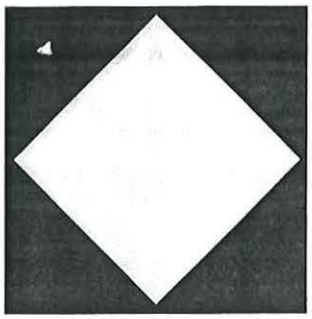
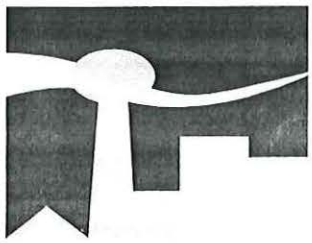
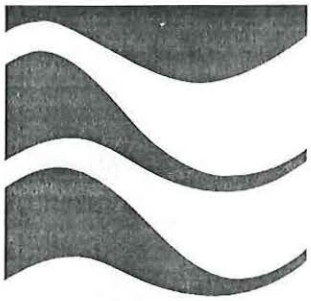




Summary of Closure AOCs #5, #8, and #11

Fraser Shipyards, Inc.



Superior, Wisconsin

SEH No. FRASE9401.00

November 2000

SHORT ELLIOTT HENDRICKSON INC
Multidisciplined.
Single Source.

TRANSMITTAL

421 Frenette Drive, Chippewa Falls, WI 54729-3374 715.720.6200 800.472.5881 715.720.6300 FAX

TO: Ron Peterson

Fraser Shipyards, Inc

Superior , WI

November 15, 2000
Date

File Number and Location
AFRASE9401
Client Number

RE: Final Report

We are

☒ *Enclosing* ☐ *Sending Under Separate Cover* ☐ *As Requested*

Six Copies - Summary of Closure AOCs #5, 8, and 11

For your

☐ *Information/Records* ☒ *Review* ☐ *Approval*

☐ *Action* ☒ *Distribution* ☐ *Revision and resubmittal*

REMARKS:

Ron - Enclosed are 6 copies of the final report for AOCs # 5, 8, and 11. Submittal of these documents to the WDNR should fulfill the requirements of Fraser's Stipulated Agreement with the State. Please review and, if satisfactory, sign the cover letter of all six documents.Forward two (2) copies to Steve LaValley at the WDNR. Please send 2 copies back to me for my files and retain the last 2 for your facility. IF you have review comments which must be addressed by SEH, mark up one copy and send all the copies back to me for revision.

Once the WDNR receives these documents, they will begin a 30 day public notice period. After that time period, the site should be officially closed. Thanks again for the opportunity of working with you and the other folks at Fraser on this project.

BY: Cy Ingraham

c:

FRASER
SHIPYARDS, INC.
P. O. BOX 997
SUPERIOR, WISCONSIN
54880
DIAL (715) 394-7787
FAX (715) 394-2807

November 15, 2000

RE: Fraser Shipyards, Inc.
Summary of Closure
AOCs #5, #8, and #11
Superior, Wisconsin
SEH No. FRASE9401.00

Mr. Steven LaValley, Hazardous Waste Specialist
Wisconsin Department of Natural Resources
1401 Tower Avenue
Superior, WI 54880

Dear Mr. LaValley:

Fraser Shipyards, Inc. (Fraser) (Fraser) is submitting this report which includes a summary of the documentation of closure for areas of concern (AOC) #5 - Paint Waste Staging Area, #8 - Paint Room Storage Pad, and #11 - Dry Dock #1 Base This report was prepared on behalf of Fraser by our consultant, Short Elliott Hendrickson Inc. (SEH). The document describes investigation and closure activities which were performed to meet the requirements for closure of an unlicensed hazardous waste facility as outlined in ch. NR 685 Wisconsin Administrative Code. The Fraser facility is located in Superior, Wisconsin.

This document is submitted to fulfill Fraser's obligation under paragraph #9 of the January 9, 1998 Stipulation and Order for Judgment. If you have any questions regarding this document, please call me at (715) 394-7787 or Cy Ingraham at (715) 720-6231.

Sincerely,
Fraser Shipyards, Inc.

Ronald Peterson
Yard Superintendent

GGC/ls/CWI/JEG

Summary of Closure
AOCs #5, #8, and #11

Fraser Shipyards, Inc.
Superior, Wisconsin

Prepared for:
Fraser Shipyards, Inc.
Superior, Wisconsin

Prepared by:
Short Elliott Hendrickson Inc.
421 Frenette Drive
Chippewa Falls, WI 54729-3374
715.720.6200

I, Gloria Chojnacki, hereby certify that I am a scientist as that term is defined in s. NR 712.03(3), Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Gloria Chojnacki — 11-14-00

Gloria Chojnacki, CHMM — Date
Environmental Scientist

I, John E. Guhl, hereby certify that I am a Hydrogeologist as that term is defined in s. NR 712.03(1) Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

John E. Guhl — #120 — 11/14/2000

John E. Guhl, P.G. — P.G. Number — Date
Hydrogeologist

I, Cyrus W. Ingraham, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

E-24690 — 11/14/00

Cyrus W. Ingraham, P.E. — P.E. Number — Date
Sr. Project Manager

Distribution List

No. of Copies	Sent to
2	Steven LaValley, Hazardous Waste Specialist Wisconsin Department of Natural Resources 1401 Tower Avenue Superior, WI 54880
2	Ron Peterson, Superintendent Fraser Shipyards, Inc. Third Street and Clough Avenue Superior, WI 54880
2	Cyrus W. Ingraham, P.E. Short Elliott Hendrickson Inc. 421 Frenette Drive Chippewa Falls, WI 54729

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Fraser Shipyards, Inc.

Prepared for Fraser Shipyards, Inc.

1.0 Introduction

On behalf of Fraser Shipyards, Inc. (Fraser), Short Elliott Hendrickson Inc.® (SEH) has prepared this Summary of Closure for Areas of Concern (AOCs) #5 - Paint Waste Staging Area, #8 - Paint Room Storage Pad, and #11 - Dry Dock #1 Base. This report describes investigation and closure activities conducted in order to meet the requirements for closure of an unlicensed hazardous waste facility as outlined in ch. NR 685 Wisconsin Administrative Code (WAC). In addition, this report is submitted to fulfill Fraser's obligation under paragraph #9 of the January 9, 1998 Stipulation and Order for Judgment.

1.1 Project Contacts

1. Ron Peterson, Superintendent
   Fraser Shipyards, Inc.
   Third Street and Clough Avenue
   Superior, WI 54880
   (715) 394-7787

2. Steve LaValley
   Hazardous Waste Specialist
   Wisconsin Department of Natural Resources
   1401 Tower Avenue
   Superior, WI 54880
   (715) 392-7988

3. Cyrus Ingraham, P.E., Sr. Project Manager
   Short Elliott Hendrickson Inc.
   421 Frenette Drive
   Chippewa Falls, WI 54729
   (715) 720-6231

2.0 Background Information

2.1 Site Location and Setting

The Fraser facility is located at Third Street and Clough Avenue in Superior, Wisconsin as depicted on Figure 1, "Site Location." The site is located on Howard's Bay in Section 11, T49N, R14W, Douglas County, Wisconsin.

Based on plat maps obtained from Douglas County, the site is bounded by industrial, residential, and waterfront properties. According to a zoning map obtained from the City of Superior, the site is zoned W1, Waterfront.

According to the U.S. Department of Housing and Urban Development "Flood Insurance Study," the site is not located within the Zone A or A1 100 year floodplain of Lake Superior. No other significant water bodies appear to exist within an approximate 0.5 mile radius of the site.

According to the Wisconsin Department of Natural Resources (WDNR) Wisconsin Wetland Inventory Map (WWIM) for the vicinity, there are five identified wetland areas within a 0.5 mile radius of the site. The closest wetland is located adjacent to the western fence line of the site. No wetlands were identified on the Fraser property based on the WWIM.

The only parkland known to exist within a 0.5 mile radius of the site is Kelly Park to the south on 7th Street and Baxter Avenue. No schools are currently located within a 0.5 mile radius of the site.

2.2 Site Description

The Fraser property (also referred to as the site) is approximately 65 acres in area with over 50,000 square feet of shops, office, and warehouse space. The site is located with over 13,000 linear feet of frontage on Howards Bay, an enbayment of the Superior, Wisconsin Harbor. The site features are shown on Figure 2, "Site Plan."

