GSI Water Solutions, Inc.

February 26, 2016

Bob Williams
Remedial Action Project Manager
Oregon Department of Environmental Quality - NWR
700 NE Multnomah St., Suite #600
Portland, OR 97232

Re: Response to DEQ November 23, 2015 Letter
Remedial Investigation/Feasibility Study
Astoria Marine Construction Company
ECSI # 1898

Dear Bob:

This letter was prepared in response to your November 23, 2015[1] letter regarding future operations and land use at the Astoria Marine Construction Company (AMMCO) site (Site). This information was requested to support the Remedial Investigation (RI) and Feasibility Study (FS). The Oregon Department of Environmental Quality (DEQ) comments are restated below in italics, followed by the AMCCO's responses.

DEQ COMMENTS

As you are aware from meetings with the Community Advisory Group and reactions expressed by the Astoria fishing community and the Port of Astoria, there is a high level of concern from the local community and regional stakeholders over the potential closing of the AMCCO shipyard.

The draft Feasibility Study presented by GSI to DEQ was developed under the assumption that current operations will terminate. In order to assure that a full range of cleanup options is evaluated in the Feasibility Study, DEQ has asked your consultants, GSI Water Solutions and Maul Foster Alongi, Inc., to develop a cleanup alternative that would preserve the current functionality of the AMCCO shipyard.

Response: The requested cleanup alternative was developed in a Technical Memorandum prepared by Maul Foster Alongi (MFA) (see Attachment A). This memorandum presents a description and evaluation of a cleanup alternative that would accommodate the continued operation of AMCCO shipways. This alternative is based on Sediment Alternative 3 presented in the June 2015 FS report[2] and would require the following additional actions beyond the required elements of Sediment Alternative 3:

- Removal of hotspot sediment within the ways (via suction dredging or other appropriate method).

[1] Letter from Mr. Robert Williams, Oregon DEQ, dated November 23, 2015, to Mr. Tim Fastabend, AMCCO regarding the closing of the AMCCO shipyard and future site land use.

[2] The revised FS will be submitted to DEQ in March 2016. Sediment Alternative 3 is the same as presented in the June 2015 FS.

- Removal of sediment adjacent to the ways to improve submerged slope stability (via suction dredging or other appropriate method).
- Dewatering and placement of dredged sediment on-site in the uplands under an impervious concrete cap.
- Placement of reactive core mat and articulated concrete block within the rails and on the cut slopes adjacent to the rails to physically stabilize and chemically isolate contaminated sediment.

The estimated cost of Sediment Alternative 3 is approximately $1.25M (see FS). The estimated cost for the additional actions listed above is approximately $1.9M (see Attachment A), bringing the total cost of a sediment remedy that allows the continued operation of AMCCO shipways to over $3M.

This sediment remedy would be protective, effective, and reliable, and would meet DEQ's preference to treat or remove hot spots. In addition, the remedy would allow continued operation of the ship-repair facility by preserving existing infrastructure. However, the remedy has significant drawbacks in implementation risk, as well as excessive cost compared to other sediment remedial alternatives described in the FS. At nearly twice the cost of Sediment Alternative 3, the additional remedial actions are not considered cost reasonable. In addition, this remedy provides no added protection of human health or the environment. It should be noted that this cost estimate does not include the operation or costs of deferred maintenance, described in EcoNorthwests' economic viability assessment of AMCCO (see Attachment B).

We are also seeking clarification from you, as president and owner of AMCCO, as to your long-term business plans for the facility.

Oregon Cleanup law [OAR 340-122-080(3)(e)] requires that DEQ consider current and reasonably anticipated future land uses at the facility when approving a final cleanup remedy. This includes taking into account current land use zoning and land use plans, intentions of the facility owner, neighbors, the community, and any other relevant information such as development patterns and population projections.

In order to determine the future land uses of the AMCCO facility, DEQ requests the following information:

- *Your plans for future operation of AMCCO at its current location including marine and upland activities.*
- *The compatibility of these plans with land use zoning and state and federal permitting requirements.*
- *An assessment of the economic viability of the AMCCO facility to continue to provide marine and upland services at its current location.*

Response: AMCCO's decision to terminate operation of the marine ways is based on business and environmental considerations. The DEQ-required cleanup is a significant factor in the timing of this decision. Future operation of the shipways is not considered feasible because of the cost of upgrading the facility to meet environmental and deferred maintenance. As directed by DEQ, an economic analysis was completed by ECONorthwest and is included as Attachment B. This evaluation supports AMCCO's decision and describes several of the

factors going into the decision to close the shipways and the economic viability of the business.

Operations in the shipways will be permanently terminated to facilitate the implementation of the upland soil and inwater sediment remedial actions. At this time, it is anticipated that AMCCO shipway operations will cease 1 to 2 months prior to initiation of remedial action construction activities. This schedule is currently being developed with your input and is dependent on numerous factors including: the timing of DEQ's Staff Report proposing the selected Site remedies; comments received during DEQ's required 30-day public comment period; timing of DEQ's issuance of the Record of Decision documenting the selected remedy; timely issuance of various permits, etc.

The upland portion of the Site is currently zoned by Clatsop County as Marine Industrial. Future Site uses (e.g., truck or trailer parking, equipment storage, machine shop) are expected to remain consistent with the industrial zoning. While specific future land uses have not be defined, the recommended upland remedy will be designed so that remaining buildings are accessible, the soil cap can be used for light industrial purposes, the levee is extended, and a stormwater system are installed to protect the soil cap and meet protectiveness and source control objectives.

This will help DEQ select a cleanup remedy that is cost-effective, protective of human health and the environment, and consistent with the current and "reasonably anticipated" future uses of the AMCCO facility.

Response: Comment noted.

Please call if you have questions (971-200-8510).

