

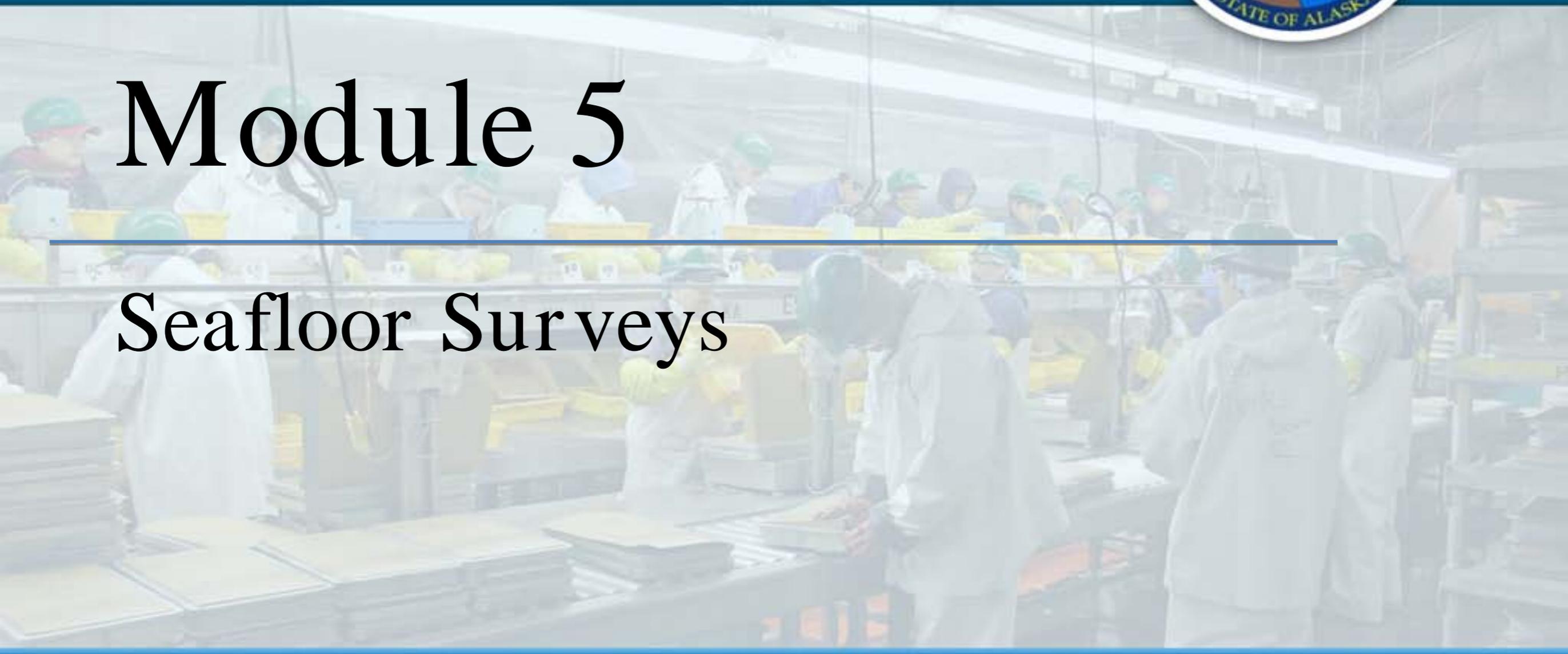


Alaska Department of Environmental Conservation
Division of Water



Module 5

Seafloor Surveys



2012 SEAFOOD PROCESSING WASTE PERMITTING & COMPLIANCE WORKSHOP

Seattle, Washington April 24-25, 2012

Module 5 – Sea Floor Surveys

MODULE 5



Shawn Stokes

Department of Environmental Conservation

Steve Haggitt

Haggitt Consulting

Module 5 – OBJECTIVES

MODULE 5



- Be aware of the various sea floor survey methods that can be utilized to satisfy permit requirements
- Understand certain key factors necessary for an acceptable sea floor survey
- Be aware of future sea floor survey requirements in upcoming permits

Module 5 – What Will You Learn

MODULE 5



- What survey method is the appropriate method for your discharge location
- What are the key survey requirements
 - Qualifications
 - Repeatability
 - Accuracy
 - Safety

Module 5 – Sea Floor Surveys

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What is the Purpose of a survey?