Two graving-type dry docks for ship repair are located in the eastern portion of the site. Dry Dock #1, the easternmost dock, can accommodate ships with up to a 620 foot length and 60 foot beam. Dry Dock #2, is located approximately 100 feet west of Dry Dock #1 and can accommodate ships with up to a 820 foot length and 80 foot beam. A smaller graving-type wet building dock which is used for pre-

fabrication of ship sections is located in the western portion of the site. A 540 foot wet slip is also located in the western portion of the site. Berthing is available for up to 15 ships in the bay area.

Structures on the property consist of a main office building; a fabrication shop and machine shop building; a joiner's shop and mold loft building; lunch room building; power house; hose house; rivet shack and tool repair building; and a store room. A railroad spur enters the site near the southwest corner and travels north approximately 900 feet. An area used for dry storage of the company's repair vessels is located in the southeastern portion of the site.

As the result of the site visits by SEH and a hazardous waste management inspection conducted by the WDNR, 14 areas of concern (AOCs) were identified. All the AOCs have met the requirements for closure under ch. NR 720 WAC. Three AOCs (#5, #8, #11) also require closure under ch. NR 600 WAC. Preparation of this report fulfills the requirements for closure of AOCs #5, #8, and #11 under ch. NR 685 WAC. The locations of AOCs #5, #8, and #11 are shown on Figure 2.

2.3 Site Topography and Drainage

The general topography of the site slopes slightly from north to south on the southern one-half of the property and south to north on the northern one-half of the property. Elevations range from 605 to 610 feet National Geodetic Vertical Datum (NGVD). Howards Bay (Lake Superior) lies immediately north of the property with an approximate mean water surface elevation recorded at 602 NGVD according to the Superior, Wisconsin 7.5 Minute USGS Topographic Quadrangle Map (dated 1954 and photorevised in 1983). Area topography is shown on Figure 1.

Surface drainage at the site is primarily dictated by topography. The northern yard area, in the vicinity of the dry docks and administrative buildings drains towards Howards Bay. The southern yard area drains to a wetland area south of the property. This wetland is bounded on the north by the Fraser Shipyard property and on the south by the Burlington Northern Railroad grade.

Two City of Superior municipal storm sewers cross the property and discharge into Howards Bay. One storm sewer discharge occurs at the easternmost terminus of Howards Bay and the other occurs at the southern end of the 540 foot wet slip. The locations of the storm sewer drains are shown on Figure 2.

2.4 General Physiography and Regional Hydrogeology

Preliminary soil survey information was provided by the USDA Soil Conservation Service located in Ashland, Wisconsin. Soils on the Fraser Shipyard property are classified as Udorthents, which form 1 to 6 percent slopes. Udorthents occur in areas where the original soil profile has been altered by the addition or removal of more than about a foot of soil materials.

Soils adjacent to the south side of the property area classified within the Ontonagon-Rudyard complex. This soil type occurs as an intermix of moderately well drained Ontonagon soil and somewhat poorly drained Rudyard soil. Rudyard soils form in clayey lacustrine deposits.

Ontonagon silty clay loams occur adjacent to the southeast corner of the property. These are well drained, highly erodible soils, which occur on 6 to 12 percent slopes and form in clayey lacustrine deposits.

Groundwater in the Ontonagon-Rudyard soil series is generally found at depths less than six feet from the surface and can be perched. Depth to groundwater in the Ontonagon silty clay loams is typically greater than six feet from surface.

Underlying the surface soils in the vicinity of the site are glacial till deposits belonging to the Douglas Member of the Miller Creek Formation. The Douglas till is comprised of fine textured glacial till averaging 10 percent sand, 26 percent silt, and 64 percent clay in the less-than-2 mm fraction. It is typically reddish-brown in color and averages 54 percent illite in the less-than-2 mm fraction. The Douglas Member is generally the surface unit throughout most of the Lake Superior bluffs, but in a few places is overlain by fluvial or lacustrine sand and gravel deposits or offshore silt and clay deposits of the Miller Creek Formation or younger fluvial, lacustrine, and organic deposits. Most of the Douglas Member is till deposited by ice of the Superior Lobe.

According to a well constructor's report for a private well located near the Fraser property, the glacial till is approximately 270 feet thick. This till consisted of red clay, silt, and sandy silt according to the driller's log.

The uppermost bedrock in the vicinity of the site is PreCambrian-aged Keweenawan sandstone. This sandstone was encountered at approximately 270 feet in the nearby private well and extends to at least a 600 foot depth based on the driller's log.

Two major aquifers are located in the vicinity of the site, the waterbearing sandstone of PreCambrian-age and the Pleistocene glacial deposits of varying productivity. Permeabilities of the sandstone are moderate to low. The sandstone aquifer yields a

sufficient amount of water for domestic wells (10 to 100 gpm) and can produce up to 500 gpm in some areas.

The Pleistocene glacial deposits consist of till, lake sand and silt, and fluvial sand and gravel. Sandy till aquifers typically yield small amounts of water (5 to 10 gpm). Yields from sand and gravel lenses do not commonly exceed 100 gpm.

Recharge to the aquifers is impeded by the low permeability red clay and silt glacial deposits. The greatest potential for recharge is through the sand and gravel layers.

Regional ground water movement is to the north into Lake Superior. Groundwater flow at the site is likely at a low horizontal hydraulic gradient towards Howards Bay.

The City of Superior obtains approximately 95 percent of its drinking water from a well field located on Minnesota Point, approximately 5500 feet northeast of the site. The well field contains approximately 83 vertical and horizontal wells which produce approximately 2.5 mgd. An additional 500,000 gpd is obtained from the City of Cloquet intake pipe, which extends out into Lake Superior from the well field location.

2.5 History of Facility

Fraser operates one of the oldest steel shipbuilding and repair facilities on the Great Lakes. The shipyard was founded in 1889 as American Steel Barge Co. Since then, the yard has been a shipbuilding and repair facility under various owners including Fraser-Nelson Shipbuilding and Dry Dock Co., Inc. In 1977, the shipyard was acquired as a subsidiary of Reuben Johnson and Son, Inc., a Superior, Wisconsin general contractor. The yard continues to operate today under the name of Fraser Shipyards, Inc.

Fabrication of heavy structural steel comprises 90 percent of Fraser's business. Most of the steel fabrication is for use on Great Lakes bulk carrying vessels, however, some steel is fabricated for structures such as grain elevators. The facility is equipped for all types of hull, engine, boiler, electrical, machine, joiner, loft, and other ship work which includes sandblasting and repainting processes. Repair, overhaul or remodeling work can be done in dry dock or "outside" while vessels are loading or unloading.

3.0 AOC #5 – Paint Waste Staging Area

Fraser accumulated wastes from their painting operations in two portable aboveground storage tanks located in the west-central yard area. A number of tanks of varying sizes were also stored in this area to provide emergency storage capacity for oily wastes from ships. The

wastes staged in this AOC included paint wastes potentially mixed with dirty solvents. Wastes staged in these tanks were disposed at Waste Research and Reclamation on July 2, 1993. Many of the tanks initially located at AOC #5 were cut up and removed for salvage. The location of AOC #5 is indicated on Figure 2.

3.1 Soil Samples

Initial soil samples were collected from AOC #5 on January 11, 1994 at the surface and at the 2.0 to 2.5 foot depth interval. A grab sample from boring B-9 (2 - 2.5 feet) indicated a total lead concentration of 685 mg/kg and B-10 (2 - 2.5 feet) indicated a total chromium concentration of 274 mg/kg. Both of these analytical results exceeded the ch. NR 720 Wisconsin Administrative Code Residual Contaminant Levels (RCL) based on human health risk from direct contact of 500 mg/kg for lead and 200 mg/kg for hexavalent chromium (industrial standard.)

A Toxicity Characteristic Leaching Procedure (TCLP) as well as an ASTM water leach procedure was performed on the soil sample from B-9, the soil sample with the highest total lead concentration. A TCLP was also performed on B-10. the soil sample with the highest chromium concentration. No detectable concentrations of lead or chromium were noted in either of the leach procedures indicating that the lead and chromium in the subsurface are not significantly leachable.

Additional surface soil samples were collected on August 16, 1997 in order to determine if surface soil concentrations of select heavy metals pose a significant threat. Laboratory results of the surface samples (B-11, HA-1, HA-2, HA-3) ranged from 20.4 mg/kg to 66.1 mg/kg for total lead and 14.9 mg/kg to 22.2 mg/kg for total chromium. Neither lead nor chromium surface soil concentrations exceed the ch. NR 720 industrial RCL standards. Soil analytical results are summarized on Table 1, "Soil Analytical Results." Site investigation detail is presented on Figure 3, "AOC #5 Detail."

