UniSea, Inc.

Waste Remediation Plan

Prepared for

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LIMITATIONS

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The interpretations and conclusions contained in this report are based in part on site bathymetric data collected by others and provided by RPS-Evans Hamilton and Delphis Technical Support and Solutions, LLC. Floyd|Snider cannot assure the accuracy of this information.

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ADEC	Alaska Department of Environmental Conservation
APDES	Alaskan Pollutant Discharge Elimination System
BIS	Benthic Impact Survey
BMP	Best management practice
CD	Consent Decree
CY	Cubic yard
DGPS	Differential Global Positioning System
DMLW	Division of Mining, Land, and Water
DNR	Department of Natural Resources
HASP	Health and Safety Plan
MLLW	Mean lower low water
NMFS	National Marine Fisheries Services
NPDES	National Pollutant Discharge Elimination System
OSI	Organic Sediment Index
QA	Quality assurance
QC	Quality control
ROV	Remote-operated vehicle
RPD	Redox-potential discontinuity
SHPO	State Historical Preservation Office
SPI	Sediment Profiling Imaging
UniSea	UniSea, Inc.
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
WRCR	Waste remediation completion report
WRP	Waste Remediation Plan

1.0 Introduction

This Waste Remediation Plan (WRP) presents a plan for the removal and disposal of seafood waste located on the southwest shore of Amaknak Island that has accumulated from historically permitted discharges from the UniSea, Inc. (UniSea) seafood processing plant. Upon U.S. Environmental Protection Agency (USEPA) approval of this WRP, UniSea will conduct the seafood waste removal action with the marine contractor, Orion Marine Group, Inc. (Orion) out of Anchorage, Alaska, in accordance with the requirements presented herein.

1.1 BACKGROUND

UniSea operates a seafood processing plant located in the city of Unalaska, Alaska (also referred to as Dutch Harbor; Figure 1.1). The UniSea facility is permitted to discharge wastewater, solids, and residues from the processing of seafood and related support activities from their seafood processing plants through their permitted outfalls in accordance with National Pollutant Discharge Elimination System (NPDES) Permit #AK002865-7 (USEPA 2003). Authorized discharges from the UniSea facility have resulted in the formation of a seafood waste extent within a small embayment on the southwest shore of Amaknak Island (hereafter referred to as the Site; Figure 1.2).

On May 26, 2011, UniSea entered a Consent Decree (CD) with the USEPA and the State of Alaska (USEPA 2011). This CD required UniSea to perform a Benthic Impact Survey (BIS) at the Site, and, depending on the outcome of the BIS, potentially prepare a WRP. The BIS was completed by UniSea in June 2012 (RPS and NewFields 2014). Based on the results, a zone of deposit was identified, described as the extent of the seafood waste distribution at the Site. Additionally, a zone of impact was defined, described as the portion of the seafood waste extent area with impacts to the benthic habitat due to the presence of the seafood waste. Data collected as part of this effort suggested that the size of the seafood waste extent has remained relatively constant, or is nominally decreasing over time. The survey also indicated that, while the benthic ecosystem at the Site is impacted, it is still functional.

As a follow up to the BIS, UniSea proposed that an Alternatives Analysis be conducted in coordination with USEPA to evaluate both potential dredge methodologies and alternatives to dredging to address the identified areas of benthic impact at the Site prior to the preparation of this WRP. Under USEPA approval, the Seafood Waste Pile Alternatives Analysis was submitted by UniSea to USEPA in October 2014 (Floyd|Snider 2014).

In response to the Alternatives Analysis USEPA directed UniSea, via a letter dated April 27, 2015 (USEPA 2015), to dredge the seafood processing waste located on the seafloor at the Site in accordance with Paragraph 15 of the CD, which requires preparation of a WRP. The UniSea and USEPA CD states that, “EPA shall review and assess the Benthic Impact Survey and EPA shall thereafter notify Defendant in writing whether Defendant will be required to remove all, some percentage by volume, or none of the seafood processing waste located on the seafloor at UniSea's Dutch Harbor discharge locations…The seafood waste pile debris shall be dewatered and sent to UniSea's Discharge Location 004 or disposed of as an at-sea disposal site per

Section I.D. of UniSea's NPDES permit." The UniSea operational stick water is currently disposed at the at-sea Discharge Location 004 in outer Unalaska Bay during "B" season. Stick water is the wastewater resulting from the process of rendering fish waste to produce fish meal and fish oil.

This WRP has been prepared by Floyd|Snider on behalf of UniSea to comply with the terms of the CD, with the objective to establish a detailed plan for the dredge and at-sea disposal of the seafood waste extent located at the Site, and consequently address the associated area where benthic habitat is impacted.

As directed in USEPA's April 2015 letter (USEPA 2015), this WRP constitutes the proposed plan and outlines the means and methods for removal of accumulated seafood waste at the Site greater than 1 foot in thickness, and the transport of dewatered seafood waste to the proposed location for at-sea disposal in the summer of 2016, assuming that all required approvals and/or permits will be issued by the regulatory agencies before that time.

1.2 SUMMARY OF RECENT SEAFLOOR AND BENTHIC MONITORING

1.2.1 National Pollutant Discharge Elimination System Permit Seafloor Monitoring

Beginning in 2004, biannual dive surveys have been conducted at the Site to monitor the bioremediation of the seafood waste. In 2009, in accordance with the NPDES Permit, the dive surveys were extended to seafloor monitoring surveys. The surveys consist of bathymetric data, underwater video, and sediment cores, which provide the information necessary to calculate the thickness, volume characteristics, and topographic changes of the seafood waste at the Site over time. The results of previous seafloor monitoring surveys were presented in detail in the Alternatives Analysis (Floyd|Snider 2014).

The most recent seafloor survey was conducted in 2015 and the draft monitoring report was submitted to UniSea on October 20, 2015 (the NPDES Permit requires submittal by February the following year of the survey). Consistent with the 2013 survey results, the seafood waste at the Site is highly localized, as it is contained within the natural swale of the embayment into which it is discharged (Figure 1.3). As described further in Section 2.2, there are two larger legacy piles of seafood waste present at the Site that were generated between 1985 and 1995. The seafood waste at the Site is deepest within the two larger legacy piles, generally exceeding thicknesses of 6 feet and reaching a maximum thickness of 16.5 feet. These legacy seafood waste piles consist of heavier seafood waste materials such as shell and bone and appear to be static in extent and depth (RPS 2013). The peripheral areas of the extent of the seafood waste at the Site consist mainly of a thin layer of fine organic sediment, which is a mix of native detritus (including grasses) and some seafood waste over native seafloor such as cobble, gravel, or clay. As of 2015, the upper limit (shoreward extent) of the seafood waste material within the embayment extends in places to a depth of approximately -28 feet mean lower low water (MLLW), but typically lies below -40 feet MLLW. The lower limit (waterward extent) of the seafood waste material has remained consistent for a number of seafloor monitoring surveys at approximately -114 feet MLLW (RPS 2013). The Site currently (2015 survey) covers an area of approximately 137,300 square feet (or 3.15 acres), shown on Figure 1.3. This is an approximate 5 percent

reduction from 2013, with an area of approximately 145,000 square feet. The 2015 calculated volume of seafood waste at the Site with thicknesses of greater than 1 foot was reported to be approximately 7,800 cubic yards (CY), and is present over approximately 1.9 acres.

1.2.2 Benthic Impact Surveys

Following the 2012 BIS, two additional surveys have been conducted: (1) a focused benthic assessment and grab sample collection field event was performed at the Site in June 2014 in coordination with an aeration pilot study (RPS et al. 2014), and (2) 2015 post-aeration pilot study May and July surveys were also performed.

1.2.2.1 2014 Pre-Aeration Study Surveys

The June 2014 aeration pilot study and benthic survey (RPS et al. 2014) was performed to collect site-specific information necessary to inform the Alternatives Analysis. Videography, sediment grab sampling, and Sediment Profiling Imaging (SPI) were conducted during the survey.

The 2014 survey indicated that the zone of impact is adversely affecting the benthic community. Various SPI indices, such as redox-potential discontinuity (RPD) depths (described in Section 1.2.2.2), resulted in low organism-sediment index values over approximately 50 percent of the seafood waste extent. An azoic successional stage and the lack of bioturbating microfauna was also observed over approximately 50 percent of the seafood waste extent.

1.2.2.2 2015 Post-Aeration Study Surveys

Two post-aeration study surveys were completed in early 2015 (in May and July) to assess the effects of aeration on benthic restoration, and to collect additional information that would be provided to USEPA during their review of the alternatives proposed to restore benthic habitat at the Site. Post-processing of these data and subsequent preparation of a report describing the efficacy of the pilot study takes several months. However, prior to commencement of this work and submittal of the results, USEPA issued a letter directing UniSea to dredge the seafood processing waste at the Site (USEPA 2015). The Seafood Waste Pile Aeration Pilot Study Data Report (NewFields 2015) was submitted to USEPA in August 2015, following submittal to USEPA of the draft WRP that outlines the mandated dredging.

Results from the May and July 2015 post-aeration pilot study surveys (NewFields 2015) indicate aeration has resulted in improvement to environmental conditions on the seafloor within the aeration pilot area. The 2015 post-aeration underwater video surveys identified a significant reduction in the presence of *Beggiatoa* bacteria (sulfate-reducing bacteria, indicative of anaerobic conditions) coverage in the aeration pilot study area, in comparison to 2014 observations. *Beggiatoa* bacteria were still observed in the southern control area, although with lower surface coverage in comparison to 2014. Surface video, SPI, and plan view observations at the Site also show an increased abundance of surface polychaete worm tubes on the surface of the seafloor in many areas of the Site, with the aeration pilot study area showing higher densities of worm tubes in comparison to other areas of the Site. The increase in polychaete worm tube

abundance in areas outside the aeration footprint, combined with an overall reduction in observation of methane bubbles and *Beggiatoa* coverage, indicate environmental improvement throughout the Site; however, other observations of environmental improvement were only identified in the aerated area. Statistically, significant improvement in apparent RPD depths (the approximate depth of oxygenation of surface sediments), Organic Sediment Index (OSI [a measure of general benthic habitat quality in shallow water environments based on dissolved oxygen conditions, RPD depths, infaunal successional stage and presence or absence of methane]), and Infaunal Fish Waste Impact Index (IFWI [similar to the OSI, but includes consideration of *Beggiatoa* presence, and the presence and degree of methane bubbles]) were observed in the aerated area. Values for all three parameters in the control area showed no statistically significant improvement since 2014. This increase in benthic health at the Site is attributed to the aeration pilot study conducted in 2014.

During the 2012, 2014, and 2015 surveys, macrobenthos were observed throughout the seafood waste extent, including the larger, more visible benthic organisms such as polychaete worms, sea anemones, and larger crustaceans (crabs). Although the diversity and population of these species may not be as great as those observed in background reference stations, these species are still present, indicating the benthic ecosystem is impacted, but still functional.

1.3 DOCUMENT ORGANIZATION

The remainder of this WRP is organized as follows:

- **Section 2.0—Site Description.** Provides information on the location and background of the Site, including environmental setting and the history of seafood waste discharge.
- **Section 3.0—Overview of Waste Removal and Disposal Action.** Describes the activities to be completed as part of the removal and disposal action, including pre-dredge and post- dredge dive, hydrographic surveys and BISs at the Site, dredging and dewatering of the seafood waste, transport and at-sea disposal of the seafood waste, continued source control activities and reduction monitoring, and continued seafloor monitoring.
- **Section 4.0—Agency Coordination and Permitting Requirements.** Identifies the federal and state approval and permitting processes and coordination required for the implementation of the remediation activities at the Site under a USEPA CD.
- **Section 5.0—Waste Remediation Work Elements and Protection Measures.** Provides the construction sequence and schedule, and discusses in detail the project activities, includes protection measures to be implemented during dredging and disposal.
- **Section 6.0—Health and Safety.** Provides information regarding the Health and Safety Plan (HASP) that the selected contractor will perform the work under, and the Floyd|Snider HASP (provided in Appendix B) that will be followed during construction oversight.

- **Section 7.0—Waste Remediation Reporting.** Presents an overview of the Waste Remediation Completion Report (WRCR), which will provide documentation of the removal and disposal action, including the results of the various pre-dredge and post-dredge surveys.
- **Section 8.0—References.** Provides a list of materials cited in the WRP.

2.0 Site Background and Seafood Waste Distribution

2.1 SITE LOCATION AND BACKGROUND

2.1.1 Facility and Local Setting

The UniSea facility is located within Unalaska Bay on the southwest shore of Amaknak Island (Figure 1.1). The area surrounding the UniSea facility is primarily commercial or undeveloped land. The city of Unalaska is located on the coast of Unalaska and Amaknak Islands, and is home to over 4,700 full time residents, located mostly on Amaknak Island. These residents support the commercial fishing, seafood processing, fleet services, and marine transportation economy of the region (City of Unalaska 2014). The UniSea facility consists of four individual processing plants that produce different seafood products. Seafood processing at the UniSea facility occurs year round, as the seasons for their various processes overlap. The UniSea facility outfalls (five outfalls, including a set of quad outfalls [Outfalls 001A through D] and the "Pac Pearl" outfall [Outfall 001E]) are located within a small embayment on the southwest shore of Amaknak Island (Figure 1.2), north of Arch Rock where the main entrance to Captains Bay opens to the north into Unalaska Bay. The Unalaska Bay then opens into the Bering Sea. Wastewater from the fish and crab processing is discharged following treatment to an embayment of Unalaska Bay through Outfalls 001A through E.

2.1.2 Local Weather and Seasonality

The mean annual temperature for Unalaska is approximately 41 degrees Fahrenheit and the mean annual precipitation is approximately 61 inches per year, with rain occurring approximately 224 days a year. Snowfall generally occurs between October and May, with a mean annual snowfall of approximately 92 inches (Western Regional Climate Center 2014). During this same window of snowfall, it is common for high winds and greater currents to restrict viable opportunities for in-water work. Due to these weather conditions, the typical construction season in Unalaska is from late May or early June to September.

2.1.3 Currents and Wind

There are weak and variable currents with directional structure developing during peak flood or peak ebb tidal phases between Captains Bay and Unalaska Bay. Measurements collected at the Site in 2011 indicated the maximum current velocities occur approximately 200-meters from the discharge locations of the UniSea facility outfalls, with current flow directions to the northeast during the ebb tide following the natural bathymetry of Unalaska Bay (RPS 2011). The currents are mainly driven by wind, and secondarily by tides (RPS 2011).

Wind rose diagrams and data from the Unalaska Airport show wind speeds and direction vary significantly throughout the year, ranging from calm to gusts of approximately 80 miles per hour (ISU 2014, Weather Underground 2014). Based on data collected since 1973 at the Unalaska

Airport, the annual predominant wind direction is from the northwest with an annual average speed of 11.3 mph (Weather Underground 2014).

As part of the preparation of the WRP and scoping of the removal and disposal action, a location for at-sea disposal of seafood waste within outer Unalaska Bay, consistent with the CD direction described above, was identified in a Seafood Waste Disposal Location document that was provided to USEPA in support of the agency's associated coordination with Alaska Department of Environmental Conservation (ADEC) regarding the one-time at-sea disposal of UniSea's seafood waste (Floyd|Snider 2015). The Seafood Waste Disposal Location document is provided in Appendix A. The document and identification of the proposed disposal location within outer Unalaska Bay included a current regime and circulation model evaluation within Unalaska Bay with a three-dimensional boundary-fitted hydrodynamic model (BFHYDRO). The surface currents at the proposed disposal location are strong and predominantly wind driven, and have little tidal influence. The surface currents (extending to approximately 15 feet of water) flow to the north, toward the mouth of the bay, at an average rate of 0.12 knots and an upper range of approximately 0.3 knots.

2.2 SEAFOOD WASTE DISCHARGE AND OUTFALL HISTORY

As described in Section 2.1, UniSea's seafood processing wastewater, along with the majority of the stormwater from the UniSea facility is currently discharged at the Site through Outfalls 001A through E, shown on Figure 1.2. These outfalls are located north of Arch Rock within a small embayment of Unalaska Bay on the west shore of Amaknak Island where the main entrance to Captains Bay opens to the north into Unalaska Bay.

The original set of quad outfalls used for discharging seafood processing wastewater at the Site was first put into service in 1985. This original set of quad outfalls was used at the Site until 1995 when they were decommissioned and the current set of quad outfalls (Outfalls 001A through D) were installed (Figure 1.2). When the outfalls were decommissioned, all associated piping and structures were removed. A decade of discharges from the original set of quad outfalls, authorized under the previous Grind and Discharge permit, resulted in a large seafood waste pile containing larger fragments of shell and bone in addition to seafood tissue, forming around and downslope from these outfalls.

Seafood processing wastewater discharges from the current set of quad outfalls after 1995 also resulted in a second, but smaller, pile of seafood waste forming within the embayment at the terminus of these outfalls. As source control methods improved, larger particulates were no longer discharged, and only finer particulates and tissue continued to be discharged. The two main piles, consisting primarily of larger-diameter particulates, are located within the larger extent of seafood waste, and are referred to as the legacy seafood piles. As smaller particulates stay suspended longer, and can travel farther, these smaller particulates have accumulated across a wider area, resulting in the current extent of the seafood waste, or the Site.

In 2000, per a requirement of the NPDES Permit, processing wastewater discharges from the current set of outfalls began to be screened to a 0.5-millimeter (mm) width. Routine NPDES

monitoring the extent of the seafood waste began in 2009. UniSea conducts seafloor monitoring surveys biennially and the data are used to map the area and thickness of the seafood waste extent, per NPDES Permit requirements. Effluent monitoring of these discharges is also required on a routine basis. UniSea continues to meet the terms of the effluent limits and monitoring established in their NPDES Permit.

3.0 Overview of Waste Removal and Disposal Action

The removal and disposal action will include specific work elements necessary to facilitate the removal of the accumulated seafood waste that is 1 foot or greater in thickness. The project includes the following activities, which are also described in detail in Section 5.0:

- **Mobilization and Staging of Equipment.** Project activities will commence with mobilization of dredge and disposal barges to the Site. Project actions will be conducted by Orion, based out of Anchorage, Alaska, with some resources and equipment potentially mobilized out of Washington State.
- **Mechanical Dredging and Dewatering of Approximately 7,800 CY of Seafood Waste.** The extent of seafood waste that is greater than 1 foot in thickness is distributed over an area that is approximately 1.9 acres and consists of an in situ volume of approximately 7,800 CY. The seafood waste is located on a slope along the southwest shore of Amaknak Island, where the UniSea processing facility active outfall lines are located (Figure 1.2). An offset around the active outfalls will be maintained, as described in Section 5.3. The dredged seafood waste will be dewatered on a flat deck barge where the water drainage is filtered to remove particles and solids using a combination of filter fabric and straw wattles or Geotube® filter bags, or equivalent materials. This will occur within the seafood waste area.
- **Pre-Dredge, Interim, Post-Dredge Hydrographic and Dive Surveys.** Pre-dredge existing conditions will be documented by a pre-dredge multi-beam hydrographic survey and a dive survey. The surveys will be used to both confirm the extent of the dredge area (the 1-foot thickness boundary) that will be used by the contractor in construction, and to accurately locate the active outfall pipe locations to be avoided during dredging. Twice during dredge operations, intermediate diver or remote-operated vehicles (ROV) surveys and multi-beam hydrographic surveys will also be conducted to monitor the effectiveness of seafood waste removal. Immediately following the completion of required dredging, a post-dredge multi-beam hydrographic survey will be completed and used to identify any high spots that may require additional removal, as well as to confirm that the required extent of seafood waste removal has been accomplished and document the post-removal action conditions of the seafloor. A post-dredge dive survey will also be performed to confirm the required extent of the seafood waste removal and the post-removal action conditions of the seafloor.
- **Pre-Dredge and Post-Dredge Benthic Assessment SPI Surveys.** A pre-dredge SPI benthic assessment survey will be performed prior to the start of dredging. Within 30 days of the completion of dredging, as confirmed by the post-dredge hydrographic survey, a post-dredge SPI survey will be performed to assess the post-construction benthic conditions. The benthic SPI survey will be performed in accordance with the 2012 BIS USEPA-approved Quality Assurance Project Plan (QAPP; RPS 2012) and will re-occupy the same station locations and reference locations as monitored in the 2012 BIS.

- **Seafood Waste Removal Confirmation.** The extent of seafood waste removal will be confirmed with an iterative approach using multiple methods. The confirmation methods that cross-check seafood waste removal include ongoing visual confirmation of seafood waste removal as well as multi-beam and dive/ROV survey comparisons.
- **Seafood Waste Transport and At-sea Disposal.** The dewatered seafood waste is planned to be disposed of at the proposed at-sea disposal location within outer Unalaska Bay, approximately 5 nautical miles from the UniSea facility (refer to Appendix A for the proposal document). While in transport to the disposal location, the seafood waste will be contained with no release of seafood waste or water. The offloading operation will be done while the barge is underway (at a speed of at a minimum of 3 knots as required by the CD) to maximize dispersal of the seafood waste.
- **Ongoing Seafloor Monitoring.** Long-term seafloor monitoring at Outfall 001 A−E will continue to be conducted bi-annually, as required by the existing NPDES Permit, or through requirements included in a potential future Alaskan Pollutant Discharge Elimination System (APDES) Permit, issued by the State. The seafloor monitoring program includes a single-beam bathymetric survey, underwater video, and sediment cores, and results will be compared against the post-construction hydrographic survey.
- **Ongoing Source Control Implementation and Reduction Monitoring and Reporting.** Based on the successful installation of a decanter in the surimi process, source controls at the UniSea facility will positively contribute to the overall benthic habitat restoration goal by removing additional fish proteins from the waste stream each year. Wash water that previously would have been sent through the waste water treatment system and eventually discharged, is now entering a new product stream utilizing this decanter. The operational decanter following installation did not meet UniSea recovery expectations, and, prior to the upcoming “A” season, UniSea is making line changes that aim to increase recovery. Production values associated with this wash water will be monitored and provided to USEPA as reduction reporting.
- **Demobilization.** Demobilization will include the contractor’s closeout of the project. Work will include removal of construction equipment from the Site following the completion of the post-dredge hydrographic survey and seafood waste removal confirmation.

4.0 Agency Coordination and Permitting Requirements

The UniSea CD states that, "The seafood waste pile debris shall be dewatered and sent to UniSea's Discharge Location 004 or disposed of as an at-sea disposal site per Section I.D. of UniSea's NPDES permit." It is UniSea's understanding that USEPA confirmed with ADEC the one-time disposal of the seafood waste at an at-sea disposal location in Unalaska Bay (as proposed in the seafood waste disposal location document provided in Appendix A) to allow UniSea to complete the mandated disposal activity. When UniSea engaged ADEC and the USEPA Ocean Dumping Permitting Program in May 2015, directly following the receipt of USEPA's April 2015 letter, UniSea was directed that disposing of the seafood waste in State waters would not be allowed. UniSea continues to engage other resource agencies to determine the permits or approvals required for the at-sea disposal and is working proactively to obtain such approvals prior to the 2016 construction season.

In an effort to support agency review and approval processes for this action, and to identify a disposal location that would provide for dispersal of the dredged seafood waste, UniSea commissioned a circulation model of Unalaska Bay. The prevailing currents and water velocities in the proposed location would reduce impacts to water quality during disposal and would minimize the amount of sediment accumulation in any one location. The mixing characteristics would also ensure that federally listed threatened and endangered species, essential fish habitat, and critical habitat are not adversely affected by these activities. This planning-level effort was the initial step in minimizing impacts to the marine environment from this work; best management practices (BMPs) will be implemented during the dredging and disposal of the seafood waste to further avoid or minimize potential adverse effects.

Dredging of the seafood waste from a small embayment on the southwest shore of Amaknak Island will result in short-term impacts to water quality. Protection measures and BMPs to be implemented during the dredging are presented in Section 5.0 and will be implemented in compliance with the associated terms and conditions of the project permits, as outlined below. All equipment operators and field staff will conduct visual surveys periodically throughout the duration of the work, and will modify procedures as needed to minimize turbidity.

During transport, the seafood waste will be contained on the vessel and release of seafood waste during transport will not be allowed. Short-term impacts to water quality are also anticipated during the seafood waste disposal, but ambient conditions are expected to resume within a few hours. To ensure effective dispersal and to reduce associated turbidity levels, in accordance with the CD, the disposal barge will be moving at a minimum speed of 3 knots as the seafood waste is released.

4.1 ANTICIPATED REQUIRED PERMITS AND APPROVALS

In discussions with multiple state and federal agencies, the removal and disposal of accumulated seafood waste is a unique and infrequent action, such that applicable state and federal approvals or permits and the associated application processes are not pre-determined or codified. Federal

and state agencies are unable to determine the required permitting and approval processes until a comprehensive summary of the project scope is provided. The receipt of USEPA's October 14, 2015 comment letter on the Draft WRP provided certainty on the removal and disposal action, and allowed UniSea to reach out to and update agency representatives with a confirmed project plan and scope. Based on subsequent discussions with ADEC, the U.S. Army Corps of Engineers (USACE), and Alaska Department of Natural Resources (DNR), Division of Mining, Land, and Water (DMLW), it is UniSea's understanding that the following permits are required with the anticipated timelines:

- **ADEC Short-Term Water Quality Variance for both dredging and disposal.** ADEC has stated that they have reviewed the Draft WRP and assessed how the plan provides the necessary information to meet State water quality regulations and where additional information is needed to further the Water Quality Variance issuance process. Once UniSea receives ADEC's comparison and comment letter, UniSea will provide the information needed to demonstrate that the regulations required for a Water Quality Variance are met, a Water Quality Monitoring Plan will be submitted, and a 30-day public comment period will commence. UniSea anticipates receiving ADEC feedback in late-November; therefore, the subsequent issuance of a Water Quality Variance is anticipated by March 2016. UniSea is coordinating with Clynda Case, the Environmental Program Manager with ADEC. UniSea will prepare a Water Quality Monitoring Plan to outline the frequency of water quality monitoring to be performed during the dredging and disposal of the seafood waste. UniSea will provide this information and any other information required in coordination with ADEC, and will ensure timely receipt of the State Short-Term Water Quality Variance.
- **Clean Water Act Section 10 and Section 404 Individual Permits.** In October 2015, UniSea reached out to the USACE to determine if a Nationwide Permit or Individual project permit would be required for the removal and disposal action. In coordination with Andy Mitzel, a USACE Regulatory Project Manager, it has been communicated to UniSea that it is likely that individual Section 10 (for dredging and disposal) and Section 404 (for disposal) permits are required. UniSea anticipates submitting a USACE permit application by the end of November 2015, following the submittal of the Final WRP to USEPA. The USACE is assumed to take the federal lead role on this project and will lead project coordination and needed consultation with State Historical Preservation Office (SHPO) for compliance with Section 106 of the National Historic Preservation Act and with National Marine Fisheries Services (NMFS), U.S. Department of Fish and Wildlife for Endangered Species Action Section 7 compliance. Following submittal of a complete project application and USACE review, a 30-day public notice period will occur. Based on discussions with USACE, it is anticipated that the project will have a "may affect, but not likely to adversely affect" determination by the USACE and informal consultation with NMFS and U.S. Department of Fish and Wildlife to secure a Letter of Concurrence. Additionally, it is anticipated that USACE will determine that no historic properties are found or no effects on historic properties would be expected from the project, and this determination would be documented in a "No Historic Properties Affected" letter to

SHPO. The USACE targeted timeline for this permit process is approximately 120 days, or 4 months; however, coordination with SHPO for Section 106 compliance and with NMFS and U.S. Department of Fish and Wildlife for Endangered Species Act Section 7 compliance can result in additional agency coordination and agency review durations.

After reviewing information that UniSea provided, Alaska DNR DMLW, Southcentral Region Land Office determined that no permit will be required from their office for the proposed project activities, if no overnight anchoring of a vessel at the disposal site occurs. UniSea's contractor will not be anchoring a vessel at the disposal site.

UniSea will take all other actions necessary to submit timely and complete permit applications and to provide any information needed to support the agency permitting processes in order to meet the objective of beginning removal and disposal activities in the summer of 2016.

5.0 Waste Remediation Work Elements and Protection Measures

This section provides a summary of the removal and disposal action work elements to be completed and protection measures for work during surveying and dredging. Per the CD and USEPA's direction in their letter issued April 2015,

> "UniSea is required to complete all field work under an approved remediation plan within 270 days from the commencement of field work. Any delay in implementing required remediation activities beyond the stated deadlines may subject UniSea to stipulated penalties, as set forth in Paragraph 36 of the CD. USEPA expects that on-the-ground remediation will be underway in 2016."

5.1 CONSTRUCTION SEQUENCE AND SCHEDULE

The schedule provided in Table 5.1 has been proposed with the objective of complying with USEPA's direction (USEPA 2011 and 2015). The construction start dates and associated durations provided in this WRP are based on current expectations regarding the local construction season and discussions with contractors; however, the contractor will develop a detailed construction schedule that will be submitted to UniSea and provided to USEPA. UniSea is in coordination with Orion to secure the necessary equipment to complete the project in the 2016 summer construction season, as described below. The timing and durations of the USEPA submittals are consistent with those requirements as stated in the CD.

Table 5.1
Schedule for the Project Work Elements

Work Elements	Activity Duration and/or Required Timing
USEPA Pre-Construction Submittals	
Submittal of Proposed Seafood Waste Disposal Location Document to USEPA	July 27, 2015
Submittal of Draft WRP to USEPA	By August 24, 2015
Submittal of Final WRP to USEPA[1]	By November 18, 2015, within 30 days of receipt of USEPA comments on Draft WRP (October 19, 2015)

[1] The CD states that "Within fifteen (15) Days of receipt of EPA's written approval of the final Waste Remediation Plan Defendant shall commence work in accordance with the EPA-approval final Waste Remediation Plan." Following USEPA's review and approval of the final WRP, UniSea will continue contractor and agency coordination as needed to be able to complete the seafood waste removal and disposal actions in the summer of 2016; however, due to local weather conditions and coordination with regulatory agencies, the removal action cannot occur until the summer of 2016, consistent with USEPA's direction in the April 2015 letter.

Work Elements	Activity Duration and/or Required Timing
Pre-Construction and Construction Items	
Pre-dredge SPI benthic assessment survey	May or June 2016, prior to the start of dredging
Contractor mobilization, pre-dredge multi-beam hydrographic and dive surveys†	Expected in May or June 2016[1]
Seafood waste dredging, dewatering, intermediate diver or ROV and multi-beam hydrographic surveys, and at-sea disposal	Expected duration of approximately 4 weeks in Summer 2016
Post-dredge multi-beam hydrographic survey	Immediately following completion of dredging
Contractor demobilization	Following confirmation of seafood waste removal by multi-beam hydrographic survey
Post-dredge baseline SPI benthic assessment survey	Within 30 days of the completion of all dredging (initial and any required high spot additional dredging)
Post-dredge dive survey†	After September 15, 2016[1]
Post-Construction USEPA Submittals	
Submittal of Draft WRCR	Due within 60 days of the completion of field work
Submittal of Final WRCR	Due within 45 days of receipt of USEPA comment on the Draft WRCR

Note:
† The timing of the pre-dredge and post-dredge dive surveys is dependent on water conditions conducive to survey visibility and is described in Section 5.4.