Sincerely,

Rod Struck, R.G.
Project Manager

Cc: Tim Fastabend, Astoria Marine Construction Company
Carson Bowler, Schwabe, Williamson & Wyatt
Heidi Blischke, GSI
Madi Novak, MFA

Enclosures

Attachment A: Technical Memorandum: *Sediment Remedy to Accommodate Continued Facility Operations*

Attachment B: Technical Memorandum: *Economic Viability of the Astoria Marine Construction Site*

ATTACHMENT A

Sediment Remedy to Accommodate Continued Facility Operations

MEMORANDUM

To: Oregon Department of Environmental Quality Date: February 26, 2016

From: Erik Bakkom, PE and Jacob Faust, PE Project: 0298.04.04

EXPIRES: 12/31/2016
This digital seal certifies the signatory and document content.

RE: Sediment Remedy to Accommodate Continued Facility Operations
Astoria Marine Construction Company
ECSI #1898

The Oregon Department of Environmental Quality (DEQ) requested development of a sediment remedial alternative that would allow ship maintenance operations to continue at the Astoria Marine Construction Company (AMCCO) site located at 92134 Front Road, in Astoria, Oregon (the Site) (DEQ, 2015). Maul Foster & Alongi, Inc., and GSI Water Solutions, Inc., submitted a feasibility study report (MFA and GSI, forthcoming) (FS) that described several alternatives for remediating contaminated sediment offshore of the Site; however, all alternatives assumed that site operations would be discontinued upon remedy implementation. This memorandum describes a remedial alternative that will accommodate continued ship maintenance operations and provides a cost estimate for implementation of this remedy.

An economic analysis of the economic viability of the ship-maintenance business has been prepared and is being submitted in conjunction with this memo. The study concludes that, for a variety of reasons, continued operation of the business is not economically viable.

The sediment remedial alternative that allows for site operations to continue involves (1) implementing sediment remedial alternative 3 (the remedial action recommended in the final FS report), and (2) additional actions in the marine ways (dredging followed by installation of an engineered cap) necessary to accommodate continued ship maintenance. The following primary components of sediment remedial alternative 3 are described in the FS, and are shown in Figure 10-2 of the FS:

- Remove debris piles under docks.
- Dredge nearshore hot-spot contamination.
- Upland, on-site handling and dewatering of sediment.
- On-site consolidation of dredged sediment under impervious cap.
- Land lease and easement.
- Site use restrictions (e.g., Slow—No Wake zone).
- Site Management Plan

The additional actions that would allow continued site operations are shown on the attached figure and include:

- Dredge sediment between shipway rail bents a minimum of 2 feet to accommodate the placement of a low-profile sediment cap.
- Upland, on-site handling and dewatering of additional dredged sediment.
- Install reactive core mat (RCM) geocomposite fabric[1] over slopes and the marine way bottom as a component of the low-profile sediment cap to contain and prevent exposure to contamination left in place.
- Install articulated concrete block (ACB) in the marine way as a component of the low-profile sediment cap to protect and anchor the RCM.[2]
- On-site consolidation of dredged sediment under impervious cap (concrete).
- Mitigation for ACB (i.e., hard armoring).

The rest of this memorandum describes, evaluates, and provides estimated costs for the additional actions in the marine ways listed above (beyond those provided in sediment remedial alternative 3).

Remedial Alternative

Discrete areas of elevated sediment contamination in the ways would be removed from the rail bed and areas of the side slope. The sediment-removal area would be based on engineering considerations, such as slope stability and rail bed clearance to accommodate the low-profile sediment cap (RCM and ACB). Sediment surrounding the rails in the marine ways cannot be accessed from land and would therefore be excavated using water-based equipment. The water-based excavation likely would involve hand-operated hydraulic dredging equipment (suction dredge or similar) and dive crews, because standard mechanical equipment (excavators, clamshell dredge buckets) is not precise enough to

[1] Assumes that a single layer of RCM containing mixture of activated carbon and apatite or other, comparable, sorptive media is modeled to be effective for known site conditions.

[2] Marine ways configuration would require detailed analysis of upslope anchoring mechanisms for the low-profile cap configuration to prevent sliding. Runout or pile attachment would be considered.

excavate between and adjacent to rails and rail ties without causing damage. Dredged sediment would be dewatered, placed in an upland soil-consolidation area, and covered with an impervious cap. The attached figure shows the estimated extent of dredging and low-profile cap areas.

Based on cap dimensions and existing site bathymetry, the assumed depth required for dredging to accommodate the low-profile cap is 1 to 2 feet below mudline or approximately 1 foot below the top of the rail ties. Depth of dredging around the marine way rails will be variable, depending on subsurface conditions and structural considerations for the rail. The side slopes in the marine ways may also be excavated to provide an increased level of slope stability.

The low-profile cap would consist of two specialty products for protection of the marine ways: RCM and ACB. RCM is a geotextile composite that incorporates reactive media (activated carbon and apatite) between two layers of nonwoven geotextile. The media filter pore water passing through the geotextile and trap contaminants, preventing them from releasing to the river. ACB is a shoreline armoring technology that strings together rows of concrete blocks with stainless steel cable to form a contiguous and flexible sheet of concrete. The blocks are a uniform thickness and are arranged so that adjacent sheets can be tied together seamlessly. The stainless steel cables are used as the primary points of connection to the anchoring system, which consists of driven piles.

The low-profile sediment cap would be designed specifically to protect aquatic receptors against exposure to levels of contamination that remain in the rail bed and side slope sediments after sediment removal in the ways. Protectiveness would be based on the ability to (1) chemically isolate chemicals from the river; (2) provide surface sediment stability to prevent erosion from river and flood flow velocities; (3) provide surface sediment stability to prevent erosion from prop wash and ship dolly movement during routine ship positioning, extraction, and release operations associated with the marine ways use; and (4) provide for the protection of the RCM and sediments to prevent displacement or penetration resulting from the impact of a ship or large river/flood debris (tree trunk or similar). Chemical isolation would be verified through modeling based on concentrations of chemicals of concern (COCs) in sediment, sediment physical parameters, seepage discharge rates, porewater quality, surface water quality, and amendment sorption parameters. Modeling would need to establish a performance design criteria, such as an acceptable design life between 50 and 500-years for the reactive media. The performance criteria would be used to determine the amounts and nature of amendments necessary to satisfy remedial goals. Physical protection and sediment stability would require assessment through the collection of existing sediment geotechnical properties, ACB sizing evaluation, and ACB and RCM anchoring evaluation. Extensive design effort is anticipated for the upslope anchoring effort parallel to the rails and will require installation of piles or other specialty sediment anchors.

