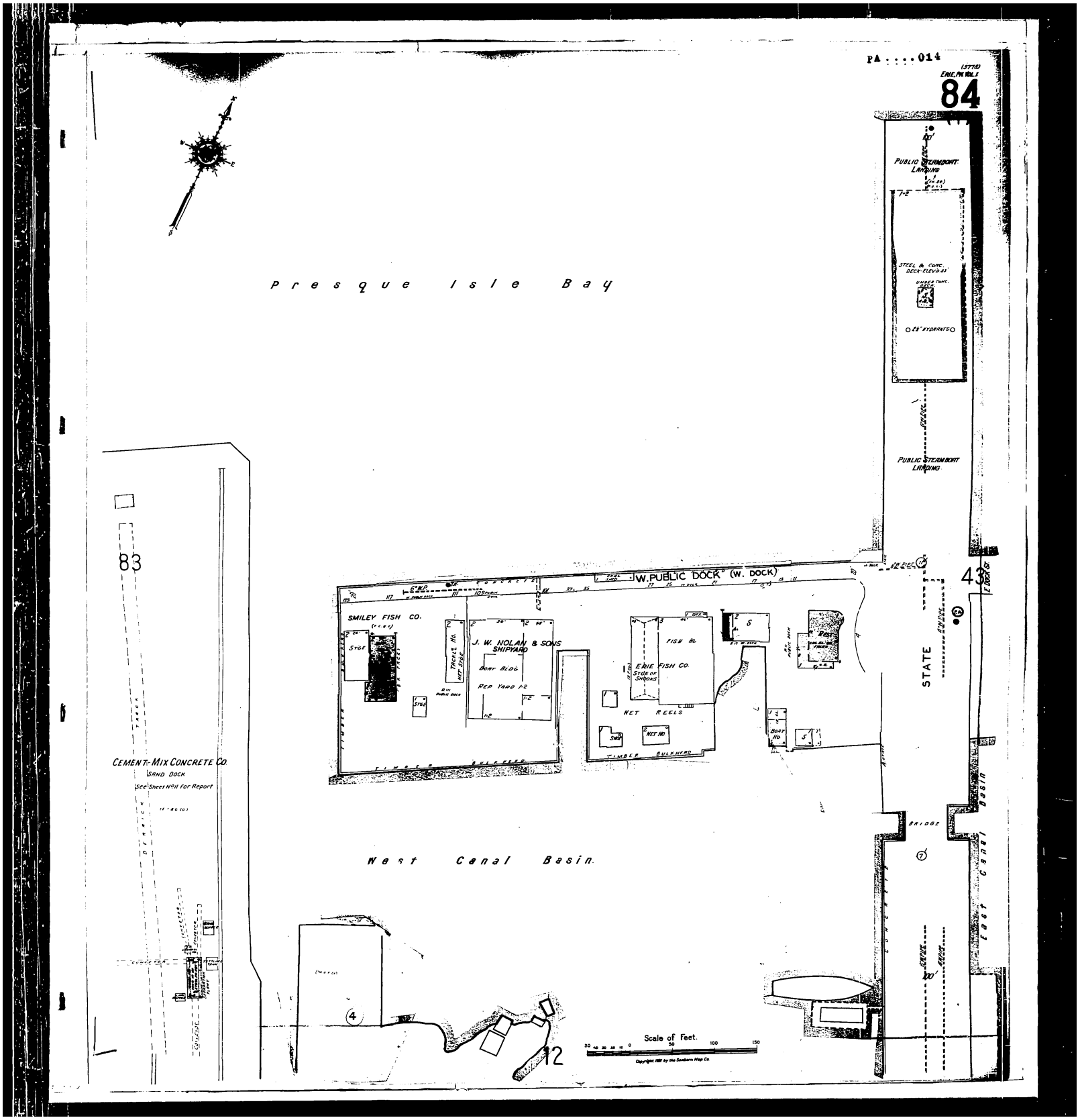

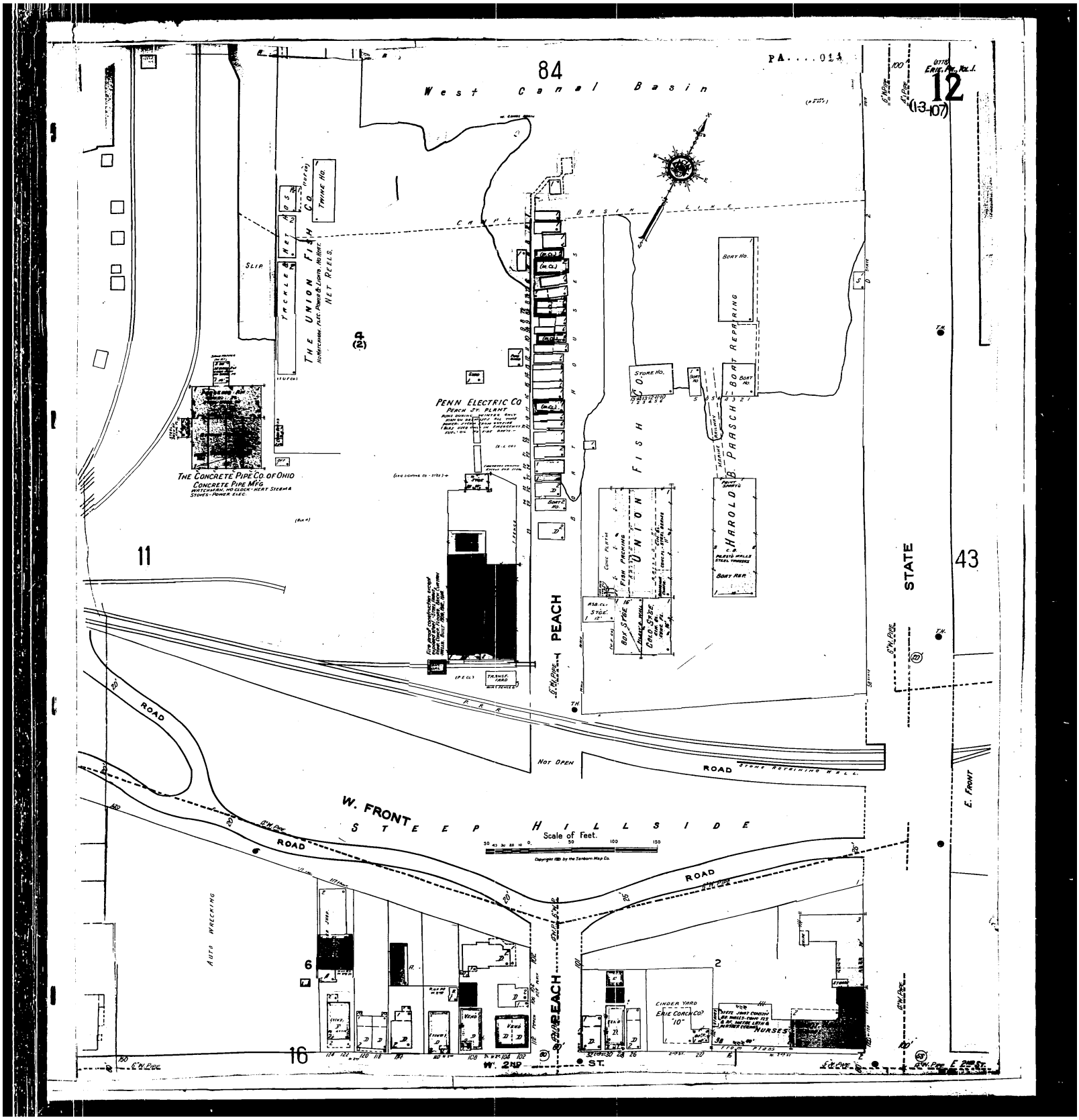

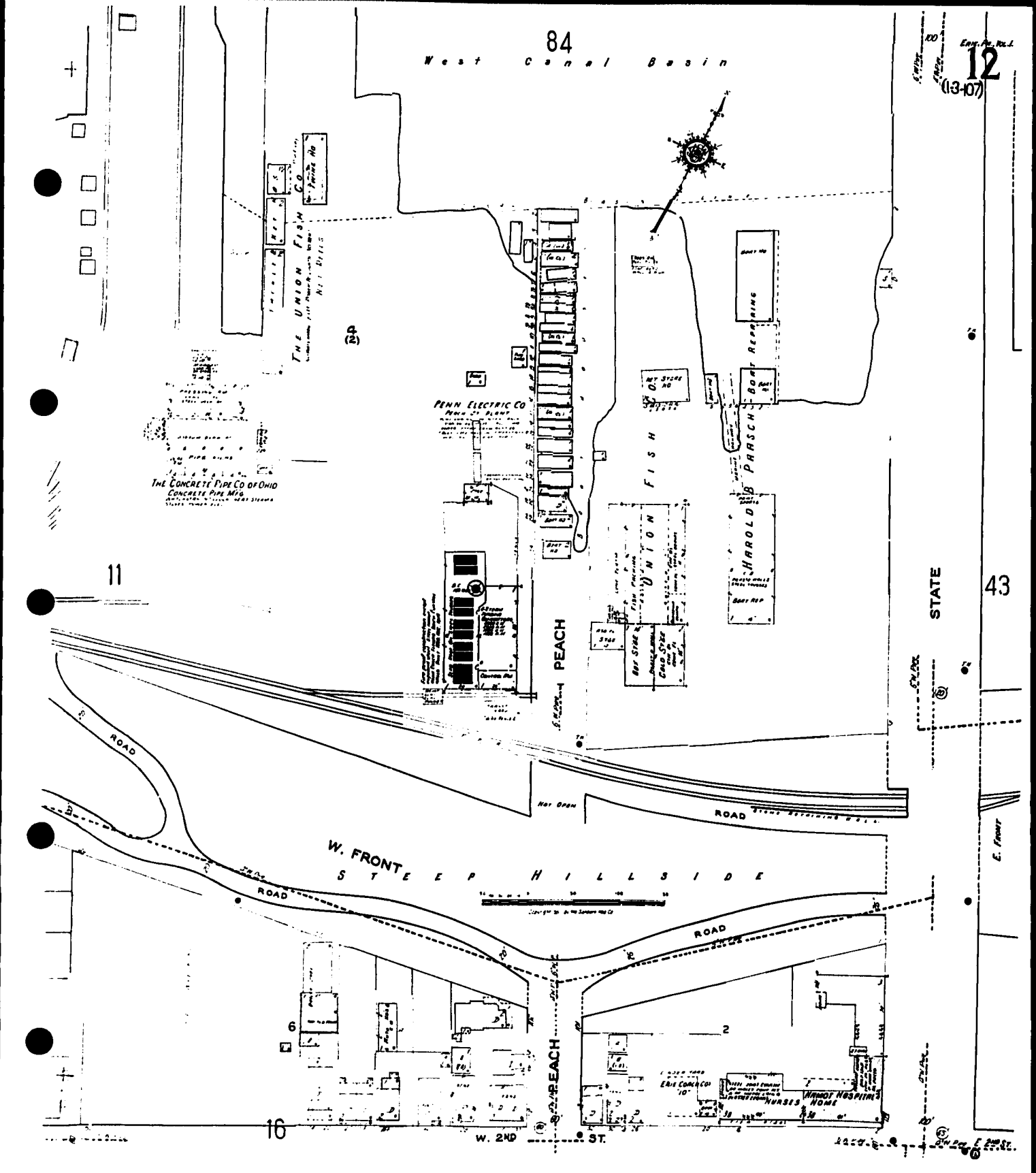

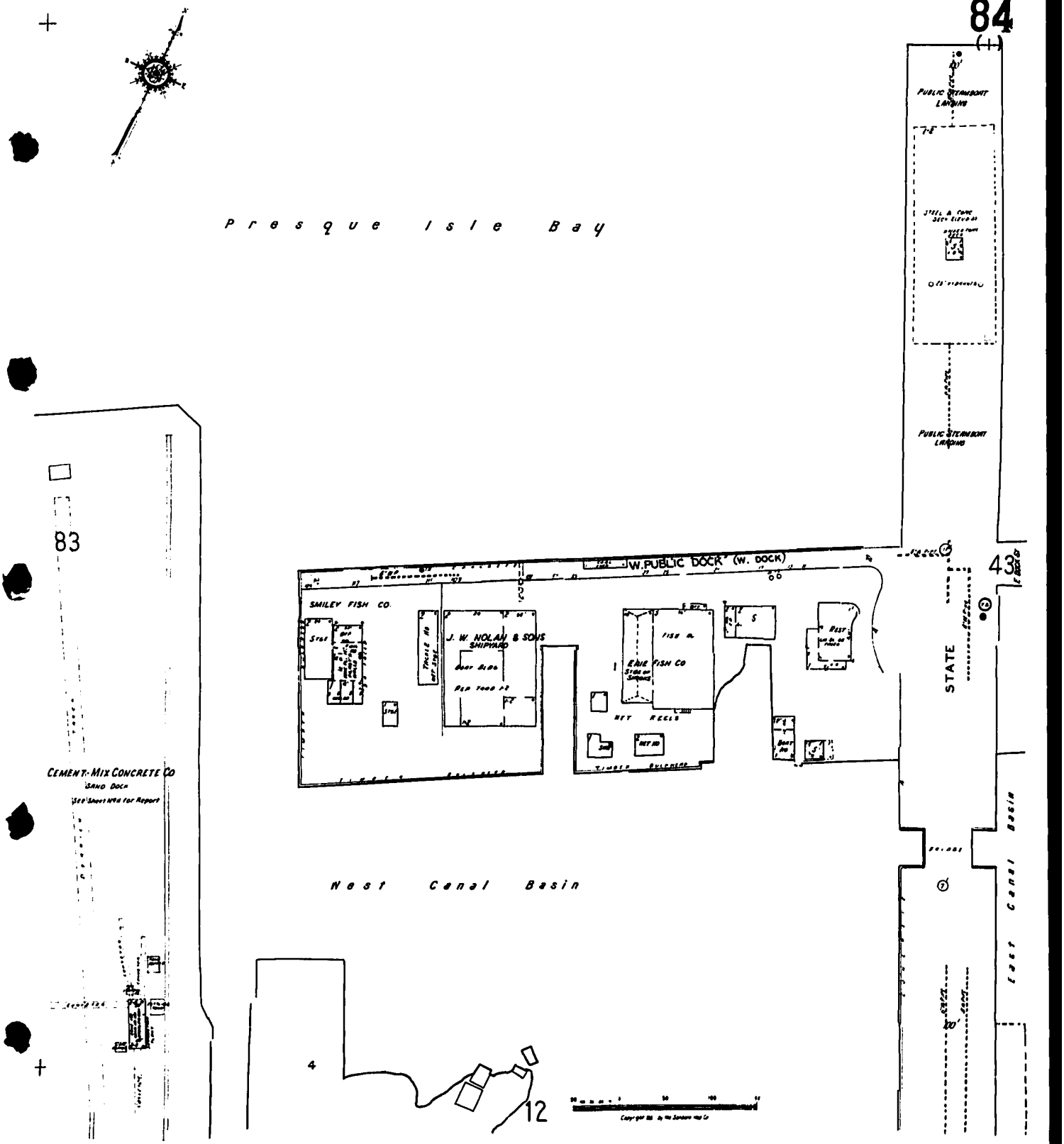

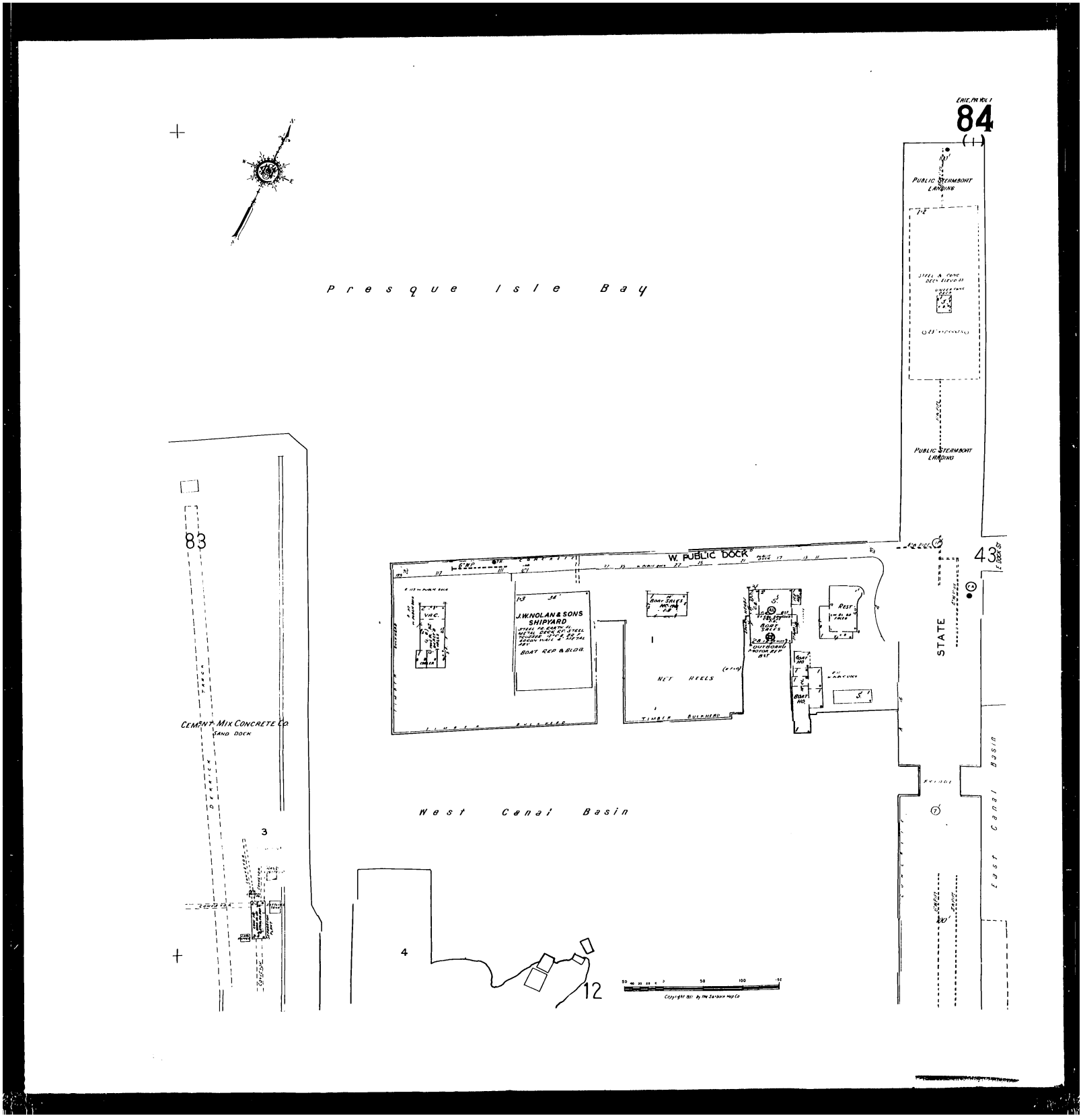

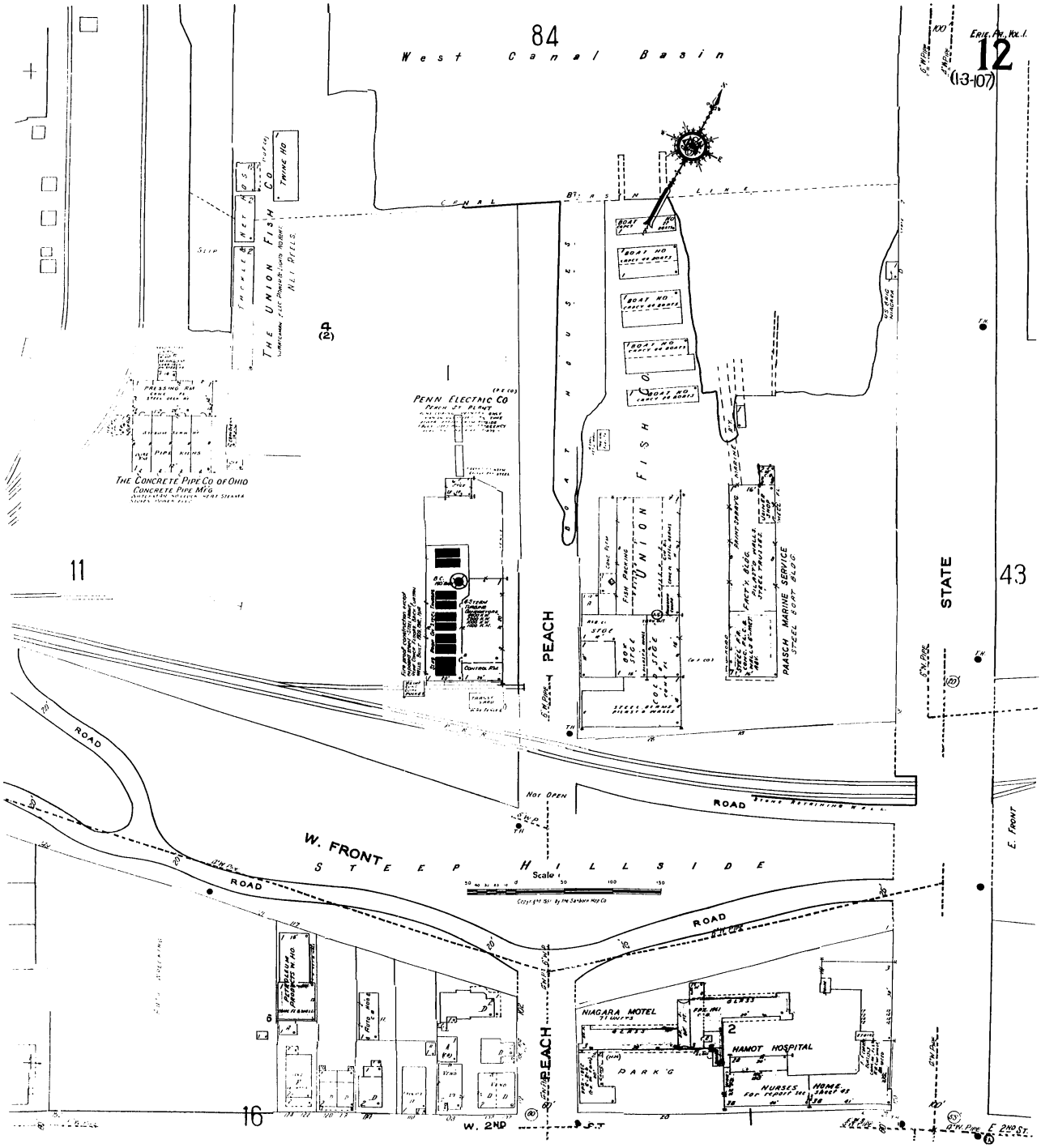

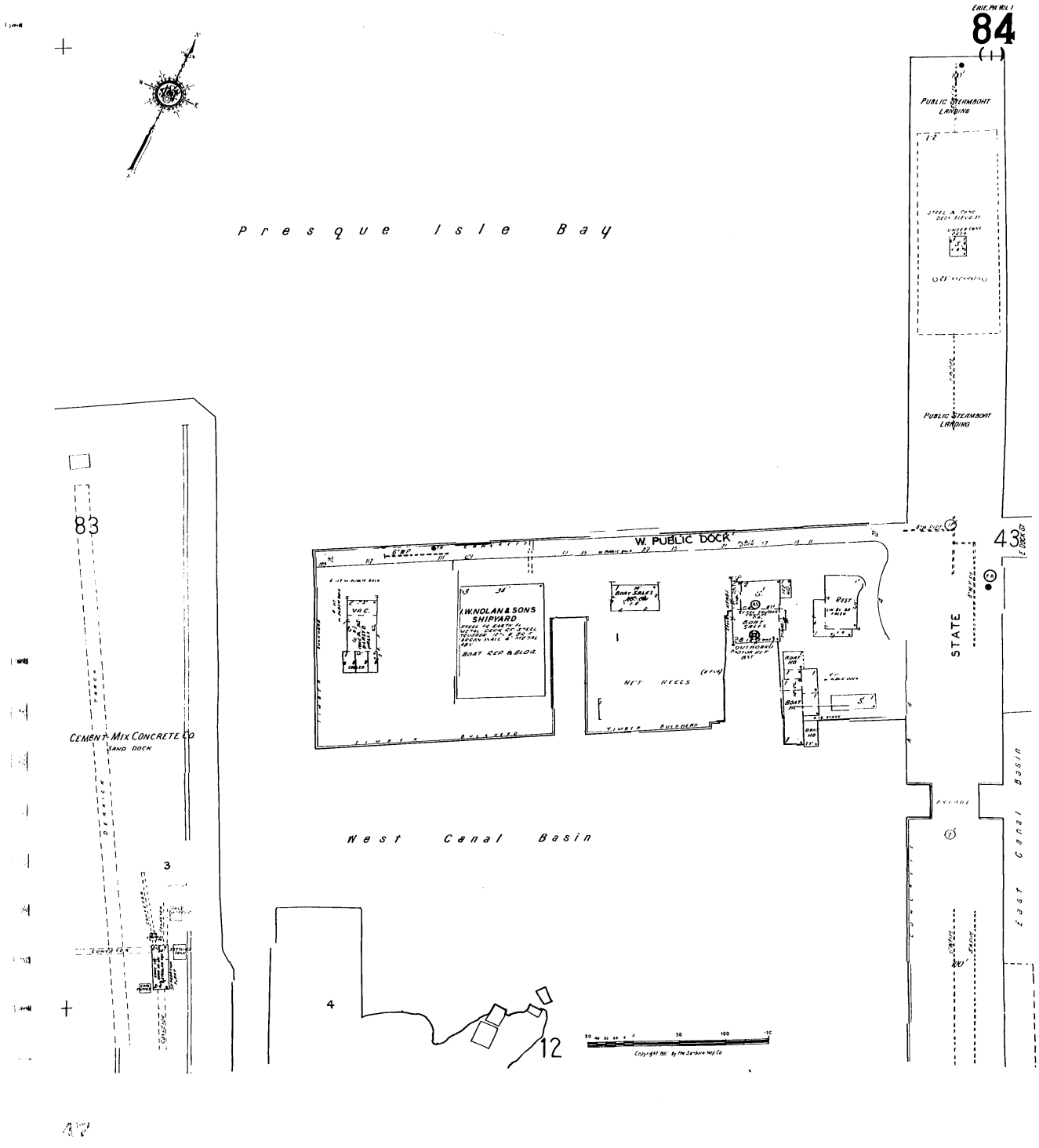

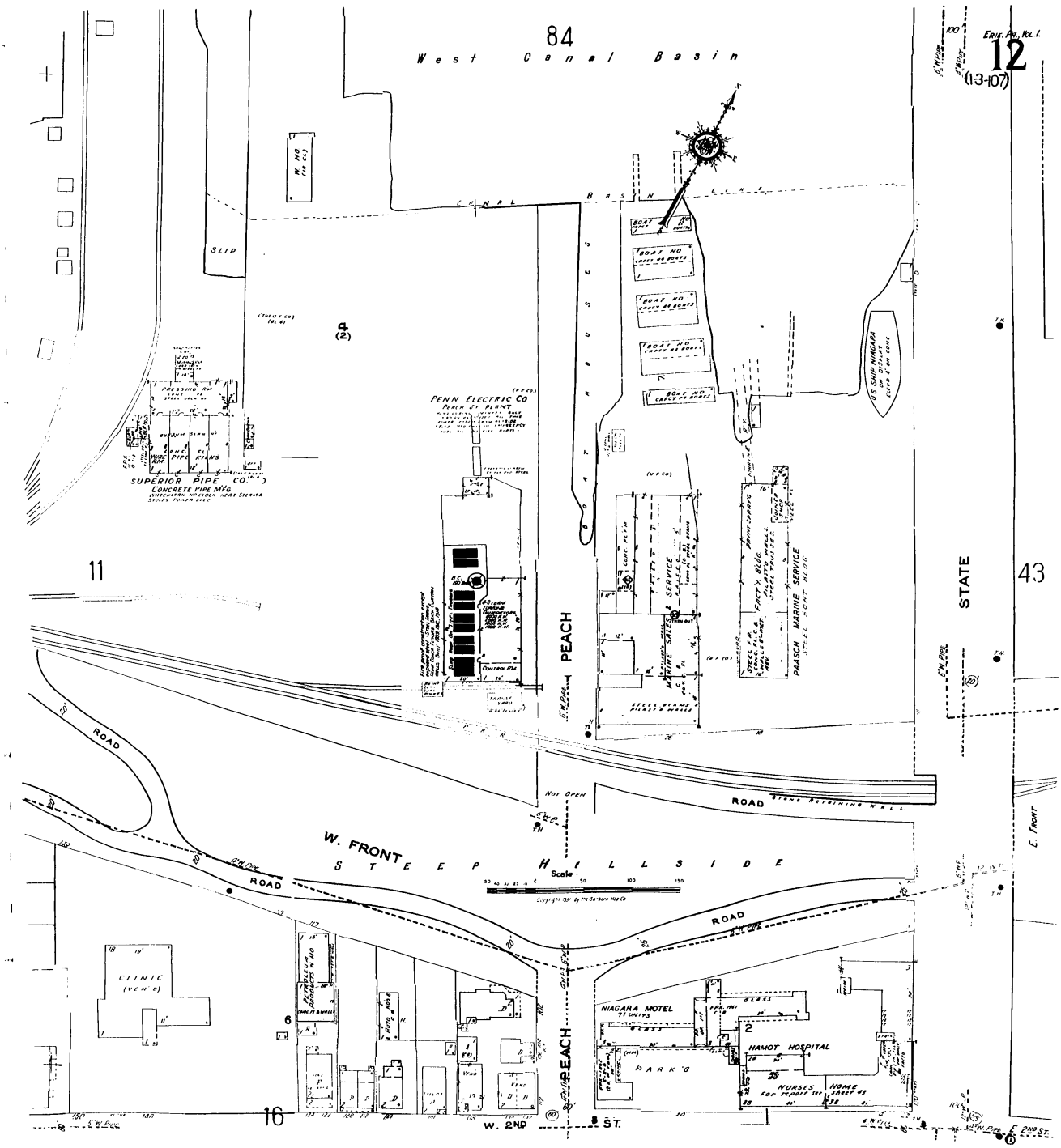

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Sanborn® Map Report

Ship To: Pat Pontoriero
MACTEC, Inc.
700 N. Bell Avenue
Pittsburgh, PA 15106

Order Date: 5/2/2007 **Completion Date:** 5/3/2007
Inquiry #: 1917818.3S
P.O. #: NA
Site Name: GAF Site
Address: 218 West Bayfront Parkway
City/State: Erie, PA 16507
Cross Streets:

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3171565KFG 412-279-6661

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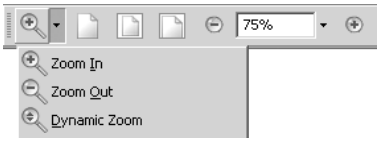

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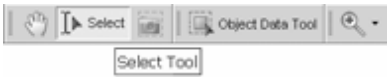

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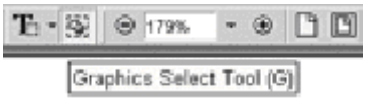
Acrobat Version 5



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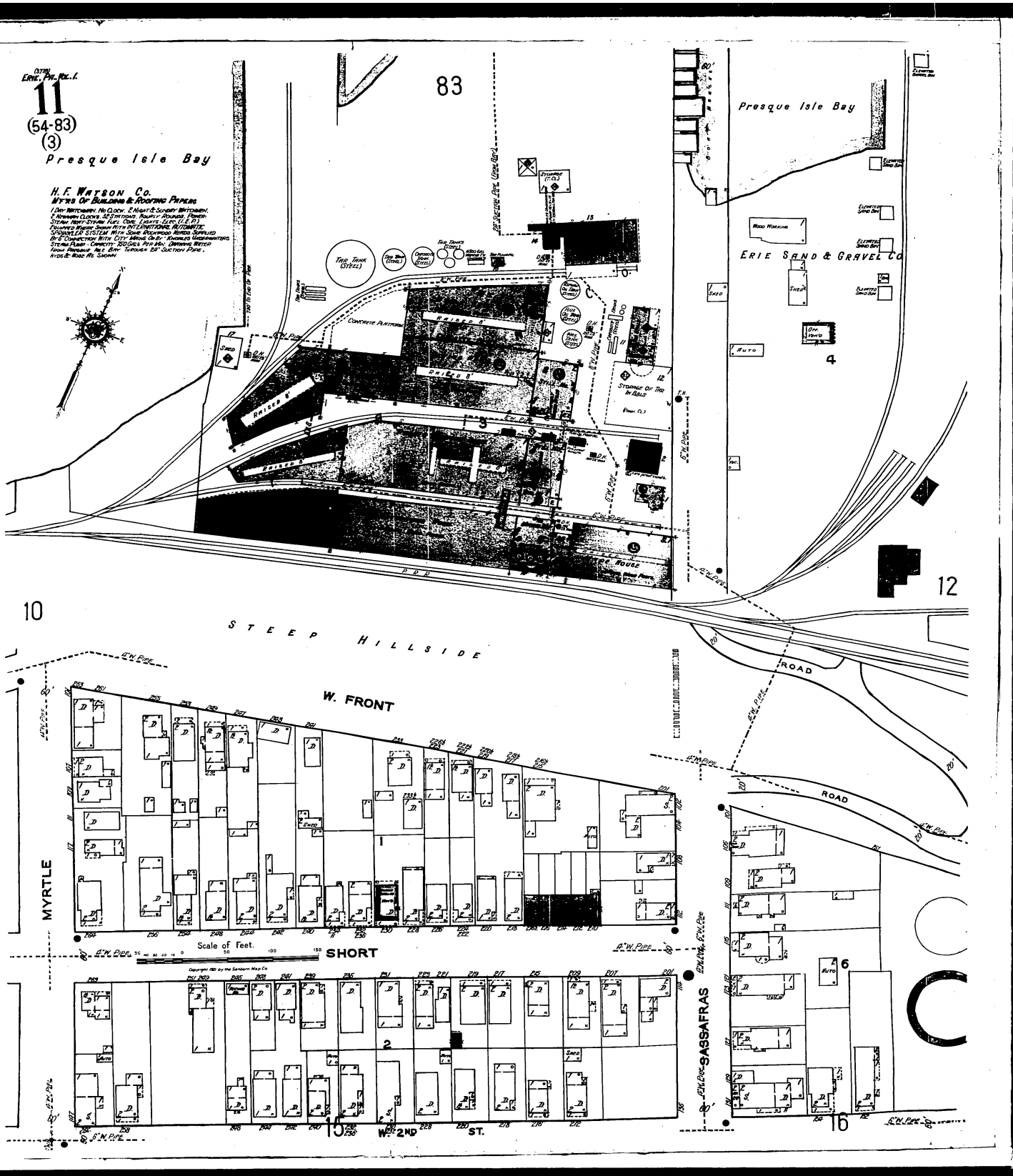


(3778)
ERIE, PA. VOL. 1.