3.2 Groundwater Samples

Groundwater monitoring well MW-2 was installed on August 16, 1996. Two rounds of groundwater samples were collected using a bailer, filtered and submitted on August 26, 1996 and November 21, 1996 for laboratory analysis of dissolved lead and chromium. Subsequently, four rounds of groundwater samples were collected from MW-2 using a peristaltic pump, filtered and submitted for dissolved lead analysis. In addition, unfiltered groundwater samples were also collected and submitted for total lead analysis during the last three sampling events.

Results of the initial rounds of sampling indicated no concentrations of chromium above the laboratory detection limit. Initial samples collected with a bailer indicated lead concentrations of 48.8 µg/l and 34.2 µg/l, exceeding the ch. NR 140 Enforcement Standard (ES) of 15 µg/l for lead. Four additional rounds of groundwater samples collected with a peristaltic pump from MW-2 indicated no detection of lead above the ch. NR 140 ES for lead. The dissolved lead concentration at one sampling event was 3.08 µg/l which exceeded the ch. NR 140 Preventive Action Limit (PAL) for lead of 1.5 µg/l.

In an effort to further investigate the potential of dissolved lead contamination in groundwater at AOC #5, six hydraulic probe groundwater samples were collected on October 1, 1997. Groundwater samples were brought to the surface with a peristaltic pump, filtered and submitted for laboratory analysis of dissolved lead. Results indicate dissolved lead concentrations ranging from none detected above laboratory detection limits to 1.06 µg/l, in compliance with the ch. NR 140 Groundwater Quality Standards. Groundwater analytical results are summarized in Table 2, "Groundwater Analytical Results." Site investigation detail is presented on Figure 3.

Discrepancies between lead concentrations in the initial rounds of groundwater monitoring and the final rounds are most likely due to the methods of collection. The vigorous action of a bailer allowed for extraction of a greater concentration of fine soil particles to which lead is adsorbed. Some of these particles likely passed through the filter, accounting for increased dissolved lead results. The final rounds of groundwater monitoring indicates that lead does not exceed the ch. NR 140 ES demonstrating that groundwater has not been adversely impacted by lead concentrations in the soil at AOC #5.

3.3 Soil Excavation

A remedial excavation was performed at AOC #5 to address lead and chromium contaminated soils. Approximately 18 cubic yards of contaminated soil was removed from the AOC on April 18, 2000. The excavation limits measured 10 feet wide by 20 feet long by 3 feet deep in the area shown on Figure 3

A total of five samples were collected from the soil excavation side walls at 2 feet below grade and the excavation bottom at 3 feet below grade. The soil samples were analyzed for lead and chromium. Results of the soil analysis indicated lead concentrations ranging from 15.8 mg/kg to 370 mg/kg. Soil chromium concentrations ranged from 4.21 mg/kg to 52.8 mg/kg.

Confirmatory laboratory analysis results following remedial excavation at AOC #5 did not indicate exceedances of ch. NR 720 Residual Contaminant Levels (RCLs) for industrial sites (industrial RCL for lead = 500 mg/kg; industrial RCL for hexavalent chromium = 200 mg/kg). Four successive quarterly rounds of groundwater were collected that demonstrated compliance with the requirements of ch. NR 140 (lead concentrations less than ES of 15 µg/l) and s. NR 726.05(3). Notice of conditional closure by the WDNR was dated August 17, 2000.

4.0 AOC #8 – Paint Room Storage Pad

Fraser temporarily stores flammable liquids in a paint room located indoors in the Fabrication Shop. A small storage pad is located south of the paint room where partially used containers of paint and solvent are staged. This storage pad had a crushed stone base, which has subsequently been covered with concrete to facilitate protection of the soils from potential future releases. The concrete pad was constructed in July 1994. The partially used materials associated with this AOC include paint and solvents. Scrap metal and solid wastes (paper, rags, etc.) were also staged in this area. The location of AOC #8 is indicated on Figure 2.

4.1 Soil Samples

AOC #8 was initially investigated for the presence or absence of contaminated soils associated with potential release from materials staged at the AOC. The investigation consisted of two soil samples (B-20 and B-21) obtained from a shallow test pit from the 0 to 1 foot (B-20) and 2 to 2.5 foot (B-21) depth interval on January 25, 1994. Two soil samples were collected from the shop floor adjacent to the storage pad with a hand auger on August 23, 1995 (HAX-1 and HAX-2) from the 8 to 12 inch depth interval to define the extent of contamination.

Laboratory testing indicated benzene and toluene at concentrations of 0.0058 µg/g and 0.15 µg/g, respectively, were detected closer to the surface (B-20), while no VOCs above laboratory detection limits were found at the 2 to 2.5 foot depth interval (B-21). Low level concentrations of various hydrocarbon compounds which appear to be petroleum and manufacturing related were detected at the surface of the shop floor in the area adjacent to the AOC. The total VOC concentration at HAX-2 was 24 µg/g.

Additional soil sampling at AOC #8 was conducted to further define the degree and extent of VOC contamination. Four additional hand auger soil samples (HAX-3, HAX-4, HAX-5, HAX-6) were obtained on August 15, 1996. The samples were collected at a depth of approximately 18 inches. These additional floor samples indicated

very low concentrations of naphthalene (0.033 µg/g) at HAX-3, chloromethane (0.028 µg/g) at HAX-4, and o-xylene and styrene (0.035 µg/g to 0.138 µg/g) at HAX-3, HAX-4, HAX-5 and HAX-6. The concentrations are below proposed or final generic soil cleanup levels based on protection of groundwater or human health from direct contact. Total lead and chromium at the four additional hand auger locations (HAX-3, HAX-4, HAX-5, HAX-6) are either not detectable or below the ch. NR 720 RCLs Table 1 values for non-industrial sites. Soil analytical results are summarized on Table 1. Site investigation detail is presented on Figure 4, "AOC #8 Detail."

Fraser constructed a concrete floor over the unpaved area at AOC #8 inside of the shop to prevent downward migration of any surficial contaminants in the building. Following those investigative and remedial actions, Fraser requested formal closure of AOC #8. Documentation submitted to the WDNR was reviewed and notice of "No further action required" was provided in July 16, 1997.

5.0 AOC #11 – Dry Dock #1 Base

Dry Dock #1 was originally constructed with a concrete base in the southern third of the dock and a stone and wooden base in the remaining northern section. As ships were repaired within the dock, wastes could have potentially fallen onto the stone base and become difficult to remove. Potential wastes which may be generated at AOC #11 consist of sandblasting grit wastes and solid wastes.

In order to prevent migration of potential contaminants into the stone base, Fraser poured concrete over the northern two thirds section of Dry Dock #1 during July and August 1994. Approximately two feet of crushed stone was placed directly below the concrete over a floor of natural red clay. Prior to placement of the stone and concrete, seven soil samples were collected from the dry dock base at depths ranging from zero to 10 inches below top of clay, and submitted for laboratory analysis of lead.

Laboratory results indicated the presence of lead concentrations ranging from 30.1 mg/kg to 272 mg/kg at a depth of six to 10 inches into the red clay floor. Lead concentrations at the clay surface ranged from 832 mg/kg to 958 mg/kg.

Additional investigation of AOC #11 was conducted on August 12, 1996 with the installation of a seepage lysimeter. The purpose of the lysimeter was to document that groundwater contamination had not occurred below the dry dock floor. Two soil samples submitted for laboratory analysis of lead collected at the time of the lysimeter installation indicated no detectable concentrations of lead at the 0 to 0.5 foot and 2.0 to 2.5 foot depth intervals. These samples were collected in close proximity to sample T2 which had a surface lead

concentration of 832 mg/kg. Soil analytical results are summarized on Table 1.

The first round of groundwater sampled from the seepage lysimeter indicated a dissolved lead concentration of 6.94 µg/l which is below the ch. NR 140 ES of 15 µg/l but above the PAL of 1.5 µg/l. The second round of sampling indicated no detectable concentrations of dissolved lead. Groundwater analytical results are summarized on Table 2. Site investigation detail is presented on Figure 5, "AOC #11 Detail."

Dry Dock #1 construction, gate detail and placement of concrete over AOC #11 have effectively confined residual lead, which may be present, to the clay surface under the concrete dry dock base. This has been demonstrated in both soil and groundwater samples collected from the seepage lysimeter. Soil samples as well as groundwater samples do not indicate that they are impacted by lead. Dry Dock #1 construction and gate detail are shown in Figure 6, "Dry Dock #1 Cross Section and Figure 7, "Gate Detail."