A plan view of the seafood waste area showing the extents of the dredging is shown on Figure 5.1. Cross-sections of the dredge area are provided in Figures 5.2 and 5.3. The presumed native seafloor, based on the 2007 sub-bottom profile survey is provided in Figure 5.4. An overview of the at-sea disposal area is provided in Figure 5.5, and proposed dive survey transects of the Site are shown in Figure 5.6.

5.2 GENERAL WATER QUALITY PROTECTION MEASURES

The project elements have been designed to minimize adverse impacts on the environment due to the project activities. The following general water quality protection measures will be

implemented on a project-wide basis to reduce, eliminate, or minimize the effects of the removal and disposal action on water quality:

- A floating boom and a quantity of sorbent materials (pads and booms) appropriate for the size of the work area, will be available for immediate deployment in the event of a spill.
- Barges will not ground out or rest on the substrate.
- The contractor will work under a written spill prevention, control, and countermeasures plan. The plan will describe measures to prevent or reduce impacts due to accidental leaks or spills, as well as all hazardous materials that will be used, their proper storage and handling, and the methods that will be used to monitor their use.

5.3 SEAFOOD WASTE DREDGING AND DEWATERING

Approximately 7,800 CY of seafood waste will be dredged by means of a mechanical standard clamshell bucket (the size will be determined by the selected contractor and equipment availability) handled by a crane on a floating derrick barge. This in situ volume of seafood waste occupies approximately 1.6 acres, and is where the seafood waste is 1 foot or greater in thickness. The 1-foot thickness boundary, shown on Figure 5.1, is based on the May 2015 seafloor monitoring single-beam bathymetric survey conducted by Delphis Technical Support and Solutions, LLC (Delphis 2015). The in situ volume of seafood waste was calculated by comparing the 2015 seafood waste surface, as depicted by the May 2015 hydrographic survey, to the 2007 sub-bottom profile that depicts the underlying presumed native seafloor (Figure 5.4). A pre-dredge hydrographic survey, as described in Section 5.4 will be conducted in 2016 prior to the start of dredging to confirm the extent of the 1-foot thickness boundary and associated seafood waste volume. Consistent with the seafood waste volume calculation approach per the UniSea Seafood Wastepile Survey (September 2007) that plots the continuous extent of the seafood waste at depths greater than one half inch, 3 inches, 1 foot, 3 feet, and 6 feet, small localized and non-contiguous areas of waste that are greater than 1 foot in thickness are not included in the dredge area. These small areas are often temporal and may vary in thickness and respective size and location between surveys. The dredge plan is presented in Figure 5.1. Representative cross sections showing the various thicknesses of the seafood waste to be removed are presented in Figures 5.2 and 5.3.

The upper limit (shoreward extent) of the seafood waste within the 1-foot boundary is present at a depth of approximately -50 feet MLLW. The lower limit (waterward extent) of the seafood waste within the 1-foot boundary is located at approximately -113 feet MLLW (Figure 5.1). Therefore, dredge operations are expected to be performed in approximately 50 to 113 feet of water.

It is anticipated that dredging will first focus on the removal of the areas of greatest seafood waste thickness, which are the two legacy mounds. The clamshell bucket will remove the seafood waste and deposit it onto a receiving flat deck barge. It is expected that a typical 200-foot deck

barge may be used and could accommodate a maximum dredged seafood waste volume of approximately 1,200 CY. The dredged volume of seafood waste that will require handling, transport, and at-sea disposal is estimated to be approximately 11,000 CY, which includes 6 inches of over-dredge and the additional volume of water associated with the seafood waste once it is dredged.

The seafood waste will be mechanically dredged to the presumed underlying seafloor elevations, as represented by the 2007 sub-bottom profile (Figure 5.4); however, the inability of the sub-bottom profile to distinguish between some seabed sediments and seafood waste provides for some potential variation in the actual interface of underlying sediments and seafood waste. Therefore, some deliberate dredging into the underlying sediments will occur and will be necessary to ensure the removal of the seafood waste as required and to address dredge residuals (i.e., seafood waste that falls back through the water column and redeposits on the mudline during dredge operations). Construction over-sight will be performed by Floyd|Snider and will include ongoing visual confirmation of seafood waste removal by identifying the presence of sediment being deposited onto the receiving barge from the dredge bucket.

The flat deck barge will be outfitted with bin walls or an equivalent configuration, to have a containment area for seafood waste handling that allows for controlled points of seafood waste dewatering. Dewatering is expected to occur through the receiving barge's scuppers, which will be fitted with fabricated grates to contain large solid seafood waste materials, as well as geotextile fabric to filter and contain smaller particles. Free water collecting above the seafood waste on the barge may be pumped into geotextile Geotubes® or similar filter arrangements to remove particulates before being discharged.

Removing seafood waste that is 1-foot or greater in thickness reduces the potential of substantial over-dredging into the underlying seabed that would occur with the removal of thinner seafood waste thicknesses. Additionally, in the steep slope and nearshore areas, dredging beyond the 1-foot thickness boundary would be limited due to vessel access and to avoid slope destabilization. All dredging will be conducted from a dredge barge, and is limited by the barge draft requirements. The peripheral areas of the extent of the seafood waste at the Site consist mainly of a thin layer of fine organic sediment, which is a mix of native detritus (including grasses) and some seafood waste over native seafloor such as cobble, gravel, or clay. Underwater rock outcrops have been identified in the general area of the Site, but, as dredging is not proposed in areas where the seafood waste accumulation is less than 1 foot in thickness, and the prominent sea-bottom rock outcroppings occur along the southern boundary of the seafood waste extent where thicknesses of seafood waste material are less than 1 foot, the presence of rock outcroppings at the Site is not anticipated to affect the extent of dredging. The extent of rock outcrops relative to the dredge area will be confirmed with the pre-dredge hydrographic survey.

There are five current outfall structures located within the seafood waste extent (Outfalls 001A through D [the Quad Outfalls] and Outfall 001E [the Pac Pearl Outfall]. To avoid damage to the operational outfall pipes, dredging by mechanical clamshell bucket will be limited to no closer than 15 feet from the pipes (Figure 5.1). A submersible hydraulic dredge pump will be used to

remove seafood waste present within the 15-foot restricted area. The seafood waste and associated water will be pumped to the receiving disposal barge as described above.

The dredge and dewatering operations are expected to occur over approximately 4 weeks, followed by post-dredge multi-beam hydrographic surveying, and additional seafood waste high-spot removal, if necessary. The protocol that will be implemented for documentation and confirmation of seafood waste removal, including the identification of seafood waste "high-spots" that may be present after the initial required dredging is completed, is described in detail in Sections 5.5.3 and 5.7.

To minimize adverse water quality impacts during dredge operations, the following BMPs will be implemented:

- Horizontal control for dredging operations will be achieved by careful tracking of clamshell bucket positions using an electronic positioning system (Differential Global Positioning System [DGPS]) to achieve the targeted dredge depths and minimize excessive over-dredging into the underlying seabed.
- The contractor will ensure that the bucket is completely emptied over the receiving barge before re-submerging the bucket in the water and that loss of dredge material from the bucket is minimized.
- Screening with reinforcing steel will be installed on the top of the mechanical clamshell bucket to prevent loss of material out the top of the bucket bowls.
- The receiving barge containment area will be configured to prevent any overboard spillage of material and all dewatering will occur through a filtration system to remove particulates before being discharged.
- The contractor and construction oversight personnel will conduct on-site visual monitoring of the water surface and record observations in a field log. Photographs of the material in the dredge bucket and on the receiving barge will be taken during dredge operations.
- The receiving barge containment area used for transposing the dredged seafood waste will not be overfilled to the point where recovered seafood waste or associated water overflows directly back to the surface water.
- The tugboat and other floating equipment will be operated to avoid nearshore propeller-wash impacts such as suspension of nearshore seafood waste and sediments.
- UniSea and its contractor will conduct both intermediate-dredge and post-dredge bathymetric and dive surveys to monitor and determine the effectiveness of the seafood waste removal, and that the seafood waste material located within the 1-foot thickness boundary was removed to the targeted extent and depths.

5.4 PRE-DREDGE AND POST-DREDGE DIVE SURVEYS

Dive surveys will be conducted by a local dive company prior to and following the completion of seafood waste dredging, per the CD. Dive surveys at the Site are constrained by the processing schedule of the UniSea seafood processing plant. Prior to June 15 in any year, the water clarity can be expected to be good for visual inspection of the sea floor by divers. After approximately June 15, the plant will usually be processing Pollock continuously (referred to as "B" season) and the visibility will be poor. The end of the Pollock fishery season, when visibility is expected to improve, is in approximately mid-September. Therefore, as described in more detail below, the pre-dredge and post-dredge dive surveys will be performed prior to June 15, 2016, and after September 15, 2016, respectively.

Dive surveys will be performed by local commercial divers using surface-supplied air, with telephone communication and video recording or, alternatively in water depths greater than 80 feet, by ROVs appropriate for the work. Divers or ROVs will operate from a surface support vessel suitable for operation on the Site in all reasonable weather, equipped with navigation, safety, and cargo handling equipment appropriate for the task. The vessel will be based in Dutch Harbor during the work and will transit from the town to the Site and back daily when dive surveys are in progress. Each of the two surveys is expected to take up to 3 days to complete.

Dive and ROV surveys will be performed on a total of 10 transects of the seafood waste-covered area, approximately 50 feet apart and ranging in length from 250 feet to 390 feet and extending east and west, or generally up and down slope (Figure 5.5). The transect end points will be established in the field by DGPS from the surface support vessel from which the divers or ROVs will operate. The line of each transect will be defined on the sea bottom by a physical transect tag-line, a non-stretch synthetic rope with station marks labeled at 10-foot intervals with easily read numerals against a contrasting background. The ends of the transect line will be held in place by anchors, lowered by the surface support vessel with meter accuracy. The diver or ROV, following the transect line, will film the sea bottom north and south along the line, as well as the area immediately along the line, allowing for a repeatable correlation of the video recording with the actual position on the bottom.

Dive survey reports will include electronic file copies of all the video along each transect, explanatory figures, and a narrative description of the survey observations and confirmation of seafood waste removal, documenting post-construction baseline conditions. The pre-dredge survey report will be submitted to USEPA within 30 days of completion of the survey and the post-dredge dive survey report will be included in the WRCR submitted to USEPA within 60 days following the completion of field work.

5.4.1 Intermediate Dive or Remote-Operated Vehicle Surveys

Per the CD, intermediate dive surveys are required during dredging; however, the surveys will be performed by either diver or ROV per the conditions prevailing at the time. The dive or ROV surveys will be used in combination with the intermediate hydrographic surveys to assess the effectiveness of seafood waste removal. The determination of the use of diver or ROV will be

made at the recommendation of the dive subcontractor based on the limited visibility that is expected during dredging, as a result of dredge operations and plant production and discharges. UniSea will provide notification to USEPA on what survey method is recommended for use and a brief summary of site conditions. Consistent with USEPA feedback, if visibility and ambient conditions at the time do not support intermediate diver or ROV surveys (i.e., neither a diver nor a ROV can see through turbid waste to any substantial distance; however, an ROV does not have limited dive time at depth like a diver would), UniSea will contact USEPA to discuss if further modification to the CD-required intermediate diver surveys are needed (USEPA 2014). The intermediate hydrographic surveys, as described in Section 5.5, will be conducted, as well as contractor quality control (QC) and progress surveys to provide data to assess removal effectiveness and the conditions of the seabed.

The intermediate diver or ROV surveys will be conducted in a consistent manner with the pre- and post-dive surveys, except that the area of survey will be limited to the areas representative of the removal of approximately 25 percent and 75 percent of the seafood waste, consistent with the intermediate hydrographic surveys. The spacing of the transects in which the diver or ROV will survey will depend on the shape and configuration of the removal area. Consistent with the pre- and post-dredge dive surveys, the line of each transect will be defined on the sea bottom by a physical transect tag-line, a non-stretch synthetic rope with station marks labeled at 10-foot intervals with easily read numerals against a contrasting background. The ends of the transect line will be held in place by anchors, lowered by the surface support vessel with meter accuracy. The diver or ROV, following the transect line, will film the sea bottom north and south along the line, as well as the area immediately along the line, allowing for a repeatable correlation of the video recording with the actual position on the bottom.

5.5 PRE-DREDGE, INTERMEDIATE, AND POST-DREDGE HYDROGRAPHIC SURVEYS

Pre-dredge, two intermediate, and post-dredge multi-beam hydrographic surveys will be performed on-site, with coverage of the dredge area. For the hydrographic surveys, the existing UniSea survey benchmarks, located at the active Outfall 001E piping/structure and the Quad outfall cement base will be used to establish survey control and verify project coordinate and elevation accuracy (refer to Figure 5.1). Prior to hydrographic surveys, a control check will be conducted at this benchmark. This benchmark is also used during the bi-annual seafloor monitoring survey events. Soundings will be acquired with a multi-beam bathymetric sonar, with data acquisition via transects through the dredge area. Survey software will be used to produce hillshade images of the bottom bathymetry. The hillshade image is a colored rendering of the surface with shadows created by an artificial sun to help draw out features, such as outfall piping, or changes in elevations.

5.5.1 Pre-Dredge Multi-Beam Hydrographic Survey

Pre-dredge existing conditions will be documented by a pre-dredge multi-beam hydrographic survey as well as a dive survey. The pre-dredge multi-beam hydrographic survey will be performed on the same mobilization as the pre-dredge dive survey, before June 15, 2016. The pre-dredge multi-beam hydrographic survey will provide a current baseline condition of the Site

prior to any seafood waste removal, and be used to delineate the extent of the dredge area—the 1-foot thickness boundary, which will be used by the contractor in construction—as well as accurately locate the active outfall pipe locations to be avoided during dredging. DGPS will be used to locate the perimeter of the seafood waste dredge area in lieu of buoys, as stated in the CD.

5.5.2 Intermediate Multi-Beam Hydrographic Surveys and Daily Quality Assurance/ Quality Control

The first intermediate multi-beam hydrographic survey will be performed when approximately 25 percent of the seafood waste dredge area has been dredged. The first intermediate survey will provide validation of the dredge contractor's quality assurance (QA)/QC survey work and will identify potential high spots that may indicate inadequate dredging. At the same time this survey should provide confirmation of the assumption that the 2007 sub-bottom profile indication of the native seafloor is correct. If that native seafloor indication is confirmed it will significantly assist in planning and executing the remaining 75 percent of the dredging to be performed.

The second intermediate multi-beam hydrographic survey will be performed when approximately 75 percent of the seafood waste dredge area has been dredged. This survey will continue to validate the dredge contractor's QA/QC daily survey work and the accuracy of the 2007 indication of the native seafloor. It will also provide for a timely indication of any potential high spots over the majority of the dredge area that will allow for the removal of any such high spots prior to completion of dredging and the post-dredge multi-beam hydrographic survey.

Additionally, the dredge contractor will perform daily surveys of the most recently dredged area using survey grade DGPS and single-beam survey grade depth sounder. The survey data will be plotted on the dredge's navigation software (WINOPS, Dredgepack, or approved equivalent) and will be available to the dredge operator and engineer in "real time" to verify the accuracy and continuity of their dredge cut.

5.5.3 Post-Dredge Multi-Beam Hydrographic Survey

The post-dredge multi-beam hydrographic survey will be performed as soon as possible after the last day of dredge operations. This post-dredge multi-beam hydrographic survey will confirm that any high spots detected in the intermediate multi-beam hydrographic surveys were removed, that there has been no infill or sloughing into the dredge area, and that the final 25 percent of the dredge area that was dredged after the second intermediate multi-beam hydrographic survey was dredged to the intended depth. If any potential high spot areas are detected by the post-dredge multi-beam hydrographic survey, then the survey subcontractor will remain on-site while the dredge contractor moves to the area in question and either removes the suspected seafood waste material or confirms that the native seafloor has in fact been reached. If appropriate, an additional final post-dredge multi-beam hydrographic survey will be done to confirm that all potential high spot areas have been removed or confirmed as native seafloor.

Following completion of the removal and disposal action, the dredge area will be presented in future bi-annual seafloor monitoring reports.

5.6 PRE-DREDGE AND POST-DREDGE BENTHIC ASSESSMENT SEDIMENT PROFILE IMAGING SURVEYS

Pre-dredge and post-dredge benthic conditions will be documented with SPI surveys. The benthic SPI surveys will be performed in accordance with the 2012 BIS USEPA-approved QAPP and will re-occupy the same station locations and reference locations as monitored in the 2012 BIS (RPS 2012; RPS and NewFields 2014). A pre-dredge SPI benthic assessment survey will be performed prior to the start of dredging. The objective of the pre-dredge SPI survey is to capture the most current benthic conditions in areas that are adjacent to the dredge area and will not be dredged. Given the variability in benthic conditions between 2012, 2014, and 2015, understanding pre-dredge benthic conditions will be helpful in assessing post-dredge conditions as part of long-term monitoring. Previous SPI benthic assessments have been conducted in the months of May or June. The pre-dredge SPI survey will be performed in May or June, prior to the start of any dredge activities.

Within 30 days of the completion of dredging, as confirmed by the post-dredge multi-beam hydrographic survey, a post-dredge baseline SPI survey will be performed to assess the post-construction benthic conditions. The results of the post-dredge SPI benthic assessment survey will be summarized in the survey report that will be included in the WRCR as an appendix.

5.7 SEAFOOD WASTE REMOVAL CONFIRMATION

The extent and success of seafood waste removal will be confirmed with an iterative approach using multiple methods. The confirmation methods that cross-check seafood waste removal include: (1) ongoing visual confirmation of seafood waste removal and presence of native sediment within the dredge bucket as part of construction oversight during dredge operations, (2) two intermediate multi-beam hydrographic surveys and daily QA/QC contractor single beam surveys as well as two intermediate diver/ROV surveys, (3) the comparison of the post-dredge multi-beam hydrographic survey with the 2007 sub-bottom profile (presumed native seafloor) and intermediate multi-beam hydrographic surveys, and (4) the post-dredge dive survey.

The designed dredge cut to remove the seafood waste material is based on the 2007 sub-bottom profile work, which is presumed to indicate the native bottom underlying the seafood waste material. However, positive indication of excavation of the seafood waste will be given by the presence of the underlying sediment in the dredge bucket. Regardless of the hypothetical thickness of the seafood waste based on the 2007 sub-bottom profile, dredging will continue over the entire surface until native material is recovered, indicating the seafood waste material has been removed.

5.7.1 Ongoing Visual Confirmation of Seafood Waste Removal

Seafood processing waste is discernable from the clean native seabed sediment through its odor, texture, and contents, such as fish bones or crab shell. The native sediments in the vicinity of the seafood waste extent are a dark grey sand/clay mix, with native shell debris and fine sediment over cobble. During the 2013 seafloor monitoring survey, seafood waste was observed to be mixed with dark native sediments settled within the confined swale near the bottom of the slope. Seafood waste materials were, therefore, less discernable and the sampling crew tended to be conservative by identifying core sediment as seafood processing waste if, at a minimum, the sample was odiferous, and contained any significant fish bone and/or crab shell. During this action, therefore, samples will conservatively be identified as seafood waste if the materials are not clearly distinguishable.

Visual observation of the return water discharge during dredging will also be conducted and observations will be recorded in the field activity log. When practical, daily video recording of the waste material on the receiving barge will also be conducted to provide visual information on the composition of the dredged seafood waste.

5.8 SEAFOOD WASTE TRANSPORT AND AT-SEA DISPOSAL

The dewatered seafood waste is planned to be disposed of at the proposed at-sea disposal location within internal waters (landward of the baseline) in outer Unalaska Bay, approximately 5 nautical miles from the UniSea facility and approximately 1.2 nautical miles from shore (Figure 5.5) Additional details of the proposed disposal location are provided in Appendix A.

The deck barge (with water-tight bin walls or fences) used for transporting dredged material will not be overfilled to the point where recovered sediment or any associated water overflows directly back to the bay. While in transport to the disposal location, the seafood waste will be completely contained with no release of seafood waste or water.

The contractor will likely use two methods of seafood waste disposal to further maximize dispersal of the seafood waste. A front end loader working on the deck of the waste-material scow will pick up 2 to 5 yards of seafood waste per bucket load and gradually release it over the side as the barge is towed at the required 3-knot speed. A seawater-supplied fire monitor or fire hose may be used to wash any residual seafood waste off the barge deck. These methods will be employed to maintain a slower and more controlled release, instead of the larger and less controlled release that would occur with a split-hull bottom dump barge. The smaller volume releases are expected to move more easily with the surface currents and would be more susceptible to vertical mixing and dispersion, thereby increasing transport out of Unalaska Bay and reducing the potential for seafood waste accumulation on the seafloor. The offloading operation will be done while the barge is underway (at a speed of at a minimum of 3 knots as required by the CD) to maximize the dispersal of the seafood waste. Additionally, as described in Appendix A, the proposed seafood waste disposal area is located above a seafloor depression where the average water depth is approximately 620 feet MLLW.

In accordance with the CD, the following monitoring will be conducted during the disposal of the dredge seafood waste at the proposed disposal location and included in the WRCR:

- The volume of each load of seafood waste dredge material will be estimated by the contractor and documented in the project log by the construction oversight field personnel.
- The date, time of day, and start and stop positions of the disposal location will be recorded for each disposal barge load.
- During seafood waste disposal, sea life, weather conditions, and pertinent visual observations will be recorded.

5.9 ONGOING SEAFLOOR MONITORING

Long-term seafloor monitoring at Outfall 001 A–E will continue to be conducted bi-annually, as required by the existing NPDES Permit, or through requirements included in a potential future APDES Permit, issued by the State of Alaska. The seafloor monitoring program includes a single-beam bathymetric survey, underwater video, and sediment cores, and results will be compared against the post-construction multi-beam hydrographic survey.

5.10 ONGOING SOURCE CONTROL IMPLEMENTATION AND REDUCTION MONITORING AND REPORTING

Through the implementation of a suite of source controls, including the use of settling/floatation tanks, 0.4-mm and 0.5-mm seafood wastewater discharge screens, and multiple decanters, UniSea has effectively prevented and minimized the generation and discharge of seafood wastes from the UniSea facility. In addition to these source control measures, UniSea added an additional decanter to the surimi processing waste stream that will remove fish proteins from the waste stream each year. The decanter was installed in June 2015. On-going discharges from the facility will continue to be conducted in a way that minimizes the associated environmental impact. UniSea will monitor the recovery of this seafood waste and will prepare reports to document such recovery in the first year of operation. Based on the installation date of June 2015, the first report will capture the seafood recovery through December 2015, and will be provided to USEPA in January 2016. In July 2016, concurrent with the anticipated timing of construction, UniSea will provide the 1-year update for total recovery by the decanter.

6.0 Health and Safety

The contractor that has been selected for the project is Orion Marine Group. Prior to starting construction, the selected contractor will provide UniSea with a HASP that ensures the protection of the public health and safety during performance of on-site work. The contractor's HASP will be prepared in accordance with USEPA's Standard Operating Safety Procedures and will comply with all currently applicable Occupational Safety and Health Administration (OSHA) regulations.

Additionally, a separate HASP to be implemented during construction oversight and potential water quality monitoring that may be required to be performed during at-sea seafood waste disposal is provided in Appendix B.

7.0 Waste Remediation Reporting

7.1 WASTE REMEDIATION COMPLETION REPORT

The removal and disposal action will be deemed complete when all work activities described in Section 5.0 of this WRP are completed, with the exceptions of on-going seafloor monitoring, as required by UniSea's NPDES Permit, and ongoing source control. Following completion of the project, a WRCR documenting the work will be prepared and submitted to USEPA for review and approval. A draft WRCR will be submitted to USEPA within 60 days of the completion of the project. It is anticipated that the removal and disposal will be completed by mid-to late July 2016 and that the post-dredge SPI benthic conditions survey will be completed by late August and, as described in Section 5.4, the post-dredge dive survey will be completed after September 15, 2016, due to visibility requirements. Therefore, if the post-dredge dive survey is the last construction activity, it is anticipated that the draft WRCR will be submitted to USEPA by mid-November 2016 in accordance with the CD requirements. Following receipt of USEPA's comments on the draft WRCR, a final WRCR will be submitted to USEPA within 45 days.

The WRCR documents and confirms the adequate performance of the removal and disposal action. The report will include the following:

- Description of project activities undertaken.
- Description of visual dredge material monitoring, SPI benthic assessment surveys, dive surveys, and hydrographic surveys undertaken to confirm that the removal and disposal action meets the project requirements identified in this WRP.
- Pre-dredge and post-dredge SPI benthic assessment reports as an appendix.
- Pre-dredge and post-dredge dive survey reports, including dive video files, as an appendix.
- Pre-dredge, intermediate, and post-dredge multi-beam hydrographic survey hillshade figures.
- Figures depicting the final post-removal action bathymetry and the extent that will be evaluated during long-term monitoring activities.
- Documentation of seafood waste at-sea disposal, including estimated volume of seafood waste disposed and observations during disposal actions.
- Summary of the monitoring associated with disposal of the seafood waste at the approved at-sea disposal location.

Once in-water work begins, routine informal reporting to Robert Grandinetti, the USEPA Compliance Officer, will be performed by either phone, (509) 376-3748, or email, Grandinetti.Robert@epa.gov. This will include status of work performed, upcoming activities, problems encountered and resolved, and problems needing resolution.

7.2 QUARTERLY PROGRESS REPORTS

In accordance with Section VII of the CD, quarterly written project reports will continue to be prepared and submitted to USEPA within 30 days of the end of each calendar-year quarter (i.e., by April 30, July 30, October 30, and January 30 of each year). These reports will be provided to USEPA until issuance of Notice of Completion of Work, or unless otherwise directed by the USEPA Compliance Officer. Therefore, per the schedule in Section 5.1, the quarterly progress report describing the work outlined in this WRP will be submitted by October 30, 2015. The progress reports will summarize the actions taken on the project and identify any anticipated modifications to the project work or schedule. Additionally, per the CD requirements, the progress reports will include the progress made on the completion of milestones; problems encountered or anticipated, together with implemented or proposed solutions; status of permit applications; operations and maintenance; reports to state agencies; and a summary of costs incurred since the previous report.

8.0 References

City of Unalaska. 2014. *Population*. http://www.ci.unalaska.ak.us/community/page/population. Last accessed 8/5/2015.

Delphis Technical Support and Solutions, LLC. (Delphis). 2015. *UniSea Seafloor Monitoring Survey Report Draft, NPDES Permit AK-002865-7, Dutch Harbor, Alaska, May 2015.* Prepared for UniSea, Inc. 20 October.

Floyd|Snider. 2014. *Seafood Waste Pile Alternatives Analysis.* Prepared for UniSea, Inc. 24 October.

NewFields. 2015. *UniSea Inc. Seafood Waste Pile Aeration Pilot Study Data Report.* Prepared by NewFields and Delphis. 27 August.

RPS Evans-Hamilton (RPS). 2011. *UniSea Outfall Current Circulation Oceanographic Data Collection.* RPS/Evans-Hamilton, Seattle, WA. August.

_____. 2012. *Final Quality Assurance Project Plan, UniSea, Inc. Benthic Impact Survey, Dutch Harbor, Alaska*. For submittal to U.S. Environmental Protection Agency, Region 10 and State of Alaska. Prepared by RPS Evans-Hamilton, Seattle, WA. 23 May.

_____. 2013. *UniSea Seafloor Monitoring Survey Report, NPDES Permit AK-002865-7, Dutch Harbor, Alaska, June 2013*. 30 September.

RPS Evans-Hamilton (RPS) and NewFields. 2014. *UniSea, Inc. Benthic Impact Survey, Dutch Harbor, Alaska*. For submittal to U.S. Environmental Protection Agency, Region 10 and State of Alaska. Prepared by RPS Evans-Hamilton and NewFields. 3 June.

RPS Evans-Hamilton (RPS), NewFields, and Floyd|Snider. 2014. *UniSea, Inc. Seafood Waste Pile Aeration Pilot Study, Dutch Harbor, Alaska, Quality Assurance Project Plan*. 29 May.

U.S. Environmental Protection Agency (USEPA). 2003. *Authorization to Discharge under the National Pollutant Discharge Elimination System. NPDES Permit No. AK-002865-7*. April.

_____. 2011. *Consent Decree.* Civil Action No. 3:11-CV-00037-JWS. USEPA and State of Alaska. 1 June.

_____. 2014. Letter from Edward J. Kowalski, USEPA, to John Iani, Perkins Coie, LLP re: United States and State of Alaska v. UniSea, Inc Civil Action No. 3:11-sv-00037-JWS. 14 October.

_____. 2015. *Letter to John Iani, Perkins Coie, from USEPA re: United States and State of Alaska v. UniSea Inc. Civil Action No. 3:11-ev-00037-JWS.* 27 April.

Weather Underground. 2014. *Weather History for PADU; January 1, 2012 to January 1, 2013*. Produced by The Weather Channel, LLC. http://www.wunderground.com/history/airport/PADU/2012/1/1/CustomHistory.html?dayend=1&monthend=1&yearend=2013&req_city=NA&req_state=NA&req_statename=NA. Last accessed 8/5/2015.

Western Regional Climate Center. 2014. *Period of Recorded Monthly Climate Summary*. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak2587. Last accessed 8/5/2015.

UniSea, Inc.

Waste Remediation Plan

Figures

Note:
· Baselayers provided by NOAA and Esri.

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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure 1.1
Vicinity Map

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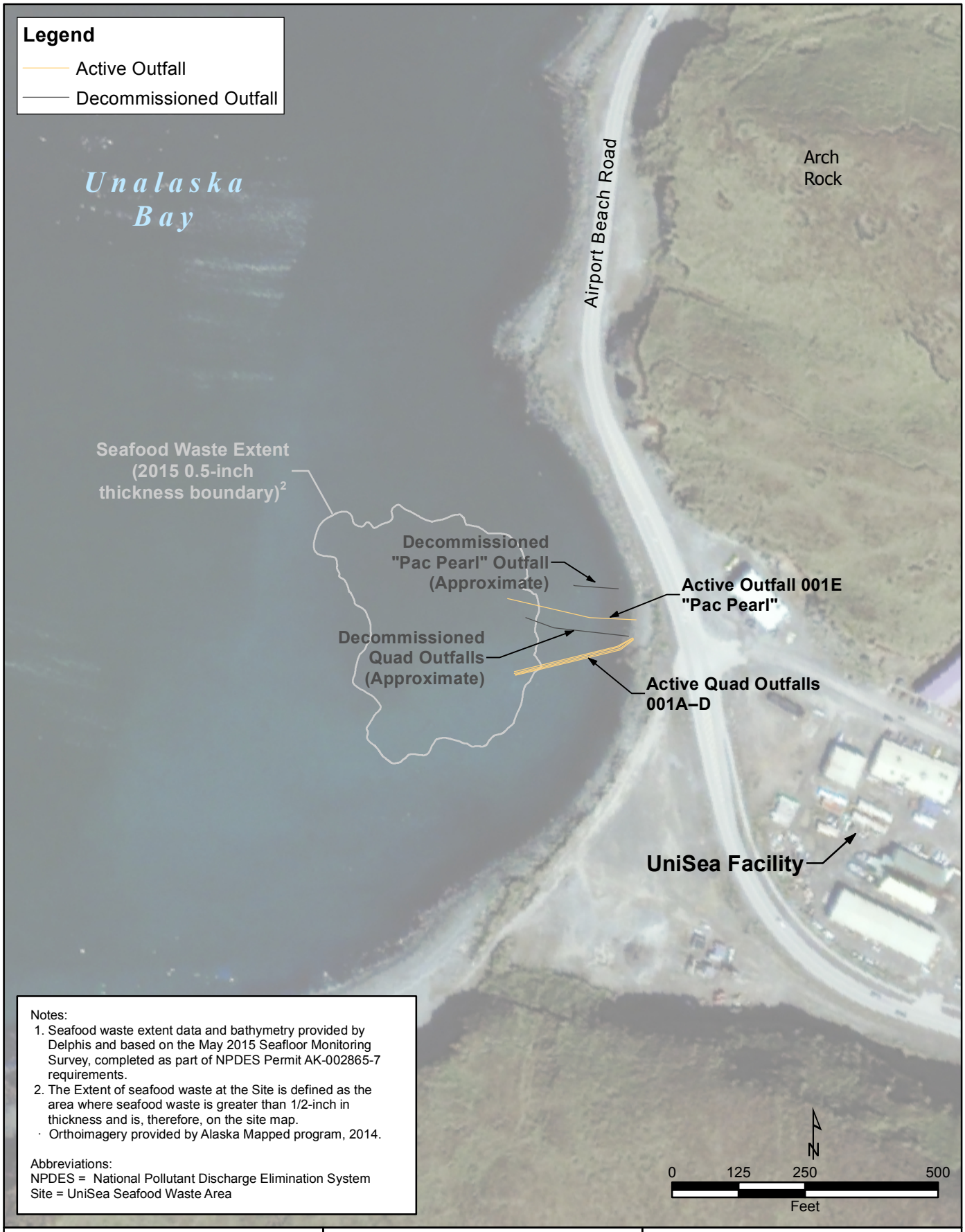
8/21/2015



Notes:
1. Seafood waste extent data and bathymetry provided by Delphis and based on the May 2015 Seafloor Monitoring Survey, completed as part of NPDES Permit AK-002865-7 requirements.
2. The Extent of seafood waste at the Site is defined as the area where seafood waste is greater than 1/2-inch in thickness and is, therefore, on the site map.