Evaluation of Balancing Factors

Evaluation of the additional remedial actions (beyond implementing sediment remedial alternative 3; see description above) necessary to accommodate continued site operations was conducted in compliance with Oregon Administrative Rules (OAR) 340-122-0085 and 340-122-0090. The

additional remedial actions were evaluated in terms of the following factors: protectiveness, effectiveness, long-term reliability, implementability, and implementation risk, preference to treat hot spots, and cost reasonableness. The balancing factors were considered in both individual and comparative analyses. To meet the intent of OAR 340-122-0090, the balancing factors, in addition to the "yes" and "no" determinations for protectiveness and preference to treat hot spots, were evaluated qualitatively to assess the incremental cost/benefit of the alternative. The comparative analysis uses a 1 (low) to 5 (high) scale. The following is a brief description of the evaluation results.

Protectiveness—Implementation of Sediment Alternative 3 (see FS report) and the additional remedial actions are protective. The alternative prevents the release of COCs in the marine ways through partial removal of contaminated surface sediment, chemical isolation of COCs, and physical stabilization of remaining sediments through armoring. The low-profile cap would significantly reduce exposure to remaining COCs in sediment.

Effectiveness—The additional remedial actions are given a rating of 4 for effectiveness. The alternative addresses unacceptable risk in the marine ways by partially removing highly contaminated surface sediments, consolidating dredged sediment in an upland area, and capping underlying contaminated sediments remaining in place. The low-profile sediment cap would chemically and physically isolate COCs and eliminate exposure pathways to human and ecological receptors.

Long-Term Reliability—The additional remedial actions are expected to be reliable in the long term, pending results of chemical isolation modeling for the RCM design. ACB and RCM would be very effective at stabilizing surface sediment and would prevent the erosional release of contaminated sediment. Contaminated surface sediment would be removed and contained in an upland disposal facility.

Implementability—The additional remedial actions are given a rating of 2 for implementability. Implementation of the alternative would be very difficult because of unknown conditions in the marine ways, the highly technical nature of in-water dredging, difficulty of installation of the RCM geotextiles in a flowing river environment, and challenges associated with installation of ACB on slopes with terminations requiring attachment to piles to prevent cap or slope failure. Extensive design would be required to address anchoring and constructability requirements, taking into consideration the safety of divers performing the work. Specialized equipment, materials, and technologies would be required, resulting in greater uncertainties associated with applying novel techniques. Significant dewatering of the dredged material generated through hydraulic dredging would be required, beyond what is anticipated for mechanically dredged sediment (as for sediment remedial alternative 3). The significantly reduced solids content would result in a much more complex upland dewatering system, e.g., including such factors as coagulation and/or required settling and compression time.

Implementation Risk—The additional remedial actions are given a rating of 2. The alternative has considerable implementation risk associated with: dredging sediments from and adjacent to the existing rails and rail ties; the potential for system upsets and impacted-material releases during

dredging; transport of dredged material to the dewatering facility; sediment strengthening and on-site placement of dredged sediments; underwater placement of geofabrics in a flowing environment; underwater placement and connections for ACB; and placement of discrete pieces of low-profile cap (RCM and ACB) between rails and bents with an appropriate method of attachment. Failures of best management practices, difficulties with safely and effectively conducting diver work (dredging, fabric placement, guiding ACB placement, ACB attachment), and failure associated with the water treatment system also increase the implementation risk.

Preference to Treat or to Excavate Hot Spots—The additional remedial actions, when implemented in conjunction with the recommended sediment remedial alternative 3, fully address hot spots.

Evaluation of Reasonableness for Cost—The cost reasonableness for the additional remedial actions is low and receives a score of 1, based on the estimated additional cost of over $1.9M. At nearly twice the cost of sediment remedial alternative 3 (which satisfies all remedial requirements and is the preferred alternative), the additional remedial actions are considered to be excessively high, while providing no added protection of human health or the environment.