In addition to the soil and groundwater samples, the bay water both inside and outside the dry dock was analyzed. Representative samples of the water column were collected in order to demonstrate that water being pumped from AOC #11 is not impacted with heavy metals. Dissolved lead was detected inside the dock (5 feet from the bottom) at a concentration of 7.57 µg/l and outside the dock (10 feet from the surface) at 6.83 µg/l. The variation indicated between these results are not significant given the accuracy limits of the analytical methods. Bay Water analytical results are summarized on Table 3, "Bay Water Analytical Results."

Additional information including the LYS-1 Construction Log and cross-section drawings of Dry Dock #1 demonstrating the lysimeter placement with relation to geologic formations and dock structure were submitted to the WDNR on June 30, 1997 and August 8, 1997, respectively. A maintenance inspection was conducted on Dry Dock #1 and an Operation and Maintenance Plan was submitted to the WDNR on August 23, 2000. This information was requested by the WDNR as conditions for closure of this AOC.

6.0 Standard of Care

The conclusions and recommendations contained in this report were arrived at in accordance with generally accepted professional engineering practice at this time and location. Other than this, no warranty is implied or intended.

GGC/ls/CWI/JEG

7.0 References and Resources

The following reports and correspondence have been submitted by SEH in support of the Closure of AOCs #5, #8, and #11.

Work Plan for Grit Stockpile Sampling	August 10, 1993
Amended Work plan – Grit Stockpile Sampling	August 25, 1993
Site Investigation Work Plan	November 1993
Site Investigation Work Plan Revisions	December 15, 1993
Site Investigation Report and Closure Plan	May 1994
Partial Closure Documentation Report	April 1995
Additional Investigation Work Plan	March 1996
Amendment to March 1996- Additional Investigation Work Plan	July 29, 1996
Partial Closure Documentation Report - AOCs #8 and #12	October 1996
Partial Closure Documentation Report - AOCs #1 and #11	February 1997
Case Summary and Close-out Forms AOC #11	March 5, 1997
Investigation Data – AOC #5	March 25, 1997
Transmittal – Requested Information	June 30, 1997
Correspondence – AOC #11 Detail	August 8, 1997
Additional Investigation Work Plan – AOC #5	August 1997
Case Summary and Close-out Forms - AOC #5	November 26, 1997
Additional Investigation Work Plan - Monitoring Well MW-5 and AOC #5	March 1998
Correspondence – AOC #5	February 17, 2000
Case Summary and Close-out Forms - AOC #5	February 24, 1999
Remedial Excavation Work Plan – AOC #5	March 30, 2000
Case Closure Request AOC #5	June 1, 2000
Operation and Maintenance Plan for Dry Dock #1	August 23, 2000

Table 1
Soil Analytical Results

Analytical Parameters	ch. NR 720 Soil RCL	AOC #/Boring No./Depth (ft)/Date																					
		AOC #5																AOC #8					
		B-9	B-10		B-11	B-12		HA-1	HA-2	HA-3	NS-1	SS-1	ES-1	WS-1	B-1	B-20	B-21	HAX-1	HAX-2	HAX-3	HAX-4	HAX-5	HAX-6
		2-2.5	0-0.6	2-2.5	0-0.5	0-0.5	2-2.5	0-0.5	0-0.5	0-0.5	2	2	2	2	2	0-1.0	2-2.5	0.66	1	1.5	1.5	1.5	1.5
		1/11/94						8/16/96				4/18/00				1/25/94		8/23/95		8/15/96			
FID (units)	NSE	1000+	0	--	0	1.4	1000+	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--
PID (units)	NSE	42	36	--	34	34	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOCs (8010/8020 or 8021) (mg/kg)	Various	BDL	--	BDL	--	--	BDL	--	--	--	--	--	--	--	--		BDL						
Benzene	5.5															0.0058							
Toluene	1500															0.15							
Butylbenzenes	NSE																	0.104	4.707				
Isopropyltoluene	NSE																		0.469				
Ethylbenzene	2900																		1.24				
Naphthalene	NSE																	0.24	5.11	0.033			
Trimethylbenzenes	NSE																	0.0665	2.706				
m- & p- Xylenes	4100																	0.194	6.45				
o-Xylene & Styrene	NSE																	0.131	3.02	0.046	0.035	0.138	0.122
Chloromethane	NSE																				0.028		
n-Propylbenzene	NSE																		0.658				
Metals (mg/kg)																							
Lead	500	685*	--	270	66.1	--	177	38.5	20.4	48.3	15.8	122	370	137	112	167	BDL	--	--	33.3	BDL	BDL	BDL
Cadmium	510	0.18	--	0.28	0.64	--	0.38	--	--	--	--	--	--	--	--	0.218	BDL	--	--	--	--	--	--
Chromium	200	22.7	--	274**	22.2	--	23.1	16.1	14.9	17.4	4.21	23.9	52.8	24.7	31.3	7.53	4.94	--	--	10.5	3.35	2.92	2.8
Mercury	NSE	0.083	--	0.25	BDL	--	BDL	--	--	--	--	--	--	--	--	0.0509	BDL	--	--	--	--	--	--

Analytical Parameters	ch. NR 720 Soil RCL	AOC #/Boring No./Depth (ft)/Date								
		AOC #11								
		DD001	DD002	DD003	T1	T2	T3	T4	LYS-1	
		0.5	0.5	0.5-0.8	0	0	0	0	0-0.5	2-2.5
		7/7/94		8/4/94	8/17/94				8/12/96	
FID (units)	NSE	--	--	--	--	--	--	--	--	--
PID (units)	NSE	--	--	--	--	--	--	--	--	--
VOCs (8010/8020 or 8021) (mg/kg)	Various	--	--	--	--	--	--	--	--	--
Benzene	5.5									
Toluene	1500									
Butylbenzenes	NSE									
Isopropyltoluene	NSE									
Ethylbenzene	2900									
Naphthalene	NSE									
Trimethylbenzenes	NSE									
m- & p- Xylenes	4100									
o-Xylene & Styrene	NSE									
Chloromethane	NSE									
n-Propylbenzene	NSE									
Metals (mg/kg)										
Lead	500	272	30.1	34.1	927	832	958	855	BDL	BDL
Cadmium	510	--	--	--	--	--	--	--	--	--
Chromium	200	--	--	--	--	--	--	--	--	--
Mercury	NSE	--	--	--	--	--	--	--	--	--

NSE = No standard established
BDL = Below laboratory detection limit
-- = Not analyzed for
0.24 = Exceeds ch. NR 720 soil cleanup standards
* = TCLP - Lead, B-9 = BDL; ASTM - Lead, B-9 = BDL
** = TCLP - Chromum, B-10 (2-2.5') = BDL
Compiled by: GGC Checked by: JJT

P:\proj\frase\9401\misc\soilanalres.xls

Table 2
Groundwater Analytical Results

Analytical Parameters	NR 140 Standards		Well No./Sampling Date													
			MW-2						HP-1	HP-2	HP-3	HP-4	HP-5	HP-6	LYS-1	
	ES	PAL	8/29/96	11/21/96	10/1/97	8/25/98	10/20/98	1/19/99	10/1/97	10/1/97	10/1/97	10/1/97	10/1/97	10/1/97	8/29/96	11/21/96
Total Dissolved Metals (µg/l)																
Chromium	100	10	BDL	BDL	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	5.0	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	15	1.5	**48.8**	**34.2**	BDL	BDL	3.08	BDL	BDL	1.06	BDL	BDL	BDL	BDL	6.94	BDL
Total Metals (µg/l)																
Lead	NSE	NSE	--	--	--	BDL	8.38	1.49	--	--	--	--	--	--	--	--
PAHs[1] (µg/l)																
Acenaphthene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	3,000	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)Anthracene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)Pyrene	0.2	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)Perylene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	0.2	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzo(a,h)Anthracene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	400	80	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluorene	400	80	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)Pyrene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1-Methyl Naphthalene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methyl Naphthalene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	40	8.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pyrene	250	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NSE = No standard established
BDL = Below laboratory detection limit
-- = Not analyzed for
48.8 = Exceeds ch. NR 140 Enforcement Standard (ES)
3.08 = Exceeds ch. NR 140 Preventive Action Limit (PAL)
[1] = PAH list is not complete; PAHs not listed are BDL
Compiled by: GGC Checked by: JEG