· Orthoimagery provided by Alaska Mapped program, 2014.

Abbreviations:
NPDES = National Pollutant Discharge Elimination System
Site = UniSea Seafood Waste Area

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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure 1.2
Site Map

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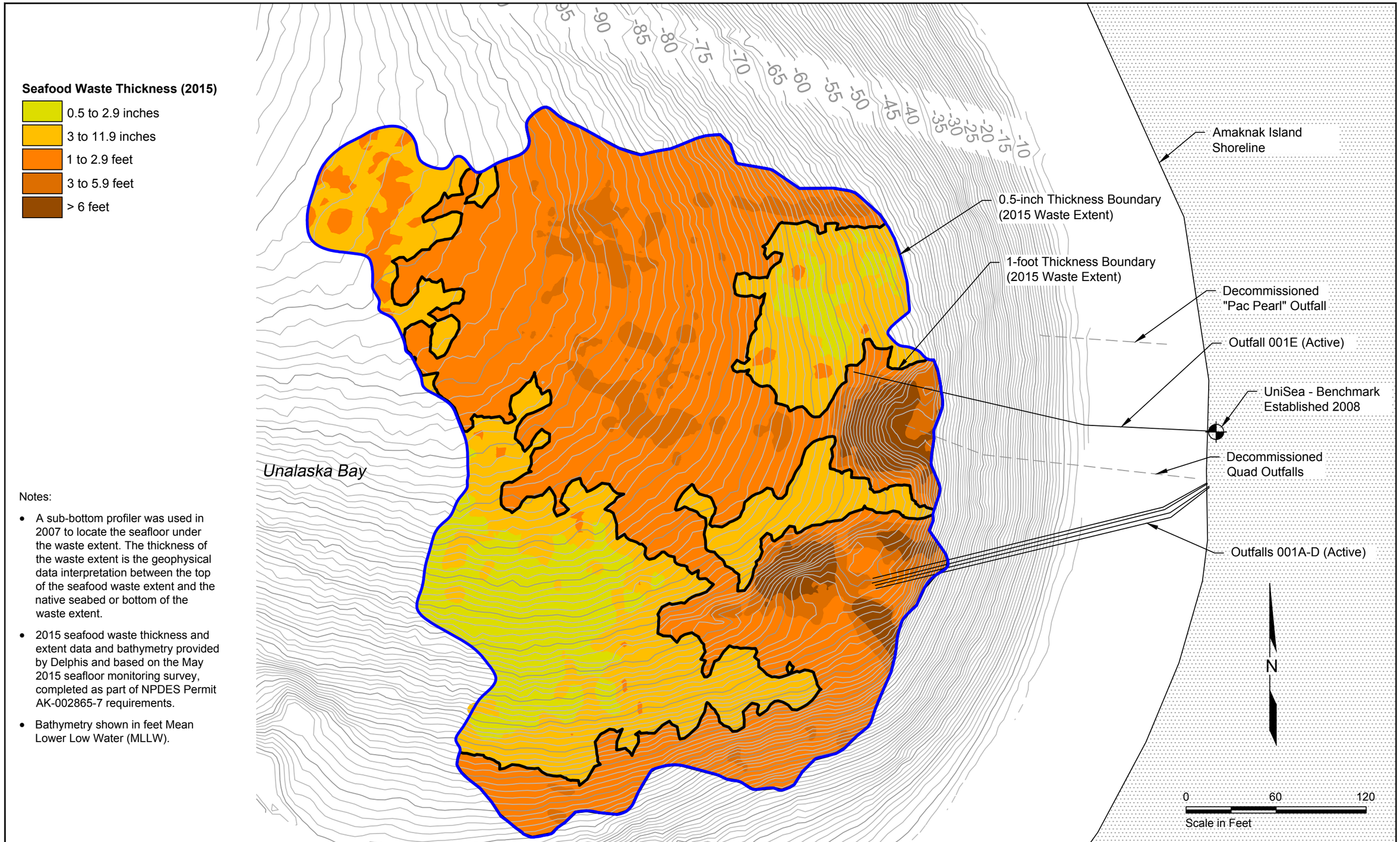
8/6/2015



Notes:

- A sub-bottom profiler was used in 2007 to locate the seafloor under the waste extent. The thickness of the waste extent is the geophysical data interpretation between the top of the seafood waste extent and the native seabed or bottom of the waste extent.
- 2015 seafood waste thickness and extent data and bathymetry provided by Delphis and based on the May 2015 seafloor monitoring survey, completed as part of NPDES Permit AK-002865-7 requirements.
- Bathymetry shown in feet Mean Lower Low Water (MLLW).

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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure 1.3
2015 Seafood Waste Extent and Thickness

DWG NAME: E:\Project\clients\Floyd and Snider\UniSea\UniSea001.dwg
DATE: 8/20/2015 7:54 PM

Seafood Waste Thickness (2015)

- 1 to 2.9 feet
- 3 to 5.9 feet
- > 6 feet

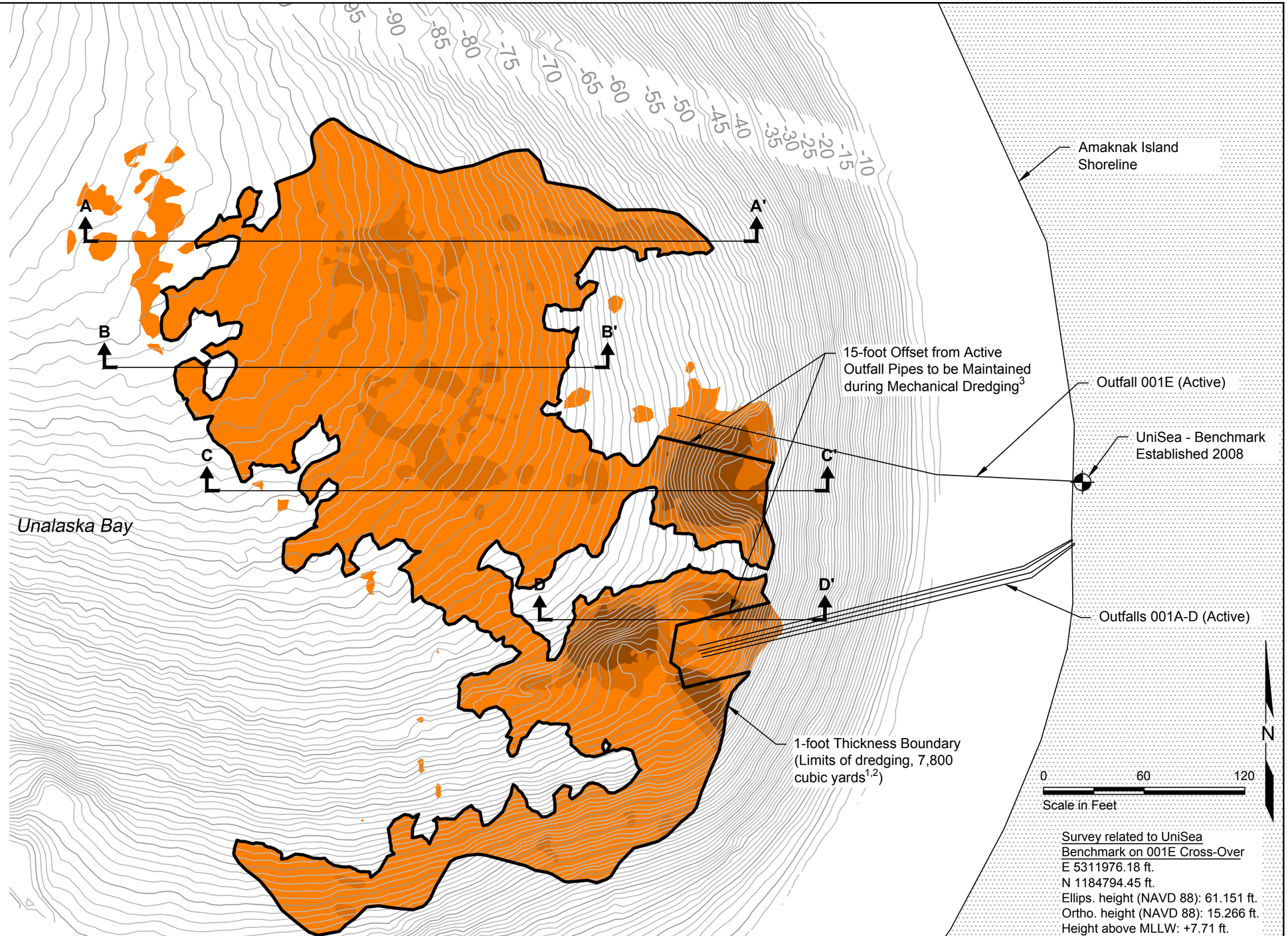
Legend

A A' Section Location

Notes:

1. Volume is approximate and does not include the 6-inch over-dredge allowance. Depth varies from 1 foot to approximately 16.5 feet.
2. All seafood waste located within the 2015 1-foot thickness contour shall be dredged and disposed of at the outer Unalaska Bay disposal location and in accordance with the Waste Remediation Plan and applicable regulations. Refer to Sections 5.3, 5.7, and 5.8 of the Waste Remediation Plan for protective measures and requirements for dredging, transport, and disposal.
3. A 15-foot offset shall be maintained during mechanical dredging with the clamshell bucket. Seafood waste located adjacent to the outflalls shall be removed with the use of a hydraulic submersible pump or equivalent method to avoid damage to the outfall pipes.

- 2015 seafood waste thickness and extent data, estimated volume, and bathymetry provided by Delphis and based on the May 2015 seafloor monitoring survey, completed as part of NPDES Permit AK-002865-7 requirements.
- Consistent with the seafood waste volume calculation approach per the UniSea Seafood Wastepile Survey (Sept. 2007) that plots the continuous extent of the seafood waste at depths greater than one half inch, 3 inches, 1 foot, 3 feet, and 6 feet, small localized and non-contiguous areas of waste that are greater than 1 foot in thickness are not included in the dredge plan. These small areas are often temporal and may vary in thickness and respective size and location between surveys.
- Bathymetry shown in feet Mean Lower Low Water (MLLW).



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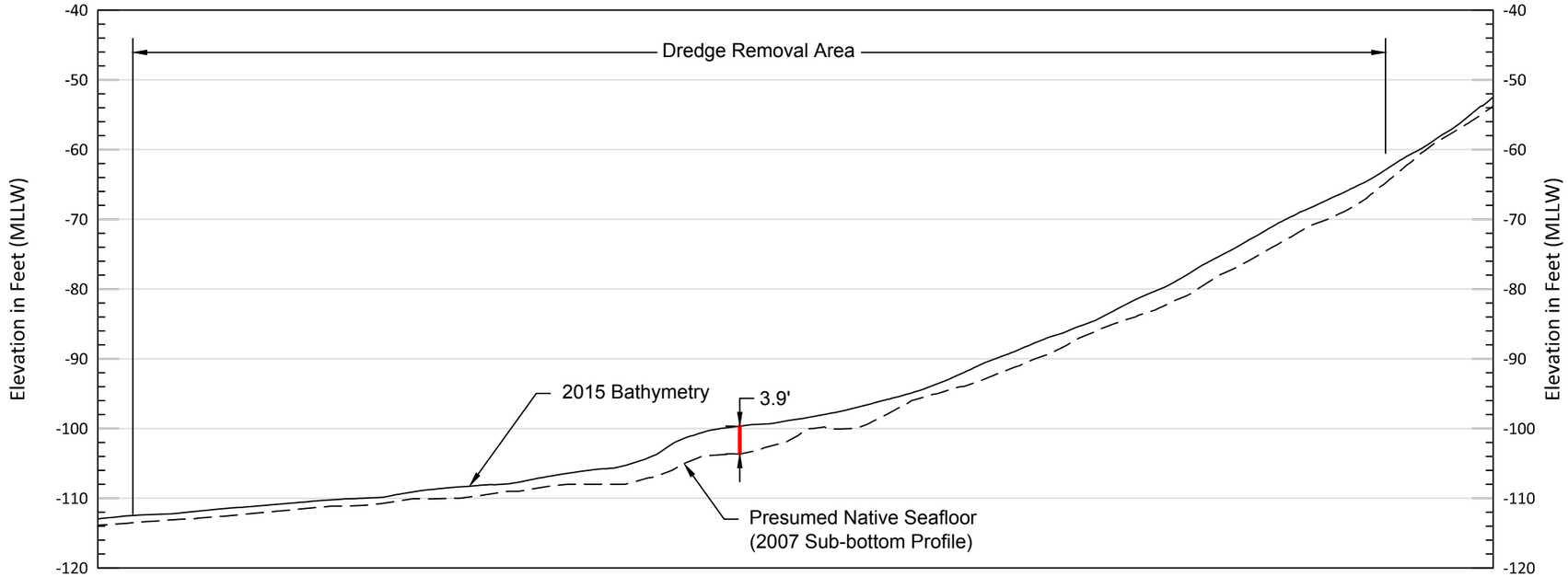
Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

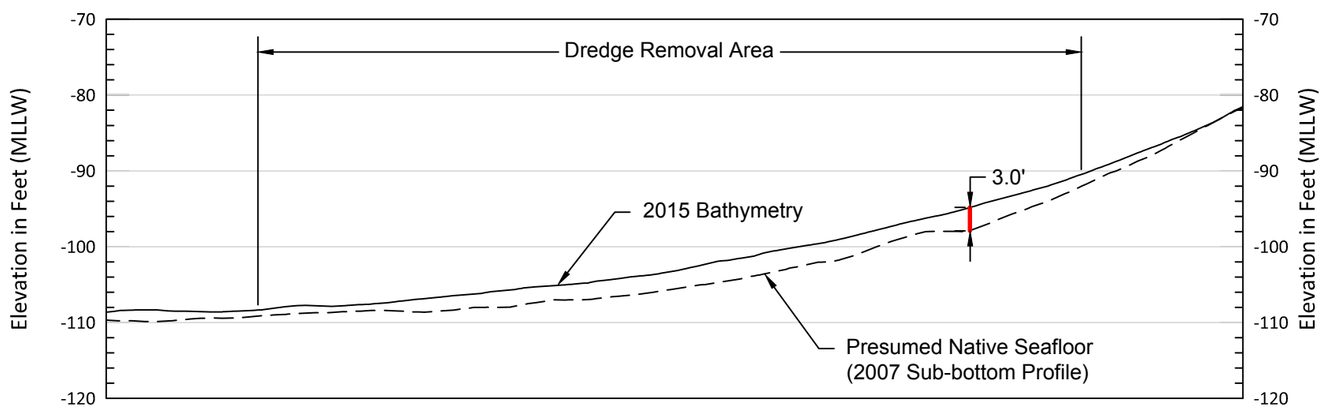
Figure 5.1
Dredge Plan

DWG NAME: E:\Project\clients\Floyd and Snider\UniSea\UniSea003.dwg
DATE: 8/20/2015 7:58 PM

SECTION A-A'



SECTION B-B'



Horizontal Scale in Feet
0 40 80
0 20 40
Vertical Scale in Feet
Vertical Exaggeration X 2

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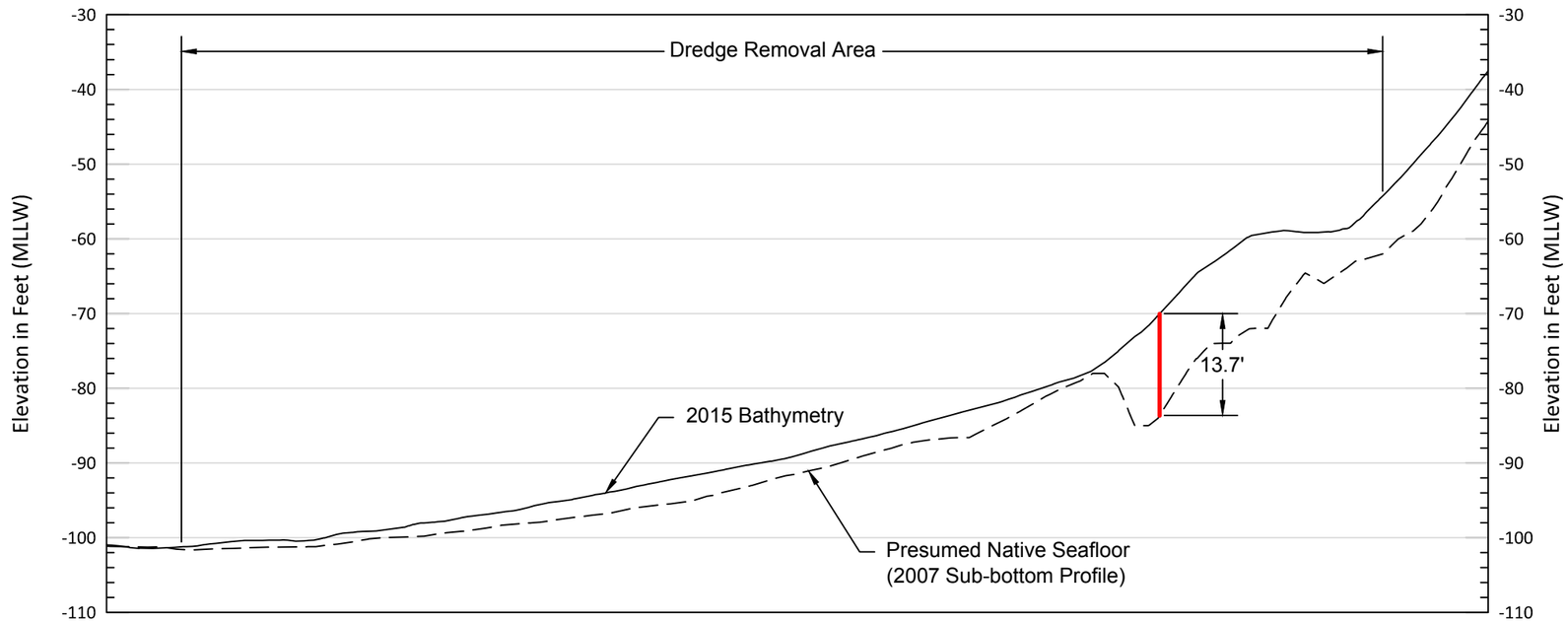
Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

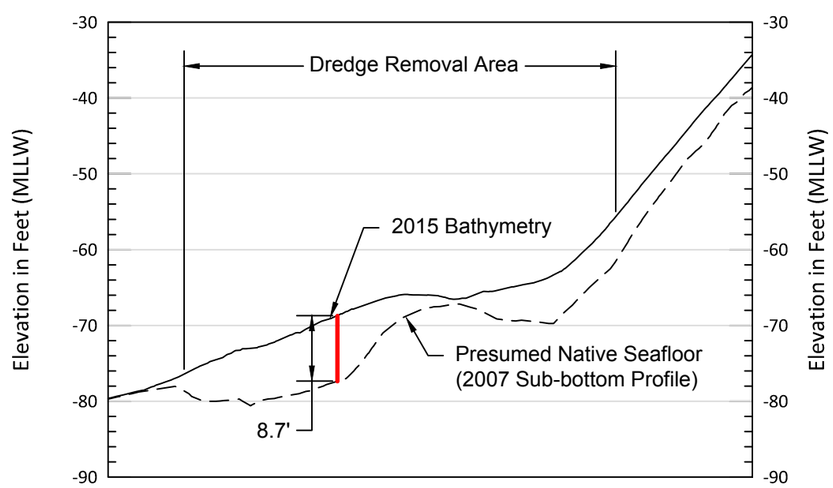
Figure 5.2
Dredge Sections A-A' and B-B'

DWG NAME: E:\Project\clients\Floyd and Snider\UniSea\UniSea004.dwg
DATE: 8/20/2015 7:59 PM

SECTION C-C'



SECTION D-D'



Horizontal Scale in Feet
0 40 80
0 20 40
Vertical Scale in Feet
Vertical Exaggeration X 2

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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure 5.3
Dredge Sections C-C' and D-D'

DWG NAME: E:\Project\clients\Floyd and Snider\UniSea\UniSea004.dwg
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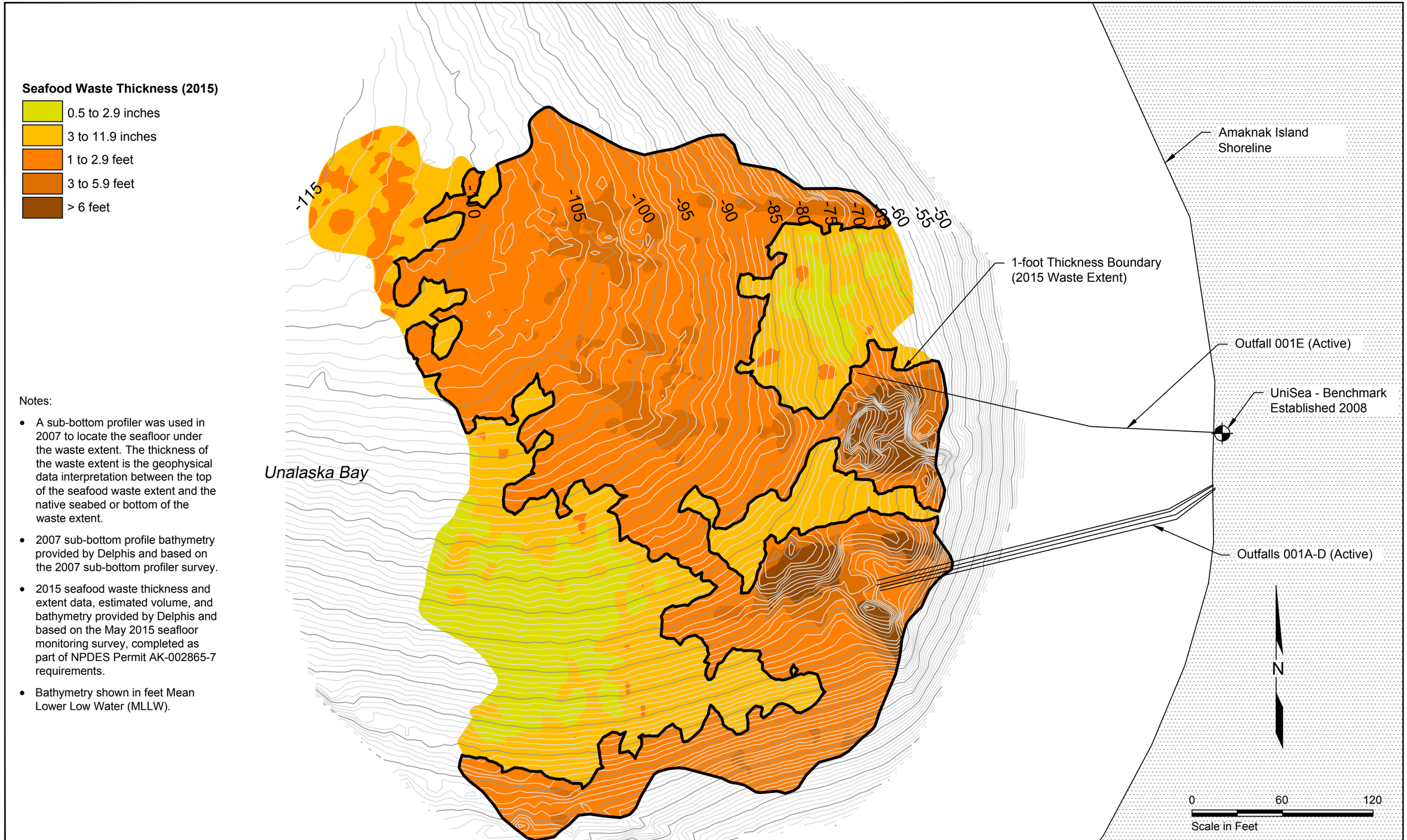

Notes:

- A sub-bottom profiler was used in 2007 to locate the seafloor under the waste extent. The thickness of the waste extent is the geophysical data interpretation between the top of the seafood waste extent and the native seabed or bottom of the waste extent.
- 2007 sub-bottom profile bathymetry provided by Delphis and based on the 2007 sub-bottom profiler survey.
- 2015 seafood waste thickness and extent data, estimated volume, and bathymetry provided by Delphis and based on the May 2015 seafloor monitoring survey, completed as part of NPDES Permit AK-002865-7 requirements.
- Bathymetry shown in feet Mean Lower Low Water (MLLW).

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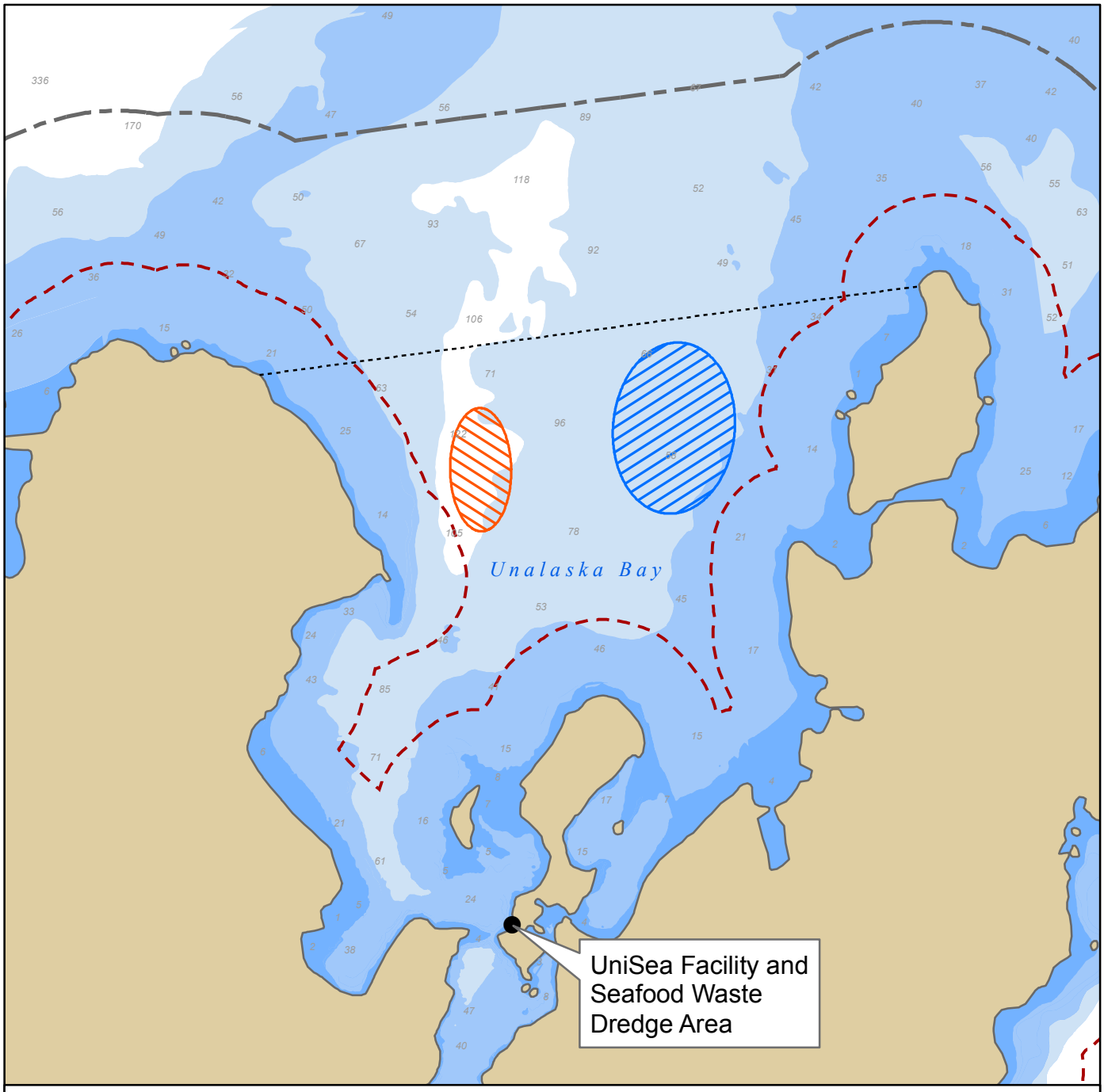
Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure 5.4
Presumed Native Seafloor
(2007 Sub-Bottom Profile)

DWG NAME: E:\Project\clients\Floyd and Snider\UniSea\UniSea002.dwg
DATE: 8/20/2015 7:56 PM



Legend

- Approximate Extent of At-Sea Discharge - Proposed Disposal Location[1]
- Approximate Extent of At-Sea Discharge Location 004[2]
- Baseline - Bay Closing Line
- 3-Nautical Mile Line
- 1-Nautical Mile Line
- 40 Sounding (Fathoms MLLW)
- Land Area

Depth Contours (Fathoms MLLW)

- 0–10
- 11–50
- 51–100
- > 100

Notes:
1. The approximate extent of the proposed disposal location is based on the anticpated area of disposal when the barge is being towed at the CD-required speed of at least three knots.
2. Approximate extent of Discharge Location 004 is based on actual vessel track lines over multiple years of disposal.

· Basemap layers provided by NOAA.