Conclusion

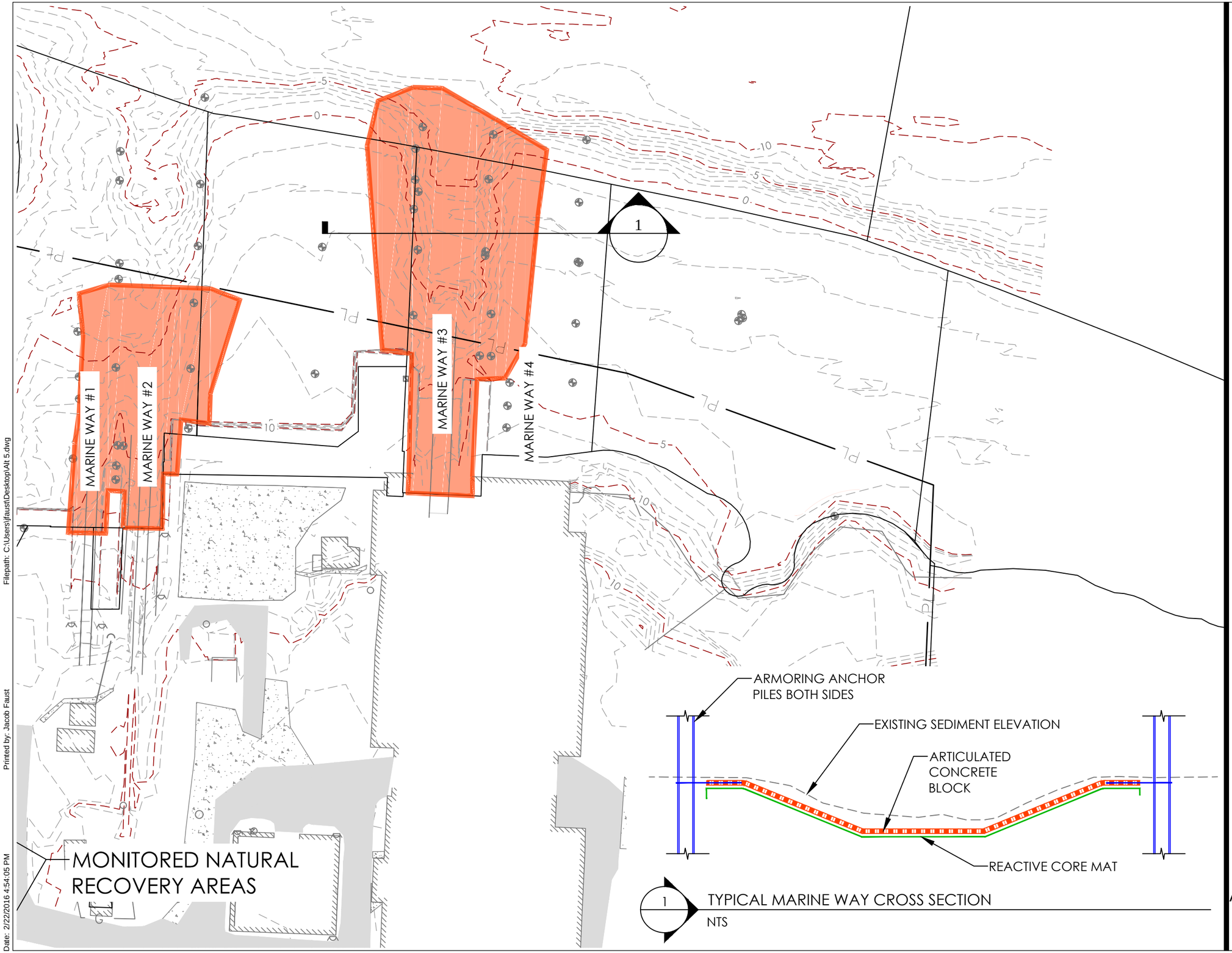
The sediment remedy described herein is protective, effective, and reliable, and meets the preference to treat or remove hot spots. In addition, the remedy allows continued operation of the ship-repair facility by preserving existing infrastructure. However, the remedy has significant drawbacks in implementation risk, as well as excessive cost compared to other remedial alternatives described in the FS. At nearly twice the cost of sediment remedial alternative 3, the additional remedial actions are not considered cost reasonable under DEQ's cleanup authority. In addition, this remedy provides no added protection of human health or the environment. It should also be noted that this cost estimate does not include the operation or costs of deferred maintenance, described in EcoNorthwest's economic viability assessment of AMCCO (EcoNorthwest, 2016), or mitigation costs associated with the additional actions described herein.

References

DEQ. 2015. Letter (re: Astoria Marine Construction Company) to T. Fastabend, Astoria Marine Construction Company, from B. Williams, Oregon Department of Environmental Quality. November 23.

EcoNorthwest. 2016. Technical memorandum (re: economic viability of the Astoria Marine Construction Company) to H. Blischke, GSI Water Solutions, from E. MacMullan, EcoNorthwest. February 8.

MFA and GSI. Forthcoming. Feasibility study report, Astoria Marine Construction Company facility, Astoria, Oregon. ECSI No. 1898. Portland, Oregon. Maul Foster & Alongi, Inc., and GSI Water Solutions, Inc., Portland, Oregon. Anticipated submittal March 2016.



GSI Water Solutions, Inc.

MAUL FOSTER ALONGI

MARINE WAY
DREDGE, RCM, ACB

0 60' 120'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Figure

Partial Alternative - Marine Way Dredge And Low Profile Capping

Astoria Marine Construction Company
Astoria, Oregon

Filepath: C:\Users\jfaust\Desktop\Alt 5.dwg
Printed by: Jacob Faust
Date: 2/22/2016 4:54:05 PM

Table
Conceptual Cost for Additional Remedial Action
Astoria Marine Construction Company, AMCCO Facility
Astoria, Oregon

Partial Alternative - Marine Ways	
Dredging to Accommodate Low Profile Cap and Cap Installa	
Project: AMCCO	
Client: GSI Water Solutions	
Project #/Task: 0298.04	
Prepared By: Jacob Faust, PE	
Checked By: Erik Bakkom, PE	
2/22/2016	
Revision #.: 0	

MAUL FOSTER ALONGI
2001 NW 19th Avenue, Suite 200
Portland, OR 97209
971.544.2139 (p)
971.544.2140 (f)

Remedy Components:

1 Removal of impacted surface sediment using suction dredging to a depth of 1 to 2 feet below mudline
2 Upland transport, handling, and dewatering of high water content solids from suction dredging
3 Diver led placement of RCM and ACB on slopes and between rails/ties
4 On-site consolidation of dredged sediment under impervious cap (asphalt/concrete).
5 Coordination with other components of preferred alternative for sediment

Primary Assumptions:

1 Geotechnical study required for anchoring of ACB, bearing strength determination of existing sediment, slope stability analysis
2 Chemical isolation modeling requires development, model input parameters must be collected.
3 Engineering of the low-profile cap will require detail analysis of runouts, anchoring, terminations, placement methods.
4 Constructability evaluation will be conducted to ensure safe installation methods are specified.
5 Additional effort is required during Section 404 permitting effort for ESA Consultation.
6 Mitigation for 0.75 acres of ACB armoring is not included in the scope of this estimate.
7 High water content dredge sediment resulting from suction dredging will require significant effort during dewatering phase.
8 Amendment estimated at 25% by weight.
9 Water treatment consists of filtering, flocking, settling, decanting, and centrifuge if necessary.
10 Reactive core mat cost is based on single layer containing activated carbon and apatite.
11 Articulated concrete mat requires stainless steel cabling and pile anchoring system for side slopes