P:\proj\frase\9401\misc\gwanalres.xls

Table 3
Bay Water Analytical Results

Analytical Parameters	AOC #/Location/Date	
	AOC #11	
	Inside Dry Dock #1 5' from Bottom	Outside Dry Dock #1 10' from Surface
	10/21/96	10/21/96
Total Dissolved Metals (μg/l)		
Lead	7.57	6.83

Compiled by: GGC Checked by: JEG

P:\proj\frase\9401\misc\bay water analytical results.xls

Figures

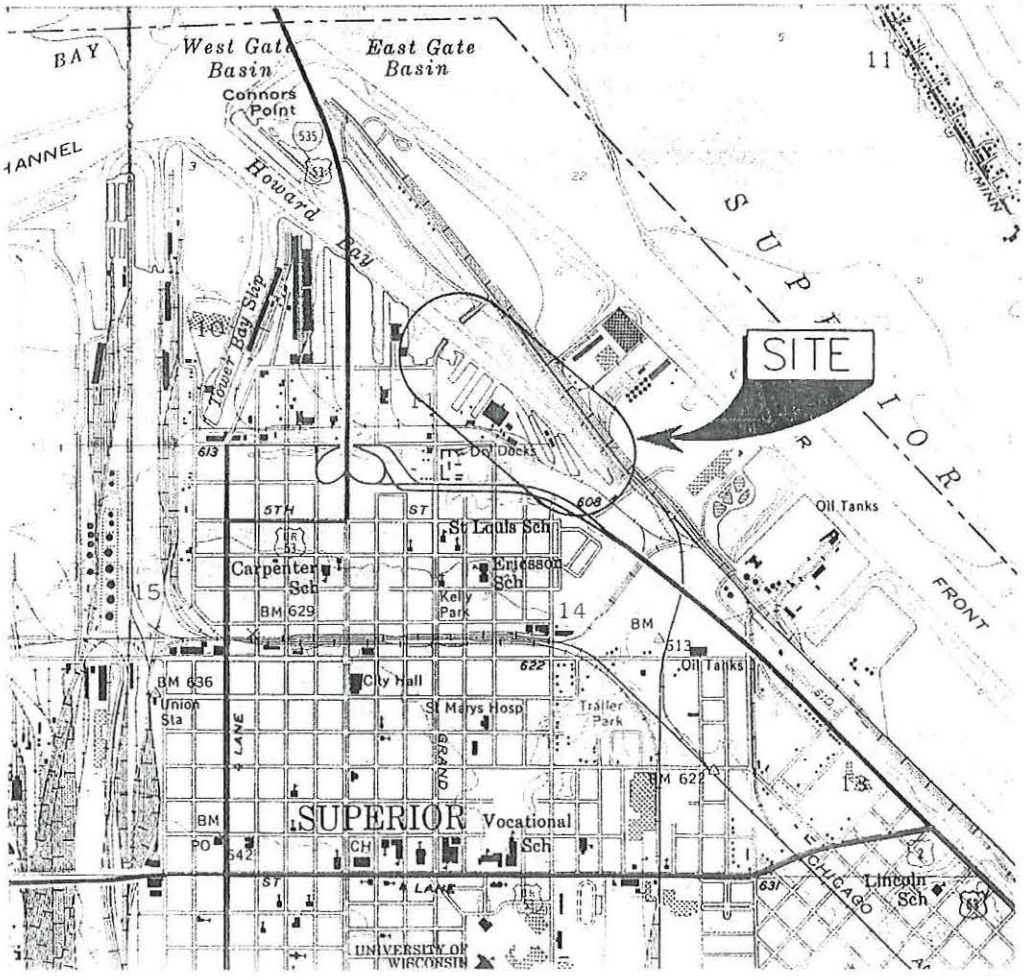
REPRODUCED FROM

USGS SUPERIOR QUADRANGLE

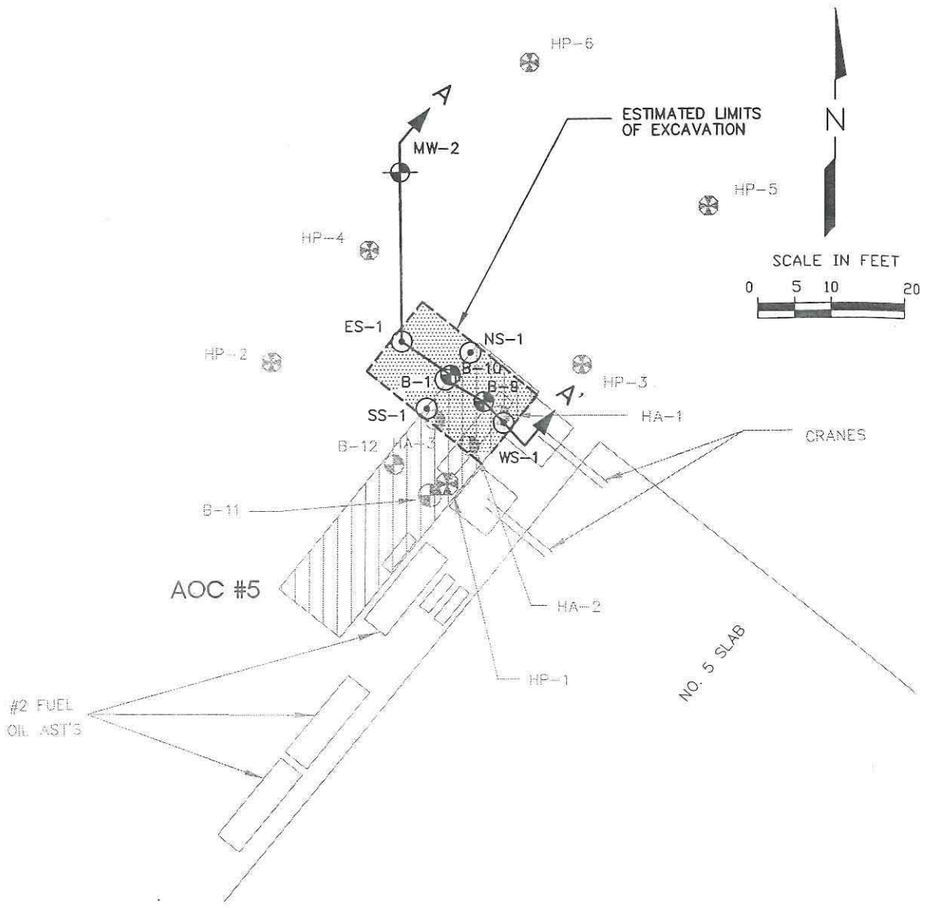
WISCONSIN - DOUGLAS CO. 7.5 MINUTE SERIES

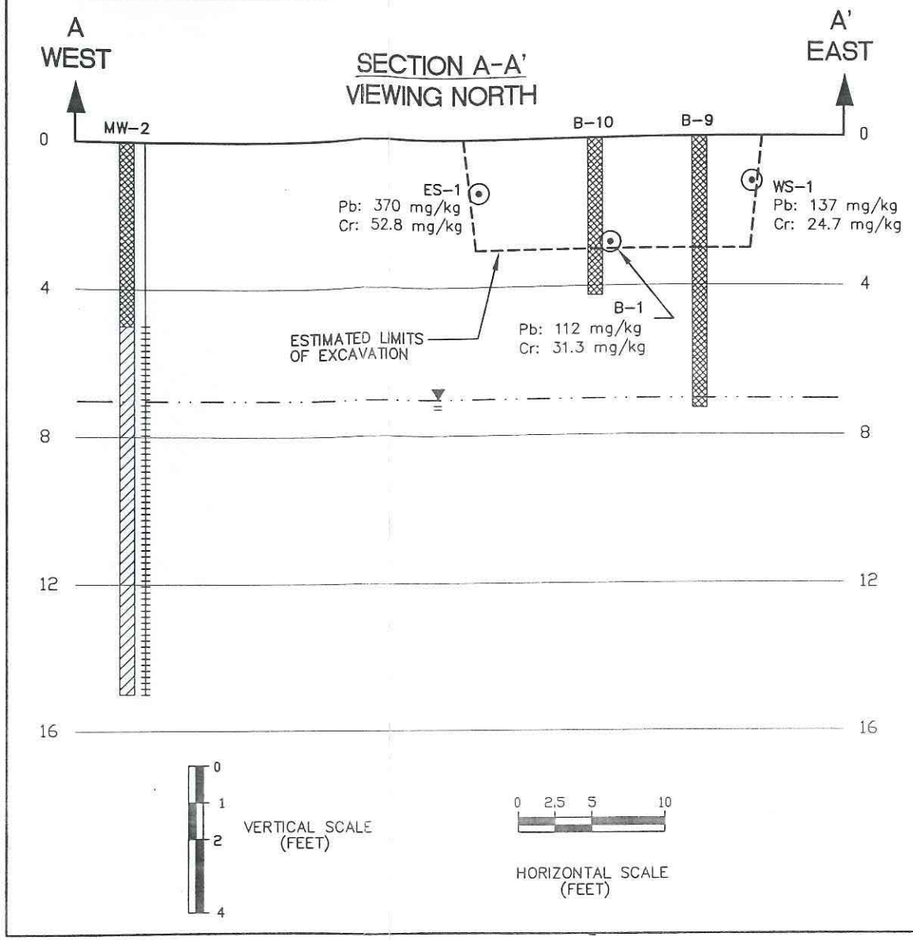
N

SCALE: 1"=2,000'