Abbreviations:
MLLW = Mean Lower Low Water
NOAA = National Oceanic and Atmospheric Administration

0 1 2 4
Nautical Miles
N

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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure 5.5
Proposed Seafood Waste Disposal Location

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8/20/2015

Seafood Waste Thickness (2015)

- 0.5 to 2.9 inches
- 3 to 11.9 inches
- 1 to 2.9 feet
- 3 to 5.9 feet
- > 6 feet

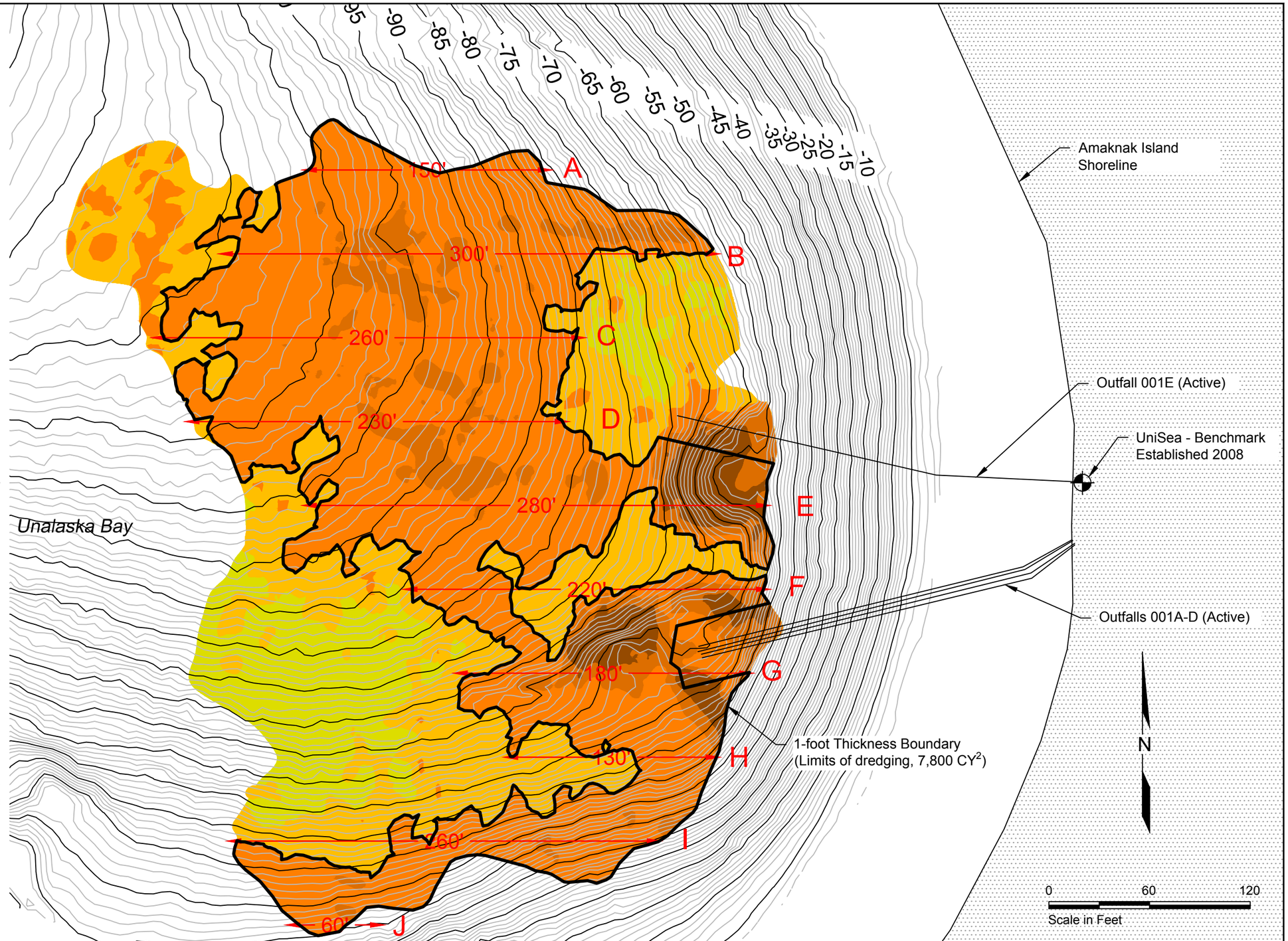
Legend

Approximate Dive Survey Transects - A through J[1]

Notes:

1. Dive surveys will be performed on a total of 10 transects, approximately 50 feet apart, as shown.
2. Volume is approximate and does not include the 6-inch over-dredge allowance. Depth varies from 1 foot to approximately 16.5 feet.

- A sub-bottom profiler was used in 2007 to locate the seafloor under the waste extent. The thickness of the waste extent is the geophysical data interpretation between the top of the seafood waste extent and the native seabed or bottom of the waste extent.
- 2015 seafood waste thickness and extent data, estimated volume, and bathymetry provided by Delphis and based on the May 2015 seafloor monitoring survey, completed as part of NPDES Permit AK-002865-7 requirements.
- Consistent with the seafood waste volume calculation approach per the UniSea Seafood Wastepile Survey (Sept. 2007) that plots the continuous extent of the seafood waste at depths greater than one half inch, 3 inches, 1 foot, 3 feet, and 6 feet, small localized and non-contiguous areas of waste that are greater than 1 foot in thickness are not included in the dredge plan. These small areas are often temporal and may vary in thickness and respective size and location between surveys.
- Bathymetry shown in feet Mean Lower Low Water (MLLW).



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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure 5.6
Pre-Dredge and Post-Dredge Dive Survey Transects

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UniSea, Inc.

Waste Remediation Plan

Appendix A
Proposed Seafood Waste Disposal Location Document

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Figure A.2 Proposed Seafood Waste Disposal Location

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Attachment A.1 UniSea Seafood Waste Disposal Location – Unalaska Bay Currents Assessment

List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ADEC	State of Alaska Department of Environmental Conservation
CD	Consent Decree
CFR	Code of Federal Regulations
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
USEPA	U.S. Environmental Protect Agency

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1.0 Introduction

This Proposed Seafood Waste Disposal Location document has been prepared on behalf of UniSea, Inc. (UniSea), and identifies a proposed location for at-sea disposal of seafood waste within outer Unalaska Bay in support of the U.S. Environmental Protection Agency (USEPA)-required Waste Remediation Plan. This document is being provided to USEPA in support of the agency's associated coordination with the State of Alaska Department of Environmental Conservation (ADEC) regarding the at-sea disposal of UniSea's seafood waste and as part of the Waste Remediation Plan.

UniSea operates a seafood processing plant located in Dutch Harbor, Alaska. The UniSea Facility is permitted to discharge wastewater, solids, and residues from the processing of seafood and related support activities from their seafood processing plant through their permitted outfalls in accordance with National Pollutant Discharge Elimination System (NPDES) Permit #AK002865-7 (USEPA 2003). Authorized discharges from the UniSea Facility have resulted in the formation of seafood waste piles within a small embayment on the southwest shore of Amaknak Island (hereafter referred to as the Site; Figure A.1).

On May 26, 2011, UniSea entered into a Consent Decree (CD) with USEPA and the State of Alaska (Civ. No. 3:11-CV-00037-JWS; USEPA 2011a). This CD required UniSea to perform a Benthic Impact Survey to characterize and delineate the extent of seafood waste at the Site (RPS and NewFields 2012). The status of biological communities at various areas within and adjacent to the Site were also assessed during this survey. Data collected as part of the 2012 effort suggested that the size of the seafood waste piles have remained constant, or are nominally decreasing. The survey also indicated that the benthic ecosystem at the Site is impacted, but still functional.

As a follow-up to the Benthic Impact Survey, UniSea prepared a *Seafood Waste Pile Alternatives Analysis* (Floyd|Snider 2014) to evaluate a variety of techniques that could address benthic impacts at the Site. Dredge methodologies and alternatives to dredging were evaluated, and applicability and feasibility of each approach was considered. As part of this effort, an aeration, or raking action, pilot study was also conducted. A recommended alternative was generated from this analysis and consisted of monitored natural recovery with source controls.

Upon review by USEPA, UniSea was directed to dredge the seafood processing waste located on the seafloor at UniSea's Dutch Harbor discharge locations. The UniSea and USEPA CD states that, "The seafood waste pile debris shall be dewatered and sent to Unisea's at-sea Discharge Location 004 or disposed of as an at-sea disposal site per Section I.D. of Unisea's NPDES permit." The UniSea operational stick water is currently disposed at the at-sea Discharge Location 004 in

outer Unalaska Bay. UniSea's NPDES permit[1] (USEPA 2003) defines at-sea discharge as discharge to 004 and includes the following under Section I(B)(D) of the permit:

> "In order to meet these limitations, the permittee may transport and dispose of seafood processing wastewater and wastes measuring no more than one half (0.5) inch in width, and unground mollusk shells, to a discharge area in outer Unalaska Bay that is more than one (1) nautical mile from shore and more than -100 feet in depth at mean lower low water (MLLW) while making way at 3 knots or more.
>
> The permittee shall maintain a written log of its discharges, noting the time, date, amount, nature, and location (latitude and longitude in degrees, minutes, and seconds as determined by GPS) of these discharges."

In compliance with the USEPA mandate and the CD, UniSea is submitting a Waste Remediation Plan to provide a summary of the activities to be completed to dredge and dispose of the seafood waste that has accumulated at the UniSea Facility. This document has been prepared in support of the Waste Remediation Plan and USEPA's coordination with ADEC; per both the CD and USEPA direction, it provides a proposed location for at-sea disposal of seafood waste within outer Unalaska Bay and demonstrates that no measurable adverse effects to the marine ecosystem are anticipated from this one-time disposal.

Per USEPA direction dated April 27, 2015 (USEPA 2015), UniSea intends to remove seafood processing waste at the Site that is greater than 1 foot in thickness, which includes an in situ volume of approximately 5,000 cubic yards over an approximate area of 1.6 acres. The seafood waste will be dewatered and taken to the proposed location for at-sea disposal in the summer of 2016, assuming that all required approvals and/or permits will be issued by the regulatory agencies before that time. It is imperative that an approved disposal location is identified in a timely manner, as this will inform the associated agency coordination and permitting process, design, and construction means and methods.

1 UniSea is authorized to discharge wastewater, solids, and residues from the processing of seafood and related support activities at the Facility through their permitted outfalls in accordance with their NPDES Permit #AK002865-7. Effluent monitoring of these discharges is also required on a routine basis, and results from this monitoring are reported to USEPA and ADEC. However, the existing NPDES permit is expired and UniSea is working with ADEC for the issuance of an Alaska Pollutant Discharge Elimination System (APDES) permit that would replace the existing NPDES permit.

2.0 Suitability of At-Sea Disposal

The United States Code of Federal Regulations (CFR) establishes criteria for the transport of material for the purpose of dumping it in ocean waters, and identifies "fish wastes" as an acceptable material for disposal at sea (USEPA 2011b). ADEC further authorizes at-sea discharge of "seafood wastes" through provisions provided within the NPDES permits issued to seafood processing facilities. Seafood processing waste is defined by ADEC as, "the waste fluids, organs, flesh, bones, woody fiber and chitinous shells produced in the conversion of aquatic animals and plants from a raw form to a marketable form." The seafood waste at the Site is consistent with these characterizations.

The seafood waste consists primarily of soft flocculent deteriorating tissue and bone waste and shell fragments at depth. The particles are no greater than ½ inch in size, and are in various stages of natural oxidation and dissolution. There are two larger legacy piles of seafood waste present at the Site that were formed during permit-authorized discharges under the previous permit requirement of grinding discharge waste to particle sizes of ½ inch or smaller. However, the peripheral areas of the seafood waste piles at the Site consists of soft flocculent seafood waste material and a thin layer of fine organic sediment.

While the seafood waste does not contain any chemical contaminants, natural degradation under anaerobic conditions has resulted in the presence of ammonia, sulfates and sulfides, methane, and low levels of carbon monoxide. Air monitoring conducted during a recent 2014 benthic assessment and aeration pilot study detected elevated levels of ammonia, hydrogen sulfide, and carbon monoxide. Upland landfill disposal is also not considered an option due to the degree of material handling and dewatering that would be required, and because the only facility in the area that would potentially have capacity to accept the waste, the Unalaska Landfill operated by the City of Unalaska, has an active lined landfill cell of approximately 7 acres. The landfill accepts a very limited volume of commercial and industrial waste, including fish waste, but the annual volume of waste accepted from all sources is approximately 8,500 tons. The estimated volume of seafood waste associated with dredging once dewatered could be over 7,000 tons, or nearly an entire year's worth of capacity.

In compliance with a USEPA-mandate to dredge the seafood waste, and with no feasible upland opportunities for disposal, UniSea must dispose of this material at sea. UniSea will remove the seafood waste via mechanical dredging with a clamshell bucket, with the potential use of a hydraulic submersible dredge pump around outfall structures as needed. The waste will be placed onto a receiving barge within a containment area that allows for controlled and filtered dewatering, and then transported to an approved at-sea disposal location. The proposed location for at-sea disposal is described herein.

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3.0 Proposed Location for Seafood Waste At-Sea Disposal

UniSea reviewed available seafloor data from National Oceanic and Atmospheric Association (NOAA) and identified a location of a deep depression, which meets the NPDES permit requirements for at-sea discharge and provides greater depths for disposal, which reduces potential impacts. This location was then further evaluated with modeling to assess the current conditions and determine if the current regime would aid in the dispersal of seafood waste over the existing approved stick water disposal location (location 004). The proposed location for at-sea disposal is above a seafloor depression within outer Unalaska Bay, between Cape Cheerful (to the west) and Cape Kalekta (to the east). Located approximately 1.7 nautical miles landward of the baseline,[2] the proposed disposal location is entirely within internal waters (refer to Figure A.2). The proposed disposal location is 5 nautical miles from the UniSea Facility and approximately 1.2 nautical miles from shore, in accordance with the UniSea-specific NPDES permit requirement that discharge must be more than 1 nautical mile from shore (USEPA 2003 and 2011b). The water depths within the proposed disposal location, as shown in the NOAA Chart 16528 and presented on Figure A.2, are greater than the permit requirement for at-sea discharge (100 feet). The average water depth in this location is greater than 100 fathoms or approximately 620 feet MLLW.

3.1 MODELING EVALUATION OF BAY CIRCULATION AND SEAFOOD WASTE DISPOSAL

RPS Evans Hamilton, on behalf of UniSea, evaluated the current regime and circulation within Unalaska Bay with a three dimensional boundary-fitted hydrodynamic model (BFHYDRO). The modeling results and current assessment is included in Attachment A.1. This three dimensional general curvilinear coordinate, boundary-fitted computer model was used to examine the suitability of the proposed disposal location relative to facilitating seafood waste dispersion and in comparison to the at-sea Discharge Location 004. This model has a primary focus of predicting current velocities in coast and ocean waters. Results from the model indicate that the general current regime and vertical profile of current speeds at the proposed disposal location would allow for rapid dispersal of the seafood waste through the water column, as described below.

The model incorporates existing bathymetry files and appropriate boundary conditions (such as temperature and wind stress), and its forcing is based on observations from the nearby NOAA Station 9462620. The model timing was set for June and July 2010. This time period provides a data set representative of the conditions anticipated during the proposed summer construction

[2] The United Nations Convention on the Law of the Sea (UNCLOS) is recognized as the defining authority and formal codification for maritime boundaries, by NOAA and within the applicable and relevant regulations to this work. UNCLOS provides that the normal baseline is the low-water line along the coast, as marked on large-scale charts officially recognized by the coastal State (Part II, Section 2, Article 5). However, as outlined in Article 10 of the same section, a closing line may be drawn between two low-water marks if the natural entrance of the bay does not exceed 24 nautical miles, and the water therein would be considered as internal waters. Article 8 states that internal waters are landward of the baseline, as defined within Part II, Section 2. As such, the baseline for Unalaska Bay is referenced at the closing line, which extends from Cape Cheerful to Cape Kalekta. Therefore, these reference lines and terms are synonymous in this location, marking the seaward boundary of internal waters and the landward boundary of the Territorial Sea.

season, and can be compared to data from existing NOAA stations for model prediction verifications.

The model predictions were compared to existing observations at four NOAA stations within Unalaska Bay; one station was used to compare predictions of surface elevation, and the other three provided comparative current data. This comparison ensured adequate performance and accuracy of the model results.

Surface currents at the proposed disposal location are strong and predominantly wind driven, and have little tidal influence. The surface currents (extending to approximately 15 feet of water) flow to the north, toward the mouth of the bay, at an average rate of 0.12 knots and an upper range of approximately 0.3 knots. Mixing occurs below the surface current, as subsurface currents switch to a southward movement. At depths greater than approximately 100 feet, current speed is generally reduced by half. For comparative purposes, the prevailing surface current direction at the at-sea Discharge Location 004 is also the north, but with slightly slower speeds. The average surface current speed in this location is 0.11 knots with an upper range of approximately 0.25 knots, which suggests that surface current speeds are up to 20 percent greater at the proposed disposal location. The difference in current speed increases as depth increases; at 100 feet of water, current speeds at the proposed disposal location are approximately 50 percent greater than those at the at-sea Discharge Location 004 (0.15 knots compared to 0.1 knots).

In accordance with UniSea's NPDES permit, the seafood waste will be disposed of while the barge is underway at a minimum speed of 3 knots. Based on the conditions described above, at the proposed disposal location, the majority of the seafood waste is expected to disperse within the upper water column during the offloading operations. The prevailing northward surface current and relatively strong current speed will assist in moving the seafood waste out of the bay.

The contractor will likely use two methods of waste disposal to further maximize dispersal of the seafood waste. A bucket loader or clamshell bucket will push a number of smaller loads of waste off the vessel rather than offloading in a single large mass, and a seawater-supplied fire monitor will wash any residual seafood waste off the barge deck. Both of these methods will be employed to maintain a slower and more controlled release, instead of the larger and less controlled release that would occur with a split-haul bottom dump barge. The smaller volume releases are expected to move more easily with the surface currents and would be more susceptible to vertical mixing and dispersion, thereby increasing transport out of Unalaska Bay and reducing the potential for waste accumulation on the seafloor. Additionally, as described above, the proposed waste disposal area is located above a seafloor depression where the average water depth is approximately 620 feet MLLW.

4.0 Effects Determination

No unreasonable degradation of the marine environment is anticipated from the one-time disposal of seafood waste in this proposed location. The prevailing currents and water velocities would reduce impacts to water quality during disposal and would minimize the amount of sediment accumulation occurring in any one location. These mixing characteristics would also ensure that federally listed threatened and endangered species, essential fish habitat, and critical habitat are not adversely affected by these activities. No other dumping is known to occur in the area. In accordance with the CD, any sea life activity observed during disposal will be monitored and recorded.

The proposed seafood waste disposal location occurs in an area of designated essential fish habitat for all species of salmon, 16 species of groundfish, and weathervane scallop. This area has been designated as critical habitat for Steller Sea Lions. However, essential fish habitat areas protected from fishing and habitat areas of particular concern do not exist within Unalaska Bay.

The above-listed resident and migratory listed species may relocate temporarily during disposal of the seafood waste, as the material settles through the water column. This displacement would only occur temporarily during disposal. With effects to water quality lasting less than 4 hours, normal use of the area would resume within hours (if not sooner). Accumulation is not expected to be concentrated in any one location, so a significant adverse effect to these organisms is not anticipated. Additionally, disposal would occur during transit and would be located in deep waters as noted above, further increasing dispersal and minimizing accumulation.

In compliance with conditions of the NPDES permit and USEPA CD, the vessel would be making way at 3 knots. This ensures reasonable dispersal of the seafood waste and would reduce associated turbidity levels. The mixing characteristics described above would minimize potential impacts from temporarily increased turbidity levels. Water quality is expected to return to ambient conditions within 4 hours, and before reaching any beach or shoreline.

Seafood waste would be transported to the proposed location on an enclosed vessel. A support boat may assist in this effort by carrying monitoring equipment or personnel. The relatively minor nature of this operation would not affect navigation of any type and would not impact commercial or recreational activities occurring in the area. The proposed at-sea disposal location has not been identified as a traditional cultural property or of special scientific importance.

Best management practices will be implemented to ensure that the waste is contained during transport and only discharged within the proposed location. A written log of discharges (noting time, date, amount, nature, and location) will be recorded. Water quality monitoring will be conducted during waste disposal as required by ADEC; specific conditions will be reflected in the Water Quality Monitoring Plan once these conditions have been provided to UniSea. Additional detail regarding best management practices are included in the Waste Remediation Plan.

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5.0 Conclusion

UniSea has been directed by USEPA to remove seafood processing waste greater than 1 foot in thickness that is currently accumulated on the seafloor at UniSea's Dutch Harbor facility. UniSea must dispose of the material in accordance with the USEPA CD and NPDES permit within outer Unalaska Bay. This document demonstrates that no measureable adverse effects to the marine ecosystem are anticipated from this one-time disposal. The seafood waste material is suitable for disposal at-sea based on the definitions provided in applicable state and federal regulations. Additionally, no other reasonable or feasible alternative exists to disposing of this material at sea.

The proposed at-sea disposal location has been recommended by UniSea for a number of reasons. Most importantly, disposal at this location would not have a measurable effect on the marine environment, as evidenced by the current regime and mixing characteristics, which would provide for rapid dispersal. Dispersal of the seafood waste would reduce the extent of accumulation in any location on the seafloor and would, therefore, minimize potential impacts to the federally listed threatened and endangered species, essential fish habitat and critical habitat, and benthic communities. Additionally, impacts to water quality would only be temporary in nature. The proposed location also meets the applicable NPDES conditions; it is more than 1 nautical mile offshore and would be in water depths greater than 100 feet.

For these reasons, the proposed at-sea disposal location should be approved for use by UniSea as part of the upcoming work to remove seafood waste from the Dutch Harbor Site.

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6.0 References

Floyd|Snider. 2014. *Seafood Waste Pile Alternatives Analysis*. Prepared for UniSea, Inc. Dutch Harbor, Alaska. 24 October.

RPS Evans-Hamilton and NewFields (RPS and NewFields). 2012. *UniSea, Inc., Benthic Impact Survey, Dutch Harbor, Alaska, Draft Report*. 7 November.

U.S. Environmental Protection Agency (USEPA). 2003. Authorization to Discharge Under the National Pollutant Discharge Elimination System. NPDES Permit No. AK-002865-7. April.

_____. 2011a. Consent Decree. Civil Action No. 3:11-CV-00037-JWS. USEPA and State of Alaska. 1 June.

_____. 2011b. United States Code of Federal Regulations. Title 40, Volume 25, Chapter 1, Subchapter H, Part 220-238. 1 July.

_____. 2015. Letter to Mr. John Iani re: United States and State of Alaska v. UniSea, Inc., Civil Action No. 3:11-cv-00037-JWS. Seattle, WA. 27 April.

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UniSea, Inc.

Waste Remediation Plan

Appendix A
Proposed Seafood Waste Disposal Location Document

Figures

Note:
· Baselayers provided by NOAA and Esri.

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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure A.1
Vicinity Map

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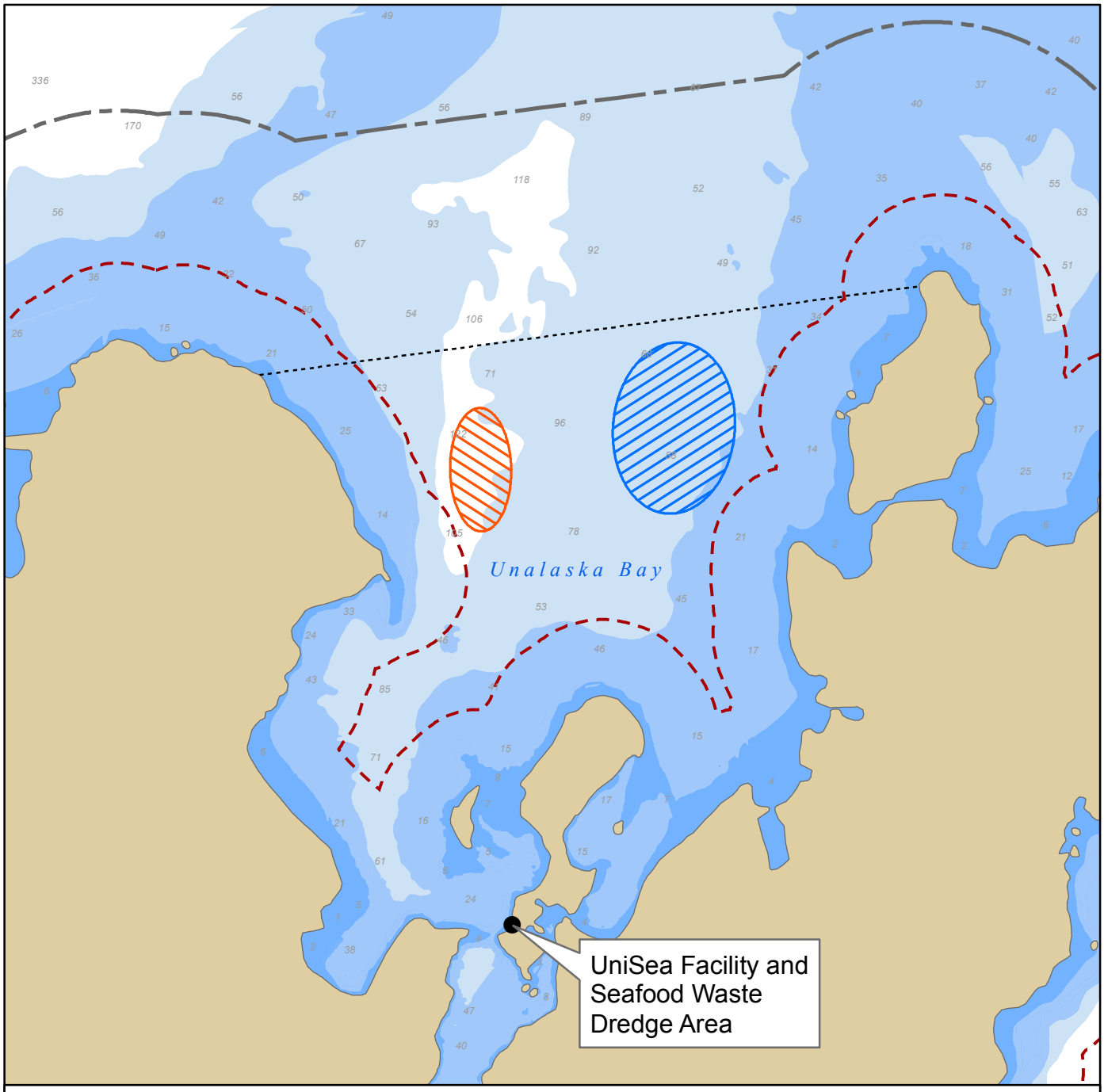
8/21/2015



Legend

- Approximate Extent of At-Sea Discharge - Proposed Disposal Location[1]
- Approximate Extent of At-Sea Discharge Location 004[2]
- Baseline - Bay Closing Line
- 3-Nautical Mile Line
- 1-Nautical Mile Line
- 40 Sounding (Fathoms MLLW)
- Land Area

Depth Contours (Fathoms MLLW)

- 0–10
- 11–50
- 51–100
- > 100

Notes:
1. The approximate extent of the proposed disposal location is based on the anticpated area of disposal when the barge is being towed at the CD-required speed of at least three knots.
2. Approximate extent of Discharge Location 004 is based on actual vessel track lines over multiple years of disposal.

· Basemap layers provided by NOAA.

Abbreviations:
MLLW = Mean Lower Low Water
NOAA = National Oceanic and Atmospheric Administration

0 1 2 4
Nautical Miles
N

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Waste Remediation Plan
UniSea, Inc.
Dutch Harbor, Alaska

Figure A.2
Proposed Seafood Waste Disposal Location

I:\GIS\Projects\UniSea-DH\MXD\Proposed Disposal Location\Figure A.2 Proposed Seafood Waste Disposal Location.mxd
8/21/2015

UniSea, Inc.

Waste Remediation Plan

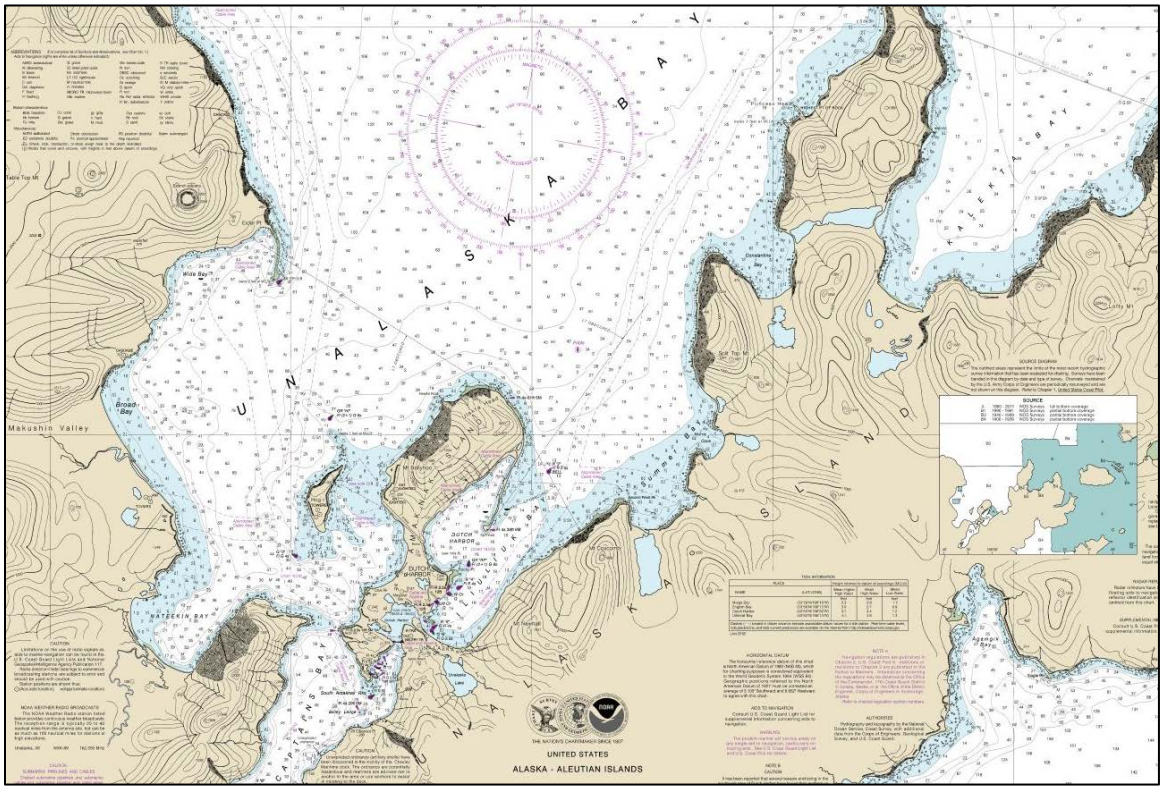
Appendix A
Proposed Seafood Waste Disposal Location Document

Attachment A.1
UniSea Seafood Waste Disposal Location – Unalaska Bay Currents Assessment

FINAL REPORT

UniSea Seafood Waste Disposal Location

Unalaska Bay Currents Assessment



RPS-EHI Project: S6566

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1. Introduction

UniSea operates a seafood processing plant located in Dutch Harbor, Alaska. The UniSea Facility is permitted to discharge wastewater, solids, and residues from the processing of seafood and related support activities from their seafood processing plant. Authorized discharges from the UniSea Facility have resulted in the formation of seafood waste piles within a small embayment on the southwest shore of Amaknak Island. USEPA has directed UniSea to dredge the seafood processing waste located on the seafloor at Unisea's Dutch Harbor discharge locations. In compliance with the EPA-mandate and a 2011 Consent Decree, UniSea is preparing a Waste Remediation Plan to provide a summary of the activities to be completed to dredge and dispose of the seafood waste that has accumulated at the UniSea facility.