Item	Unit Cost	Units	Quantity	Total Cost
Additional Design and Permitting Costs				
Geotechnical Studies	$50,000	LS	1	$50,000
Chemical Isolation Modeling	$15,000	LS	1	$15,000
Site Parameter Sampling and Studies (including seepage)	$75,000	LS	1	$75,000
Engineering Design	$30,000	LS	1	$30,000
Constructability Evaluation	$15,000	LS	1	$15,000
Additional 404 Effort, ESA Consultation	$50,000	LS	1	$50,000
Project Mitigation (not included)	- -	Acre	0.75	$0
Total Additional Design and Permitting				$235,000

Table
Conceptual Cost for Additional Remedial Action
Astoria Marine Construction Company, AMCCO Facility
Astoria, Oregon

Item	Unit Cost	Units	Quantity	Total Cost
Additional Construction—Dredge, Dewatering, and Capping				
On-site Sediment Handling/Dewatering	$25.00	CY	1,690	$42,250
Sediment Dewatering Amendment	$50.00	Ton	592	$29,575
Water Treatment for Discharge	$30.00	CY	1,690	$50,700
Hydraulic Dredging in Marine Ways	$90	CY	1,690	$152,127
Reactive Core Mat—material and installation	$8.00	SF	35,000	$280,000
Articulated Concrete Block—material, anchor piles, and installation	$20.00	SF	35,000	$700,000
	Total Additional Construction			$1,254,652
Additional Contingency		percent	30%	$446,896
	Total Cost Add, Marine Way Capping			**$1,936,547**

ATTACHMENT B

Economic Viability of the Astoria Marine Construction Site

ECONorthwest
ECONOMICS • FINANCE • PLANNING

DATE: February 9, 2016
TO: Heidi Blischke
FROM: Ed MacMullan
SUBJECT: ECONOMIC VIABILITY OF THE ASTORIA MARINE CONSTRUCTION COMPANY

Introduction

This memo summarizes an analysis of the economic viability of the Astoria Marine Construction Company (AMCCO). AMCCO began operations in 1924, building wooden-hulled fishing boats. During World War II and the Korean War, the company constructed vessels under contract to the U.S. government. Through the Vietnam War, AMCCO continued repairing and refurbishing vessels, including those for the U.S. government. Since about the 1970s, AMCCO's business consists mostly of repairing commercial fishing boats.[1]

In March 2011, EPA proposed adding the AMCCO site to the Superfund National Priorities List. In September 2012, EPA deferred the listing and Oregon DEQ took over managing the cleanup. DEQ subsequently signed an agreement with AMCCO regarding the site investigation.[2]

This economic analysis was conducted per DEQ's November 23, 2015 letter[3] requesting, "An assessment of the economic viability of the AMCCO facility to continue to provide marine and upland services at its current location." Specifically, the analysis addressed AMCCO's strengths and weaknesses in the marketplace, as well as the company's main opportunities and threats. The analysis took into account relevant market forces and trends affecting AMCCO, its competitors, and the industry in general.

The following sections describe a visit to the AMCCO site, the types of materials considered in the analysis, the details of the strengths, weaknesses, opportunities, and threats (SWOT) analysis, and conclusions.

Site Visit

Staff from ECONorthwest (ECONW) visited the AMCCO site on January 11, 2016. Prior to visiting the site staff reviewed information on AMCCO's history and current conditions. Mr. Fastabend walked ECONW staff around the site identifying and describing AMCCO's major facilities including: outbuildings; docks; slips and ways; rails, cradles and winch houses; and the two large covered ways and work buildings. He described for each facility its purpose, use over time, and current conditions. Topics discussed also included deferred maintenance and its consequences on reducing the capacity of AMCCO's ways, rails and cradles, which in turn,

[1] State of Oregon Department of Environmental Quality (DEQ). 2012. *Fact Sheet Astoria Marine Construction Company*. DEQ 12-LQ-026. September 18. www.oregon.gov/DEQ.

[2] DEQ, 2012.

[3] Letter from Mr. Robert Williams, Project Manager, Oregon Department of Environmental Quality, Northwest Region, to Mr. Tim Fastabend, November 23, 2015.

reduces the weight of boats that the firm can service. He mentioned the site's addition to the National Register of Historic Places and the challenges this poses to renovating outbuildings. Mr. Fastabend also described his thoughts on the possible operation of the facility post-Superfund cleanup, and how future operations would differ from current operations.

Following the walk around, ECONW staff interviewed Mr. Fastabend regarding AMCCO's operations and financial performance. The discussion touched on topics including:

- The types of marine repair and construction services AMCCO provides
- The market in which AMCCO competes
- AMCCO's customer base
- Other competitors in the market and their locations
- The impacts of industry trends and government regulations on the marine repair and construction market
- The trajectory of the firm's business, costs, revenues, and profits over time and the factors affecting these trajectories
- Prospects for growth of the business
- The regulatory environment within which the firm operates
- Labor supply and constraints
- The influence of tides, water depth and sedimentation on accessing AMCCO's slips and docks

In a follow up call, ECONW staff discussed with Mr. Fastabend the costs of specific facility and equipment upgrades that would be needed should the company continue in the marine repair and construction business.

Materials Considered

In addition to the information provided by Mr. Fastabend, ECONW staff review and considered the following types of materials:

- Websites describing AMCCO's history and operations up to the present
- U.S. Environmental Protection Agency and Oregon Department of Environmental Quality websites and reports on the AMCCO site and Superfund designation
- Industry newsletters, reports and websites that describe trends and developments that affect the supply of fishing boats and thus the demand for marine repair and construction services
- Same types of sources for information on trends and development in the marine repair and construction industry

- Directories of marine repair and construction facilities for information on AMCCO's competitors
- Reports by state and federal agencies on trends and management issues for relevant fisheries

AMCCO SWOT Analysis

Strength, weaknesses, opportunities and threats (SWOT) analyses are a commonly used method by which analysts assess a business' economic viability[4]. Strengths and weaknesses are factors *internal to the firm* that benefit or harm, respectively, a firm's performance or prospects. The management and operation of a firm can affect strengths and weaknesses. For example, having a well-respected reputation in the market is an example of a strength. A poorly trained labor force would be a weakness. Opportunities and threats are factors *external to the firm* that benefit or harm, respectively, a firm's performance or prospects. These factors are out of a firm's control. A region's growing population could be an opportunity for a firm that sells products to the given population. Rising fuel prices would be a threat to a firm that relies on delivery vehicles.