ENGINEERS ■ ARCHITECTS ■ PLANNERS	DRAWN BY: KEA 10/18/93 CHECKED BY:	FIGURE 1 FRASER SHIPYARDS, INC. SUPERIOR, WISCONSIN	FILE NO. FRASE9401 DRG. NO. 9401FZA1





NOTES:

1. ELEVATIONS ARE SHOWN IN REFERENCE TO SITE DATUM.
2. HORIZONTAL DISTANCES ARE MEASURED WITH RESPECT TO THE CENTER OF EACH SOIL BORING LOCATION.
3. GROUNDWATER ELEVATIONS ARE BASED ON MEASUREMENTS OBTAINED BY SEH ON 08/29/96.

LEGEND

- FILL
- CLAY
- WATER TABLE ELEVATION AS OF 08/29/96
- WELL SCREEN INTERVAL
- Pb= LEAD
- Cr= CHROMIUM

NO.	DATE	ISSUE/REVISIONS	DRAWN BY		DESIGN		FIELD REVIEW	QC CHECK
1	06/07/00	–	RJH	10/00	BLK	06/00		

SEH

FRASER SHIPYARDS, INC.

FIGURE 3
AOC #5 DETAIL

PROJ. NO. FRAS9401
DATE 06/07/00

3/7

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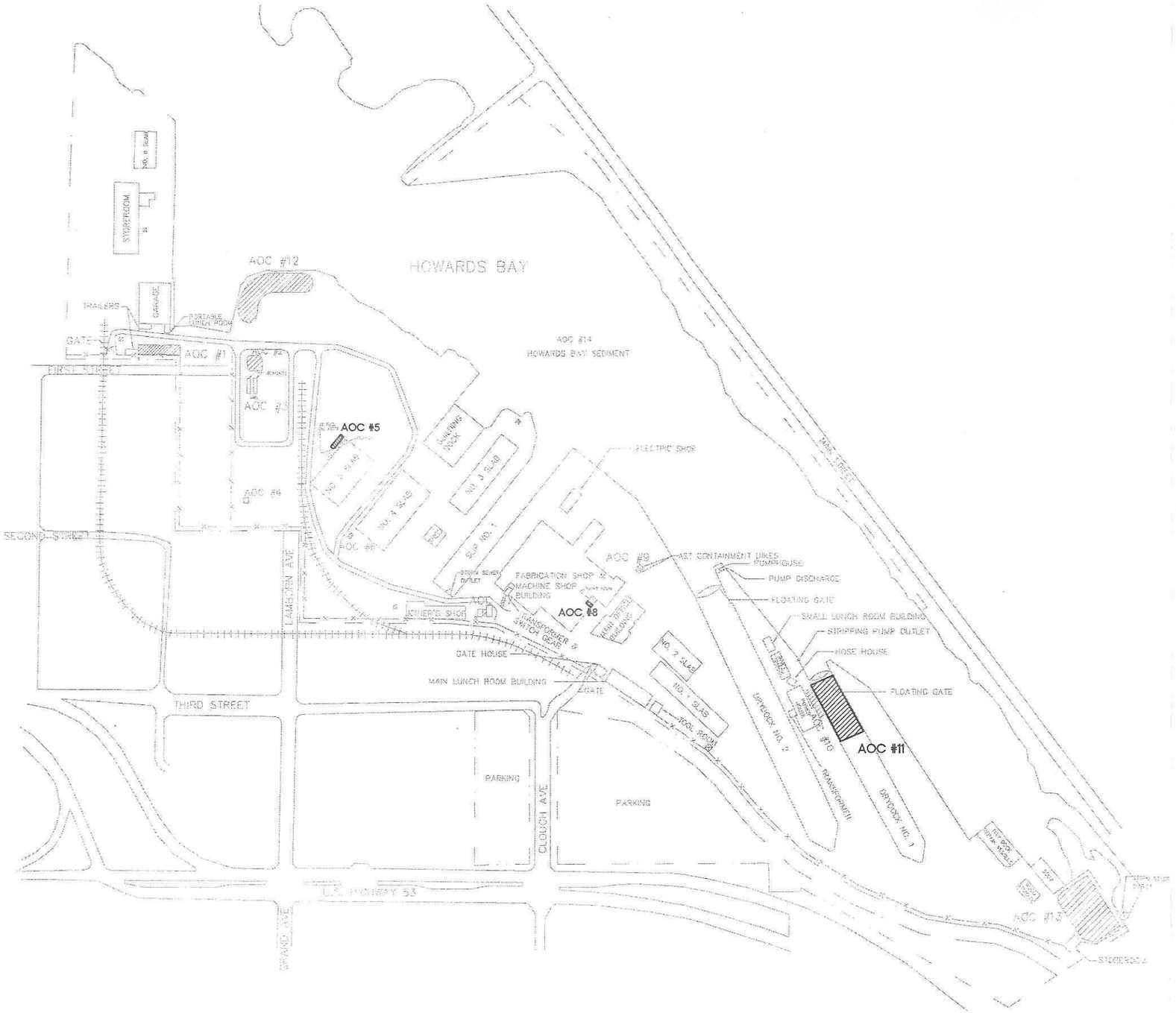

NO.	DATE	ISSUE/REVISIONS	DRAWN BY	DESIGN	FIELD REVIEW	QC CHECK
1	03/03/97	---------	RJH 10/00	JEG 03/97		

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FRASER SHIPYARDS, INC.

FIGURE 2
SITE PLAN

PROJ. NO. FRAS9401
DATE 03/03/97

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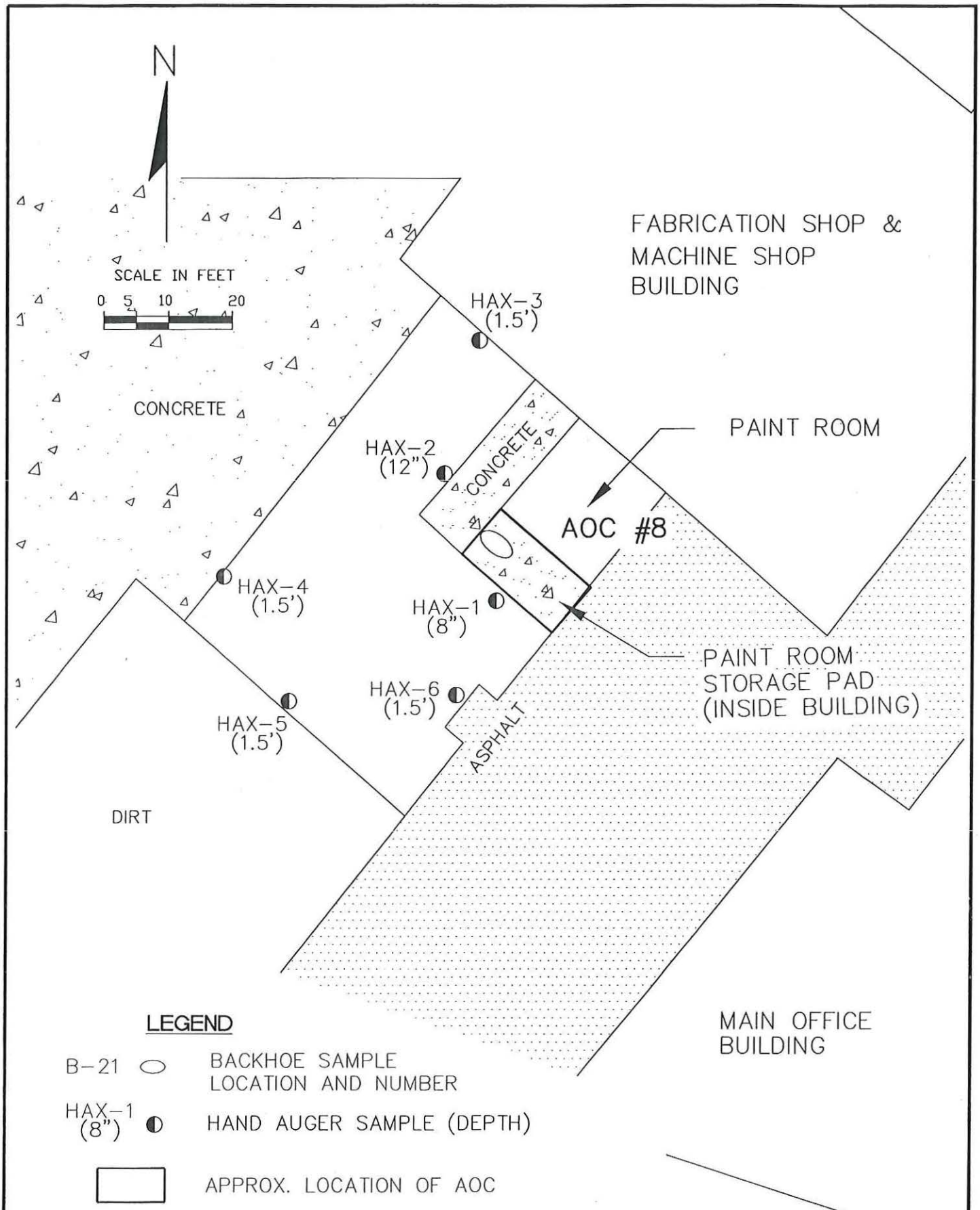
E:\WASTE\FRAS9401\REPORT\FUA6