83

Presque Isle Bay

84

3

11

SASSAFRAS

Scale of Feet.
50 40 30 20 10 0 50 100 150

(3770)
ERIE, PA VOL-1

PA....014

83

Presque Isle Bay

84

CONCRETE PLANT No2

CONCRETE PLANT No1

CEMENT-MIX CONCRETE CO.
See Sheet No11 for Report

ORE DOCK

DOCK

TRACK

OIL TANKS

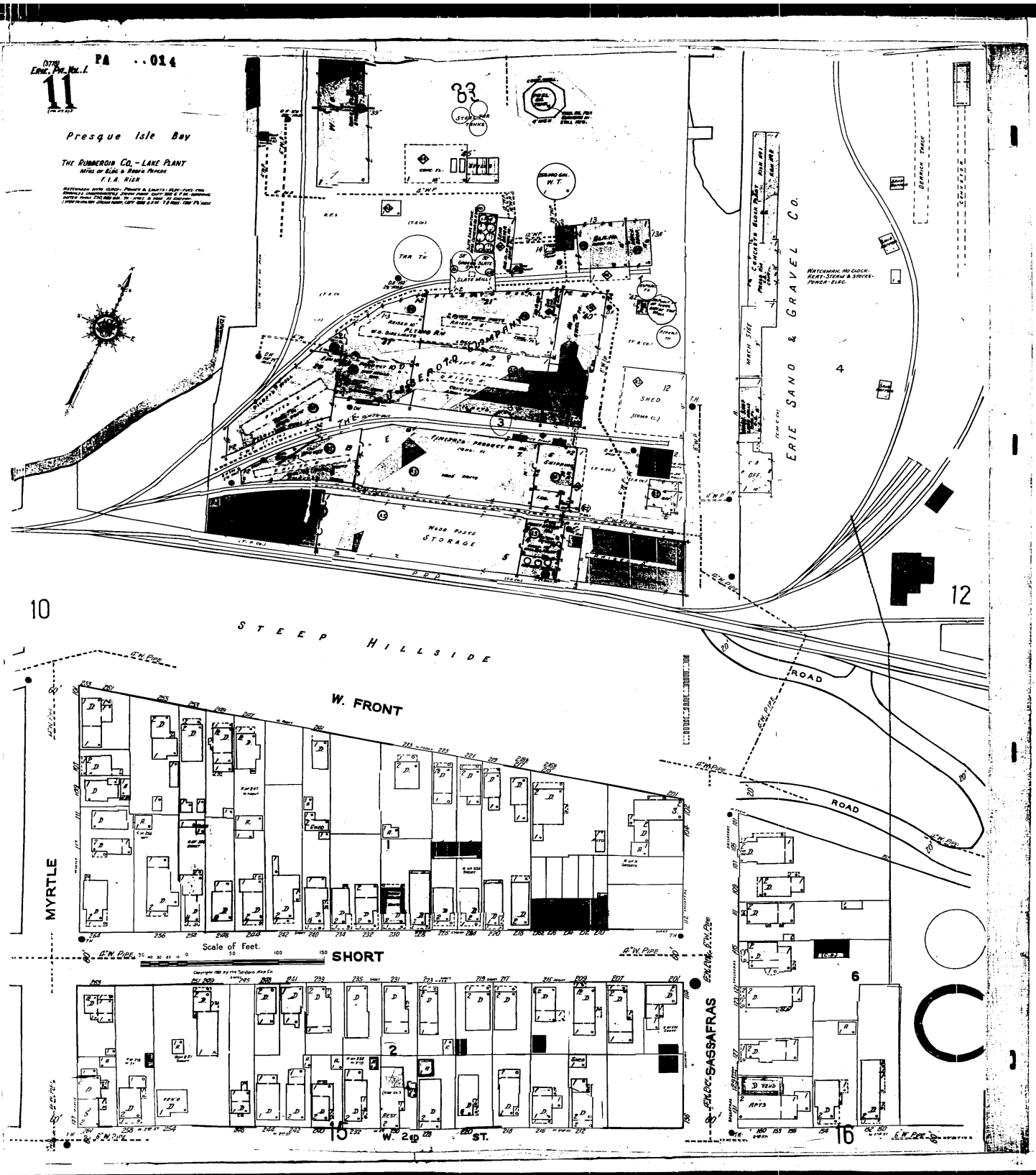
OFF SCALE

BOAT No

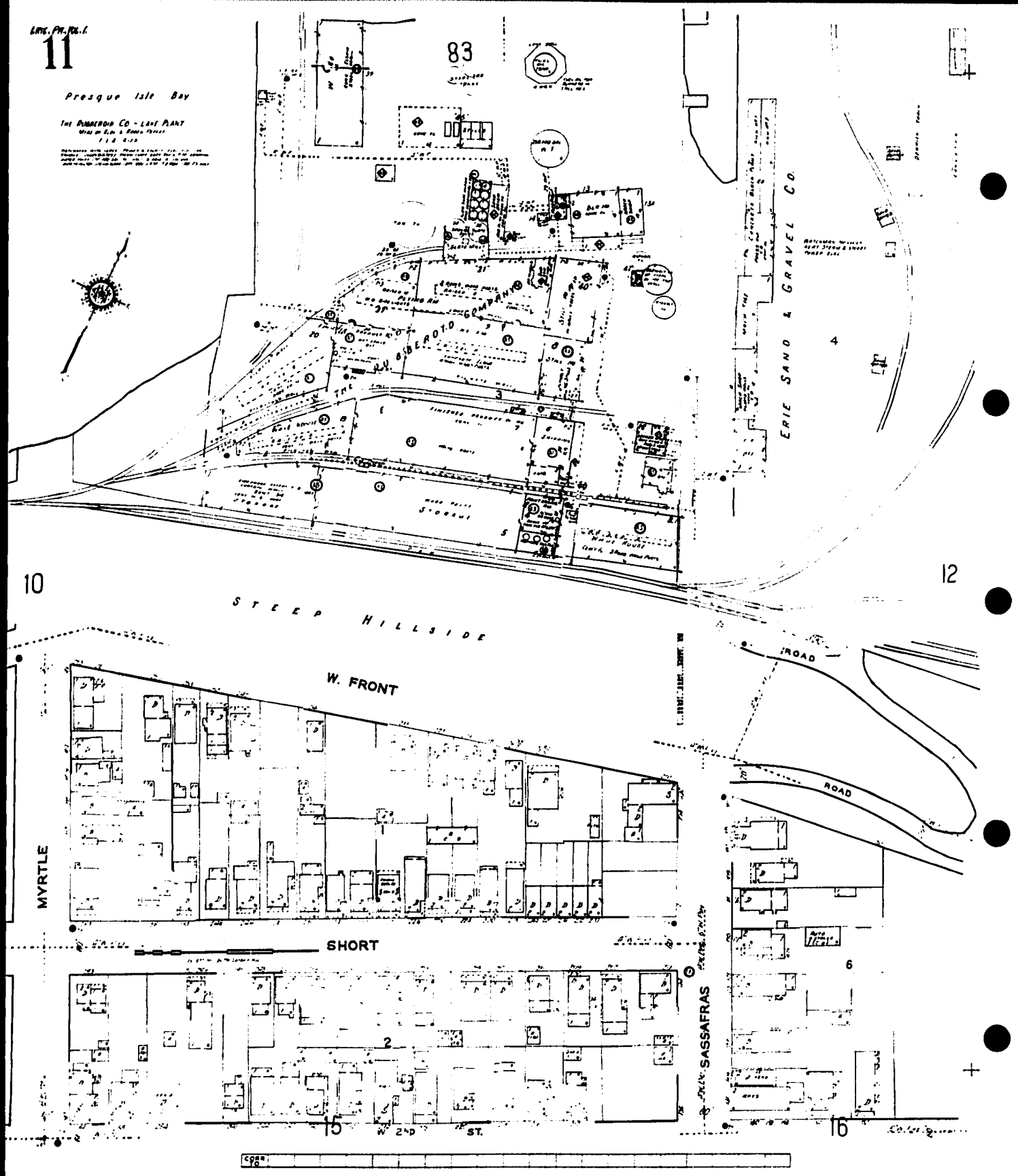
3

11

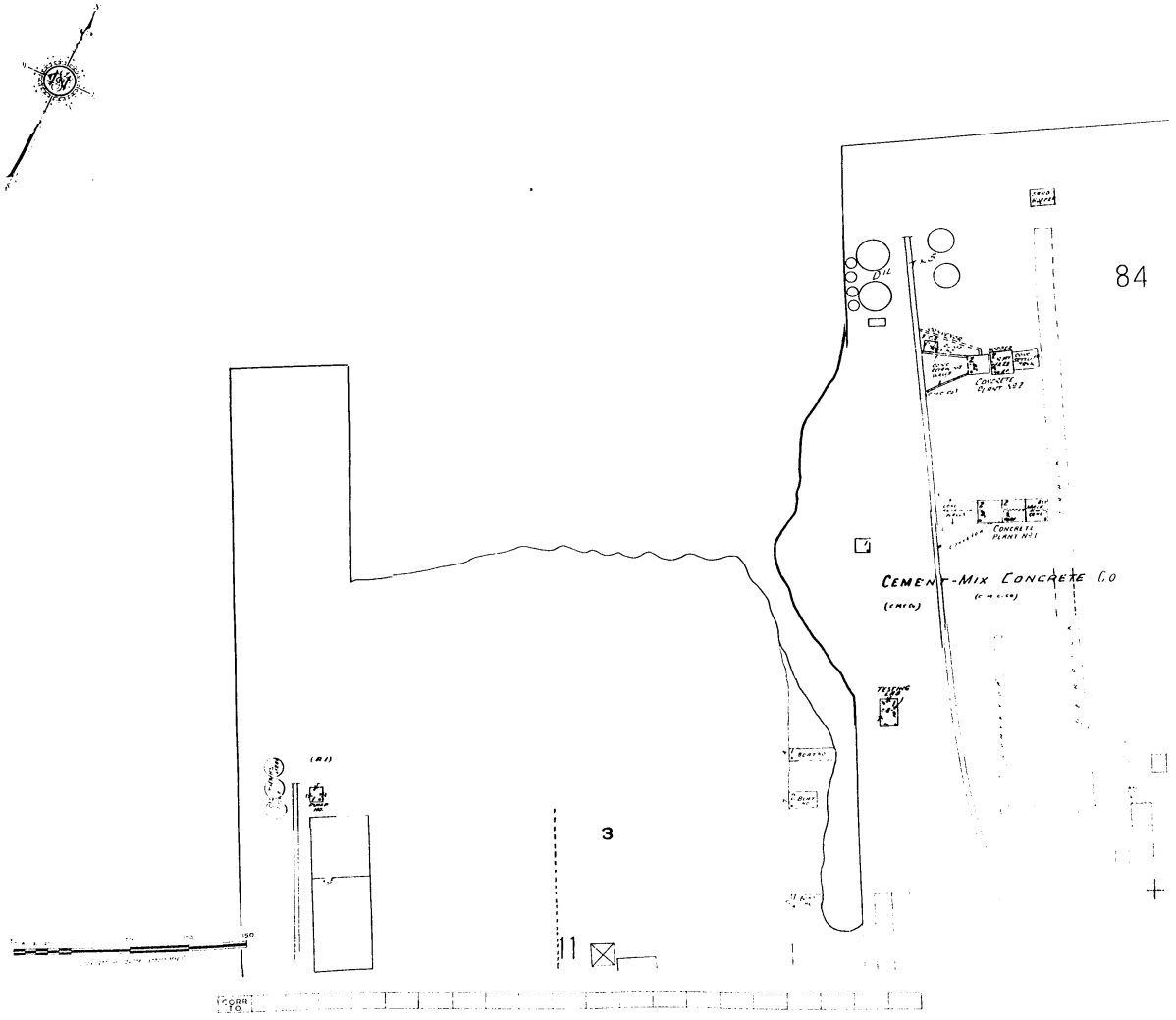
Scale of Feet.
50 40 30 20 10 0 50 100 150

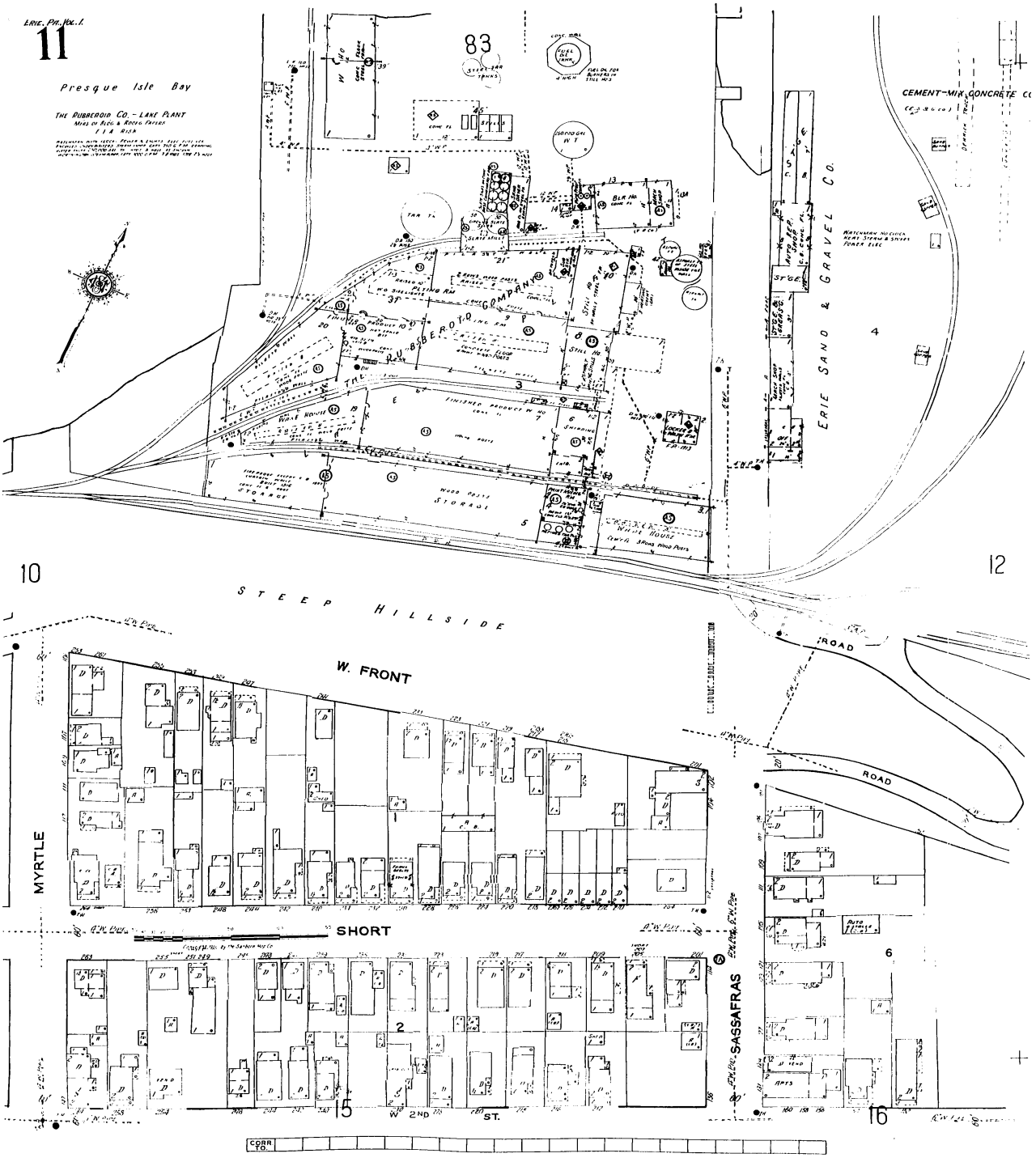


P r e s q u e I s l e B a y

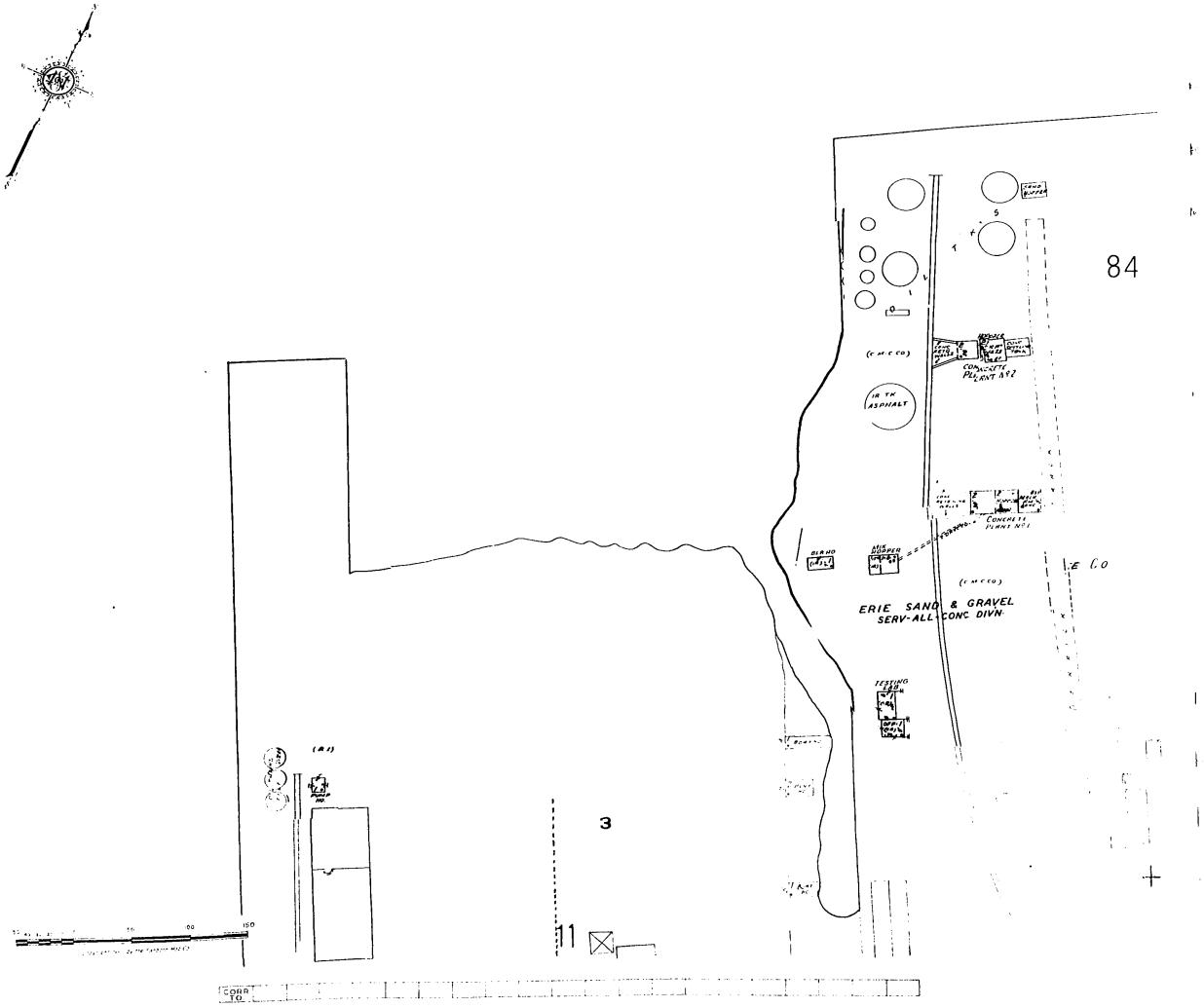


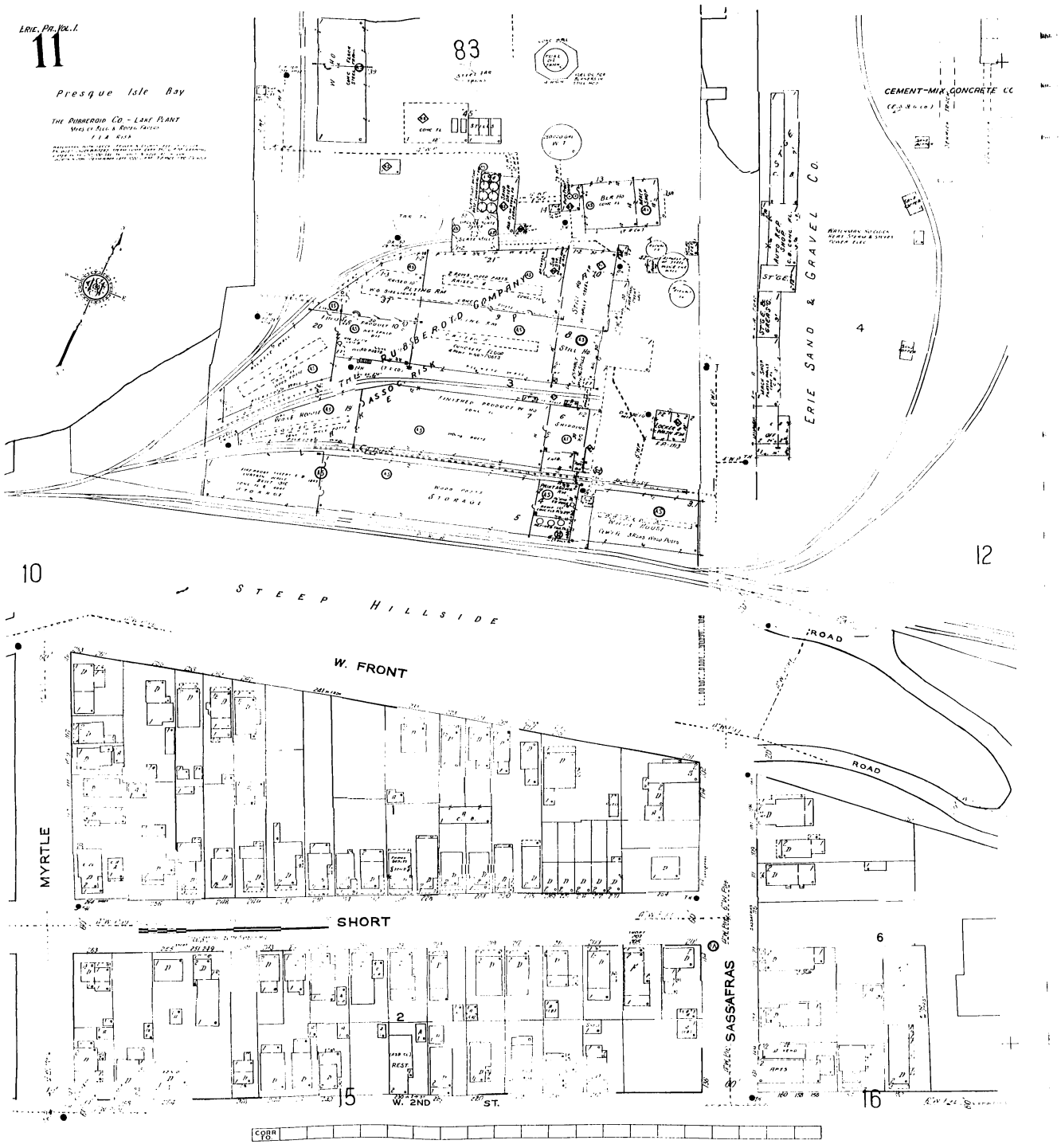
P r e s q u e I s l e B a y





p r e s q u e I s l e B a y





APPENDIX B

SOIL BORING AND TEST PIT LOGS/WELL CONSTRUCTION DIAGRAMS

MACTEC

PROJECT:	GAF Phase II	**BORING:**	**S-1**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	4/1/2009
CLIENT:	Erie Convention Authority	**FINISH:**	4/1/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"		
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter		
Ground Elevation:	578.80	**Sampling Device:**	Split Spoon Sampler		
Northing:	5423.52	**Total Depth:**	13'		
Easting:	8644.34	**Depth to Water:**	7'	**Date:**	4/1/2009
Ref. Elevation:	578.80	**GW Elevation:**	NA	**Date:**	