SWOT analyses can rely on data and information from a variety of sources including:

- Company business records
- Interviews with key staff
- Business journals and related industry publications
- Government publications that describe factors affecting the industry at issue

SWOT analyses are more art than science. That is, they rely on no formulas or regimented step-by-step method. Analysts collect and review information on the SWOT factors, and then organize this information in a way that describes a firm's current performance and future prospects. Given that SWOT factors change over time, SWOT results describe current conditions and likely future prospects over the near-term future. That is, a SWOT analysis represents a snapshot in time of a firm's economic viability. Reviewers of SWOT results should keep this limitation in mind.

AMCCO's SWOT analysis includes the following factors.

AMCCO Strengths

A long history in the industry. As described above in the Introduction, AMCCO started in the marine repair and construction industry in the 1920s. The firm grew and contracted over time, but maintained a continued presence in the industry and region's economy. Such a long history of continued operations provides name recognition benefits over other competitors.

[4] Team FME. 2013. *SWOT Analysis Strategy Skills*. www.free-management-ebooks.com.

A strong and personal connection with its customers. The firm relies on repeat customers and word-of-mouth recommendations. AMCCO does not pay for advertising. Many customers have used AMCCO for years.

Low administrative overhead costs. The firm uses a no-frills approach to business that includes: handshake agreements rather than detailed contracts; verbal communications on requested repair and maintenance work rather than written scopes of work; and self financed accounts receivable rather than a line of credit from a financial institution.

A skilled workforce for current market. AMCCO's current work force of eight to ten workers is well trained and experienced for the types of work the firm currently conducts.

A niche business. AMCCO provides services not offered by other and larger marine repair and construction firms. The firm specializes in quick up-and-down out of water work for boats that need small-scale maintenance and repairs.

AMCCO Weaknesses

A significant amount of deferred maintenance. AMCCO began receiving scrutiny over environmental concerns in the late 1990s. These concerns created a financial uncertainty for the firm's owners over their cost of clean up. This uncertainty increased the operating risk of the firm because the owners were unsure if they could pay for the clean up. They were also concerned that they would be unable to recoup investments in repair and maintenance of facilities and equipment. Why invest in the future if it's unclear if the firm will be operating? The approach to maintenance and repair became, "fix only what breaks." The uncertainty over the cost of environmental clean up continues to this day. As a result the firm has a significant amount of deferred maintenance that now limits its ability to continue operations. The deferred maintenance includes the following.

- Repairing the cradle on ways #3, the largest of the three ways, is estimated to cost approximately $60,000 in materials and between $35,000 and $40,000 in labor. This cost estimate is from approximately 2011. Taking inflation into account, current costs would be higher. Without repair, the capacity of this cradle is approximately half its original design capacity. This limits the size of boats that AMCCO can service, which also limits the firm's revenues.
- New steel pilings for docks will cost approximately $60,000 to $80,000.
- New planking on docks will cost approximately $30,000 to $40,000.
- Replacing winch wires for the three ways will cost approximately $15,000 to $20,000. The wires should be replaced every two years. They are currently due for replacement.
- Ways #2 needs approximately $30,000 of repair and maintenance work.
- Fixing the leaky office roof will require a $14,000 reroof of the building.

- Two welders need replacing, at $8,500 each, as well as replacing a $13,500 lath.
- The two large work buildings are leaning to the north. They are also too large for the current size of the operation. The cost of repairing and reducing the size of these buildings is unknown at this time but is likely to cost over $100,000.
- Taken together the cost of the deferred maintenance listed above is approximately $374,500 to $414,500.
- This estimate does not include the cost of rail repairs or replacements at the ways, nor the costs of complying with environmental regulations while addressing the deferred maintenance issues listed above. Both of these costs are unknown at this time but are likely significant.

Revenues. During the previous five years the firm's gross revenues ranged from approximately $750,000 to $1,000,000.

Profits. During this period the firm's profits range from +/- five percent of gross revenues. Three years ago the firm lost $20,000. In 2014 the firm generated approximately $25,000 in profits. Mr. Fastabend pays himself an hourly rate, but typically does not pay himself for all the hours that he works. Thus, the profit amounts listed above likely overstate slightly the firm's actual profits.

No line of credit to finance needed improvements. The firm operates without a line of credit. According to Mr. Fastabend, the firm has always self financed improvements and maintenance, as well as their accounts receivable. Such an approach lowers operating costs. Lacking a line of credit under current conditions, however, limits the firm's ability to finance repairs and maintenance needed to remain in business. Given the Superfund designation and related concerns and uncertainties regarding future liabilities, the significant amounts of deferred maintenance at the site, and the firm's limited revenues and profits, it is unlikely a financial institution would extend AMCCO a line of credit, or do so at rates the firm could afford.

The firm's location is not optimal. The AMCCO location is not optimal for a marine repair facility. The location's tidal influence and relatively shallow draft limit access to docks and slips, and the high siltation rate can block access to slips and ways. These factors limit the size of boats that the firm can service, which limits their revenues, and also limits the timing of access, which cannot happen at low tides. According to Mr. Fastabend, owners put AMCCO up for sale in the late 1970s but found no buyers. Interested parties who visited the site noted the poor access to the facility as one reason they were not interested in purchasing the firm. Given the firm's current financial conditions, acquiring and complying with the necessary dredge permits would be cost prohibitive.