RPS Evans Hamilton is working with Floyd|Snider to develop a preliminary hydrodynamic model application to Unalaska Bay for the prediction of currents and circulation in the Bay in order to site the proposed location of the one-time disposal of UniSea seafood waste within an area that would optimize seafood waste dispersion. There are currently no observations available within outer Unalaska Bay and the potential area of disposal. Therefore, this modeling evaluation was performed, and prior to construction, the model predictions may be compared to measurements through the deployment of a series of acoustic Doppler current profilers (ADCP) in the area to ground truth the current values. There are no observations available at the potential site itself, so the current model predictions will be used to characterize the site.

2. Description of Study Area

Unisea, Inc is located at the southern end of Dutch Harbor on the east side of Amaknak Island at the southern end of Unalaska Bay, with Iliuliuk Bay to the east and Captains Bay channel on the west. The town is in a fairly sheltered area, surrounded by rugged mountainous coastal terrain. While the dredging is to take place in the harbor area, the seafood waste material disposal will potentially take place in an area located in the more open Unalaska Bay to the north of Amaknak Island (see Figure 2-1). There is the potential for substantial orographic steering of the winds in the area as a result of the complex mountains coastal terrain to the east, south, and west, but the bay is open to the north where it connects to Chelan Bank offshore (Figure 2-2).

Bathymetry in Unalaska Bay is fairly flat throughout, at roughly 60 fathoms (360ft), shallowing near shore, but with a deeper area on the western side of the bay, where the potential seafood waste disposal was evaluated and proposed in compliance with the USEPA Consent Decree and UniSea NPDES permit, defined as At-Sea Discharge, Discharge 004. The area itself is at an approximate depth of 100 fathoms (600ft), as can be seen in the NOAA bathymetric chart for Unalaska Bay presented in Figure 2-3.

Figure 2-1. Map of Dutch Harbor and Unalaska location at Amaknak Island, Alaska.

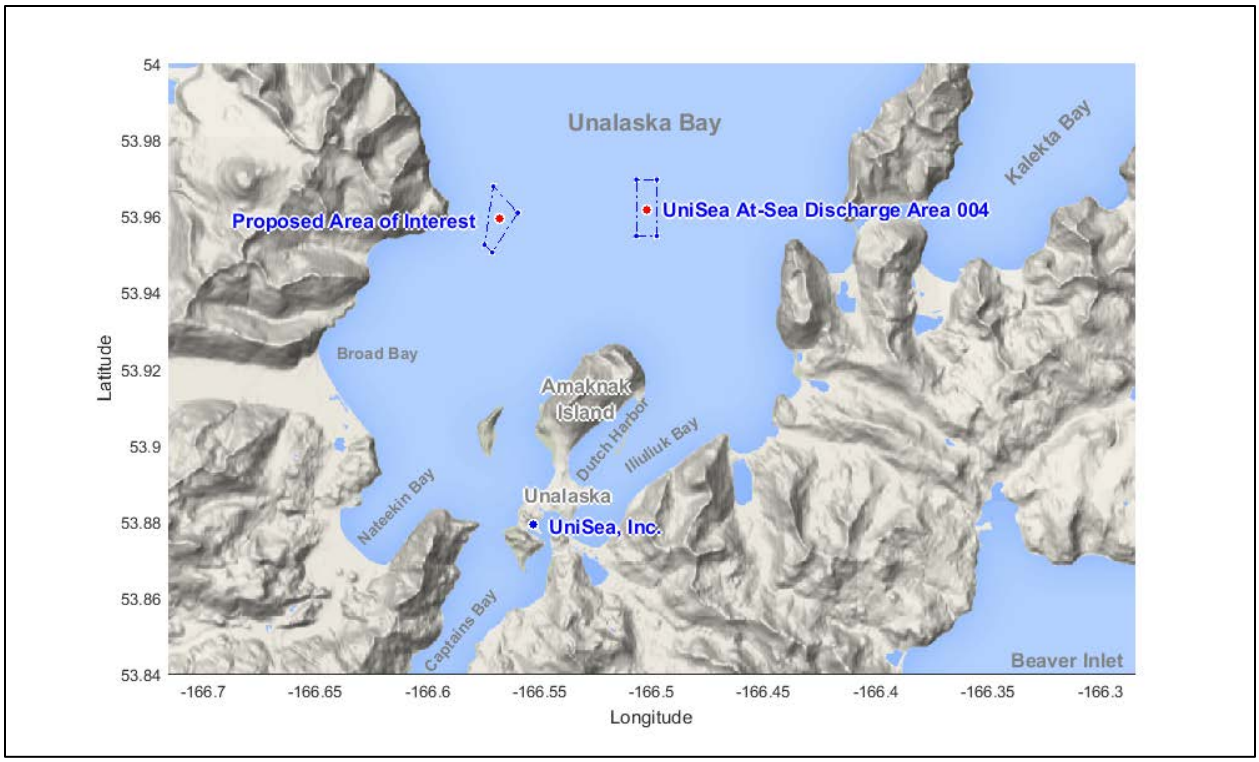

Figure 2-2. Map of study area and potential seafood waste material disposal location in Unalaska Bay, Alaska.

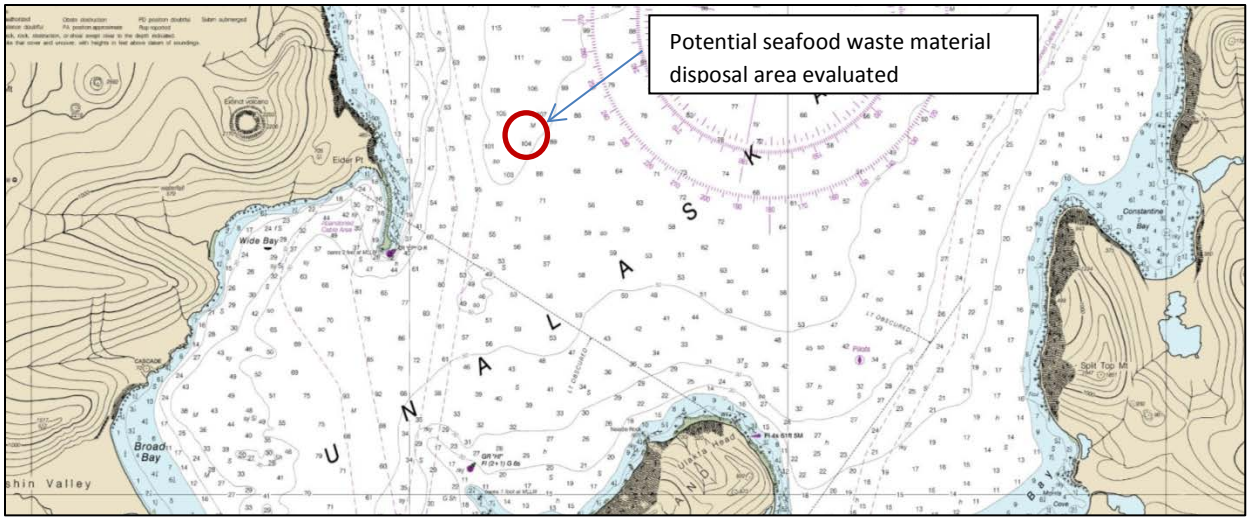

Figure 2-3. Bathymetry of the study area and potential seafood waste material disposal site in Unalaska Bay, Alaska (NOAA chart 16528, 2014).

3. Description of Available NOAA Observations

The current observation data was gathered from the NOAA Tides and Currents historic stations database. The area of interest fell within the Unimak Pass station group, of which three stations are within the model domain. These three stations are NE of Ulakta Head (UNI1014), the East Channel of Iliuliuk Bay (UNI1015), and Captains Bay (UNI1016) as seen in Figure 3-1. The location, date range, and depth range of the current data from each of the three stations can be found in **Table 1**.

Table 1. Description of NOAA current observation stations and data used for the model comparisons.

NOAA Station ID	Station Name	Latitude	Longitude	Start Date	End Date	Number of Depth Bins	Minimum Depth (ft)	Maximum Depth (ft)
UNI1014	Ulakta Head, NE of	53° 56.188' N	166° 28.798'W	6/10/2010	7/22/2010	27	19	190
UNI1015	Iliuliuk Bay, East Channel	53° 52.647'N	166° 31.699'W	6/9/2010	7/22/2010	16	6.9	56
UNI1016	Captains Bay	53° 52.630' N	166° 34.097' W	6/13/2010	7/28/2010	9	8.2	61

Currents at UNI1014 (station 14) present a good characterization of the general trends in Unalaska Bay. A time series stick plot of the wind and the current vectors at the surface mid and bottom of the water column at station 14 is presented in Figure 3-2. Average currents in the near surface of the water column at station 14 flowed towards the northeast for the majority of the record. Referring to the top 2 plots, for the wind and the near surface currents, it can be seen that the near surface currents are

predominantly wind driven. When the wind blows strongly towards the north, the current flows that way as well, with almost no evident tidal signal. It is expected that the majority of Unalaska Bay will also behave in this fashion, as the bay is wide and open to the north. At the mid-level, the currents appear to be diminished and occasionally flow counter to the predominant northerly direction. In the near bottom part of the water column the is some sign of a diurnal tidal oscillation, but at lower speeds.

Currents at UNI1015 (station 15) near surface flowed towards the west-southwest at station 15 for approximately 25 percent of the record, and were generally the weakest of the three stations due to its location at the head of the Iliuliuk Bay. Station 15 shows a larger spread in current directions, near rotary, and was not focused in any single direction, most likely due to very low current speeds and wind shading from coastal terrain.

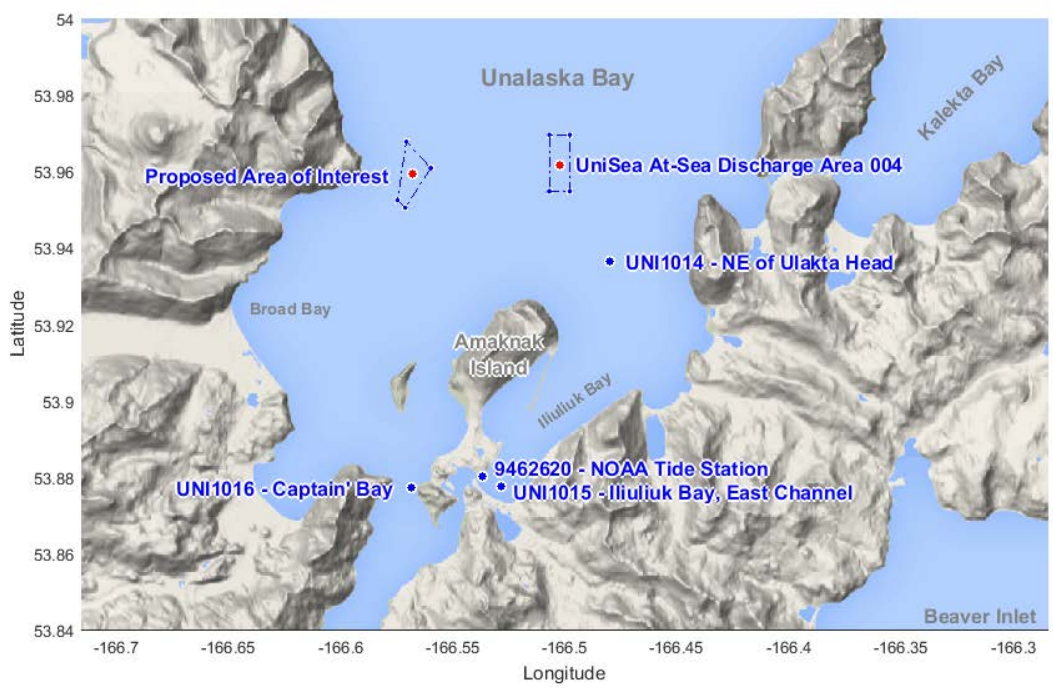

Figure 3-1. Map showing the location of the 3 NOAA current observation stations and the tide station used in the model comparison.

Tidally influenced currents are most evident at station 16, with the currents varying between the south-southeast and north-northwest, clearly oriented to the Captains Bay channel. This tidal influence decreases closer to the surface where the currents are heavily influenced by the wind. The currents at station 16 are also generally the strongest of the three stations and are a function of the narrow passage that forms the entrance to Captains Bay and the inlet channel and local winds.

The wind observations were collected from NOAA Tides and Currents station in Unalaska (Station 9462620) (Table 2) for a date range matching the available current data date ranges. The wind sensor was positioned at 45.8 feet above mean sea level (MSL). The strongest winds blew generally from the south for approximately 25 percent of the selected date range, and from the west-southwest for approximately 18 percent of the selected date range.

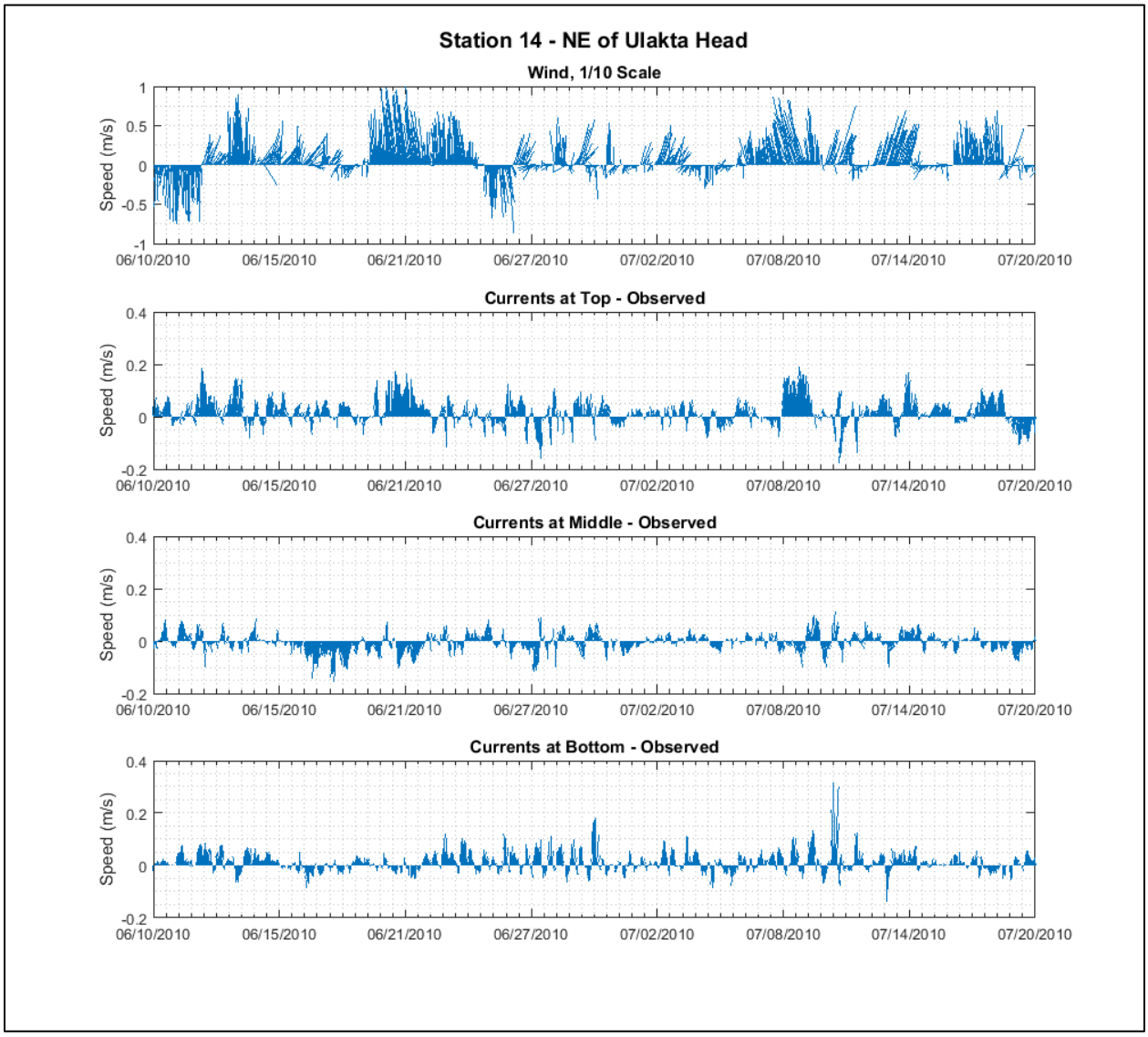

Figure 3-2. Observed wind and current vector stick plots at Station UNI1014 for the period of 10 June 2010 through 20 July 2010. Plot shows the wind (top), near surface (2nd plot), mid-depth (3rd plot) and near seabed (bottom) currents.

Table 2. Description of NOAA wind observation station used for the model forcing.

NOAA Station ID	Station Name	Latitude	Longitude	Sensor Height (MSL)
9462620	Unalaska, AK	53° 52.8' N	166° 32.2' W	45.8 ft

Water surface elevation observations were collected from NOAA Tides and Currents station in Unalaska (Station 9462620) for a date range matching the available current data date ranges. The observed water surface elevations relative to mean sea level were obtained from the gage. A summary of the station parameters is presented in Table 3 .

Table 3. Description of NOAA water elevation observation station used for the model forcing.

NOAA Station ID	Station Name	Latitude	Longitude
9462620	Unalaska, AK	53° 52.8' N	166° 32.2' W

4. BFHYDRO Hydrodynamic Model System Description

In order to accurately model the currents in outer Unalaska Bay RPS's hydrodynamic model BFHYDRO was chosen. BFHYDRO is a three dimensional, general curvilinear coordinate, boundary-fitted computer model (Muin and Spaulding, 1997; Huang and Spaulding, 1995b; Muin, 1993) used to predict elevations, and current velocities in river, lake, coastal and ocean waters. The boundary-fitted model matches the model coordinates with the shoreline boundaries of the water body, or can be used in rectangular mode. This system also allows the user to adjust the model grid resolution as desired. Development of the model has proceeded over more than two decades (Mendelsohn, 1998; Huang and Spaulding, 1995a; Muin, 1993; and Spaulding, 1984;). The model may be applied in either two or three dimensions, depending on the nature of the inquiry and its complexity. A brief description of the model follows.

The three dimensional conservation of mass and momentum equations, with approximations suitable for lakes, rivers, and estuaries (Swanson, 1986; Muin, 1993) that form the basis of the model, are then solved in this transformed space. In addition a sigma stretching system is used in the vertical to map the free surface and bottom onto coordinate surfaces to resolve bathymetric variations. The resulting equations are solved using an efficient semi-implicit finite difference algorithm for the exterior mode (two dimensional vertically averaged), and by an explicit finite difference leveled algorithm for the vertical structure of the interior mode (three dimensional) (Swanson, 1986). The velocities are represented in their contra-variant form.

The basic equations are written in spherical coordinates to allow for accurate representation of large modeled areas. The conservation equations for water mass, momentum (in three dimensions) and constituent mass (temperature [heat] and salinity) form the basis of the model, and are well established. It is assumed that the flow is incompressible, that the fluid is in hydrostatic balance, the horizontal friction is not significant and the Boussinesq approximation applies all customary assumptions.

The boundary conditions are as follows:

- At land, the normal component of velocity is zero.
- At open boundaries, the free surface elevation must be specified, and temperature (and salinity for estuarine and coastal applications) specified on inflow.
- On outflow, temperature (heat) and salinity is advected out of the model domain.
- A bottom stress or a no slip condition is applied at the bottom. No temperature (heat) is assumed to transfer to or from the bottom, a conservative assumption as some transfer of heat to the bottom is expected to occur.
- A wind stress, and appropriate heat transfer terms, are applied at the surface.
- The surface heat balance includes all of the primary heat transfer mechanisms for environmental interaction

There are various options for specification of vertical eddy viscosity, A_v, (for momentum) and vertical eddy diffusivity, D_v, (for constituent mass [temperature and salinity]). The simplest formulation is that both are constant, A_{vo} and D_{vo}, throughout the water column. They can also be functions of the local

Richardson number, which, in turn, is a function of the vertical density gradient and vertical gradient of horizontal velocity. This application used spatially variant constant eddy viscosity and eddy diffusivity, where large upstream values were chosen to represent the turbulent waters and enhanced mixing through multiple dams.

The set of governing equations with dependent and independent variables transformed from spherical to curvilinear coordinates, in concert with the boundary conditions, is solved by a semi-implicit, split mode finite difference procedure (Swanson, 1986). The equations of motion are vertically integrated and, through simple algebraic manipulation, are recast in terms of a single Helmholtz equation in surface elevation. This equation is solved using a sparse matrix solution technique to predict the spatial distribution of surface elevation for each grid.

The vertically averaged velocity is then determined explicitly using the momentum equation. This step constitutes the external or vertically averaged mode. Deviations of the velocity field from this vertically averaged value are then calculated, using a tridiagonal matrix technique. The deviations are added to the vertically averaged values to obtain the vertical profile of velocity at each grid cell thereby generating the complete current patterns. This constitutes the internal mode. The methodology allows time steps based on the advective, rather than the gravity, wave speed as in conventional explicit finite difference methods, and therefore results in a computationally efficient solution procedure (Swanson, 1986; Muin, 1993).

5. Model Application

A three dimensional hydrodynamic model application of the study area was developed and applied for the period of 8 June 2010 through 29 July 2010. This period was chosen as it encompassed the deployment period of all of the available current observations within the model domain. In addition, it is assumed, due to local weather conditions, that the seafood waste removal and disposal work will occur within the summer months and therefore the simulation period and available observations are representative of conditions expected to occur during the time of these operational activities.

The model application included model set up and subsequent simulation. The model setup included generating the model grid and assignment of appropriate boundary conditions and model runtime parameters. The model simulation was run to generate spatially and temporally varying water surface elevation and current magnitude and direction at every grid cell for every time step to provide adequate spatial coverage through the bay disposal area of interest. The model predictions were compared to observations at three different locations to evaluate model performance and model parameters were adjusted to improve predictions. Subsequent to a satisfactory model to observation comparison the model predictions of the vertical profile of current speeds were extracted at both the present UniSea at sea Discharge 004 and disposal area of interest sites.

5.1. Model Set Up

A model grid was developed which encompassed the interior of Unalaska Bay as illustrated in Figure 5.1-1. Points of interest relevant to this study are identified in the figure. The model grid resolution is approximately 140 m in the x direction, 120 m in the y direction and variable vertical resolution based on bathymetry and the use of 31 layers in the vertical using a sigma transformation (equal number of layers at every cell, divided equally over the water column). Model grid bathymetry was determined based on digitized soundings from navigational charts (CMAP – Jeppsen Marine). The soundings are assigned to the model grid based on interpolation of the depths onto the gridded domain, such that every cell is assigned a depth; the resulting gridded bathymetry is shown in Figure 5.1-2. The model grid was assigned uniform bottom friction coefficient of 0.002 and bottom friction effects were simulated based on a quadratic formulation.

The model forcing included a time history of surface elevation applied to the open boundary cells located at the entrance to the bay. Surface winds were applied to all cells within the domain which is important since the observations show that the currents dominate the circulation in the bay. The model forcing was developed based on the observations at NOAA station 9462620.

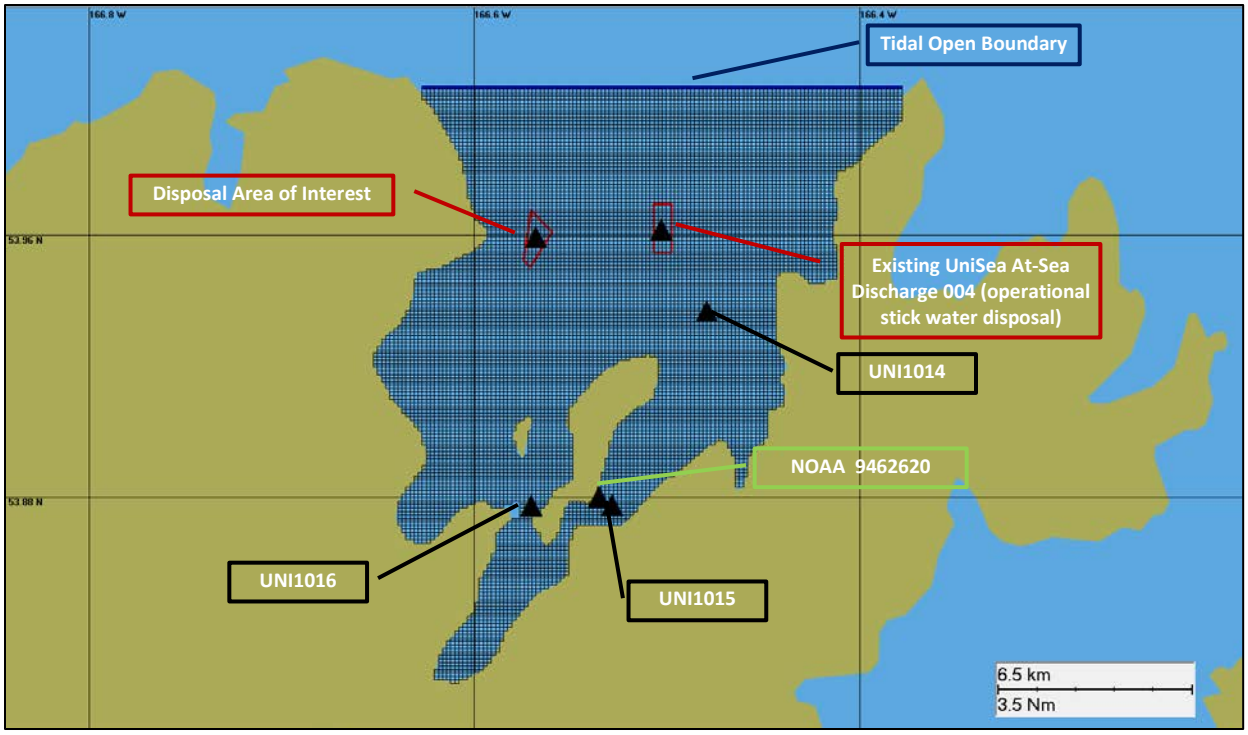

Figure 5.1-1. Model grid applied to the study area. Note that blue cells are the open boundary cells where the tidal forcing is applied. Red outlines are the location of the existing UniSea at sea discharge 004 and disposal area of interest and the black triangular markers are the locations at which predictions were queried. Map projection is Mercator.

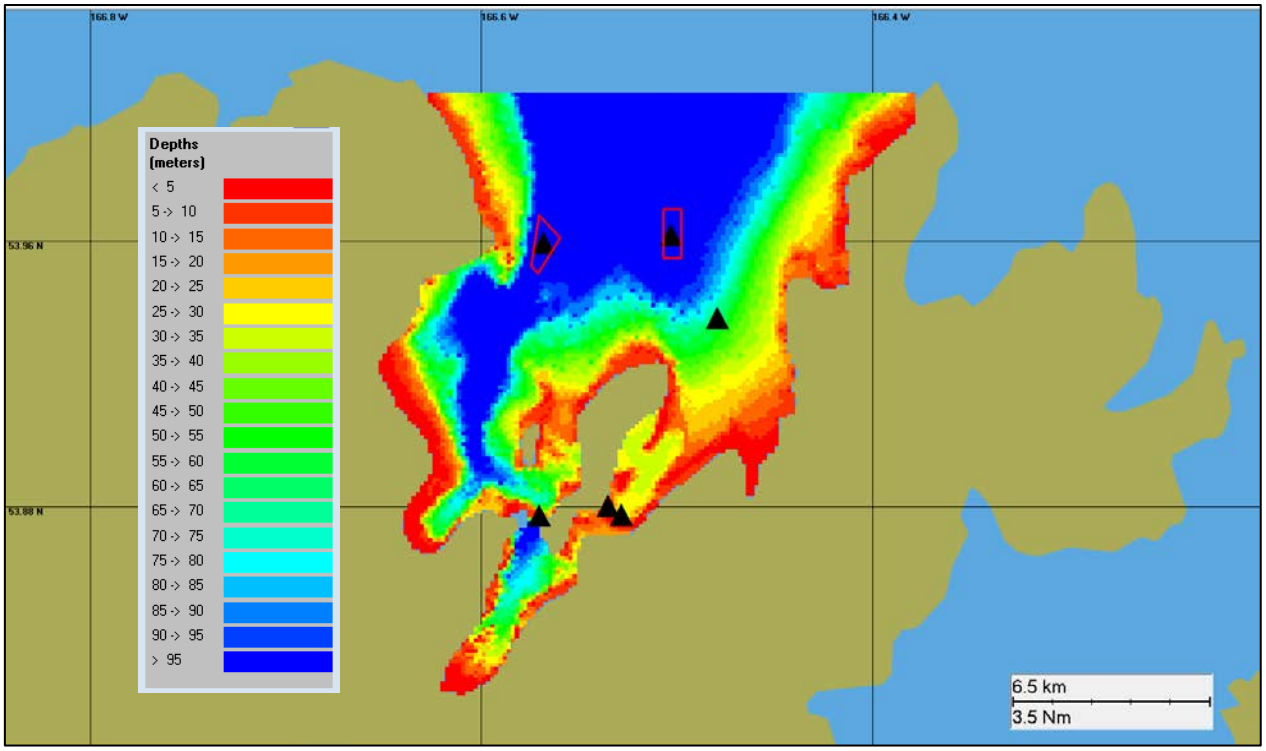

Figure 5.1-2. Model gridded bathymetry for the study area, depths are in meters. Red outlines are the location of the existing UniSea at sea discharge 004 and disposal area of interest and the black triangular markers are the locations at which predictions were queried. Map projection is Mercator.

5.2. Comparison of Model Predictions to Available Observations

The model predictions were compared to available NOAA observations of surface elevation (1 station) and currents (3 stations) within the model domain. The observation sources are summarized in Section 3. Observed and model predicted water surface elevations at NOAA station 9462620 are presented in Figure 5.1-1. This figures shows that the model was able to recreate the tidal surface water elevation signal well at this location. Furthermore this figure illustrates that this region is characterized by a mixed tide which is diurnal though modulated on a semidiurnal frequency.