NO.	DATE	ISSUE/REVISIONS	DRAWN BY	DESIGN	FIELD REVIEW	QC CHECK
1	03/12/96		RJH 10/00	CWI 10/96		

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FRASER SHIPYARDS, INC.

FIGURE 4
AOC #8 DETAIL

PROJ. NO. FRAS9401
DATE 10/03/96

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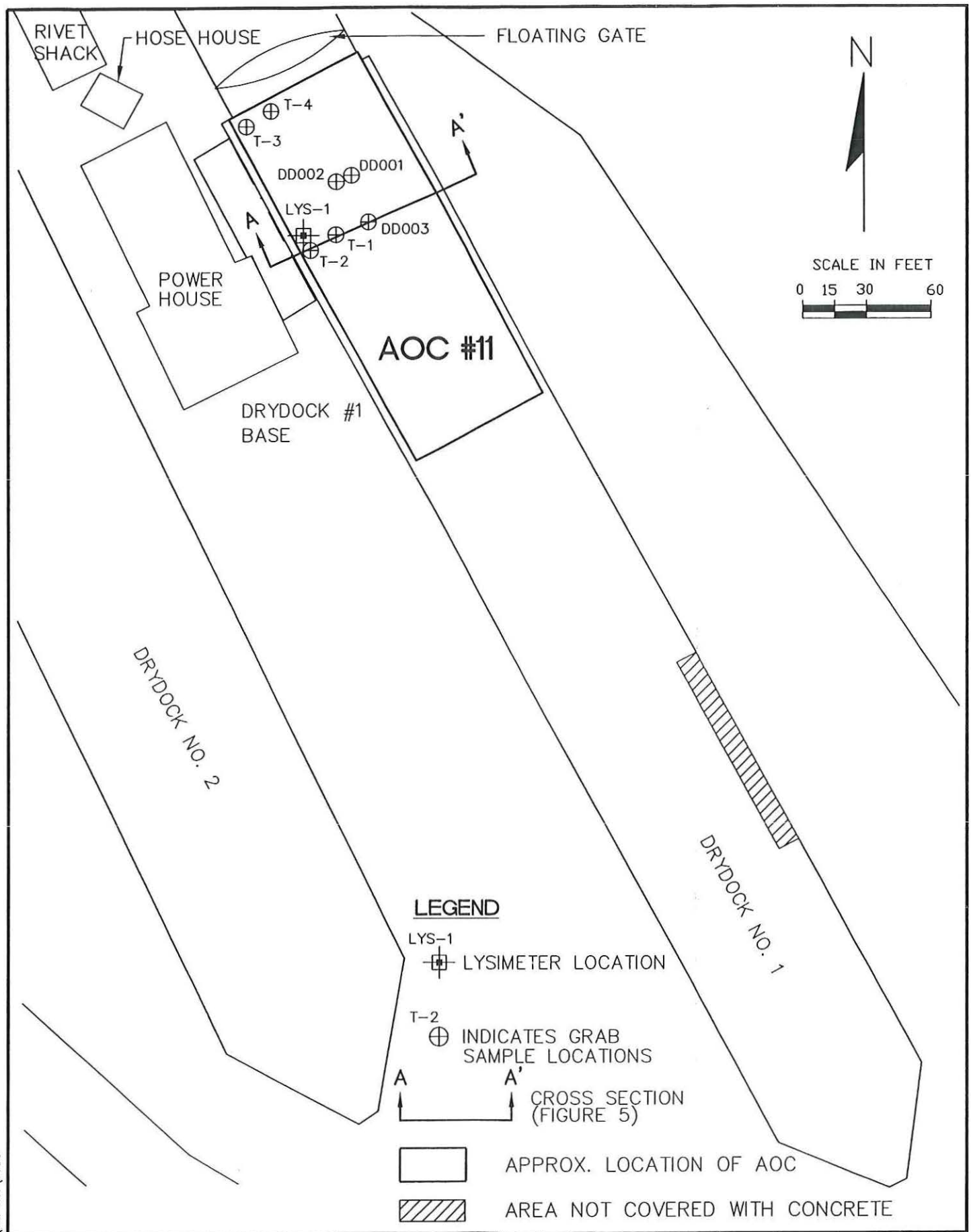

NO.	DATE	ISSUE/REVISIONS	DRAWN BY	DESIGN	FIELD REVIEW	QC CHECK
1	03/03/97		RJH 10/00	CWI 01/97		

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FRASER SHIPYARDS, INC.