AMCCO Opportunities

My analysis found no opportunities for the firm. That is, no external market or industry factors that would help a firm in AMCCOs situation. The firm operates in a niche market as a no-frills,

low overhead business. But for compliance with required operational and zoning regulations, the firm could likely continue providing small-scale marine repair and maintenance services for a few years. As I understand, however, complying with these regulations is mandatory and they are distinct from the Superfund designation and clean up.

AMCCO Threats

The Superfund designation creates a business uncertainty. As described above, the Superfund designation and anticipated cleanup creates uncertainty regarding the cost and duration of the cleanup. Such uncertainty complicates future plans for operating the firm.

Complying with operational and zoning requirements. With the Superfund designation came scrutiny from local and state regulatory agencies. Such notice increased the "fix only what breaks" approach to maintaining the site. The owners now face a significant backlog in managing a range of operational and zoning requirements including:

- Stormwater management
- Containing and treating runoff and debris from ship maintenance operations
- Maintaining channel access to slips and ways
- Dock and rail maintenance
- General waste management

In general, the increasing number and complexity of environmental regulations that marine repair and maintenance facilities must comply with make operating a small scale operation more difficult and for a facility such as AMCCO not financially feasible.

According recent articles in industry publications and other related sources, complying with environmental regulations of the type listed above is a necessary but costly effort for marine repair and maintenance facilities in the Pacific Northwest.

- Writing in an industry journal, one author noted the challenges that marine businesses face regarding complying with environmental regulations, "One of the major issues our marina and boatyard customers face today is environmental compliance. Storm water runoff, waste water discharge, hazardous material handling, and fueling operations are all of major concerns to marine based businesses as they budget the capital investment needed to be compliant with local, state and national regulations."[5]
- A report by the Washington Department of Ecology on the economic impacts of complying with wastewater management cost concluded that the average compliance costs for a small boatyard was $29,000 to $68,000 *per year*, and $51,000

[5] Seidel, J. 2012. "Seaview Boatyard faces environmental compliance as a challenge to be better," Exuma Technologies Blog, November 27. http://exumatech.com/blog/seaview-boatward-environmental-compliance/.

to $139,000 *per year* for a large boatyard.[6] The report authors' also concluded that the compliance costs would disproportionately negatively impact small firms due to their lower revenues relative to larger firms.

- The Director of the Port of Pt. Townsend, Washington, commented on the Port's website, "Probably the biggest concern we have in the coming year (and beyond) is how we deal with environmental costs. Washington has lost nearly half of its boatyards in the past few years due to the cot of meeting Department of Ecology stormwater standards. We are currently in the State's highest level of response (Level 3) for mitigating zinc and copper levels, and the costs to mitigate these are significant. The Port's operating permit is contingent on us solving these issues — we can't ignore it and hope the problem goes away. I applaud all of the Port businesses who are working with us to meet these standards. You'll be hearing much more from us moving forward about environmental compliance."[7]
- An article on the possible closure of a boatyard at Pier 3 at the Port of Astoria, Oregon, noted the high cost of complying with stormwater regulations. The Port's permit and project manager estimated at the time that compliance costs would exceed $3 million.[8]

Industry trends that reduce the number of fishing boats. During the previous ten to fifteen years, fishing quotas implemented by regulatory agencies have reduced the number of fishing boats that operate in the regulated fisheries. For example, individual fishing quotas (IFQs) were designed to apportion the allowable catch among a set group of permit holders. IFQs were meant to solve problems associated with "derby style" fisheries, which encouraged a race to the catch limit even during times of dangerous weather conditions. A key provision of IFQs is the ability of an IFQ holder to sell their catch to other IFQ holders. One outcome of this effect is fewer boats harvesting the same quantity of fish. Reducing the number of operating fishing boats reduces the demand for marine repair and maintenance services that AMCCO provides.

Examples of the impacts of recent quota systems and related regulations on participation in fisheries include the following.

- Mr. Lon White, Port and Harbor Director for the City of Kodiak, Alaska, noted recently regarding the Port's level of activity, "We are seeing consolidation of fishing fleets, seeing more limited entry into different fisheries. That has some positive and

[6] State of Washington, Department of Ecology. 2010. *Economic Impact Analysis AKART Analysis DRAFT National Pollutant Discharge Elimination System (NPDES) Wastewater Discharge General Permit for Boatyards*. Publication No. 10-10-018. April.

[7] Port of Pt. Townsend. 2014. "October 2014 Note from the Director," Port of Pt. Townsend website. October 13. http://portofpt.com/october-2014-note-from-the-director/comment-page-1/.

[8] Stratton, E. 2015. "Boatyard closure raises alarm," *The Daily Astorian*. March 9.

negative impacts. … The total number of vessels in this business now seems to have declined but the vessels that remain appear to be more financially stable. …"[9]

- In a report describing the effects of quota systems on the number of fishing vessels, the report authors identified two reasons for the declining number of vessels, "… Following implementation of the Shorebased IFQ Program in 2011, the number of vessels landing non-whiting groundfish dropped by 8 percent, while the number of vessels landing Pacific whiting fell by 19 percent. Some vessel owners likely decided that their quota shares (QS) were insufficient to fish economically, while others appear to have pooled their quota pound (QP) holdings and fished them off fewer vessels.[10]

- In a report on the economic impacts of quota systems, the authors note the impact of the systems on reducing the number of fishing vessels. "… The most frequently stated program objectives are to meet conservation requirements, improve economic efficiency and/or flexibility, *reduce excess capacity*, eliminate derby fishing conditions and to improve safety at sea. … Catch share programs have also been effective in reducing fishing capacity… Capacity Reduction Relative to the Baseline Period, all but one catch share program … resulted in immediate decreases in the number of vessels that participated in the catch share program in the first year of the program. Furthermore, with few exceptions, the number of active vessels has remained the same or declined over time. Thus, the program objective of reducing overcapacity (as measured by number of vessels) has largely been met." [emphasis added][11]

The graying of vessel owners. According to Mr. Fastabend, the large majority of his client boat owners are older and close to retirement age. Very few boat owners that AMCCO works with will likely participate in the industry beyond the next five or so years. Newer and younger boat owners will not have the personal connection to AMCCO that has been so important to the business' continue operations in the past. This graying of the fleet is an industry trend affecting vessel owners up and down the West Coast of the US.[12]

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[9] Smith, K. 2015. "West Coast Ports 2015," *Fisherman's News – The Advocate for the Commercial Fisherman*. Vol 71, No 5, May 1.