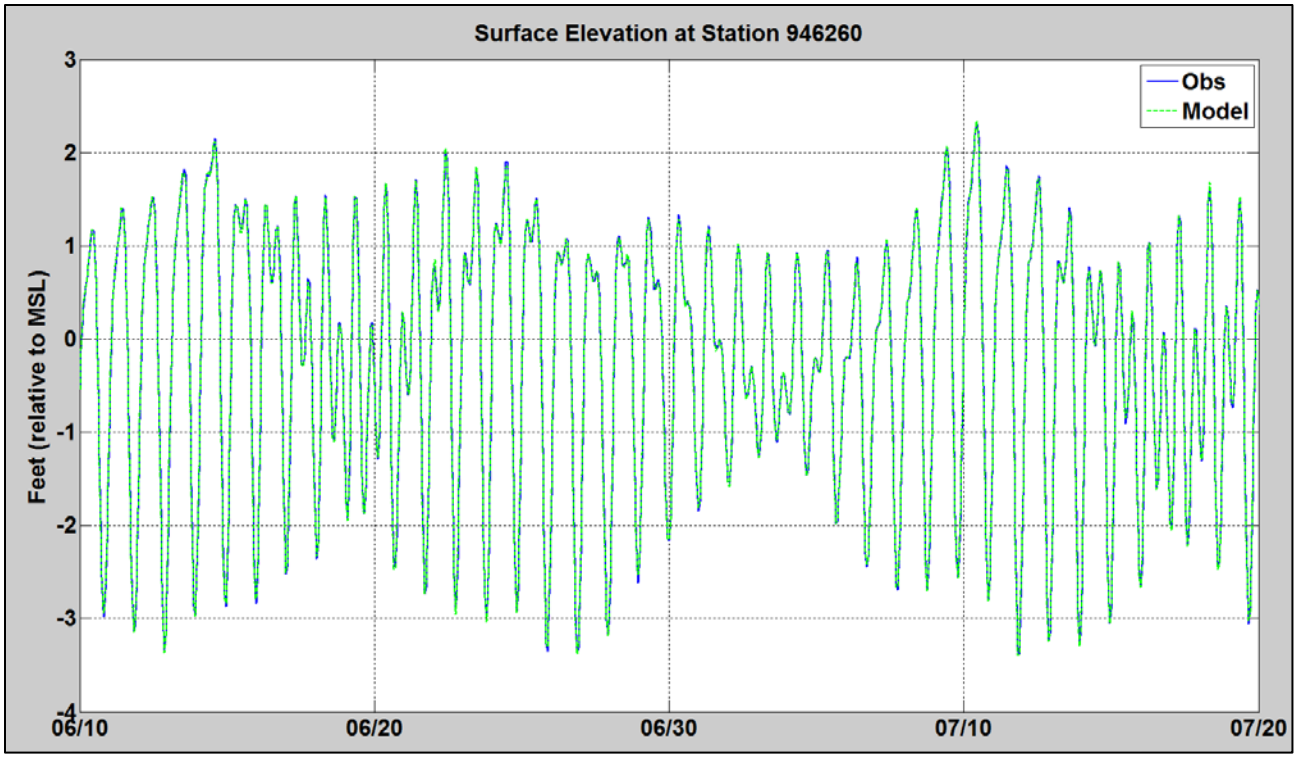

Figure 5.2-1. Observed and model predicted surface elevations at location of NOAA station ID 9462620 for the period of 10 June 2010 through 20 July 2010.

A comparison of the observed and model predicted time series of surface, middle and bottom water column currents for stations UNI1014 (Station 14), UNI1015 (Station 15), and UNI1016 (Station 16) are presented in Figure 5.2-2, Figure 5.2-5, and Figure 5.2-8 respectively. In addition the vertical profile of observed and model predicted currents at these stations are presented in Figure 5.2-3, Figure 5.2-6, and Figure 5.2-9 and observed and model predicted current roses are shown in Figure 5.2-4, Figure 5.2-7 and Figure 5.2-10, respectively.

These figures show that the model was able to recreate the currents reasonably well. Predictions at UNI1014 (Station 14) were close in magnitude to those observed. Predictions matched the observations well in the lower portion of the water column with a slight under prediction of current and vertical shear in the mid water column, but is well matched in the surface area. The analysis shows that the profile of average speed is typically 0.1 knot ± 0.05 knots, with increased speeds in the upper layer of the water column, consistent with a wind driven circulation dominated regime.

The current rose plots indicate the direction towards which the currents are heading. The size of the bars indicate the frequency of occurrence and the colors indicate the current speed. Referring to Figure 5.2-4 it can be seen that the surface roses indicate a predominance of currents to the northeast, consistent with the wind direction frequency. The observed current rose shows somewhat more variability around the northeast direction, but has magnitudes consistent the model predictions. The directional variability increases with depth in both the observations and the model predictions. Station

14 is closest, of the 3 observation stations, to the existing and evaluation disposal sites and is an important indicator of model predictive capability for the waste disposal areas under evaluation.

Both observations and predictions show that the currents at UNI1015 (Station 15) are relatively weak, consistent with its location at the southern head of Iliuliuk Bay (Figure 5.2-5 and Figure 5.2-6). The model predicts slightly greater magnitude and a slightly larger range of current speeds. Both observed and predicted current speeds show that on average the speeds are typically less than 0.1 knots throughout most of the water column.

The observations and predictions both indicate that the currents at UNI1016 (Station 16) are relatively strong compared to Station 14 and Station 15. The observations show that current speeds are strongest in the upper and bottom water column with minimum speeds in the middle of the water column (Figure 5.2-9). While the model does not recreate this profile effectively, it does recreate the observed relatively greater speeds throughout the water column and a significant amount of the variability as seen in the time series (Figure 5.2-8). Both the observations and the model predictions show more rectilinear directional duality in the current roses in the mid and lower water column, also indicative of the station location at the entrance to Captains Bay. The observed surface currents show a more definitive wind forcing than the model predictions, which may have to do with the orographic steering through Captains Bay.

The model predictions were compared to available observations of surface elevation and vertical profile of current speed and direction in order to verify the ability of the model to recreate the current regime in the study area. Overall the model was able to recreate the observed trend of surface elevation and dominant wind driven current with tidal modulations to speed. The current patterns are spatially variable and the model was able to recreate the spatial variability of strong bottom northern current moving from Unalaska Bay in and out of Captains Bay, the relative tidal nature of the currents in Dutch Harbor and the strong northeastern current predominance in the open Unalaska Bay near station 14. Based on the models predictive abilities it can be concluded that this is a valid tool for use in the characterization of the current regime in the areas of interest for potential disposal of seafood waste. Evaluation of the characterization of the current regime will also provide insight into the potential for dispersion of the seafood waste disposed of in those areas.

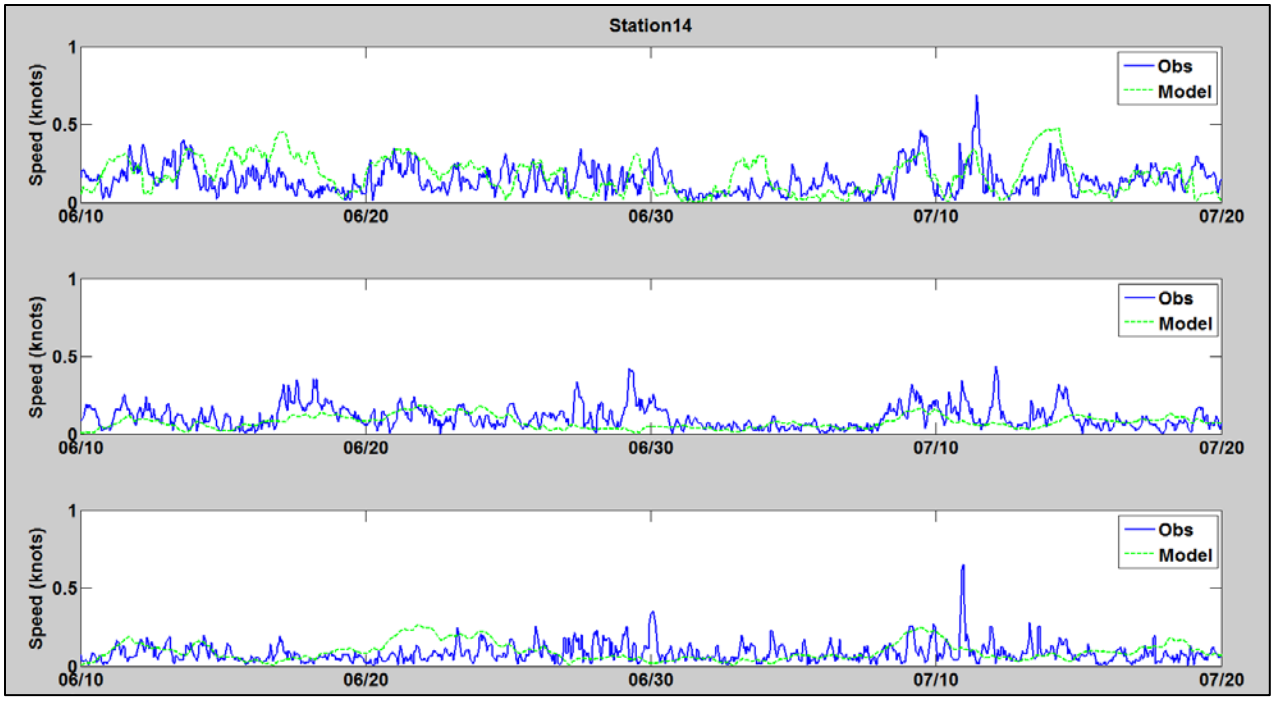

Figure 5.2-2. Observed and model predicted current speeds at location of Station UNI1014 for the period of 10 June 2010 through 20 July 2010. Plot shows surface (top), mid-depth (middle) and near seabed (bottom) currents.

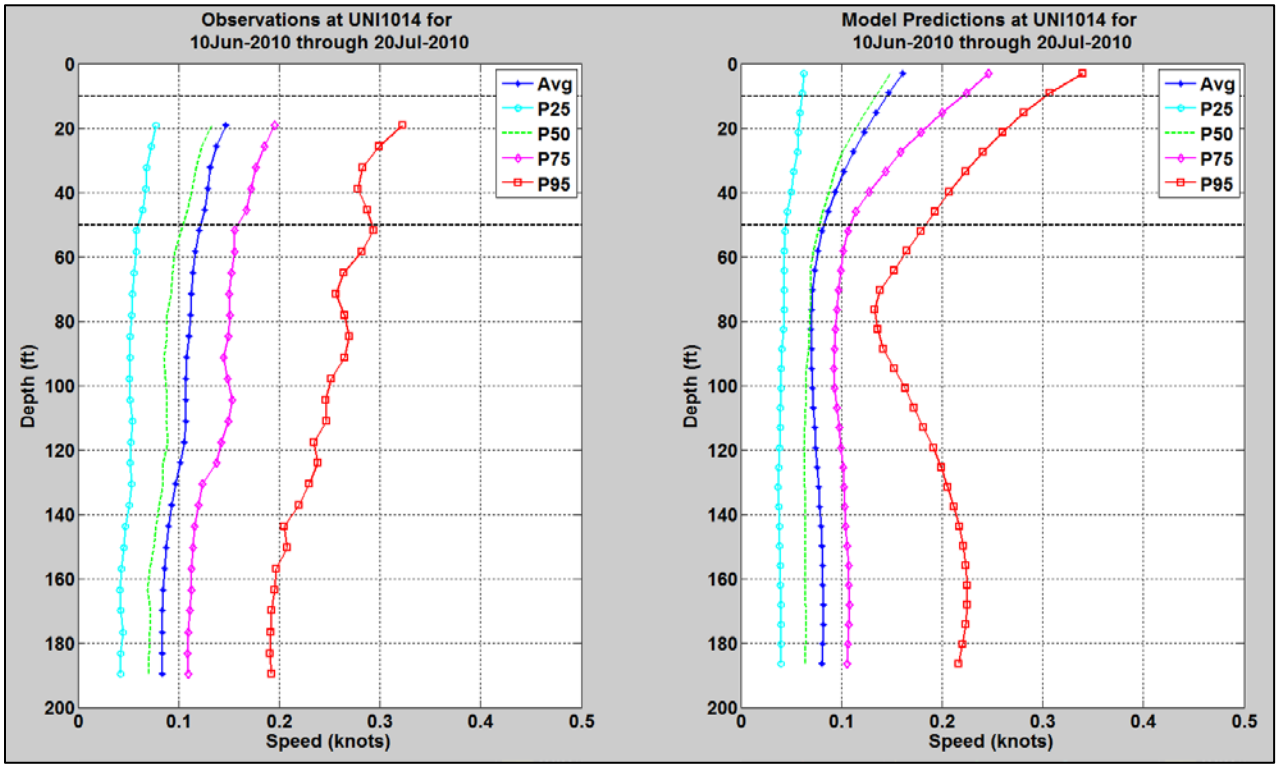

Figure 5.2-3. Vertical profile of statistical values of observed and model predicted currents at location of Station UNI1014. Black dashed lines at depths of 10 ft and 50 ft for reference.

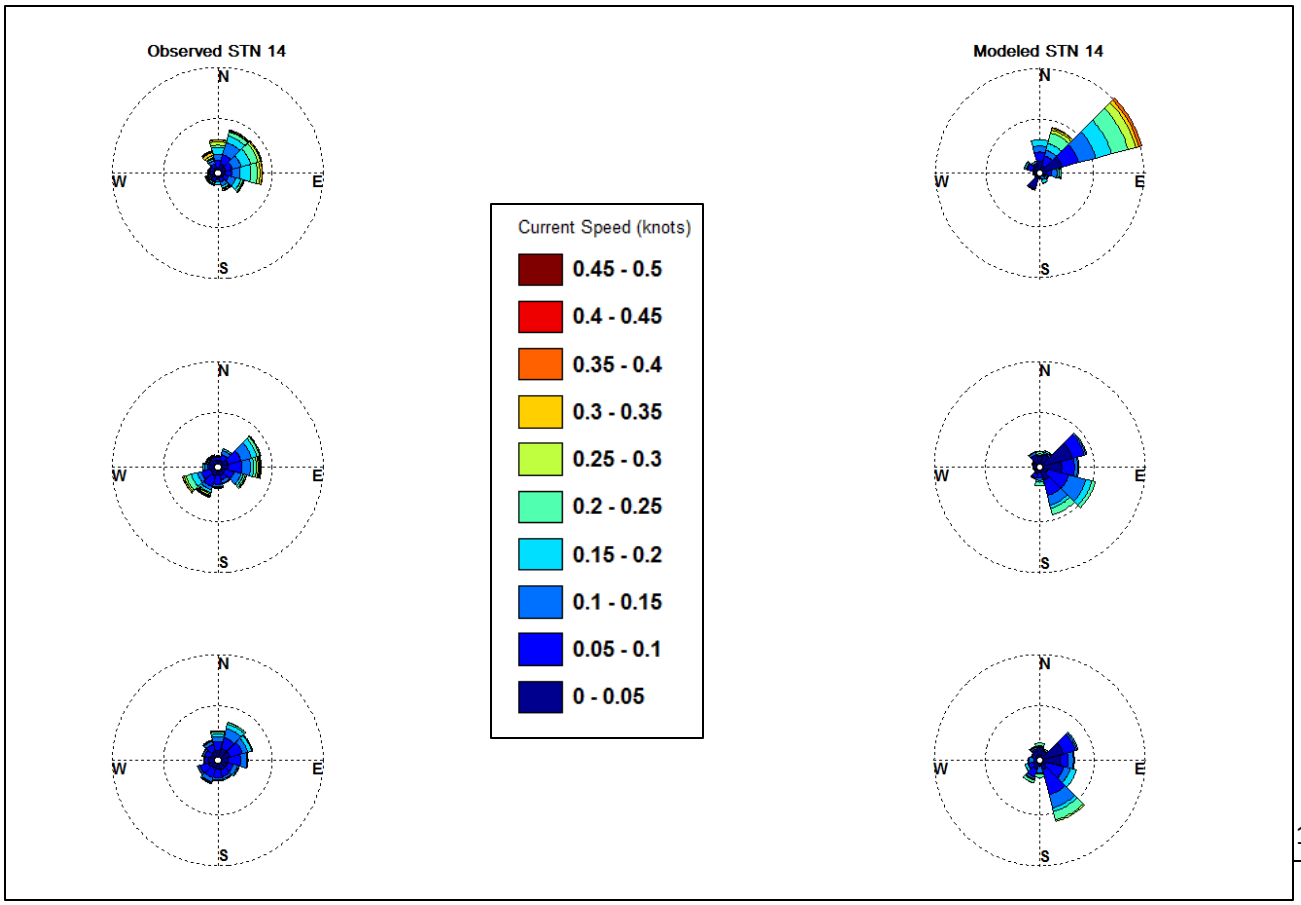

Figure 5.2-4. Observed and model predicted current roses at location of Station UNI1014 for the period of 10 June 2010 through 20 July 2010. Top roses are near surface, middle at mid depth and the bottom plots are the bin closest to the seabed. Oceanographic convention (current moving towards).

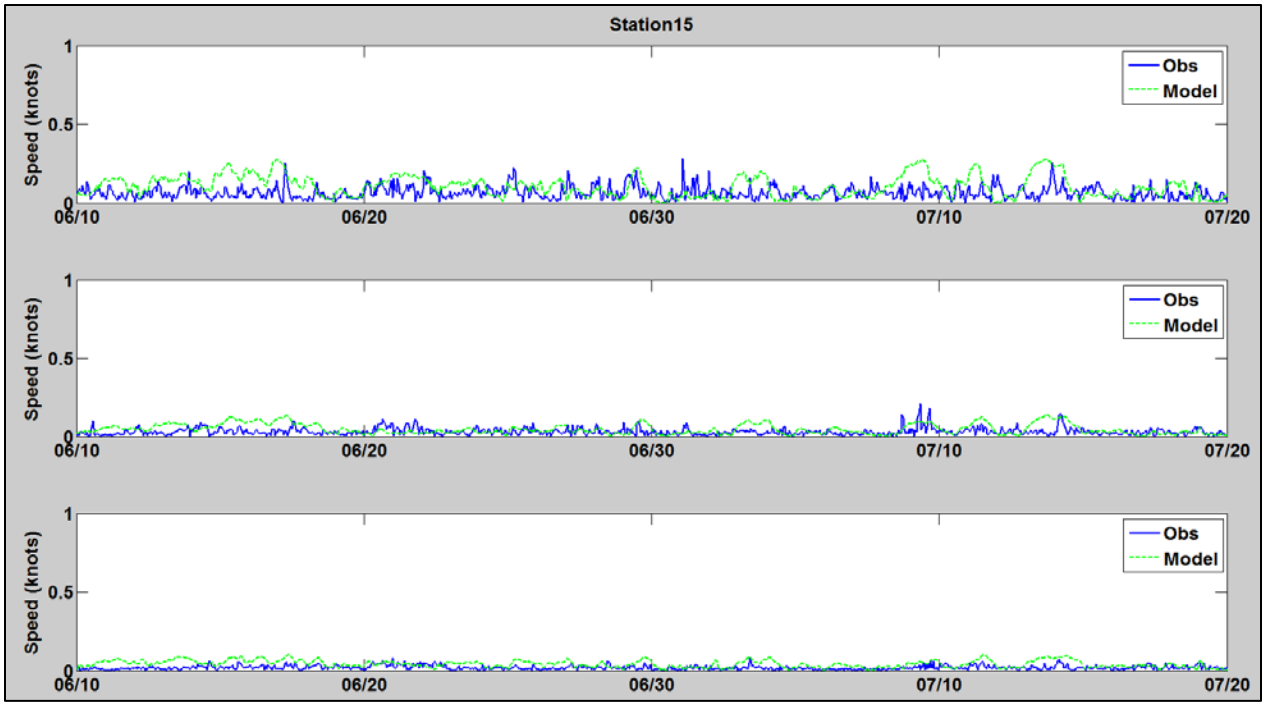

Figure 5.2-5. Observed and model predicted current speeds at location of Station UNI1015 or the period of 10 June 2010 through 20 July 2010. Plot shows surface (top), mid-depth (middle) and near seabed (bottom) currents.

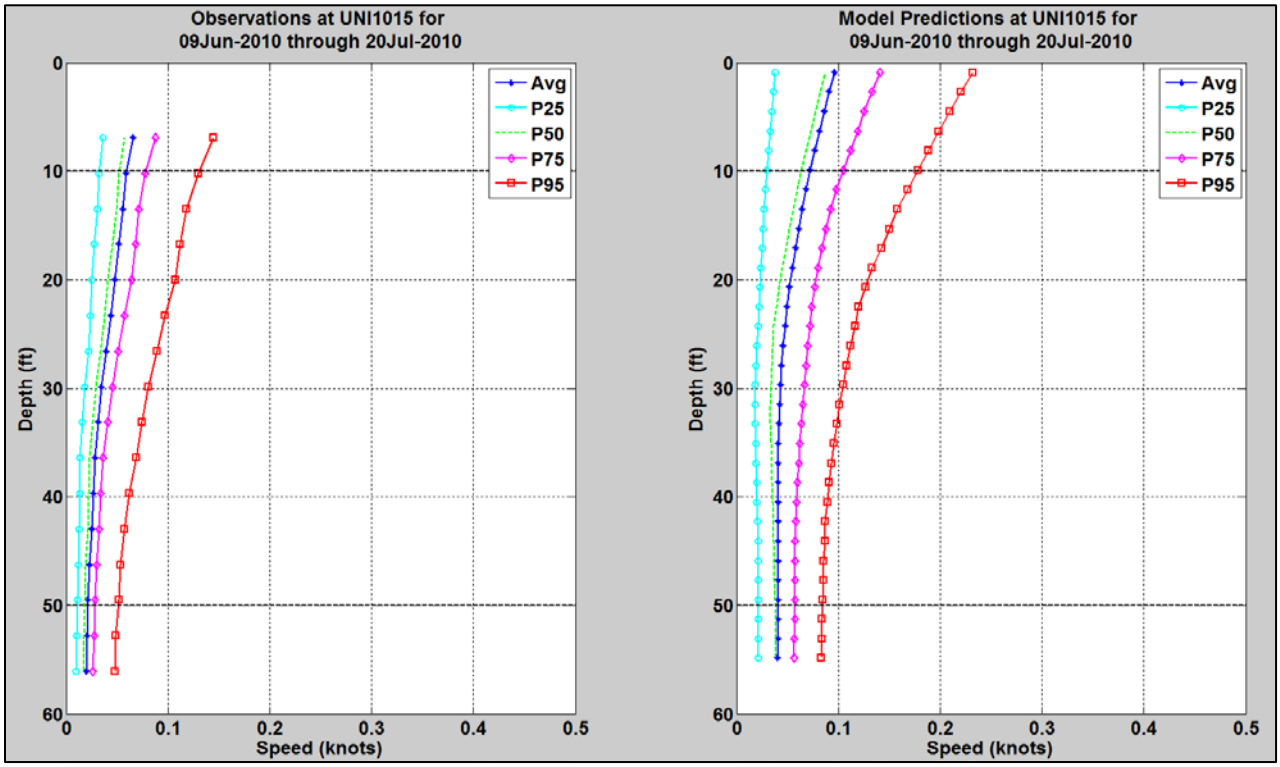

Figure 5.2-6. Vertical profile of statistical values of observed and model predicted currents at location of Station UNI1015. Black dashed lines at depths of 10 ft and 50 ft for reference.

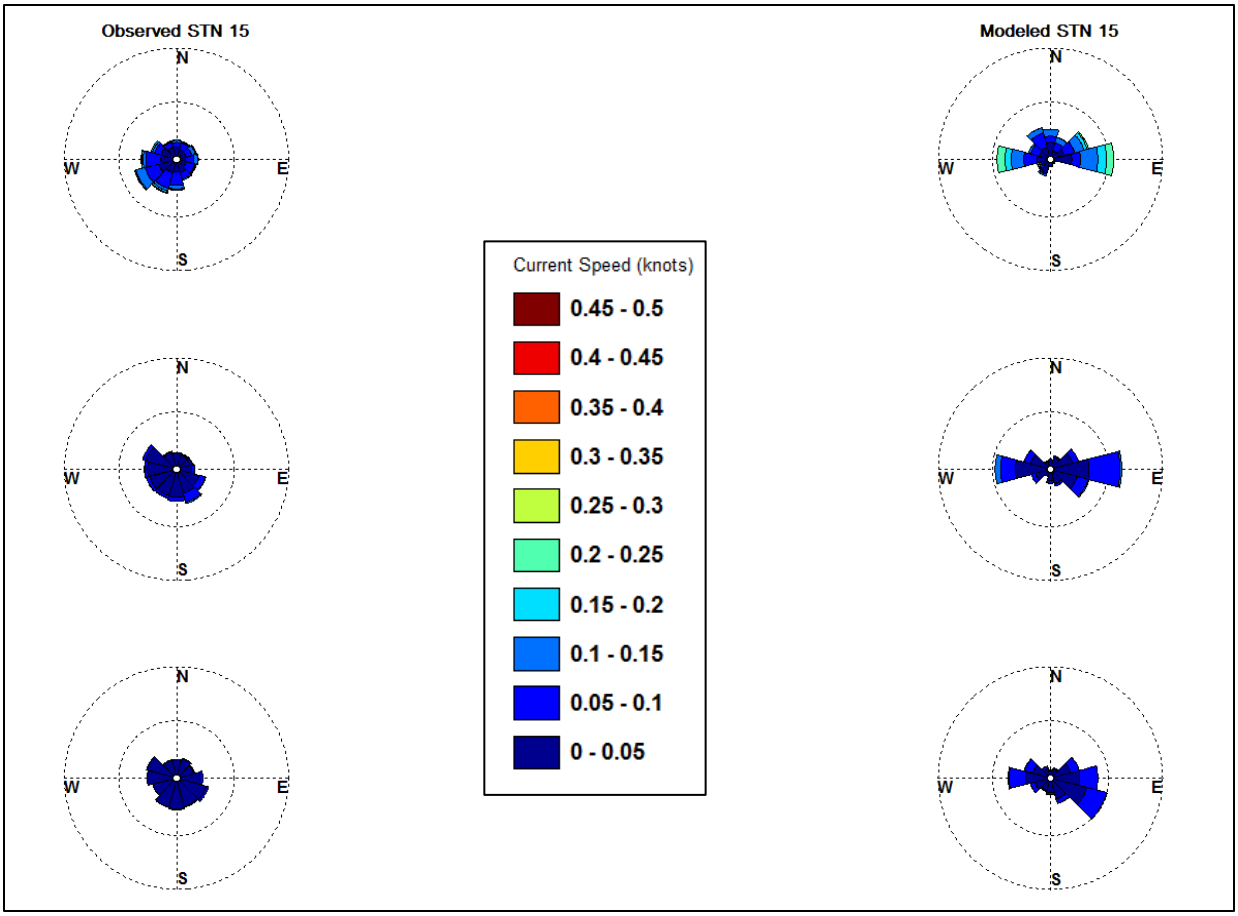

Figure 5.2-7. Observed and model predicted current roses at location of Station UNI1015 for the period of 10 June 2010 through 20 July 2010. Top roses are near surface, middle at mid depth and the bottom plots are the bin closest to the seabed. Oceanographic convention (current moving towards).

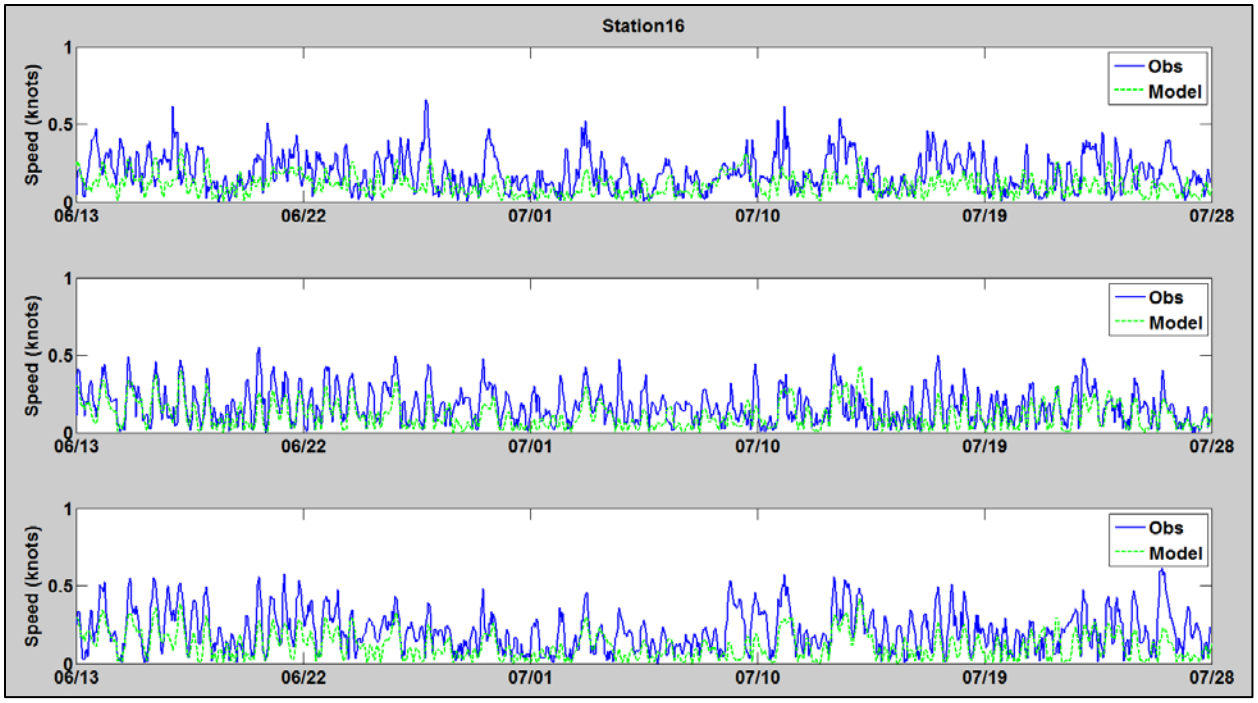

Figure 5.2-8. Observed and model predicted current speeds at location of Station UNI101610 for the period of 13 June 2010 through 28 July 2010. Plot shows surface (top), mid-depth (middle) and near seabed (bottom) currents.

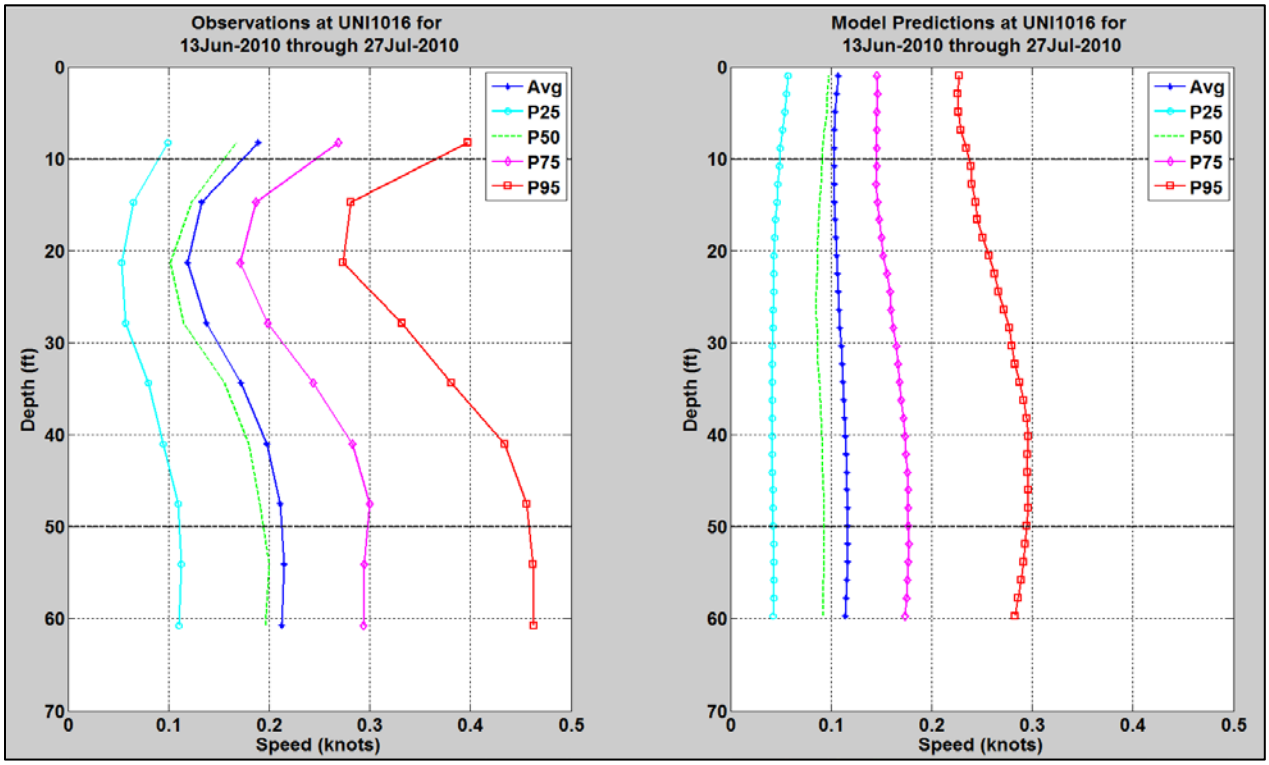

Figure 5.2-9. Vertical profile of statistical values of observed and model predicted currents at location of Station UNI1016. Black dashed lines at depths of 10 ft and 50 ft for reference.