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION	NOTES
1					**Asphalt and Fill**	**FILL**	
2	S-1-0103	0.1	34-6-4-2	80	Moist, brown, fine-coarse,**Silty Sand**	**SM**	
3							
4		0.1	2-2-2-1	20			
5							
6		0.1	8-3-3-2	50			
7							
8		0.1	4-2-2-6	70	Saturated, dark brown, **Clayey** fine **Sand**	**SC**	
9							
10		0.1	6-6-9-6	70			
11							
12		0.1	1-4-50/.4	50	Saturated, gray, **Sandy Clay**	**CL**	
13					Refusal, Dry, gray Shale**Bedrock** at 12.4'	**BR**	
14					Boring Complete at 13 ft BGS		
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

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PROJECT:	GAF Phase II	**BORING:**	**S-2**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	4/2/2009
CLIENT:	Erie Convention Authority	**FINISH:**	4/2/2009
Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	583.1	**Sampling Device:**	Split Spoon Sampler
Northing:	5354.915	**Total Depth:**	6.5'
Easting:	8441.544	**Depth to Water:**	NA **Date:** 4/2/2009
Ref. Elevation:	583.1	**GW Elevation:**	**Date:**

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					Concrete and Fill	FILL
2	S-2-005045	0.1	5-4-3-2	20	Moist, black, well graded **Sand** with bricks, cinders, and asphalt pieces	FILL
3						
4		0.1	2-1-2-3	30		
5						
6		0.1	5-7-5-6	20		
7						
8					Boring Complete at 6.5 ft BGS	
9						
10						
11						
12						
13						
14						
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16						
17						
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PROJECT:	GAF Phase II	**BORING:**	**S-3**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	4/1/2009
CLIENT:	Erie Convention Authority	**FINISH:**	4/1/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	NA	**Sampling Device:**	Split Spoon Sampler
Northing:	NA	**Total Depth:**	3'
Easting:	NA	**Depth to Water:**	NA
Ref. Elevation:	NA	**GW Elevation:**	**Date:**

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Concrete and Fill**	**FILL**
2	S-3-0103	0.1	4-4-50/.4	80	Moist, brown, sand, cinders, and asphalt **Fill**	**FILL**
3						
4					Boring Complete at 3 ft BGS - Concrete at bottom	
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
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PROJECT:	GAF Phase II	**BORING:**	**S-4**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	3/31/2009
CLIENT:	Erie Convention Authority	**FINISH:**	3/31/2009
Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	579.20	**Sampling Device:**	Split Spoon Sampler
Northing:	5495.34	**Total Depth:**	9'
Easting:	8471.61	**Depth to Water:**	8'
Date:	3/31/2009		
Ref. Elevation:	579.20	**GW Elevation:**	
Date:			

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Asphalt and Fill**	**FILL**
2	S-4-0103	0.1	10-5-9-10	70	Damp, black well-graded **Sand** with cinders and asphalt pieces	**SW**
3						
4		0.1	8-13-13-15	70		
5						
6		0.1	4-1-2-4	70	Damp, black fine **Sandy Clay,** some asphalt	**SC**
7						
8		0.1	2-2-1-1	70	Saturated at 8'	
9						
10					Boring Complete at 9 ft BGS	
11						
12						
13						
14						
15						
16						
17						
18						
19						
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23						
24						
25						

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PROJECT:	GAF Phase II	**BORING:**	**S-5**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	3/31/2009
CLIENT:	Erie Convention Authority	**FINISH:**	3/31/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"		
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter		
Ground Elevation:	580.20	**Sampling Device:**	Split Spoon Sampler		
Northing:	5424.75	**Total Depth:**	9'		
Easting:	8342.22	**Depth to Water:**	8'	**Date:**	3/31/2009
Ref. Elevation:	580.20	**GW Elevation:**		**Date:**	

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Asphalt and Fill**	**FILL**
2	S-5-0103	0.1	6-6-4-2	80	Damp, black well-graded **Sand** with cinders and asphalt pieces	**SW**
3						
4		0.1	2-38-24-4	80		
5						
6		0.1	6-6-10-6	20		
7						
8		0.1	18-13-12-12	80	Weathered, gray bedrock and clay	**CL**
9					Saturated at 8'	
10					Boring Complete at 9 ft BGS	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

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PROJECT:	GAF Phase II	**BORING:**	S-6
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	3/31/2009
CLIENT:	Erie Convention Authority	**FINISH:**	3/31/2009
Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	580.10	**Sampling Device:**	Split Spoon Sampler
Northing:	5344.85	**Total Depth:**	9'
Easting:	8269.02	**Depth to Water:**	7' **Date:** 3/31/2009
Ref. Elevation:	580.10	**GW Elevation:**	**Date:**

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Asphalt and Fill**	**FILL**
2	S-6-0103	0.1	6-6-8-5	80	Damp, black well-graded **Sand** with cinders and bricks	**SW**
3						
4		0.1	8-5-9-8	70		
5						
6		0.1	5-6-4-6	70		
7					Saturated at 8'	
8		0.1	9-7-10-8	30	Weathered, gray bedrock and well-graded **Gravel** and **Sand**	**SW**
9						
10					Boring Complete at 9 ft BGS	
11						
12						
13						
14						
15						
16						
17						
18						
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PROJECT:	GAF Phase II	**BORING:**	**S-7**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	3/31/2009
CLIENT:	Erie Convention Authority	**FINISH:**	3/31/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"		
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter		
Ground Elevation:	579.00	**Sampling Device:**	Split Spoon Sampler		
Northing:	5324.182	**Total Depth:**	9'		
Easting:	8213.417	**Depth to Water:**	7.5'	**Date:**	3/31/2009
Ref. Elevation:	579.00	**GW Elevation:**		**Date:**	

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Asphalt and Fill**	**FILL**
2	S-7-0103	0.1	5-5-4-3	70	Damp, black well-graded **Sand** with cinders and bricks	**SW**
3						
4		0.1	6-17-10-5	70		
5						
6		0.1	8-4-5-3	50		
7						
8		0.1	4-4-5-3	20	Gray, Silty Clay	**CL**
9					Saturated at7.5'	
10					Boring Complete at 9 ft BGS	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

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PROJECT:	GAF Phase II	**BORING:**	**S-8**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	3/31/2009
CLIENT:	Erie Convention Authority	**FINISH:**	3/31/2009
Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	578.90	**Sampling Device:**	Split Spoon Sampler
Northing:	5615.82	**Total Depth:**	8'
Easting:	8376.43	**Depth to Water:**	7' **Date:** 3/31/2009
Ref. Elevation:	578.90	**GW Elevation:**	**Date:**

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1	S-8-0002	0.1	3-3-8-5	80	Moist-Wet, brown-black, well-graded **Sand**, with asphalt pieces	**FILL**
2						
3		0.1	12-6	30		
4			5-7			
5		0.3	8-8	20		
6			8-12			
7		0.1	5-1-5-4	20	Saturated at 7'	
8						
9					Boring Complete at 8 ft BGS	
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

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MACTEC

PROJECT:	GAF Phase II	BORING:	S-9
LOCATION:	Erie, Pennsylvania	WELL:	
JOB NUMBER:	3410080643	START:	4/1/2009
CLIENT:	Erie Convention Authority	FINISH:	4/1/2009

Driller:	Terra Testing	Drilling Method:	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	Bore Hole Diameter:	8.25"		
Surveyor:	Sanford	Auger Size:	4.25" - inside diameter		
Ground Elevation:	582.70	Sampling Device:	Split Spoon Sampler		
Northing:	5749.38	Total Depth:	17.2'		
Easting:	8437.17	Depth to Water:	11'	Date:	4/1/2009
Ref. Elevation:	582.70	GW Elevation:		Date:	

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Asphalt and Fill**	FILL
2-3	S-9-0103	0.5	5-5-10-11	80	Moist, brown, fine-coarse, **Clayey Sand** with asphalt pieces	FILL
4-5		1.8	18-25-18-12	100		
6-7		2.0	7-5-10-10	80		
8-9		1.5	13-12-14-16	80		
10-11		1	13-9-4-2	80	**Saturated at 11'**	
12-13		0.1	4-2-2-3	80	Saturated greenish gray **Sandy Clay**	SC
14-15		0.1	4-4-3-2	80	**Sheen**	
16-17		0.1	2-2-2-2	80		
18-19		0.1	50/.2		Refusal, Dry, gray **Shale Bedrock** at 17.2'	BR
20-25					Boring Complete at 17.2' ft BGS	

1

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PROJECT:	GAF Phase II	**BORING:**	**S-10**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	3/30/2009
CLIENT:	Erie Convention Authority	**FINISH:**	3/30/2009
Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	583.00	**Sampling Device:**	Split Spoon Sampler
Northing:	5713.42	**Total Depth:**	13'
Easting:	8091.74	**Depth to Water:**	11'
Ref. Elevation:	583.00	**GW Elevation:**	
		Date:	3/30/2009
		Date:	

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Asphalt and Fill**	**FILL**
2	S-10-0103	0.2	5-6-5-7	80	Moist, brown-black, well-graded, **Silty Sand** with asphalt pieces	**SM**
3					and roofing materials: felt, green chips	
4		0.2	11-8-6-9	80		
5						
6		0.2	4-3-4-12	70		
7						
8		0.2	8-8-6-3	0		
9						
10		0.2	4-3-3-2	50		
11					Saturated at 11'	
12		0.2	8-9-4-6	50		
13						
14					Boring Complete at 13' ft BGS	
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

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PROJECT:	GAF Phase II	**BORING:**	S-11
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	3/30/2009
CLIENT:	Erie Convention Authority	**FINISH:**	3/30/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	583.00	**Sampling Device:**	Split Spoon Sampler
Northing:	5814.27	**Total Depth:**	13'
Easting:	8252.39	**Depth to Water:**	12' **Date:** 3/30/2009
Ref. Elevation:	583.00	**GW Elevation:**	**Date:**

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Concrete and Fill**	**FILL**
2	S-11-0103	0.3	2-4-4-6	80	Moist, brown-black, well-graded,**Silty Sand** with asphalt pieces	**SM**
3					and roofing materials: felt,mica	
4		0.3	9-8-7-14	100		
5						
6		0.3	9-12-18-16	100		
7						
8		0.3	17-21-25-24	100		
9	S-11-0911					
10		0.3	12-9-11-6	100		
11					Red brick pieces	
12		0.3	12-10-13-12	100	Saturated at 12'	
13						
14					Boring Complete at 13' ft BGS	
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

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PROJECT:	GAF Phase II	**BORING:**	S-12
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	4/1/2009
CLIENT:	Erie Convention Authority	**FINISH:**	4/1/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"		
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter		
Ground Elevation:	583.20	**Sampling Device:**	Split Spoon Sampler		
Northing:	6042.35	**Total Depth:**	21.6'		
Easting:	8266.23	**Depth to Water:**	13'	**Date:**	4/1/2009
Ref. Elevation:	583.20	**GW Elevation:**		**Date:**	

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					**Asphalt and Fill**	**FILL**
2	S-12-0103	0.1	5-4-4-5	90	Moist-Wet, brown-black, well-graded **Sand**, with asphalt pieces	**SW**
3						
4		0.1	4-4-3-3	90		
5						
6		0.1	2-1-3-2	90		
7						
8		0.1	3-3-2-3	90		
9						
10		0.1	3-3-2-1	90		
11	S-12-1113					
12		0.1	2-1-2-2	90		
13					Saturated at 13'	
14		0.1	1-2-2-1	90		
15						
16		0.1	3-2-3-1	70		
17						
18		0.1	1-2-2-2	70		
19					Moist, brown, fine-coarse, C**layey Sand** with asphalt pieces	**SC**
20		0.1	2-1-4-2	100		
21					Dry, gray Shale **Bedrock** at 21.5'	
22			1-50/2	90	Refusal and Boring Complete at 21.6' ft BGS	
23						
24						
25						

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PROJECT:	GAF Phase II	**BORING:**	**S-13**
LOCATION:	Erie, Pennsylvania	**WELL:**	
JOB NUMBER:	3410080643	**START:**	4/2/2009
CLIENT:	Erie Convention Authority	**FINISH:**	4/2/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter
Ground Elevation:	583.10	**Sampling Device:**	Split Spoon Sampler
Northing:	5421.834	**Total Depth:**	6.5'
Easting:	8469.700	**Depth to Water:**	NA
Ref. Elevation:	583.10	**GW Elevation:**	**Date:**