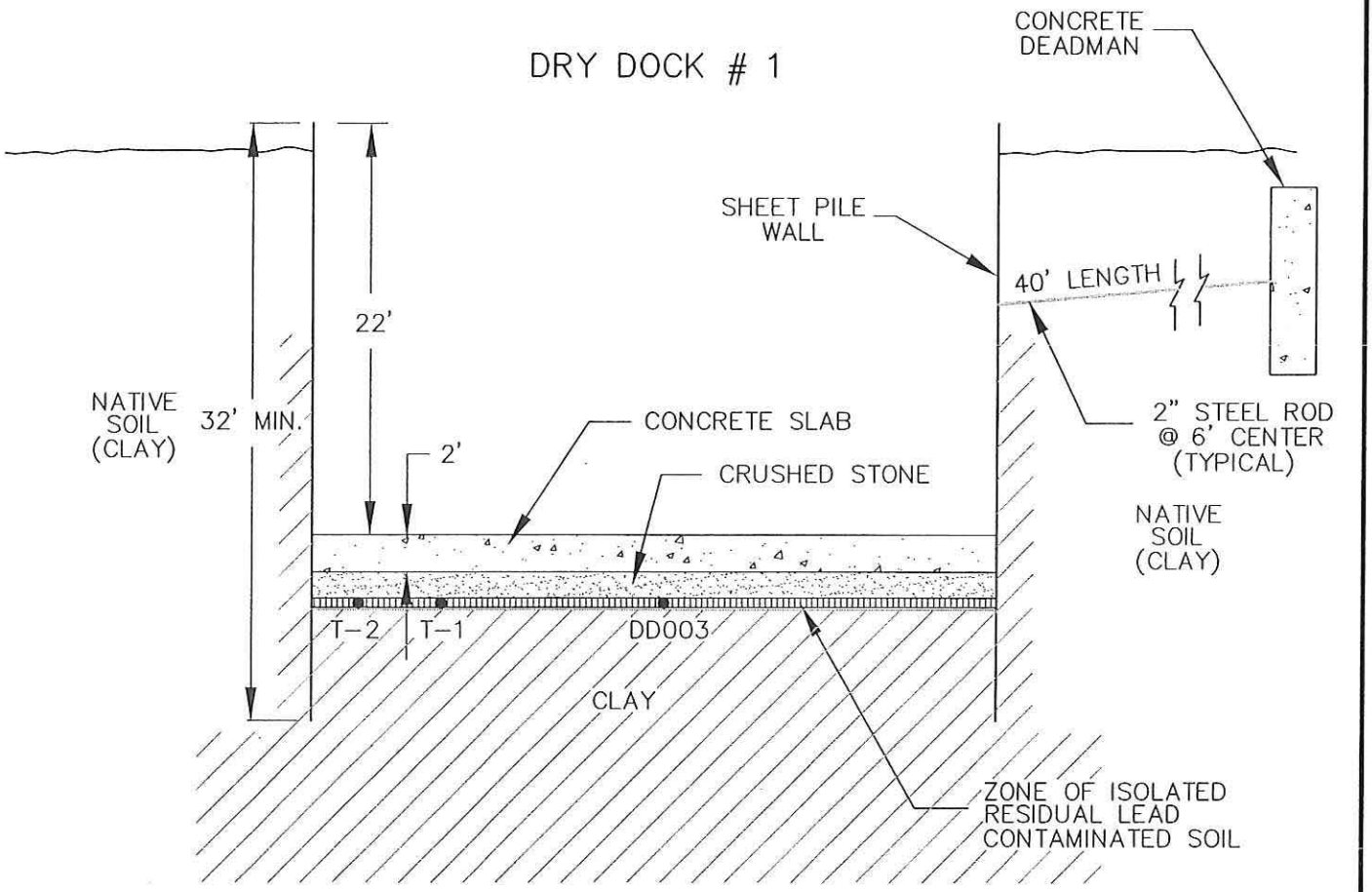
FIGURE 5
AOC #11 DETAIL

PROJ. NO. FRAS9401
DATE 03/03/97

5
7

E:\PROJ\FRAS9401\REPORT\FIG5

DRY DOCK # 1



LEAD CONCENTRATIONS

SAMPLE	ug/g	VERTICLE LOCATION
T-1	927	TOP OF CLAY
T-2	832	TOP OF CLAY
DD003	34.1	6" INTO CLAY

SECTION A-A'

(SEE FIGURE 5 FOR CROSS-SECTION LOCATION)

SCALE VERTICAL 1"=10'
HORIZONTAL 1"=20'

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1	03/03/97		RJH	10/00	CW	01/97				

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FIGURE 6
DRY DOCK # 1
CROSS SECTION

PROJ. NO. FRAS9401
DATE 03/03/97

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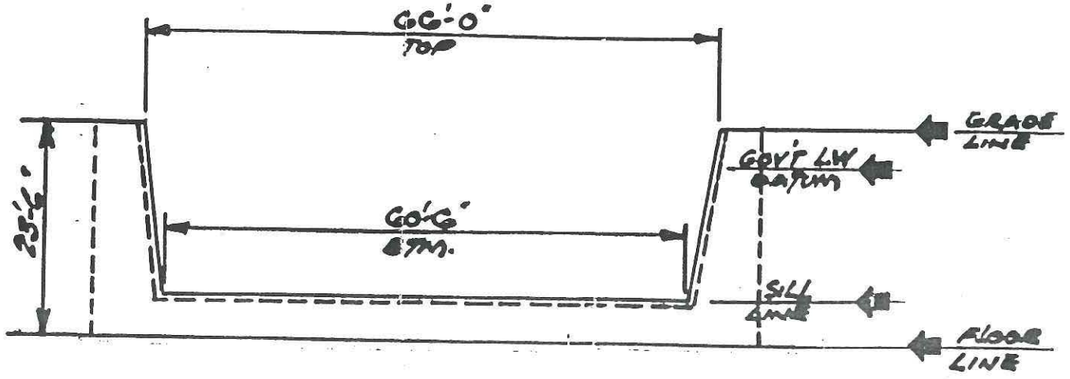
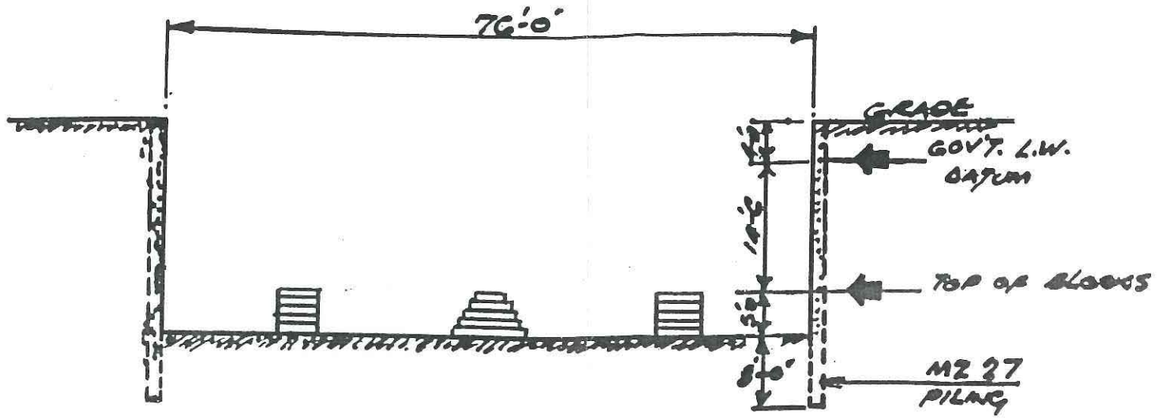
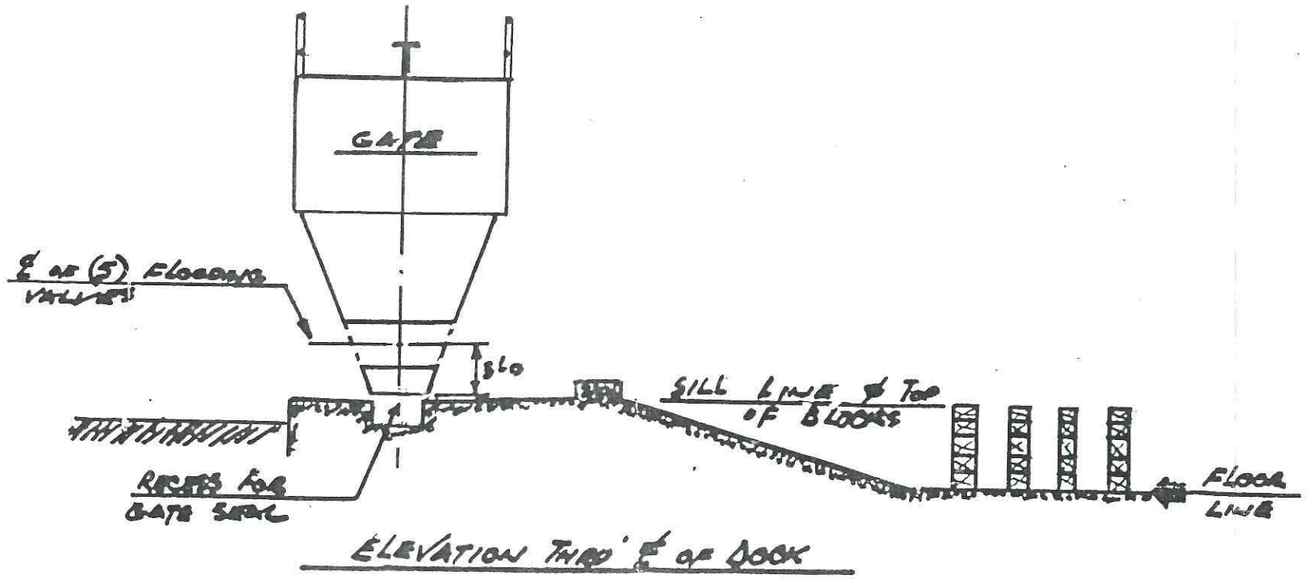


SECTION AT ENTRANCE



SECTION THRU' DOCK



ELEVATION THRU' ℄ OF DOCK

NOTE: DRY DOCK #1 DRAWING PROVIDED BY FRASER SHIPYARDS, INC.

E:\WASTE\FRAS9401\REPORT\FIJA7

NO.	DATE	ISSUE/REVISIONS	DRAWN BY	DESIGN	FIELD REVIEW	QC CHECK
1	03/03/97	--------	RJH 10/00	JEG 03/97		

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FIGURE 7
GATE DETAIL

PROJ. NO. FRAS9401
DATE 03/03/97

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