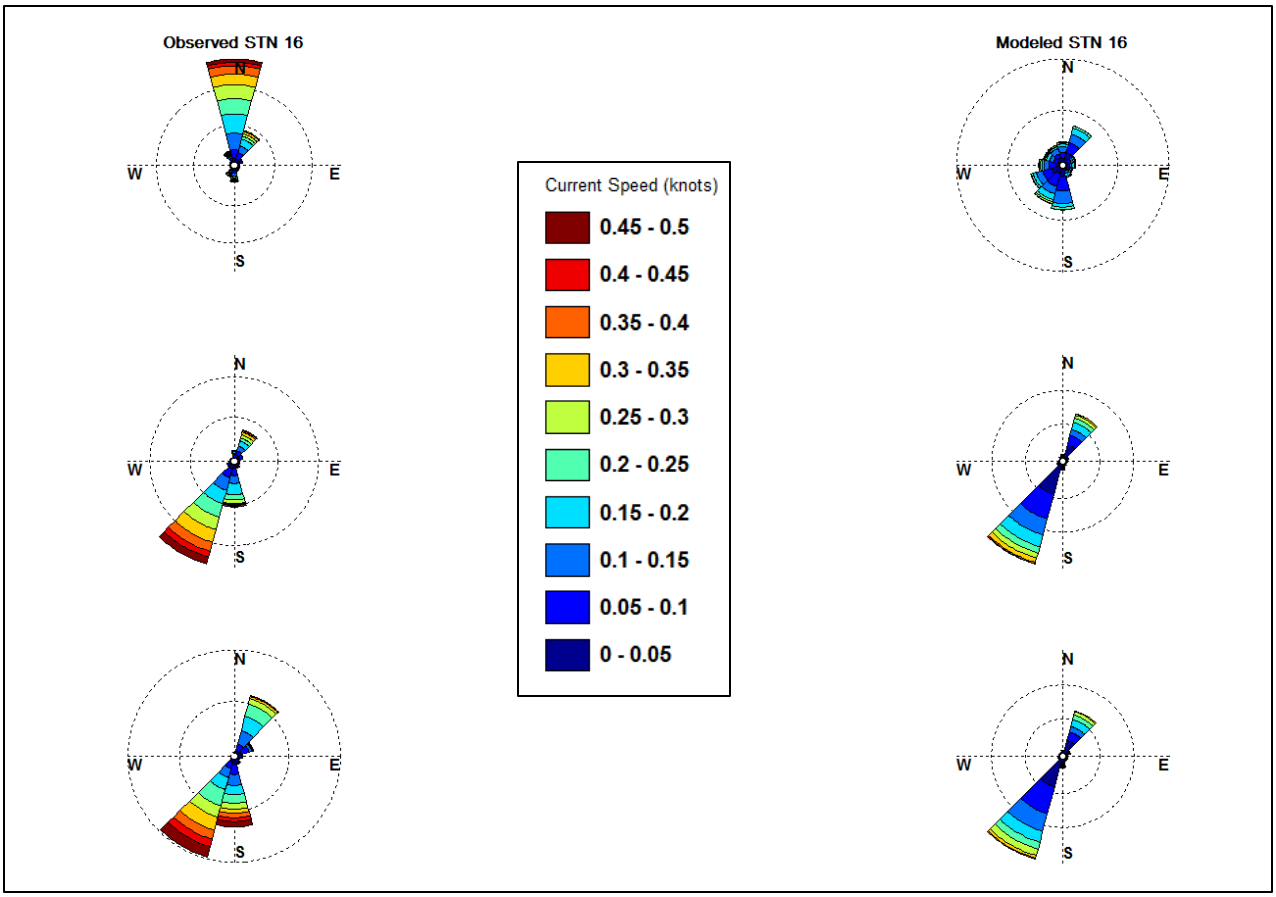

Figure 5.2-10. Observed and model predicted current roses at location of Station UNI1016 for the period of 13 June 2010 through 28 July 2010. Top roses are near surface, middle at mid depth and the bottom plots are the bin closest to the seabed. Oceanographic convention (current moving towards).

5.3. Model Prediction at the Offshore Unalaska Bay Areas

The USEPA is directing UniSea to dredge their accumulated seafood waste at an existing location and dispose of that waste in compliance with their consent decree, which makes a reference to a NPDES permit for use of their At-Sea Discharge location 004 in outer Unalaska Bay. This study therefore investigated the current regimes at both the authorized discharge location 004 and a potential alternative disposal area of interest for the purpose of optimizing the dispersion characteristics of the disposal location.

Plan views of the current vectors and speeds and the circulation patterns in the surface, mid-depth and bottom are shown in Figure 5.3-1 through Figure 5.3-3. These figures represent an instant in time when the winds are blowing from the south-southeast and had been for a few days previous. These figures show that at this instant the currents are predominately to the north at the surface. They are lower in speed but oriented more to the south however, at mid depth and near the bottom in Captains Bay, Broad Bay and Unalaska Bay. The flow direction is more variable in Illiuk Bay and northern Unalaska Bay

at these depths, with flow to both the north and east. This current field is typical in response to the predominant southerly winds at this time of year, where the surface currents follow the wind, inducing a northern flow lower in the water column. Note in these figures that the surface currents are at the same elevation however 'mid' and 'bottom' currents reflect currents at different depths for each cell depending on the depth assigned to the model cell.

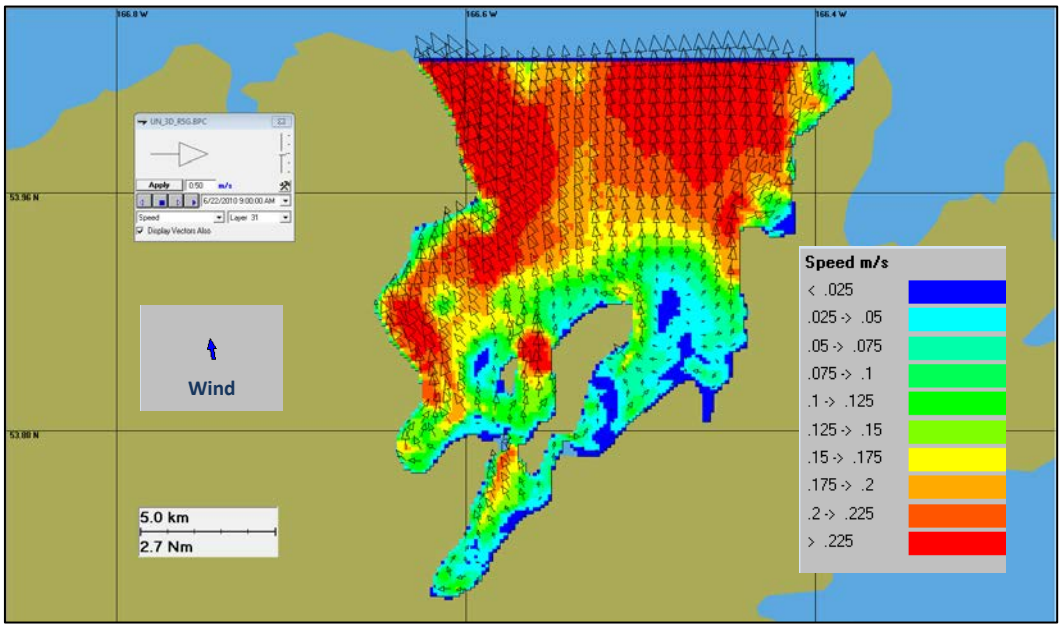

Figure 5.3-1. Snapshot of a plan view of the circulation patterns in the surface layer. The color contours reflect the magnitude of speed and the arrows represent the speed and direction of the currents. Map projection is Mercator.

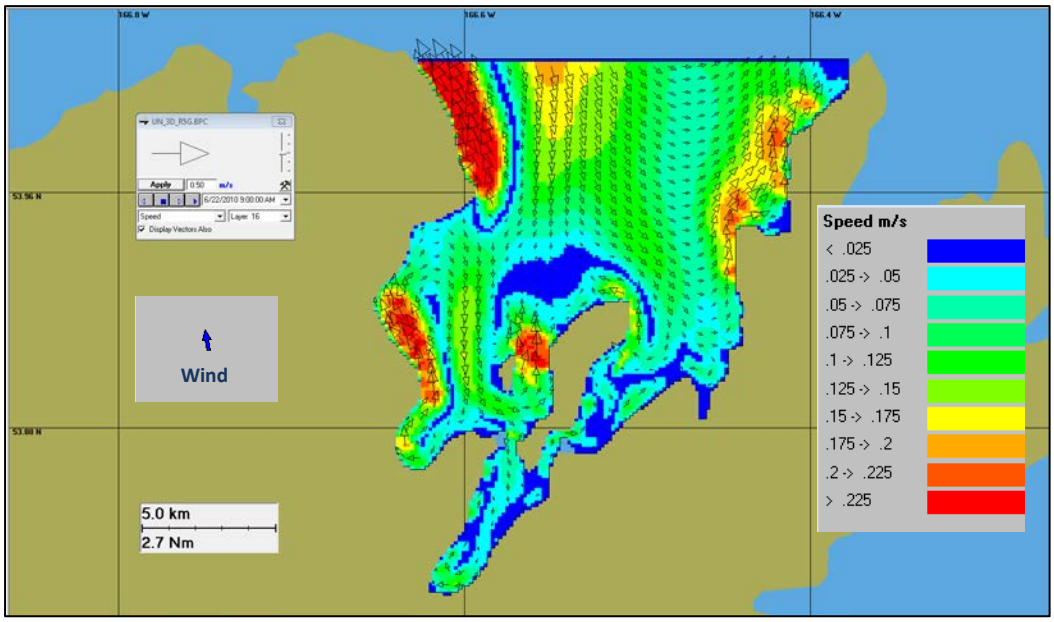

Figure 5.3-2. Snapshot of a plan view of the circulation patterns at mid depth; note the mid depth changes on a cell by cell basis as a function of bathymetry. The color contours reflect the magnitude of speed and the arrows represent the speed and direction of the currents. Map projection is Mercator.

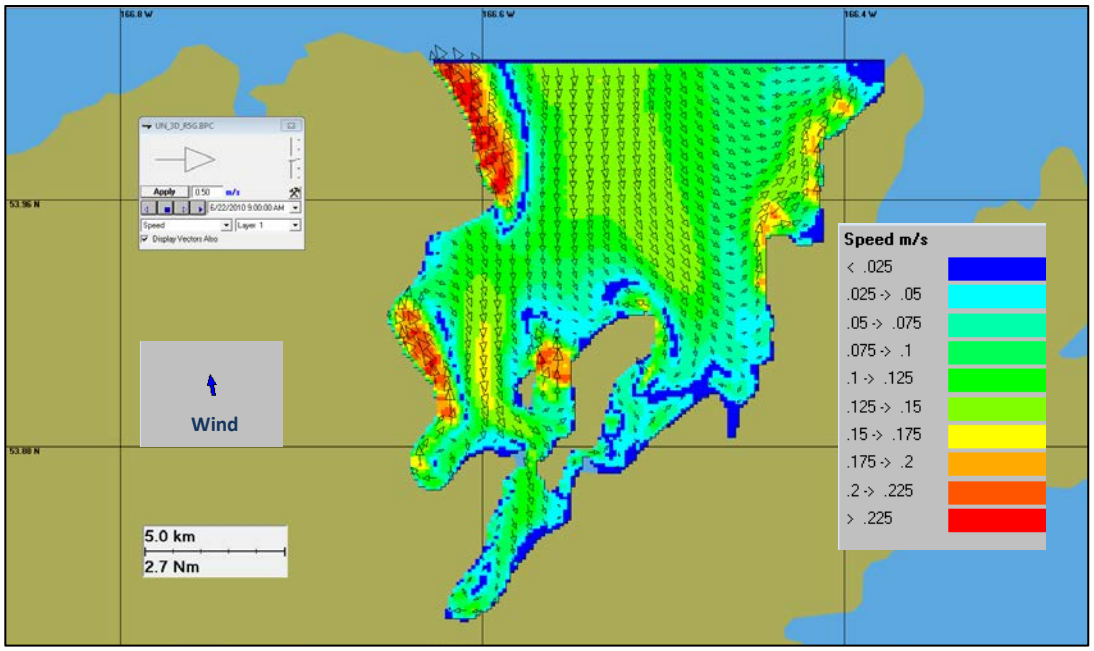

Figure 5.3-3. Snapshot of the plan view of the circulation patterns near the seabed; note the mid depth changes on a cell by cell basis as a function of bathymetry. The color contours reflect the magnitude of speed and the arrows represent the speed and direction of the currents. Map projection is Mercator.

The vertical profile of statistical metrics (percentiles of occurrence) of current speed for both the authorized discharge location 004 and the disposal area of interest are shown in Figure 5.3-4. The current roses for surface, middle and bottom currents are presented in Figure 5.3-5 and Figure 5.3-6 for the authorized discharge location 004 and the alternative disposal area under evaluation, respectively. Additionally, a table summarizing the statistical speeds at the authorized discharge location 004 and the alternative are presented in Table 4 and Table 5 respectively. These figures and tables indicate that at both locations the predominant surface current moves northward while at lower depths in the water column the currents tend to oppose the surface current moving towards the south with significantly weaker current speeds.

The surface current speeds at the alternative disposal area under evaluation is greater than that of the existing authorized discharge location 004, which would lend to increased dispersion of any discharge material at the alternative area. The 95th percentile (the current speed that is greater than 95% of the currents) surface currents (approximately the top 10-15 ft) at the alternative area is 0.3 knots vs. 0.25 knots at the existing 004 area, or 20% greater. The difference in speed varies as a function of depth such that the alternative area is approximately 50% greater at 100 ft (0.15 kts vs. 0.1 kts); note that the depth scale is different on the two plots. In both cases, the material would tend to be dispersed towards the north, in the upper part of the water column, the majority of the time. In the lower part of the water column, the alternative area has slightly lower speeds, at the depths where some return flow might be expected.

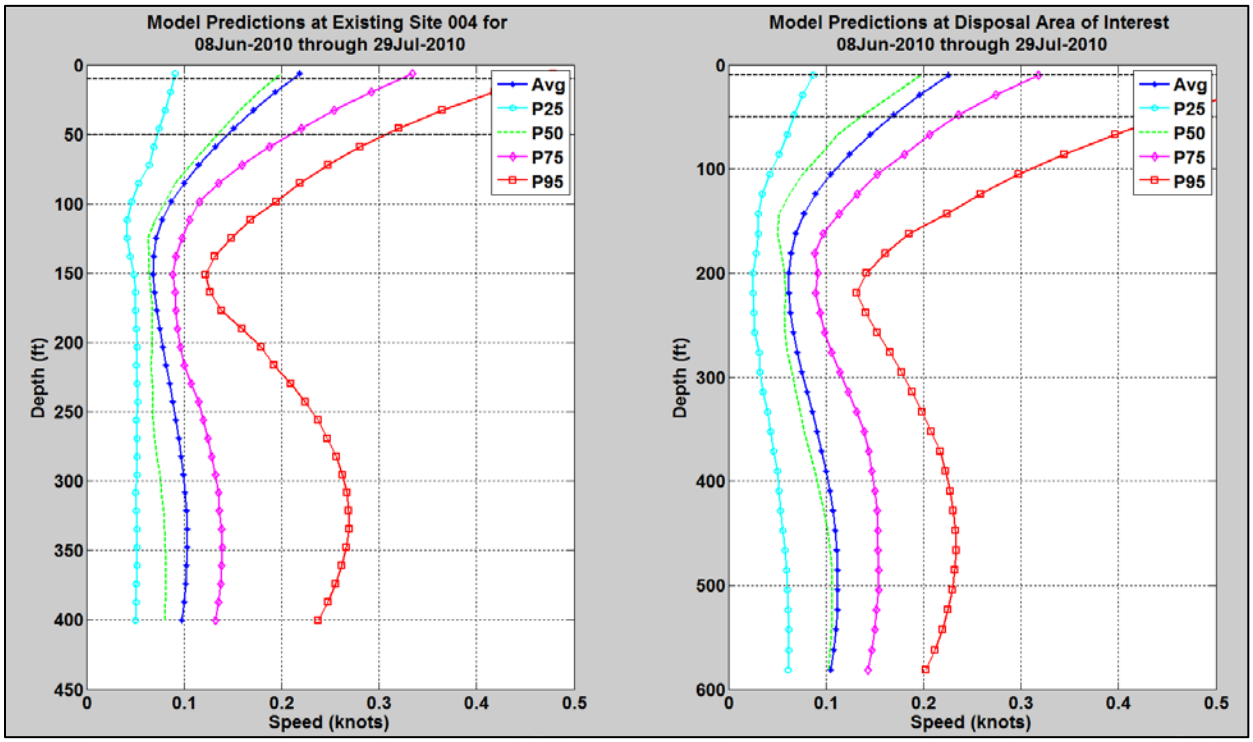

Figure 5.3-4. Vertical profile of statistical metrics of model predicted currents at existing UniSea at sea disposal 004 (left) and disposal area of interest (right) sites. Black dashed lines at depths of 10 ft and 50 ft for reference.

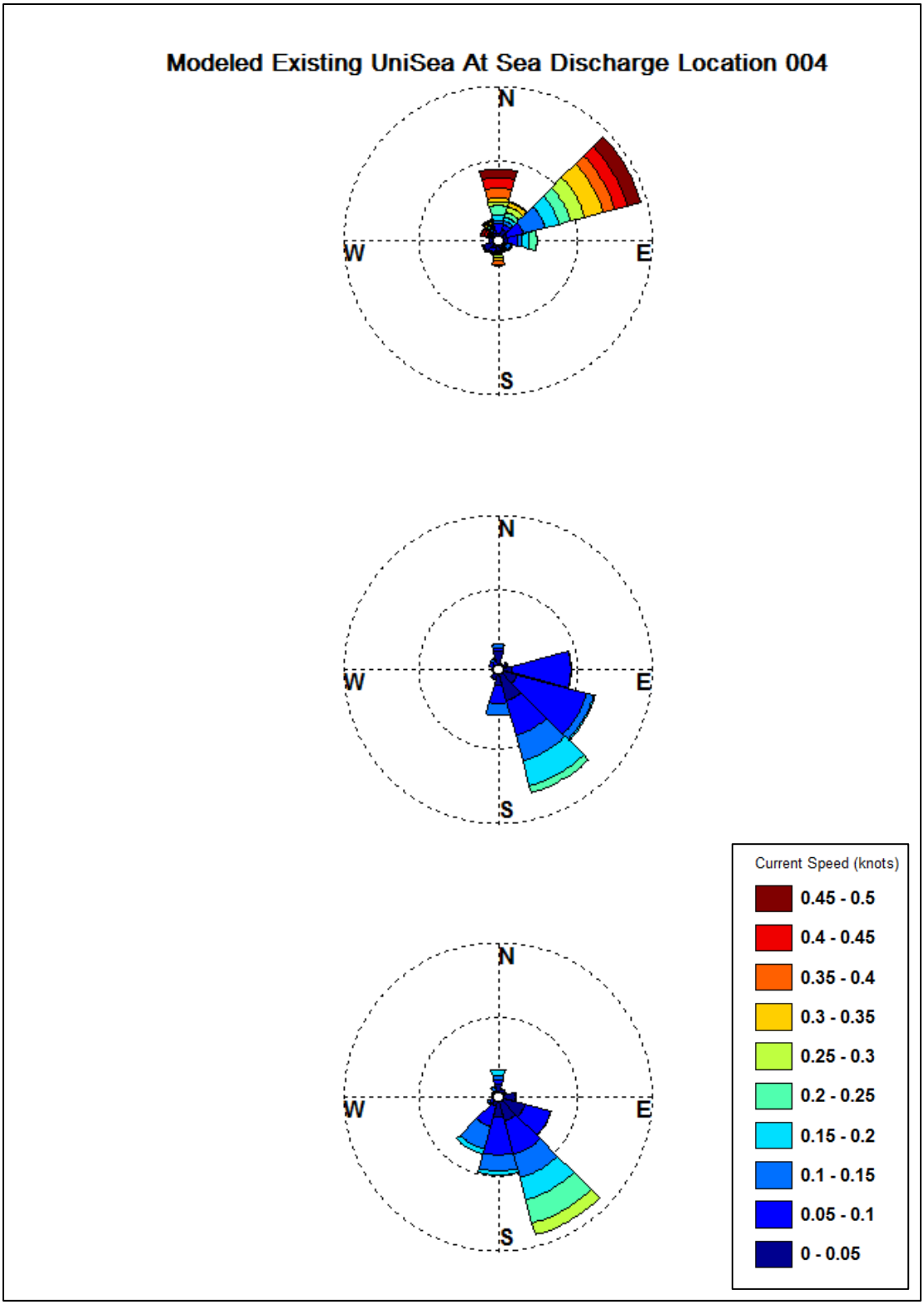

Figure 5.3-5. Current roses for surface (top), mid-depth (middle) and near seabed (bottom) currents at the existing UniSea At-Sea discharge 004 based on model predictions from a simulation period of 08 June through 29 June 2010. Oceanographic convention (current moving towards).

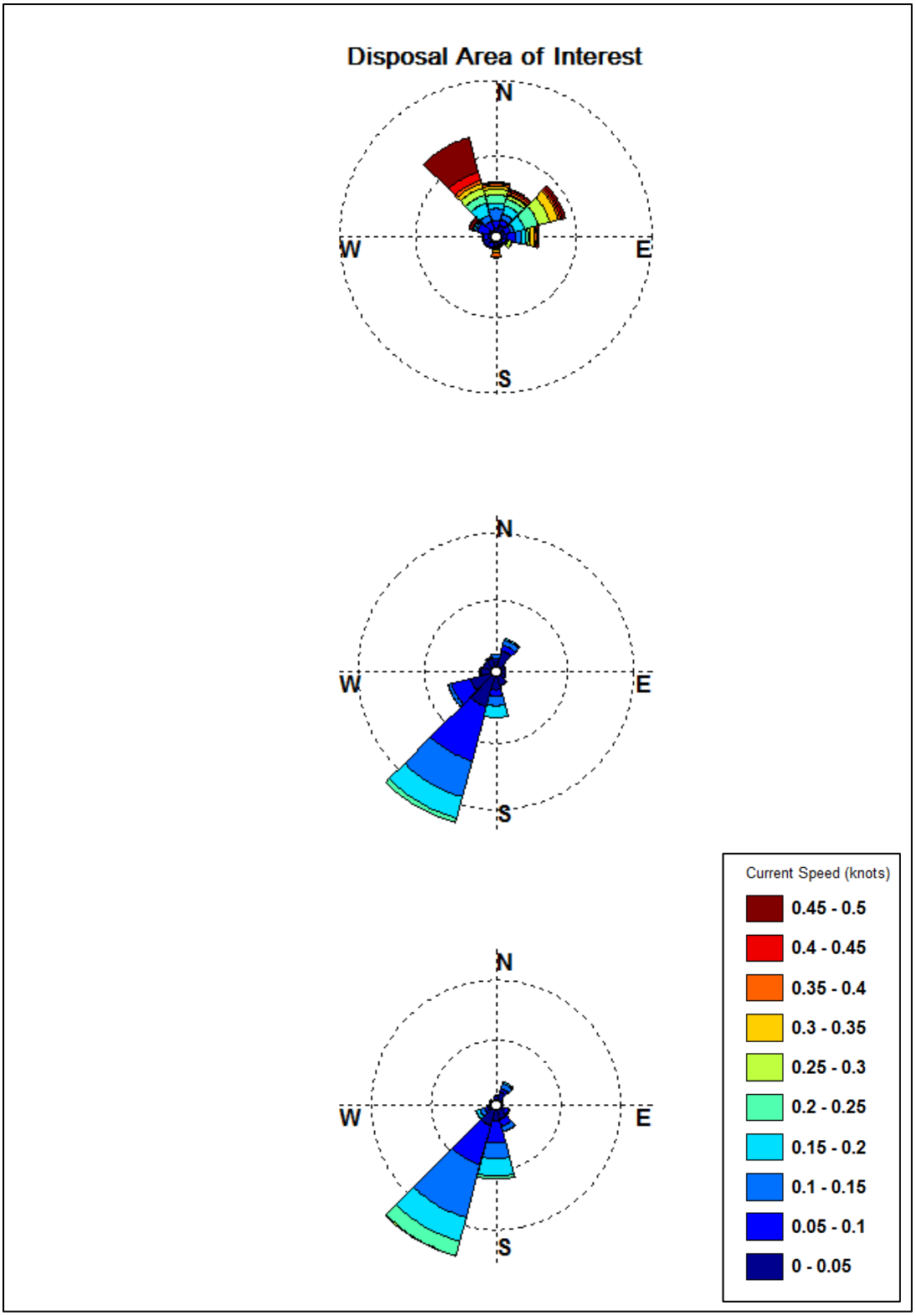

Figure 5.3-6. Current roses for surface (top), mid-depth (middle) and near seabed (bottom) currents at the disposal area of interest based on model predictions from a simulation period of 08 June through 29 June 2010. Oceanographic convention (current moving towards).

Table 4. Summary of vertical profile of statistical measures at the existing UniSea At-Sea discharge 004 site.

Depth (ft)	Average (knots)	P25 (knots)	P50 (knots)	P75 (knots)	P95 (Knots)
6.56	0.11	0.05	0.10	0.17	0.25
19.68	0.10	0.04	0.09	0.15	0.22
32.81	0.09	0.04	0.08	0.13	0.19
45.93	0.08	0.04	0.07	0.11	0.16
59.05	0.07	0.04	0.06	0.10	0.14
72.18	0.06	0.03	0.05	0.08	0.13
85.30	0.05	0.03	0.05	0.07	0.11
98.42	0.04	0.02	0.04	0.06	0.10
111.55	0.04	0.02	0.04	0.05	0.09
124.67	0.04	0.02	0.03	0.05	0.08
137.79	0.04	0.02	0.03	0.05	0.07
150.92	0.04	0.02	0.03	0.05	0.06
164.04	0.04	0.03	0.03	0.05	0.07
177.16	0.04	0.03	0.03	0.05	0.07
190.29	0.04	0.03	0.03	0.05	0.08
203.41	0.04	0.03	0.03	0.05	0.09
216.53	0.04	0.03	0.03	0.05	0.10
229.66	0.04	0.03	0.03	0.06	0.11
242.78	0.05	0.03	0.04	0.06	0.12
255.90	0.05	0.03	0.04	0.06	0.12
269.03	0.05	0.03	0.04	0.06	0.13
282.15	0.05	0.03	0.04	0.07	0.13
295.27	0.05	0.03	0.04	0.07	0.14
308.40	0.05	0.03	0.04	0.07	0.14
321.52	0.05	0.03	0.04	0.07	0.14
334.64	0.05	0.03	0.04	0.07	0.14
347.76	0.05	0.03	0.04	0.07	0.14
360.89	0.05	0.03	0.04	0.07	0.13
374.01	0.05	0.03	0.04	0.07	0.13
387.13	0.05	0.03	0.04	0.07	0.13
400.26	0.05	0.03	0.04	0.07	0.12

Table 5. Summary of vertical profile of statistical measures at the disposal area of interest.

Depth (ft)	Average (knots)	P25 (knots)	P50 (knots)	P75 (knots)	P95 (Knots)
9.52	0.12	0.04	0.10	0.16	0.30
28.57	0.10	0.04	0.09	0.14	0.27
47.62	0.09	0.03	0.07	0.12	0.23
66.67	0.07	0.03	0.06	0.11	0.20
85.72	0.06	0.03	0.05	0.09	0.18
104.77	0.05	0.02	0.04	0.08	0.15
123.82	0.05	0.02	0.03	0.07	0.13
142.87	0.04	0.02	0.03	0.06	0.12
161.92	0.04	0.02	0.03	0.05	0.10
180.97	0.03	0.01	0.03	0.05	0.08
200.02	0.03	0.01	0.03	0.05	0.07
219.07	0.03	0.01	0.03	0.05	0.07
238.12	0.03	0.01	0.03	0.05	0.07
257.17	0.03	0.01	0.03	0.05	0.08
276.22	0.04	0.02	0.03	0.05	0.09
295.27	0.04	0.02	0.03	0.06	0.09
314.32	0.04	0.02	0.04	0.06	0.10
333.37	0.04	0.02	0.04	0.07	0.10
352.42	0.05	0.02	0.04	0.07	0.11
371.47	0.05	0.02	0.04	0.07	0.11
390.52	0.05	0.03	0.05	0.08	0.11
409.57	0.05	0.03	0.05	0.08	0.12
428.62	0.05	0.03	0.05	0.08	0.12
447.67	0.06	0.03	0.05	0.08	0.12
466.72	0.06	0.03	0.05	0.08	0.12
485.77	0.06	0.03	0.05	0.08	0.12
504.82	0.06	0.03	0.05	0.08	0.12
523.87	0.06	0.03	0.05	0.08	0.12
542.92	0.06	0.03	0.05	0.08	0.11
561.97	0.06	0.03	0.05	0.08	0.11
581.02	0.05	0.03	0.05	0.07	0.10

6. References

Huang, W. and M.L. Spaulding, 1995a. Modeling of CSO-induced pollutant transport in Mt. Hope Bay. ASCE J. of Environmental Engineering, Vol. 121, No. 7, July, 1995, 492-498.

Huang, W. and M.L. Spaulding, 1995b. A three dimensional numerical model of estuarine circulation and water quality induced by surface discharges. ASCE Journal of Hydraulic Engineering, 121:(4) April 1995, p. 300-311.

Mendelsohn, D., 1998. Development of an Estuarine Thermal Environmental Model in a Boundary Fitted, Curvilinear Coordinate System. Applied Science Associates, Inc., 1998.

Muin, M., 1993. Development and Application of a Three-Dimensional Boundary-Fitted Model in Providence River, presented at: Estuarine and Coastal Modeling III, proceedings of the 3rd International Conference, Oak Brook, Illinois, September 8-10, 1993.

Muin, M., and M.L. Spaulding, 1997. Three-Dimensional Boundary-Fitted Circulation Model, published in: Journal of Hydraulic Engineering, January 1997.

Swanson, J.C., 1986. A three-dimensional numerical model system of coastal circulation and water quality, Ph.D. Dissertation, Univ. of Rhode Island, Kingston, R.I.

UniSea, Inc.