[10] 2015. MRGA Americas, Inc. *Measuring the Effects of Catch Shares. West Coast Groundfish Interim Findings: Economic Indicators. Number of Active Vessels*. www.catchshareindicators.org.

[11] 2013. Brinson, A. and E. Thundberg. *The Economic Performance of U.S. Catch Share Programs*. US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NOAA Technical Memorandum NMFS-F/PO-133. August.

[12] NOAA Fisheries. (2015). *2015 Update for the West Coast Catch Shares Program*. Washington DC, National Oceanic and Atmospheric Administration (NOAA). http://www.westcoast.fisheries.noaa.gov/mediacenter/2015_west_coast_catch_shares_program_update_and_economic_data_collection_insert.pdf; Pacific Coast Fishery Ecosystem Plan. (2015). Ecosystem Initiatives Appendix to the Pacific Coast Fishery Ecosystem Plan, Appendix A. Portland, OR: Pacific Fishery Management Council. http://www.pcouncil.org/wp-content/uploads/2016/01/FEP_Initiatives_Appendix_post_03_15.pdf.

Increased administrative costs to bid and work on government contracts. Winning contracts for repair and maintenance services for Coast Guard and other government-owned vessels would provide a new and growing source of revenue. AMCCO won this type of work in the past. Winning this work now, however, would entail significant administrative costs for mandatory compliance and inspection in order to bid on a contract. If AMCCO should win a government contract, the company would face additional compliance and inspection costs specific to the work. The cost of instituting the administrative procedures necessary to win government contracts is beyond the financial and workforce capabilities of the firm.

AMCCO faces significant competition. Boat owners may travel hundreds of miles up or down the West Coast of the US for boat repair and maintenance services. This increases the geography over which AMCCO competes for business. It also increases the number of competitors the firm faces. A sampling of businesses that offer competing marine repair and maintenance services includes the following.

- *Giddings Boat Works* – Offers repairs for rigging, welding, electrical, paint and coatings using dock-side/haul-out repair. They help repair and build fishing, crabbing and shrimping vessels as well as tug boats. Coos Bay, OR.
- *Port Townsend Shipwrights Co-op* – Their location provides them access to small and large (60, 70, and 330-ton) travel lifts and high-pressure wash-down facilities. Port Townsend, WA.
- *Mavrik Marine* – Mainly a boat building shop. La Conner, WA.
- *La Conner Maritime Fabrications* – Offers a full-service boatyard. Nanek, AK.
- *Snow and Co.* – A commercial boat builder and fishing vessel repair company. Seattle, WA.
- *Lovric's Sea*-Craft – A shipyard offering repairs and maintenance to commercial vessels. Anacortes, WA.
- *Riverside Marine Service* – Yacht and fishing boat repair services. Washougal, WA.
- *Ringo's Lakeside Marina* – Small repair business on the Oregon coast. Charleston, Bandon, and Winchester Bay.
- *Dakota Creek Industries, Inc.* – Shipbuilding and repair facility. Anacortes, WA.
- *Nichols Brother Boat Builders* – Specialize in steel and aluminum repair as well as major conversions. Freeland, WA.
- *Bayside Marine* – Providing general maintenance for boat lengths up to 34 feet. Everett, WA.
- *Platypus Marine* – All types of repair for vessels up to 120 feet. Port Angeles, WA.
- *J & H Boatworks* – Construction and repair of steel and aluminum vessels. Astoria, OR.

- *Seaview Boatyard*— Repairing and maintaining recreational and commercial boats. Seattle and Bellingham, WA.

In addition to the firms listed above, AMCCO faces competition from repair businesses that rely on boatlifts at Ports in Oregon and Washington. The Ports maintain these facilities, with work performed by private firms that conduct repairs and maintenance services in boat storage areas on dry land. AMCCO cannot compete with the capacity of, or access to, the boatlifts at these facilities. Swantown Marina and Boatworks at the Port of Olympia is an example of such a Port facility. Others include The Ports of Toledo and Astoria in Oregon, and the Port of Pt. Townsend in Washington.

Conclusions

Based on the results of the SWOT analysis described above, I reach the following conclusions.

1. The Superfund designation initially focused attention on AMCCO's operations. The increased regulatory scrutiny from state and local regulators that accompanies a Superfund designation brought to light the breadth and scope of operational and code regulations that would require increased attention and investment by AMCCO. The Superfund designation created uncertainty about the ability of the firm to pay for cleanup. Such uncertainty caused the owners to limit investing in the business. This uncertainty persisted for such an extended period that now the firm faces a significant backlog in deferred maintenance. It also faces a significant backlog in regulatory compliance costs that are unrelated to the Superfund designation. Addressing the deferred maintenance and operational and code requirements is beyond the financial capabilities of the firm.
2. If the firm could somehow address the issues listed above in my first conclusion, the amount of revenue that AMCCO earns is insufficient to support the ongoing administrative and code-compliance costs of doing marine repair and maintenance work. Said differently, the firm is too small and earns insufficient revenues and profits to compete in the industry and meet all the necessary regulatory requirements.
3. If the firm could meet clean up requirements under Superfund, it would still be required to comply with operating and code requirements. The reasons listed above describe the challenges of such compliance given the firm's financial conditions and amount of deferred maintenance. The firm could possibly refocus and conduct business on the site, but this business would not involve marine repair or construction. For example, the two largest buildings on the site could be repurposed as machine, welding and woodworking shops. The costs of such repurposing are unknown at this time. Also unknown is the financial feasibility of such a business model for the site.