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					Concrete and Fill	**FILL**
2	**S-13-005025**	0.1	10-4-3-3	80	Moist, black, well graded **Sand** with bricks, cinders, and asphalt pieces	**FILL**
3						
4		0.1	3-3-3-5	80		
5						
6	**S-13-045065**	0.1	12-11-3-1	80		
7						
8					Boring Complete at 6.5 ft BGS	
9						
10						
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MACTEC	**PROJECT:**	GAF Phase II	**BORING:**	S-14	
	LOCATION:	Erie, Pennsylvania	**WELL:**		
	JOB NUMBER:	3410080643	**START:**	4/1/2009	
	CLIENT:	Erie Convention Authority	**FINISH:**	4/1/2009	
Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"		
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter		
Ground Elevation:	583.60	**Sampling Device:**	Split Spoon Sampler		
Northing:	5240.23	**Total Depth:**	6.5'		
Easting:	8431.39	**Depth to Water:**	NA		
Ref. Elevation:	583.60	**GW Elevation:**		**Date:**	

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					Concrete and Fill	FILL
2	S-13-005025	0.1	2-3-16-15	80	Moist, black, well graded **Sand** with bricks, cinders, and asphalt pieces	FILL
3						
4		0.1	13-13-12-14	80		
5						
6	S-13-045065	0.1	15-22-36-22	80		
7						
8					Boring Complete at 6.5 ft BGS	
9						
10						
11						
12						
13						
14						
15						
16						
17						
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23						
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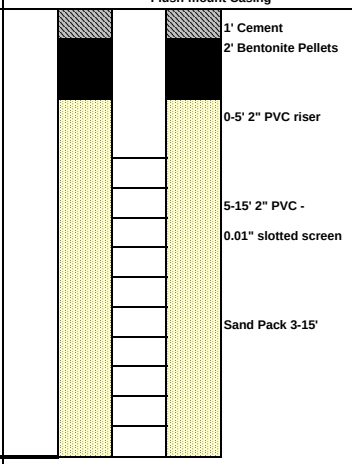
PROJECT:	GAF Phase II	BORING:	MW-7
LOCATION:	Erie, Pennsylvania	WELL:	MW-7
JOB NUMBER:	3410080643	START:	3/31/2009
CLIENT:	Erie Convention Authority	DATE:	3/31/2009

Driller:	Terra Testing	Drilling Method:	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	Bore Hole Diameter:	8.25"		
Surveyor:	Sanford	Auger Size:	4.25" - inside diameter		
Ground Elevation:	582.36	Sampling Device:	Split Spoon Sampler		
Northing:	5085.926	Total Depth:	15'		
Easting:	8278.618	Depth to Water:	1.80	Date:	4/10/2009
Ref. Elevation:	582.36	GW Elevation:	580.56	Date:	4/10/2009

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1	MW-7-0002	0.1	2-2-2-3	80	Moist, brown **Sandy Clay**	SC
2						
3		0.1	2-2-3-5	80		
4						
5	MW-7-0406	0.1	4-3-2-4	80		
6						
7		0.1	2-4-3-3	80	Saturated at 7'	
8						
9		0.1	50/.2	100	Dry, gray **Shale Bedrock,** Refusal at 8.2'	BR
10						
11						
12						
13						
14						
15						
16					Boring Complete at 15 ft BGS	
17						
18						
19						
20						
21						
22						
23						
24						
25						

WELL DIAGRAM:



1

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Checked by: CH

MACTEC

PROJECT:	GAF Phase II	**BORING:**	MW-8
LOCATION:	Erie, Pennsylvania	**WELL:**	MW-8
JOB NUMBER:	3410080643	**START:**	3/31/2009
CLIENT:	Erie Convention Authority	**DATE:**	3/31/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"		
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter		
Ground Elevation:	579.53	**Sampling Device:**	Split Spoon Sampler		
Northing:	5587.124	**Total Depth:**	15'		
Easting:	8289.214	**Depth to Water:**	5.79	**Date:**	4/10/2009
Ref. Elevation:	579.53	**GW Elevation:**	580.56	**Date:**	4/10/2009

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION	WELL DIAGRAM:
1					Concrete	FILL	Flush-mount Casing
2	MW-8-0103	0.1	4-5-4-1	90	Moist, well-graded brown **Sand**, with red bricks, stone, gravel, asphalt pieces	SW	1' Cement 2' Bentonite Pellets
3							
4	MW-8-0305	2.5	7-6-4-5	90	Odor and sheen		0-5' 2" PVC riser
5							
6		0.8	4-2-2-3	80			
7					Saturated at 7.5'		5-15' 2" PVC -
8		0.1	5-2-3-1	60	Slight sheen		0.01" slotted screen
9							
10							
11							Sand Pack 3-15'
12							
13					Saturated, gray **Silty Clay**	CL	
14							
15							
16					Boring Complete at 15 ft BGS		
17							
18							
19							
20							
21							
22							
23							
24							
25							

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Checked by: CH

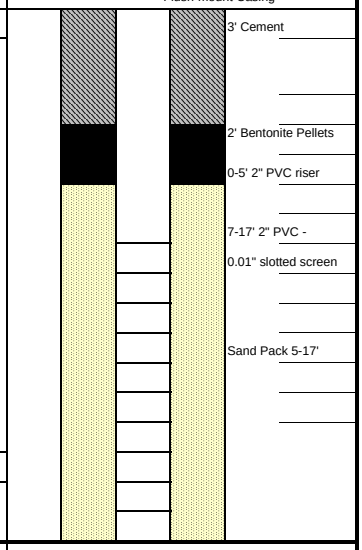
MACTEC

PROJECT:	GAF Phase II	**BORING:**	MW-9
LOCATION:	Erie, Pennsylvania	**WELL:**	MW-9
JOB NUMBER:	3410080643	**START:**	3/31/2009
CLIENT:	Erie Convention Authority	**DATE:**	3/31/2009

Driller:	Terra Testing	**Drilling Method:**	Hollow Stem Auger		
Field Scientist:	Ellen Berklite	**Bore Hole Diameter:**	8.25"		
Surveyor:	Sanford	**Auger Size:**	4.25" - inside diameter		
Ground Elevation:	582.63	**Sampling Device:**	Split Spoon Sampler		
Northing:	5773.830	**Total Depth:**	17'		
Easting:	8188.217	**Depth to Water:**	8.86	**Date:**	4/10/2009
Ref. Elevation:	582.63	**GW Elevation:**	580.56	**Date:**	4/10/2009

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SPLIT SPOON BLOWS PER 6 INCHES	% RECOVERY	SOIL DESCRIPTION	SOIL CLASSIFICATION
1					Concrete	FILL
2	MW-9-0103	0.3	18-10-9-6	30	Moist, well-graded brown **Sand**, with red bricks, stone, gravel, asphalt pieces	**SW**
3						
4		0.3	7-7-10-11	30		
5						
6		0.3	7-12-21-21	100		
7						
8		0.3	36-12-9-9	70		
9						
10		0.3	13-10-10-10-10	100		
11						
12	MW-9-1113	0.3	9-12-18-18	100	Saturated at 12'	
13						
14						
15					Saturated, gray, **Silty Clay**	**CL**
16						
17						
18					Boring Complete at 17 ft BGS	
19						
20						
21						
22						
23						
24						
25						

WELL DIAGRAM:



1

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Checked by: CH

MACTEC

PROJECT:	GAF Phase II	Test Pit:	TP-1
LOCATION:	Erie, Pennsylvania		
JOB NUMBER:	3410080643	START:	3/24/2009
CLIENT:	Erie Convention Authority	FINISH:	3/24/2009

Excavator:	Terra Testing		
Field Scientist:	Ellen Berklite		
Surveyor:	Sanford		
Ground Elevation:	586.8	**Northing:**	6003.563
Depth to Water:		**Easting:**	8068.296

DEPTH (ft-bgs)	ANALYTICAL SAMPLE	PID READING	SOIL DESCRIPTION	SOIL CLASSIFICATION	NOTES
1 2 3 4 5 6			Dry, brown Silty Sand with roofing felt and chunks of tar. No groundwater encountered.	FILL	
			Test Pit completed to dimensions of approximately 5' long x 3' wide x 6' deep		

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Checked by: CH

APPENDIX C

PHASE II PHOTOGRAPHS

Test Pit TP-1

Test Pit TP-1 Waste Pile

Test Pit TP-2

Test Pit TP-2 Waste Pile

Test Pit TP-3

Photos by MACTEC

Test Pit TP-3 Waste Pile

Photos by MACTEC

Test Pit TP-4

Test Pit TP-5

Test Pit TP-5 Waste Pile

Western Bank of Site on Presque Isle Bay – Tar Expression and Asbestos Paper Rolls

Western Bank of Site on Presque Isle Bay – Tar Expression and Asbestos Paper Rolls

Photos by MACTEC

APPENDIX D

LABORATORY ANALYTICAL DATA REPORTS

APPENDIX E

O'BRIEN & GERE AND ER&R ANALYTICAL RESULTS

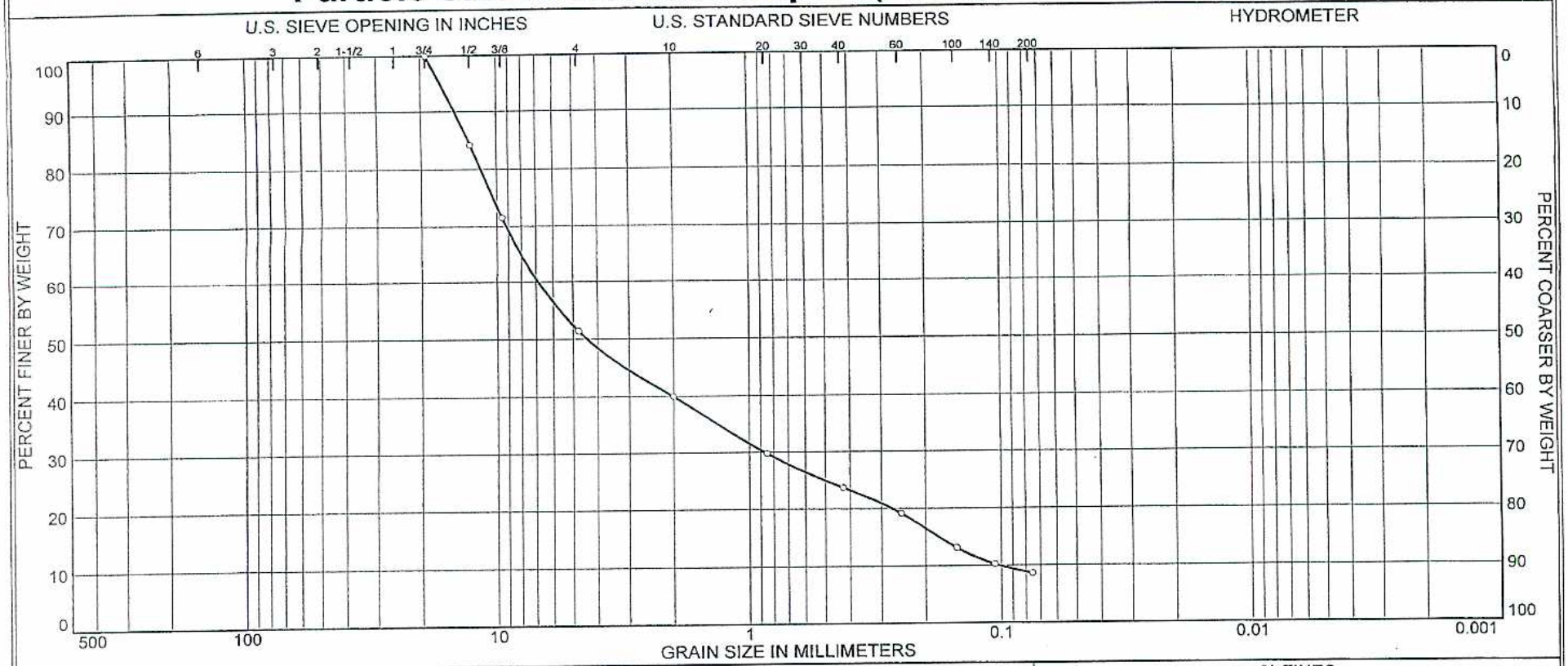
APPENDIX F

ASBESTOS ANALYTICAL DATA REPORTS

APPENDIX G

GEOTECHNICAL DATA REPORT

Particle Size Distribution Report (ASTM D422-63 (2007))



	% COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	48.6	11.5	16.2	15.1	8.6	

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	MW-9-0711	MW-9-0711	N/A	4/27/09	GW-GM	Reddish Black Well-graded Gravel with Silt and Sand		NV	NP

Client

Project GAF, Erie, PA

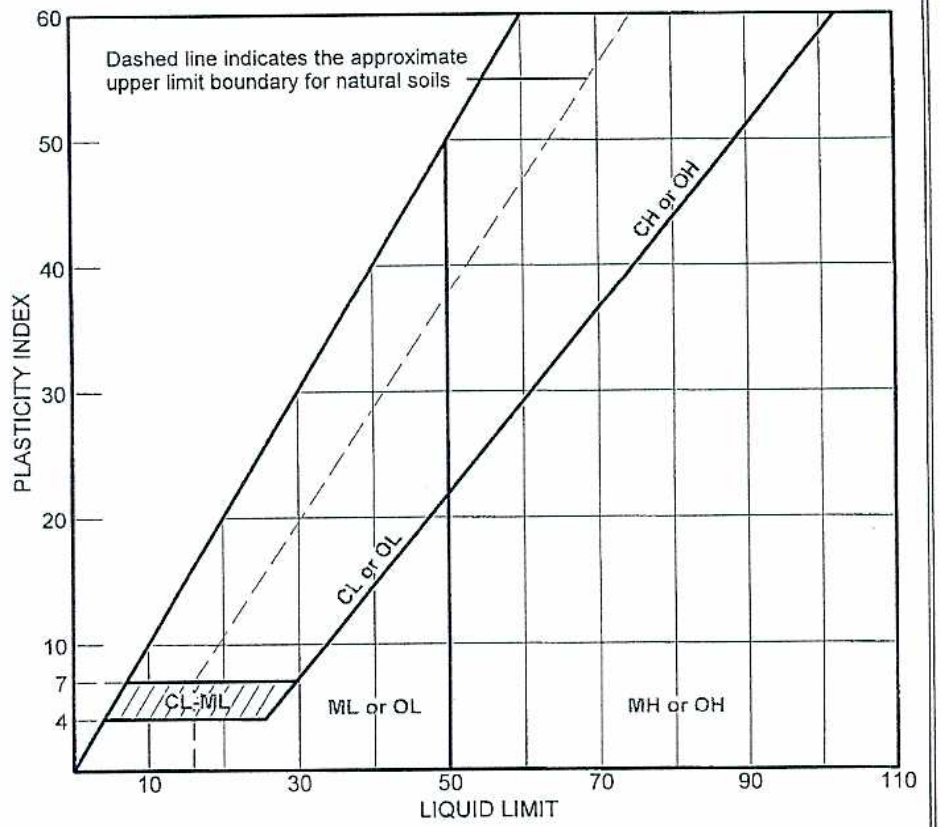
Project No. 3410-08-0643.02 Lab No. 9588

MACTEC ENGINEERING AND CONSULTING, INC.