Waste Remediation Plan

Appendix B
Floyd|Snider Health and Safety Plan

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
°F	Degrees Fahrenheit
CPR	Cardiopulmonary resuscitation
HASP	Health and Safety Plan
HSO	Health and Safety Officer
PFD	Personal flotation device
PM	Project Manager
PPE	Personal protective equipment
SS	Site Supervisor
UniSea	UniSea, Inc.
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
VHF	Very high frequency

1.0 Plan Objectives and Applicability

This Health and Safety Plan (HASP) has been written to comply with the standards prescribed by the Occupational Safety and Health Act and the Washington Industrial Safety and Health Act.

The purpose of this HASP is to establish standards and mandatory safe practices and procedures for all Floyd|Snider personnel involved in activities described in the UniSea, Inc. (UniSea) Waste Remediation Plan. Under direction received by the U.S. Environmental Protection Agency (USEPA), UniSea will dredge seafood waste currently located within a small embayment on the southwest shore of Amaknak Island (refer to Figure 1.2 of the Waste Remediation Plan. The seafood waste will be dewatered and taken to the proposed disposal location in outer Unalaska Bay, approximately 5 nautical miles from the UniSea Facility. Floyd|Snider will be on-site to provide oversight of this work. The site includes the dredge area within the southwest shore of Amaknak Island, the proposed disposal site in outer Unalaska Bay, the transport route between these locations, and the barge decks or other support vessels.

This HASP assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may occur during this construction oversight. The plan consists of site descriptions, a summary of work activities, an identification and evaluation of physical hazards, and emergency procedures.

The provisions and procedures outlined by this HASP apply to all Floyd|Snider personnel on-site. Contractors, subcontractors, and all other persons involved with the field work activities described herein are required to develop and comply with their own HASP. All Floyd|Snider staff that will be on-site are required to read this HASP and indicate that they understand its contents by signing the Health and Safety Officer/Site Supervisor's (HSO/SS) copy of this plan.

This HASP is based on information that was available as of the date indicated on the title page. It is possible that additional hazards that are not specifically addressed by this HASP may exist at the site, or may be created as a result of on-site activities. It is the firm belief of Floyd|Snider that active participation in health and safety procedures and acute awareness of on-site conditions by all workers is crucial to the health and safety of everyone involved. Should project personnel identify a site condition that is not addressed by this HASP and have any questions or concerns about site conditions, they should immediately notify the HSO/SS and an addendum will be provided to this HASP.

The HSO/SS is responsible in the field for ensuring that the provisions outlined herein adequately protect worker health and safety and that the outlined procedures are properly implemented. In this capacity, the HSO/SS will conduct regular site inspections to ensure that this HASP remains current with potentially changing site conditions. The HSO/SS has the authority to make health and safety decisions that may not be specifically outlined in this HASP, should site conditions warrant such actions. Personnel responsibilities are further described in Section 4.0.

This HASP has been reviewed by the Project Manager (PM) and the HSO/SS prior to commencement of work activities. All Floyd|Snider personnel shall review the plan and be familiar with on-site health and safety procedures. A copy of the HASP will be on-site at all times.

2.0 Background Information

2.1 SITE BACKGROUND

UniSea operates a seafood processing plant located in Dutch Harbor, Alaska. The UniSea Facility is permitted to discharge wastewater, solids, and residues from the processing of seafood and related support activities from their seafood processing plant through their permitted outfalls in accordance with National Pollutant Discharge Elimination System (NPDES) Permit #AK002865-7 (USEPA 2003). Authorized discharges from the UniSea Facility have resulted in the formation of seafood waste piles within a small embayment on the southwest shore of Amaknak Island.

UniSea has been directed by USEPA to dredge the seafood waste located on the seafloor at UniSea's Dutch Harbor discharge locations. UniSea has prepared a Waste Remediation Plan to provide a summary of the activities to be completed to dredge and dispose of the seafood waste that has accumulated at the UniSea Facility. UniSea intends to remove seafood processing waste at the site that is greater than 1 foot in thickness and dispose of the waste at an approved location in outer Unalaska Bay. This dredging and at-sea disposal is expected to occur in the summer of 2016.

2.2 SCOPE OF WORK

This HASP focuses on the activities required to provide construction oversight during the dredging, transport, and disposal of the seafood waste, and to conduct water quality monitoring. It is anticipated that Alaska Department of Environmental Conservation will require water quality monitoring at the disposal location; all associated and required activities will be conducted in accordance with project agency approvals and/or permits. It is assumed that only one Floyd|Snider employee will be needed for construction oversight, and may not be accompanied by another Floyd|Snider employee during this work. However, during water quality sampling, two Floyd|Snider employees may be needed on-site.

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3.0 Emergency Contacts and Information

3.1 DIAL 911

In the event of any emergency, dial 911 to reach fire, police, and first aid.

3.2 MARITIME EMERGENCIES

For maritime emergencies, call the U.S. Coast Guard (USCG) by marine very high frequency (VHF) radio on channel 16 or call *CG from any Alaska-registered cell phone. Other USCG contact information includes:

Contact	Phone Number
USCG emergency number	(907) 463-2367
USCG Alaska (Unit 17) headquarters	(907) 463-2065
USCG office in Kodiak	(907) 487-5700

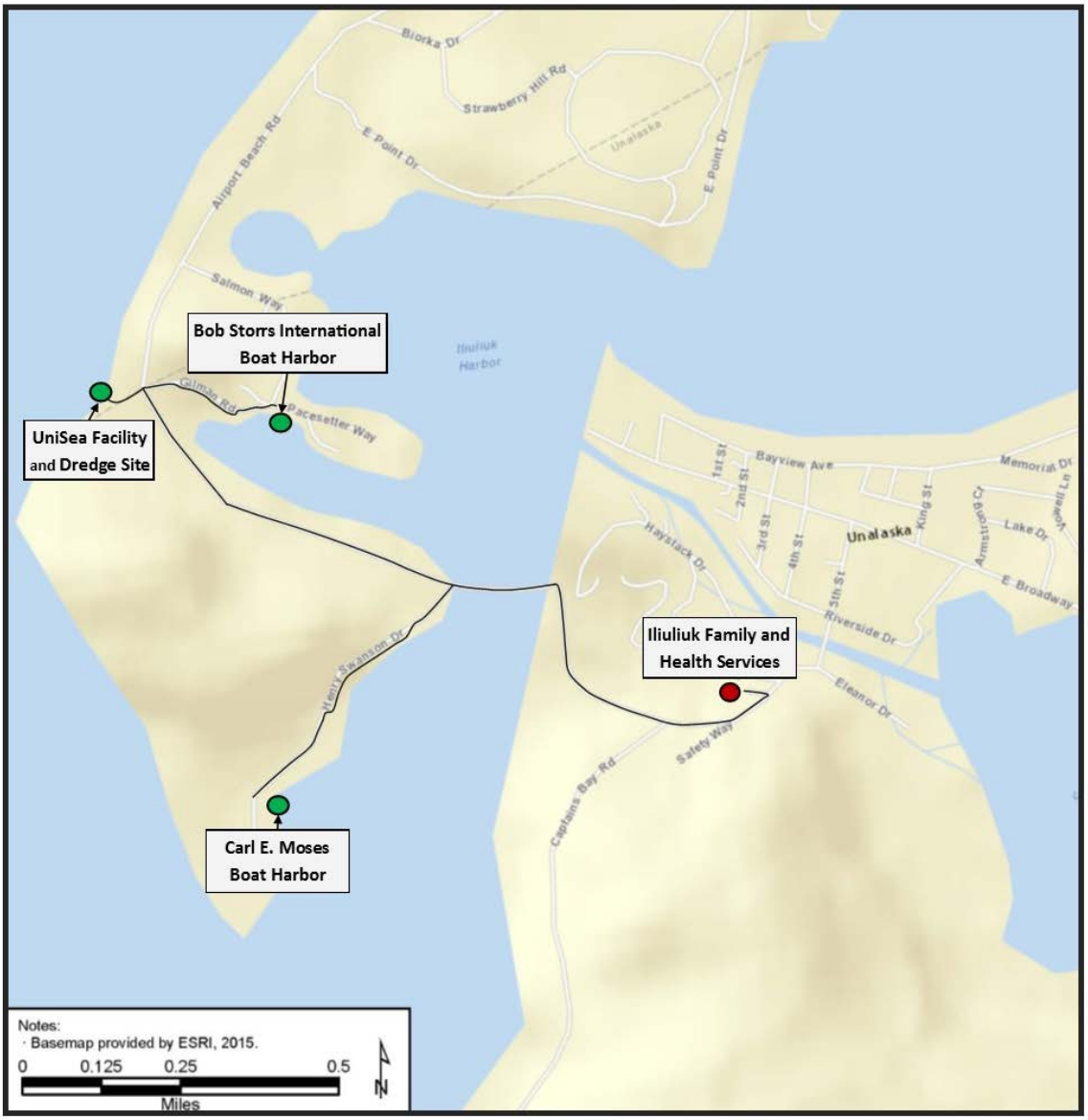
3.3 HOSPITAL AND POISON CONTROL

Nearest Hospital: Refer to Figure B.1 for map and directions to the hospital.	Iliuliuk Family and Health Services 34 Lavelle Court Unalaska, AK 99685 (253) 426-4101
Poison Control Center:	(800) 222-1222

Iliuliuk Family and Health Services provides urgent care and emergency services. If needed, Medevac is also available. Hospital hours are as follows:

Monday–Friday: 8:30 AM–6:00 PM
Saturday: 8:30 AM–1:00 PM
Closed Sundays

Figure B.1: Hospital Location



1. **From Robert Storrs Small Boat Harbor**, turn LEFT onto PACESETTER WAY.
2. Turn LEFT onto GILMAN WAY.
3. Turn LEFT onto AIRPORT BEACH ROAD and head SOUTH toward the vehicle bridge connecting Amaknak Island to Unalaska Island.
4. Continue on AIRPORT BEACH ROAD.
5. Turn LEFT onto LAVELLE COURT, arriving at ILIULIUK FAMILY AND HEALTH SERVICES.
   - *Driving distance: 1.5 miles* *Driving time: 5 minutes*

-or-

1. **From the UniSea Facility and Dredge Site**, turn RIGHT onto AIRPORT BEACH ROAD and head SOUTH toward the vehicle bridge connecting Amaknak Island to Unalaska Island.

2. Continue on AIRPORT BEACH ROAD.
3. Turn LEFT onto LAVELLE COURT, arriving at ILIULIUK FAMILY AND HEALTH SERVICES.
   - *Driving distance: 1.2 miles* *Driving time: 3 minutes*

-or-

1. **From Carl E. Moses Boat Harbor**, turn RIGHT onto HENRY SWANSON DRIVE.
2. Turn RIGHT onto AIRPORT BEACH ROAD and cross the vehicle bridge connecting Amaknak Island to Unalaska Island.
3. Continue on AIRPORT BEACH ROAD.
4. Turn LEFT onto LAVELLE COURT, arriving at ILIULIUK FAMILY AND HEALTH SERVICES.
   - *Driving distance: 1.0 mile* *Driving time: 3 minutes*

3.4 PROVIDE INFORMATION TO EMERGENCY PERSONNEL

All Floyd|Snider project personnel should be prepared to give the following information to emergency personnel:

Information to give to Emergency Personnel	
Site Location:	Project activities will primarily occur off shore, adjacent to the UniSea Facility in Dutch Harbor, and at the disposal location in outer Unalaska Bay. Vessel transport will occur between these two sites, so Floyd|Snider project personnel should be aware of their location and should be able to relay approximate whereabouts to emergency personnel. Global Positioning System (GPS) coordinates for exact location will likely be available from instruments in the barge wheelhouse. **UniSea Facility, Dredge Location:** X: 5311601.72483, Y: 1184780.40187 *Physical location: at Airport Beach Road and Gilman Way* **Unalaska Bay, Disposal Location:** X: 5308295.09488, Y: 1218184.25507
Number that You are Calling from:	The phone you are calling from will have information on its telephone number.
Type of Accident or Type(s) of Injuries:	Describe accident and/or incident and numbers of personnel needing assistance.

3.5 FLOYD|SNIDER AND OTHER CONTACTS

After contacting emergency response crews as necessary, contact the Floyd|Snider HSO/SS, PM, or a Principal to report the emergency.

Floyd|Snider Emergency Contacts:

Contact	Office Phone Number	Cell Phone Number
Megan McCullough, HSO/SS	(206) 292-2078	(206) 291-7713
Jessi Massingale, PM		(206) 683-4307
Kate Snider, Principal		(206) 375-0762

The Floyd|Snider contact may then direct the field staff to inform others from the list of contacts below.

UniSea Emergency Contacts:

Contact	Office Phone Number	Cell Phone Number
Gregg Bishop	(907) 581-7264	(907) 359-7264
Emily Gibson	(907) 581-7373	(907) 359-1737

Emergency Contacts for Spill Response:

Contact	Office Phone Number
National Response Center	(800) 424-8802
Alaska Department of Environmental Conservation, Dutch Harbor Office (Spill Response)	(907) 581-4632
Port of Dutch Harbor	(907) 359-1254

4.0 Primary Responsibilities and Requirements

4.1 PROJECT MANAGER—JESSI MASSINGALE, PE

The PM has overall responsibility for the completion of the work, including the review and oversight of this HASP. The PM will review health and safety issues as needed, and has the authority to allocate resources and personnel to safely accomplish this work.

The PM will provide primary direction to all Floyd|Snider personnel involved in work at the site. If the project scope changes, the PM will notify the HSO/SS so that an appropriate addendum to the HASP can be prepared. The PM will ensure that all Floyd|Snider personnel on-site have received the required training, are familiar with the HASP, and understand the procedures to follow in the event of an accident and/or emergency.

4.2 HEALTH AND SAFETY OFFICER AND SITE SUPERVISOR—MEGAN MCCULLOUGH, PE

The HSO/SS will approve this HASP and any amendments, and will ultimately be responsible for full implementation of all elements of the HASP.

The HSO/SS will conduct on-site safety meetings daily before work commences, and will ensure that all Floyd|Snider personnel have appropriate personal protective equipment (PPE) on-site and that the PPE is properly used.

The HSO/SS will advise the PM and project personnel on all potential health and safety issues of activities to be conducted at the site. The HSO/SS will modify the site HASP based on field assessment of accidents and incidents that may occur, and will report any accidents and incidents to the PM and recommend corrective action if needed. If the HSO/SS observes unsafe working conditions, the HSO/SS will suspend all work until the hazard has been addressed.

Administratively, the HSO/SS will be responsible for keeping attendance lists of personnel present at site health and safety meetings, completed accident reports, and signatures of all personnel who have read this HASP.

4.3 FLOYD|SNIDER PROJECT PERSONNEL

All Floyd|Snider project personnel will take precautions to prevent accidents and/or incidents from occurring to themselves and others in the work areas. Employees will report all accidents, incidents, or unsafe working conditions to the HSO/SS immediately. Employees will inform the HSO/SS of any physical conditions that could impact their ability to perform field work.

All field personnel will adhere to general safety rules regarding appropriate PPE by wearing hard hats, safety glasses, gloves, steel-toed boots, high visibility safety vest, and a USCG-approved personal flotation device (PFD).

4.4 TRAINING REQUIREMENTS

All Floyd|Snider personnel must participate in a site emergency briefing and hazard orientation with the HSO/SS prior to conducting any work on-site. Additional site-specific training that covers on-site hazards, PPE requirements, use and limitations, and emergency response information as outlined in this HASP will be given by the HSO/SS before on-site work activities begin. Daily health and safety meetings will be documented on the Daily Safety Meeting form included as Attachment B.1.

At least one person on-site must have current Cardiopulmonary resuscitation (CPR)/First Aid certification.

5.0 Hazard Evaluation and Risk Analysis

There are two broad categories that may be encountered during this work, including physical hazards and fire/explosion hazards. Sections 5.1 and 5.2 discuss specific hazards within these categories.

5.1 PHYISCAL HAZARDS

The following table summarizes a variety of physical hazards that may be encountered at the site during work activities. For convenience, these hazards have been categorized into several general groupings with recommended preventative measures.

Hazard	Cause	Prevention
Head Strike	Falling and/or bumping hazards	Hard hats will be worn by all personnel at all times when overhead hazards exist, such as during dredging activities and around large, heavy equipment.
Foot/Ankle Twist, Crush, Slip/Trip/Fall	Dropped objects, uneven and/or slippery surfaces	Steel-toed boots must be worn at all times. Pay attention to footing on uneven or wet terrain and do not run. Keep work areas organized and free from unmarked trip hazards. Do not step on or inside ropes or lines.
Hand Cuts	Hands or fingers pinched or crushed, cut from handling sharp/rough objects and tools	Safety gloves will be worn to protect the hands from cuts and abrasions. Keeps hands and fingers clear of heavy machinery, and inside of the vessel during docking procedures.
Eye Damage from Flying Materials, or Splash Hazards	Exposure due to flying debris or splashes, poor lighting	Safety glasses will be worn at all times. If a pressure washer is used to wash the deck of the barge, a face shield may be needed over safety glasses or goggles.

Hazard	Cause	Prevention
Fall/Hypothermia/ Drowning Hazard	Falling off vessel, stormy weather	Avoid leaning over the edge of the vessel. If work must be conducted over edge, secure workers with a lifeline, avoid sampling on stormy days or when seas are high, use caution when transferring from land to sea, and make sure vessel is secured to dock or pier before boarding or disembarking. As with any offshore work, there is a possibility of falling overboard. When possible, personnel will stand well in from the edges of the deck. Personal USCG-approved PFDs will be worn at all times when on the vessel. At least one person trained in CPR/First Aid will be on board at all times.
Fire Aboard Vessel or Abandon Ship	Mechanical and electrical systems failure, gasoline ignition, water in-take	If there is a call to abandon ship, use the following steps for safe evacuation: • If time allows, contact the USCG (phone numbers listed in Section 3.2). • Deploy and board life raft while wearing a PFD • Perform head count to ensure that all project personnel have evacuated safely • Contact emergency response crews • Inform the HSO/SS and PM of the situation
Mechanical Hazards	Heavy equipment such as vessel winches, motors, booms, and other machines	Ensure the use of competent operators, backup alarms, regular maintenance, daily mechanical checks, and proper guards. Subcontractors will supply their own HASP. All project personnel will make eye contact with operator and obtain a clear “OK” before approaching or working within swing radius of heavy equipment, staying clear of swing radius. Personnel will stand clear of machinery at all times unless specific instructions are given by the vessel captain or other persons in authority.

Hazard	Cause	Prevention
Hearing Damage due to Noise	Machinery creating more than 85 decibels TWA, less than 115 decibels continuous noise, or peak at less than 140 decibels	Wear earplugs or protective earmuffs when a conversational level of speech is difficult to hear at a distance of 3 feet; when in doubt, a sound level meter may be used to document noise exposure.
Strains from Improper Lifting	Injury due to improper lifting techniques, overreaching/ overextending, or lifting overly heavy objects	Use proper lifting techniques and mechanical devices where appropriate. The proper lifting procedure first involves testing the weight of the load by tipping it. If in doubt, ask for help. Do not attempt to lift a heavy load alone. Take a good stance and plant your feet firmly with legs apart, one foot farther back than the other. Point the forward foot in the direction of the eventual movement. Make sure you stand on a level area with no slick spots or loose gravel. Keep your back straight, almost vertical. Bend at the hips, holding load close to your body. Keep the weight of your body over your feet for good balance. Use large leg muscles to lift. Avoid quick, jerky movements and twisting motions. Never try to lift more than you are accustomed to. Use as much of your hands as possible, not just your fingers.
Accidents due to Inadequate Lighting	Improper illumination	Work will proceed during daylight hours only or under sufficient artificial light.
Noxious Odors	Dredging and transport of seafood waste	Dredged material will be placed on an open-deck barge, and not in a confined space, which allows for adequate material off-gassing. Personnel will avoid close contact with the seafood waste to reduce irritation to nose, mouth, and eyes from the odor.
Heat Exposure	High temperatures exacerbated by PPE and/or dehydration	Heat exposure and heat-related illnesses are not anticipated because the average summer temperature at the site is no greater than 60 degrees Fahrenheit (°F). However, workers will ensure adequate hydration and shade, and will take breaks when temperatures are elevated.

Hazard	Cause	Prevention
Cold Stress	Cold temperatures and related exposure on- and offshore	Workers will wear appropriate clothing, stay dry, and take breaks in a heated environment if working in freezing temperatures. **Additional details on cold stress are provided in Section 5.1.1.**

Abbreviation:
TWA Time-weighted average.

5.1.1 Cold Stress

While this work will be completed in the summer months, exposure to cold temperatures and water may occur due to the weather and wind conditions in Dutch Harbor, Alaska, and the low temperatures of the sea water. Exposure to moderate levels of cold can cause the body's internal temperature to drop to a dangerously low level, causing hypothermia. Symptoms of hypothermia include: slow, slurred speech; mental confusion; forgetfulness; memory lapses; lack of coordination; and drowsiness.

To prevent hypothermia, site personnel will stay dry and avoid exposure. Site personnel will have access to a warm, dry area, such as a wheelhouse, to take breaks from the cold weather and warm up. Site personnel will be encouraged to wear sufficient clothing in layers such that outer clothing is wind- and waterproof and inner layers retain warmth (wool or polypropylene), if applicable. Site personnel will keep hands and feet well protected at all times. The signs and symptoms and treatment for hypothermia are summarized below.

Signs and Symptoms

- Mild hypothermia (body temperature of 98–90 °F)
  - Shivering
  - Lack of coordination, stumbling, fumbling hands
  - Slurred speech
  - Memory loss
  - Pale, cold skin
- Moderate hypothermia (body temperature of 90–86 °F)
  - Shivering stops
  - Unable to walk or stand
  - Confused and irrational
- Severe hypothermia (body temperature of 86–78 °F)
  - Severe muscle stiffness
  - Very sleepy or unconscious

  - Ice-cold skin
  - Death

Treatment of Hypothermia (Proper treatment depends on the severity of the hypothermia)

- Mild hypothermia
  - Move to warm area
  - Stay active
  - Remove wet clothes and replace with dry clothes or blankets and cover the head
  - Drink warm (not hot) sugary drinks
- Moderate hypothermia
  - All of the above, plus:
    - call 911 for an ambulance
    - cover all extremities completely
    - place very warm objects such as hot packs or water bottles on the victim's head, neck, chest, and groin
- Severe hypothermia
  - Call 911 for an ambulance
  - Treat the victim very gently
  - Do not attempt to re-warm—the victim should receive treatment in a hospital

Frostbite

Frostbite occurs when the skin actually freezes and loses water. While frostbite usually occurs when the temperatures are 30 °F or lower, windchill factors can allow frostbite to occur in above-freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands. Frostbite symptoms include cold, tingling, stinging, or aching feelings in the frostbitten area followed by numbness and skin discoloration from red to purple, then to white or very pale skin. Should any of these symptoms be observed, wrap the area in soft cloth—do not rub the affected area—and seek medical assistance. Call 911 if the condition is severe.

Protective Clothing

Wearing the right clothing is the most important way to avoid cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, retains its insulation even when wet. The following are recommendations for working in cold environments:

- Wear *at least three layers* of clothing:
  - An outer layer to break the wind and sea spray while allowing some ventilation (like Gortex or nylon)

  - A middle layer of wool to absorb sweat and provide insulation even when wet
  - An inner layer of cotton or synthetic weave to allow ventilation
- Wear a hat—up to 40 percent of body heat can be lost when the head is left exposed
- Wear insulated and steel-toed footwear
- Keep a change of dry clothing available in case work clothes become wet
- Do not wear tight clothing—loose clothing allows better ventilation

Work Practices

- Drinking: Drink plenty of liquids, avoiding caffeine and alcohol. It is easy to become dehydrated in cold weather.
- Work Schedule: If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold in heated areas.

5.1.2 Biohazards

Bees and other insects may be encountered during the field work tasks. Persons with allergies to bees will make the HSO/SS aware of their allergies and will avoid areas where bees are identified. Controls such as repellents, hoods, nettings, masks, or other personal protection may be used. Report any insect bites or stings to the HSO/SS and seek first aid if necessary.

Site personnel will maintain a safe distance from any urban wildlife encountered, including raccoons and rodents, to preclude a bite from a sick or injured animal.

5.2 FIRE AND EXPLOSION HAZARDS

Flammable and combustible liquid hazards may be present from fuels and lubricants brought to the property to support heavy equipment. When on-site storage is necessary, such material will be stored in containers approved by the Alaska Department of Transportation and Public Facilities in a location not exposed to strike hazards, and provided with secondary containment. A minimum 2-A:20-B fire extinguisher will be located within 25 feet of the storage location and where refueling occurs. Any subcontractors bringing flammable and combustible liquid hazards to the site are responsible for providing appropriate material for containment and spill response, and such hazards should be addressed in their respective HASP. Transferring of flammable liquids (e.g., gasoline) will occur only after making positive metal to metal connection between the containers. A bonding strap may be necessary to achieve this. Storage of ignition and combustible materials will be kept away from storage and fueling operations.

6.0 Personal Protective Equipment

All work will proceed in Level D PPE, which will include a hard hat, safety glasses, gloves, steel-toed boots, high visibility safety vest, and a USCG-approved PFD. USCG-approved PFDs must be worn at all times while performing work on a vessel. Hearing protection should be used as needed.

All personnel will be properly trained in the use of PPE. The HSO/SS will periodically inspect equipment such as gloves and hard hats for defects.

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7.0 Communication

The primary means of communication on-site and with off-site contacts will be via cell phones; however, cell phone service will be limited. Phones serviced by AT&T will have minimal reception, and other service providers do not provide coverage in this area. The PM may provide Floyd|Snider staff with SIM cards to extend coverage. VHF radios may also be used for communication to external parties during vessel movement off-shore.

An agreed-upon system of alerting via air horns on the vessel may be used to signal an emergency if noise levels do not allow for effective communication by voice, and sounding of the vessel's general alarm is not needed.

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8.0 Emergency Response and Contingency Plan

This section defines the emergency action plan for the site. It will be rehearsed with all Floyd|Snider personnel and reviewed whenever the plan is modified or the HSO/SS believes that site personnel are unclear about the appropriate emergency actions.

A muster point of refuge that is clear of adjacent hazards will be identified by the HSO/SS and communicated to the field team. In an emergency, all site personnel will evacuate to the muster point for roll call. It is important that each person on-site understand their role in an emergency, and that they remain calm and act efficiently to ensure everyone's safety.

After an emergency is resolved, the entire project team will meet and debrief on the incident—the purpose is not to fix blame, but to improve the planning and response to future emergencies. The debriefing will review the sequence of events, what was done well, and what can be improved. The debriefing will be documented in a written format and communicated to the PM. Modifications to the emergency plan will be approved by the PM.

Reasonably foreseeable emergency situations include medical emergencies, accidental release of hazardous materials (such as gasoline or diesel), and general emergencies such as fire, thunderstorm, and earthquake. Expected actions for each potential incident are outlined in the following sections.

8.1 MEDICAL EMERGENCIES

In the event of a medical emergency, the following procedures should be used:

- Stop any imminent hazard if you can safely do so.
- Remove ill, injured, or exposed person(s) from immediate danger if moving them will clearly not cause them harm and no hazards exist to the rescuers.
- If serious injury or a life-threatening condition exists, call **911** for USCG, paramedics, fire department, and police. The USCG may also be reached by VHF radio on channel 16 or call *CG from any Alaska-registered cell phone.

  Clearly describe the location, injury, and conditions to the dispatcher. Designate a person to meet with emergency responders and direct emergency equipment to the injured person(s).
- Trained personnel may provide CPR/First Aid if it is necessary and safe to do so.
- Call the PM and HSO/SS.
- Immediately implement steps to prevent recurrence of the accident.

Refer to Figure B.1 in Section 3.3 for a map showing the nearest hospital location.

8.2 RELEASE OF HAZARDOUS MATERIALS

1. Instruct a designated person to contact the PM and confirm a response.
2. Contain the spill, if it is possible and can be done safely.
3. If the release is not stopped, contact 911 to alert the fire department.
4. Contact the National Response Center at 1 98000 424-8802 to report the release.
5. Initiate cleanup.
6. The PM will submit a written report to Alaska Department of Environmental Conservation in the event of a reportable release of hazardous materials.

8.3 GENERAL EMERGENCIES

In the case of fire, explosion, earthquake, or imminent hazards, work shall be halted and all on-site personnel will be immediately evacuated or moved to a safe place. The local police/fire department shall be notified if the emergency poses a continuing hazard by calling 911. USCG responders can also be reached by VHF radio channel 16 or by dialing *CG from any Alaska-registered cell phone.

In the event of a thunderstorm, outdoor work will be discontinued until the threat of lightning has resided. During the incipient phase of a fire, the available fire extinguisher(s) may be used by persons trained in putting out fires, if it is safe for them to do so. Contact the USCG and/or fire department as soon as feasible.

8.4 EMERGENCY COMMUNICATIONS

In the case of an emergency, an air horn may be used to signal the emergency. One long (5-second) blast will be given as the emergency/stop work signal. If the air horn is not working, overhead waving of arms will be used to signal the emergency. Or, if additional warning is needed, the vessel's general alarm system may be activated. In any emergency, all personnel will move to the designated refuge area and await further instruction.

8.5 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available on the vessel(s) and functional at all times:

- First Aid Kit—contents approved by the HSO/SS, including two bloodborne pathogen barriers.
- USCG- approved throwable flotation devices – three orange 24-inch ring life buoys, with at least 90 feet of line per device.
- USCG-approved buoyant apparatus of sufficient capacity to accommodate every person on board.
- Portable fire extinguishers as required by law for tonnage and size of vessel.
- Navigation information and compass.
- A copy of the current HASP.

9.0 Approvals

Project Manager	Date
Project Health & Safety Officer	Date

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10.0 Signature Page

I have read this HASP and understand its contents. I agree to abide by its provisions and will immediately notify the HSO/SS if site conditions or hazards not specifically designated herein are encountered.

Name (Print)	Signature	Date	Company/Affiliation

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UniSea, Inc.

Waste Remediation Plan

Appendix B
Floyd|Snider Health and Safety Plan

Attachment B.1
Daily Safety Meeting Forms

DAILY SAFETY MEETING AND DEBRIEF FORM

Instructions:
To be completed by supervisor prior to beginning of work each day, when changes in work procedures occur, or when additional hazards are present. Please maintain a copy of this form with the site-specific HASP for the record.

PROJECT NAME AND ADDRESS:	**WORK COMPLETED/TOOLS USED:**

TOPICS/HAZARDS DISCUSSED:

Chemicals of concern:
Slip, trip, fall:
Heat or cold stress:
Required PPE:
Other Potential Hazards:
• Environmental:
• Physical:
• Biological:
• Other :

INFORMAL TRAINING CONDUCTED (Name, topics):

NAMES OF EMPLOYEES:

ADDITIONAL HAZARDS IDENTIFIED AT END OF WORK DAY:

Near Misses/Incidents? If so proceed to Page 2 Near Miss and Incident Reporting Form

Supervisor's Signature/Date: _____

NEAR MISS AND INCIDENT REPORTING FORM

INCIDENTS:

INJURIES:

NEAR MISSES:

CORRECTIVE ACTIONS:

Supervisor's Signature/Date: _____

DAILY SAFETY MEETING ATTENDEES

Name/Company (printed)	Signature

Conducted by: _____ _____ _____

Name **Signature** **Date**