○ Tested By: EH Reviewed by: JW

JW 5/1/09

LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D4318 (05)



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
•	MW-9-0711	MW-9-0711	N/A	4/27/09	GW-GM	Reddish Black Well-graded Gravel with Silt and Sand		NV	NP

Client

Project GAF, Erie, PA

Project No. 3410-08-0643.02 Lab No. 9588

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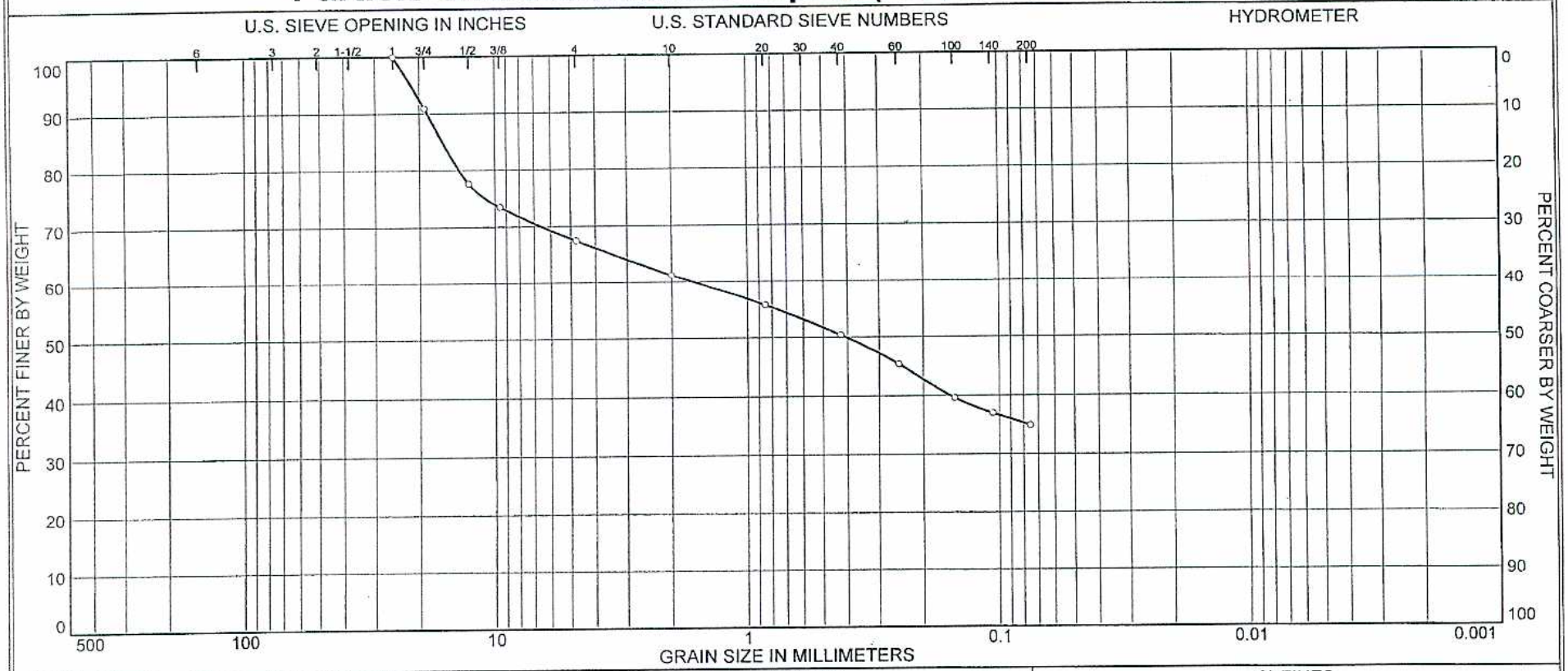
Particle Size Distribution Report (ASTM D422-63 (2007))



	% COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	9.1	23.4	6.2	10.9	15.5	34.9	

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	S-10-0307	S-10-0307	N/A	4/27/09	SM	Greenish Black Silty Sand with Gravel	20.6	35	26

Client

Project

Project No. Lab No. 9589

MACTEC ENGINEERING AND CONSULTING, INC.

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5/11/09

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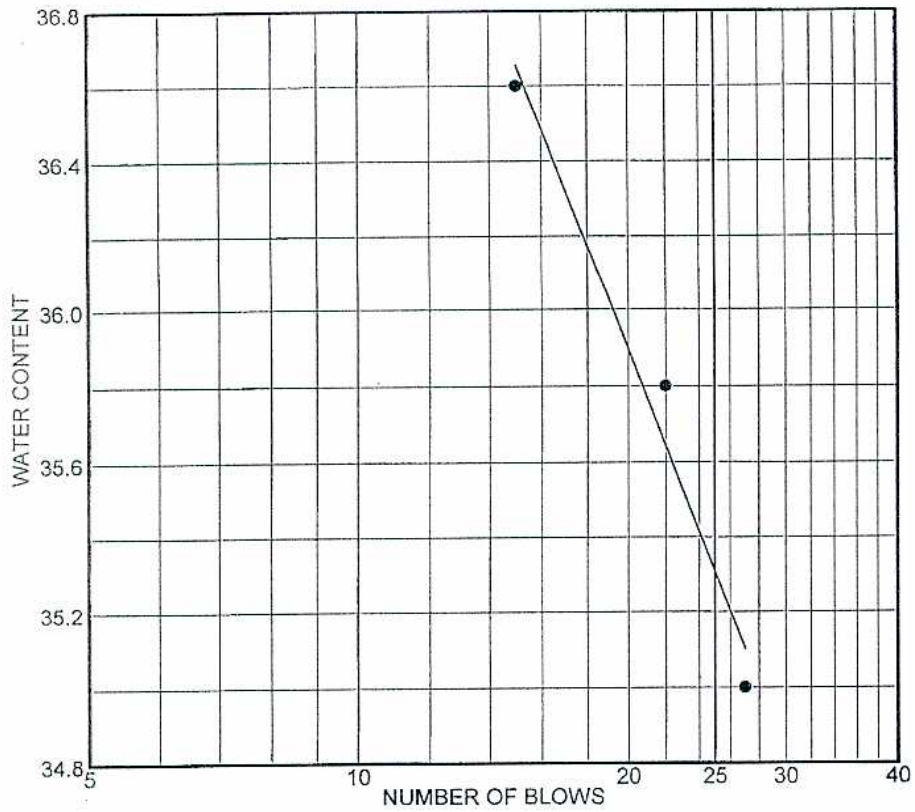

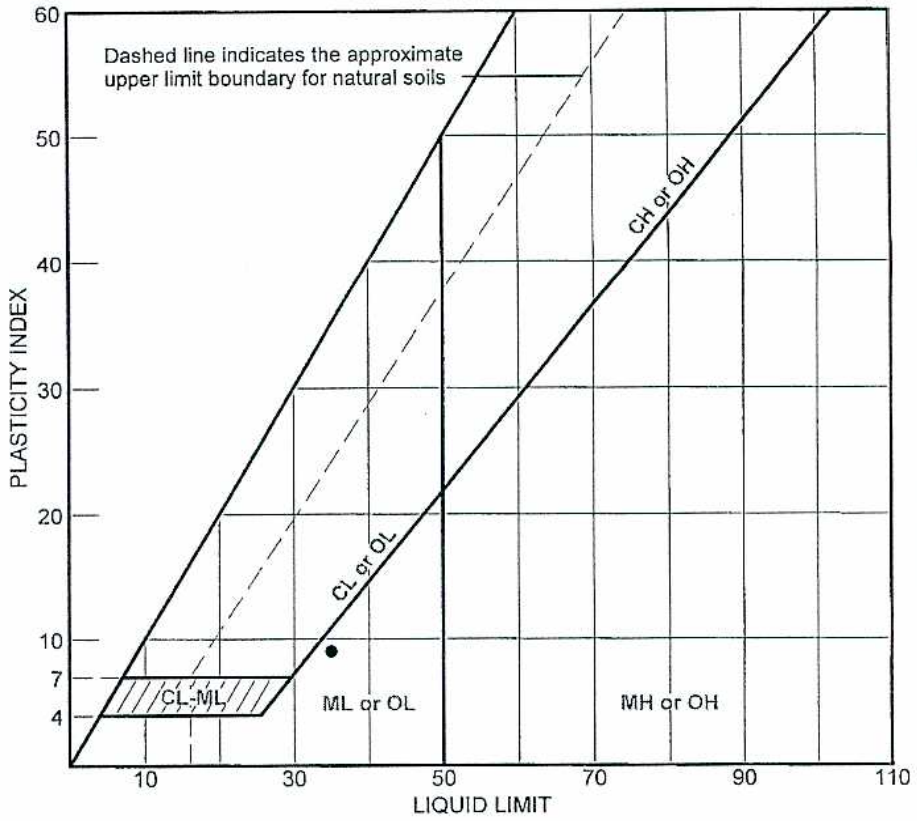

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
•	S-10-0307	S-10-0307	N/A	4/27/09	SM	Greenish Black Silty Sand with Gravel	20.6	35	9

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Project No. Lab No. 9589

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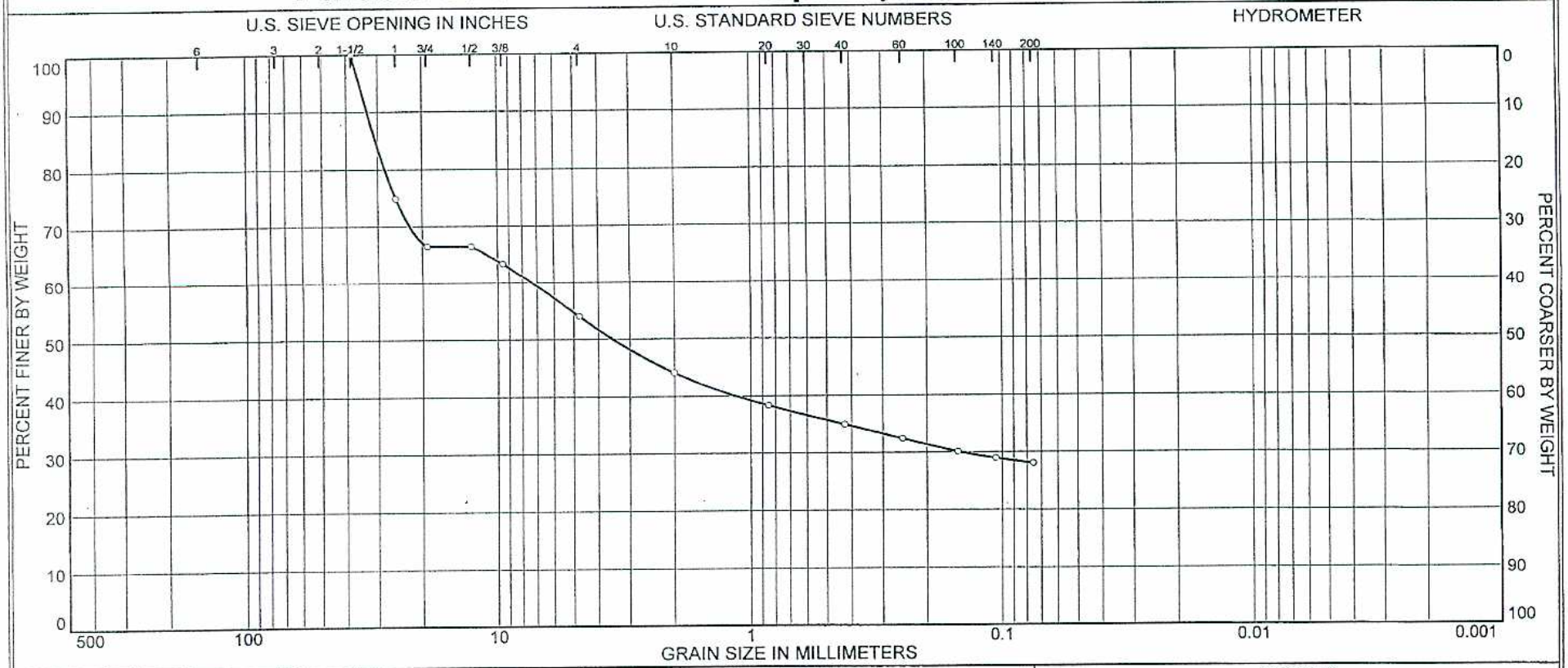
Particle Size Distribution Report (ASTM D422-63 (2007))



	% COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	33.5	12.6	9.8	9.2	6.9	28.0	

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	S-10-1113	S-10-1113	N/A	4/27/09	GC	Greenish Gray Clayey Gravel with Sand	16.3	37	23

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Project

Project No. Lab No. 9590

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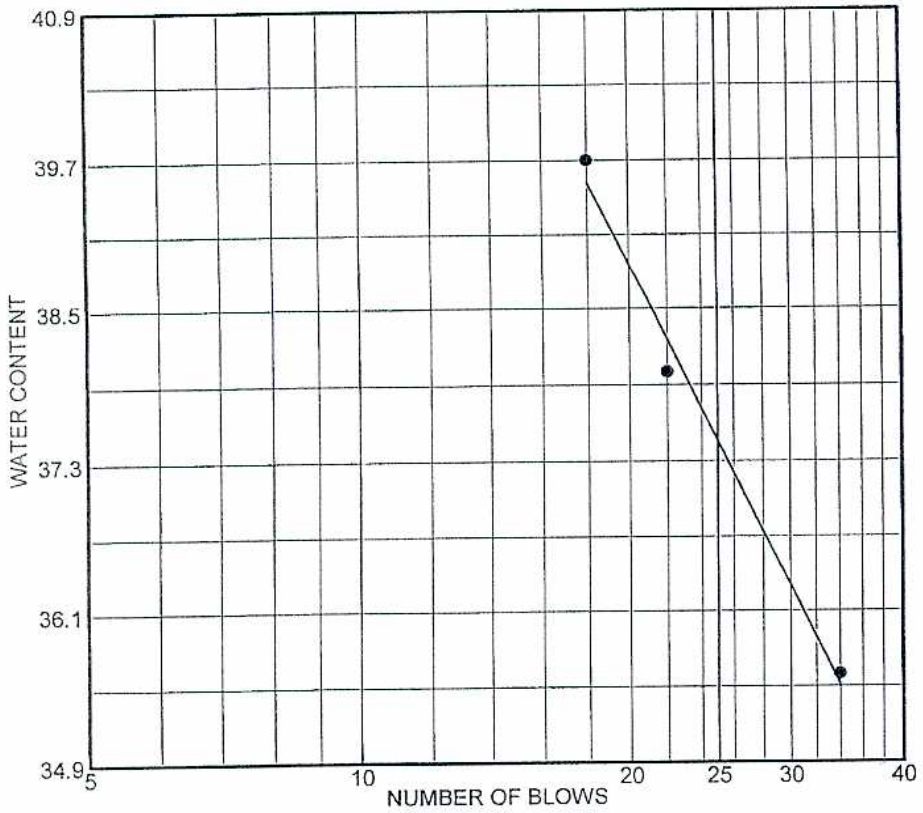
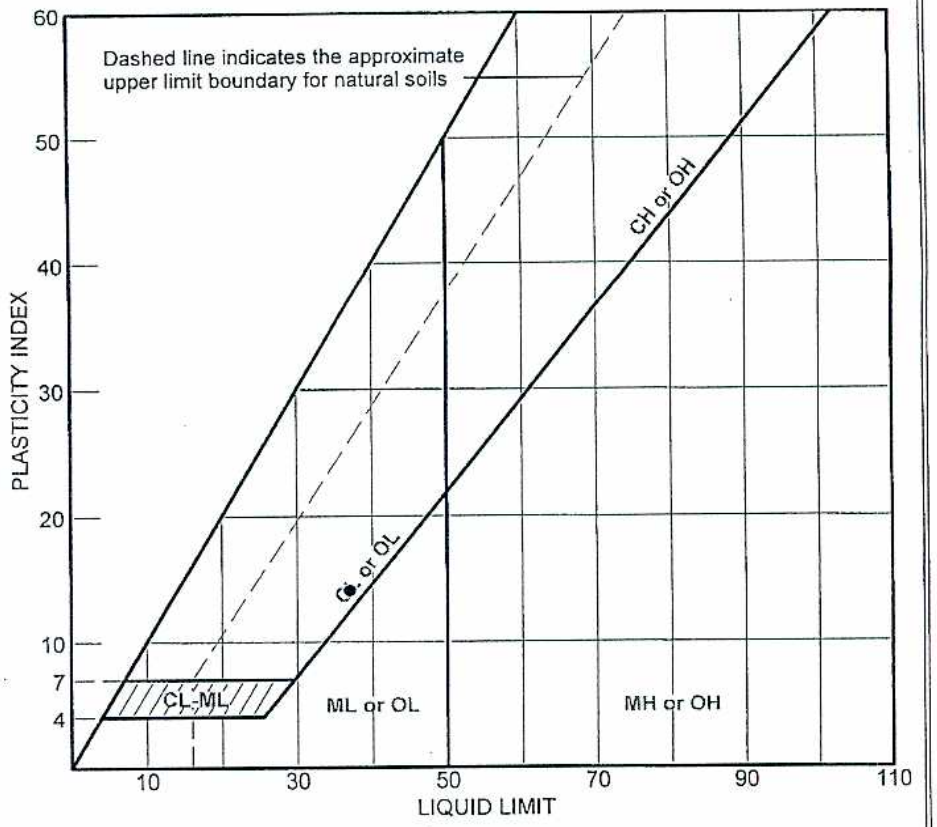
LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D4318 (05)





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
•	S-10-1113	S-10-1113	N/A	4/27/09	GC	Greenish Gray Clayey Gravel with Sand	16.3	37	14

Client

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Project No. Lab No. 9590

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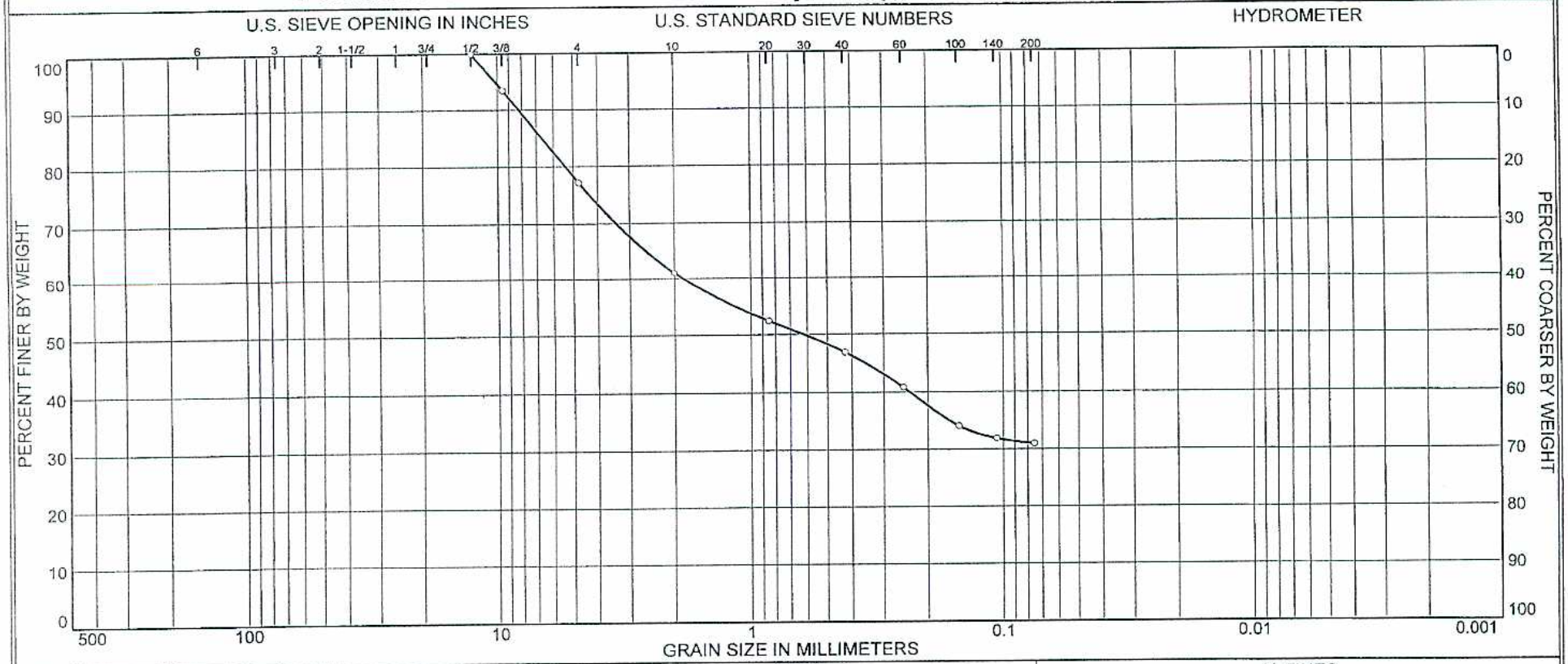
Particle Size Distribution Report (ASTM D422-63 (2007))



	% COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	22.8	16.1	14.2	15.9	31.0	

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	S-11-0507	S-11-0507	N/A	4/27/09	SM	Black Silty Sand with Gravel			

Client

Project GAF, Erie, PA

Project No. 3410-08-0643.02 Lab No. 9591

MACTEC ENGINEERING AND CONSULTING, INC.

○ Tested By: EH Reviewed By: JW

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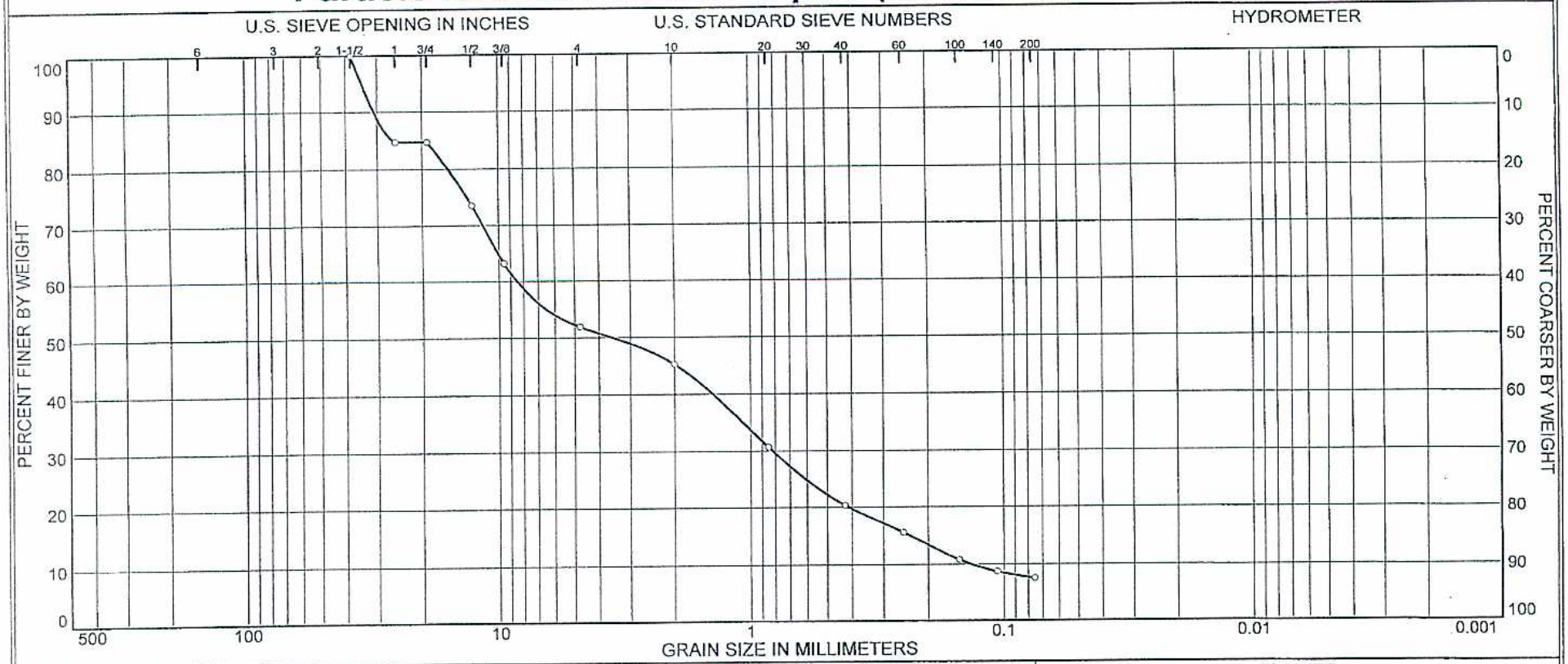
Particle Size Distribution Report (ASTM D422-63 (2007))



	% COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	15.2	32.9	6.6	25.0	12.8	7.5	

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	S-11-1113	S-11-1113	N/A	4/27/09	GP-GM	Greenish Brown Poorly Graded Gravel with Silt and Sand		NV	NP

Client

Project GAF, Erie, PA

Project No. 3410-08-0643.02 Lab No. 9592

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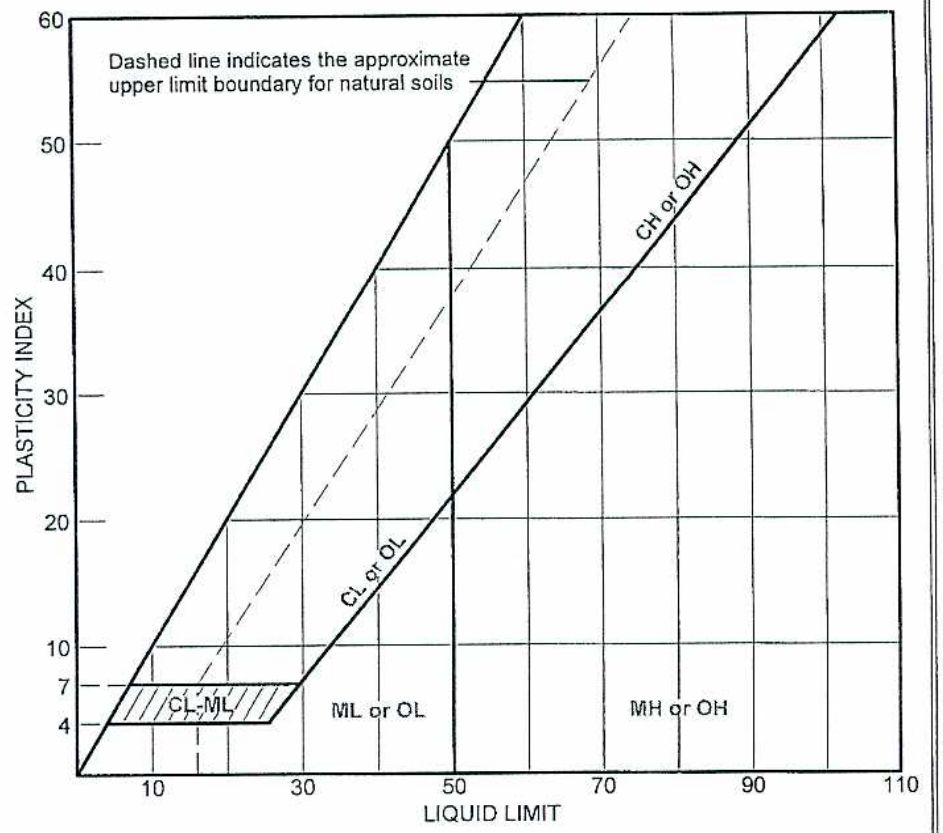
LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D4318 (05)



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
•	S-11-1113	S-11-1113	N/A	4/27/09	GP-GM	Greenish Brown Poorly Graded Gravel with Silt and Sand		NV	NP

Client

Project GAF, Erie, PA

Project No. 3410-08-0643.02 Lab No. 9592

MACTEC ENGINEERING AND CONSULTING, INC.

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GAF Phase II

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