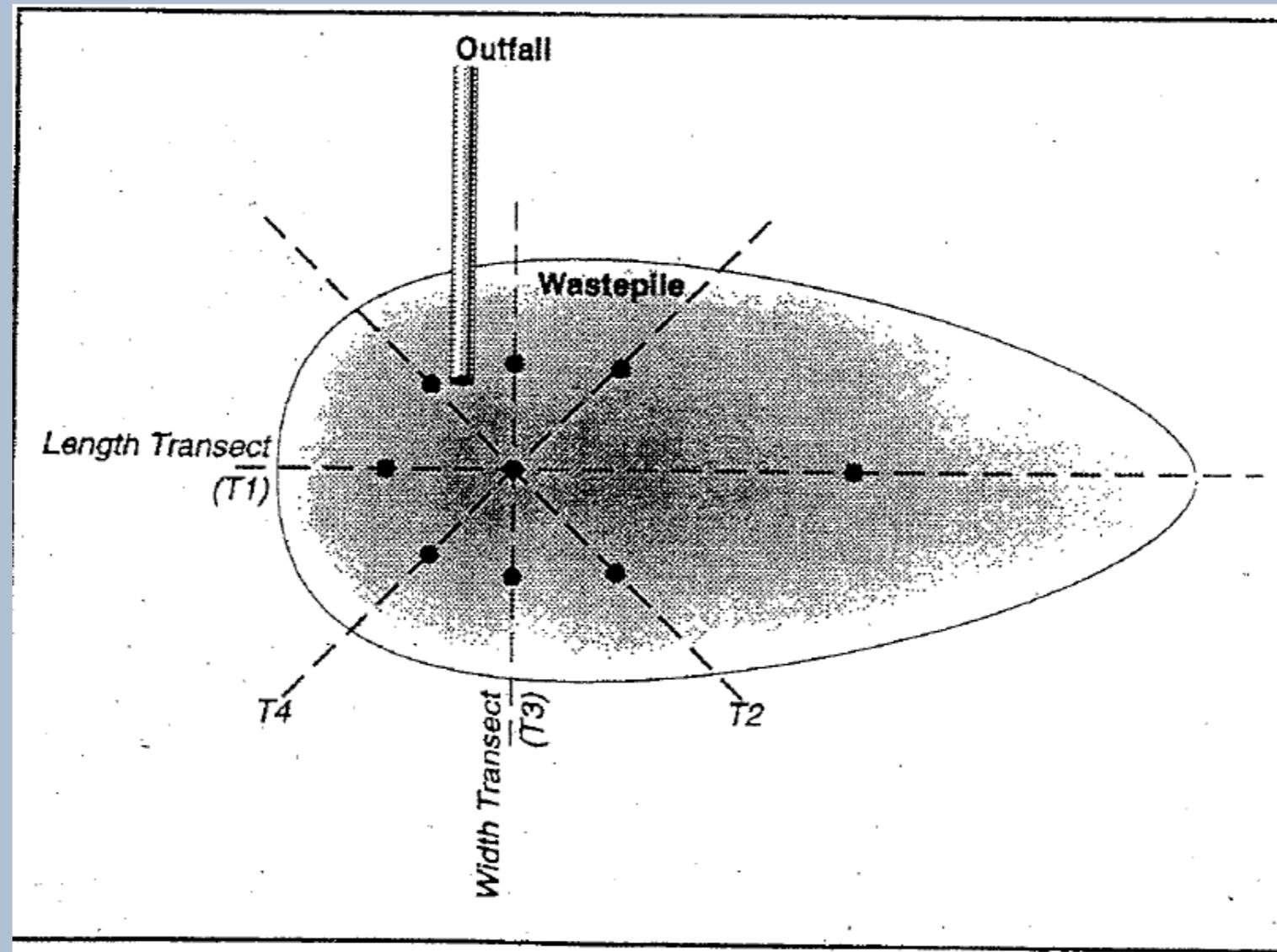
- Compliance with the residues water quality criteria
- Boundary of Seafood Processing Waste

Module 5 – Sea Floor Surveys

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AKG520000 "Tiers"

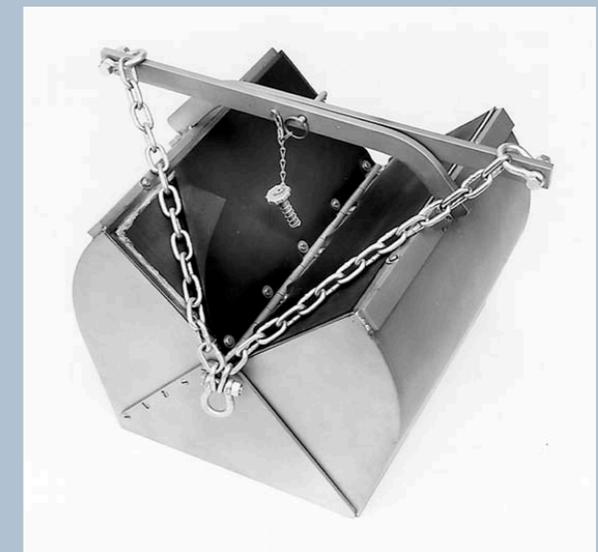
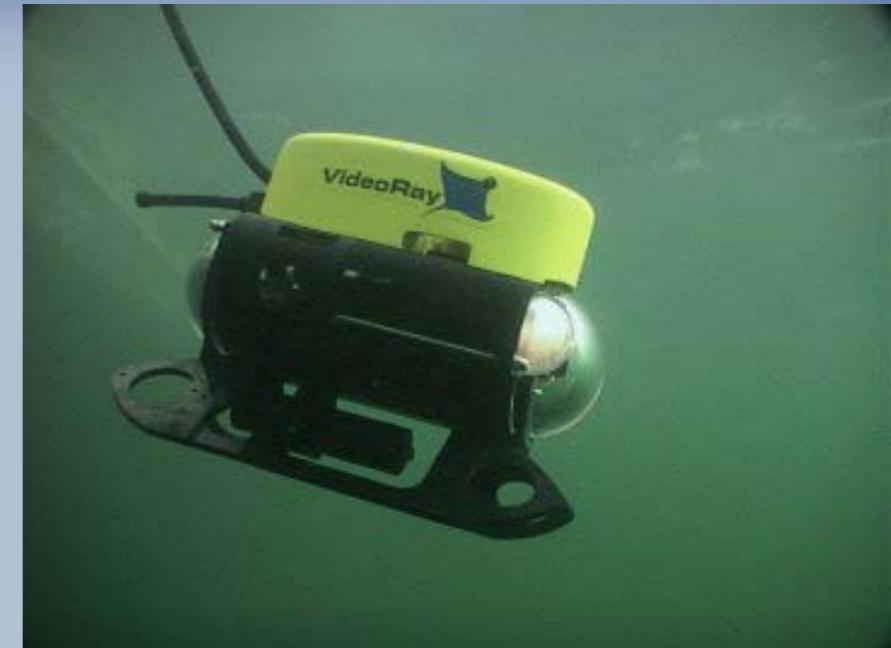
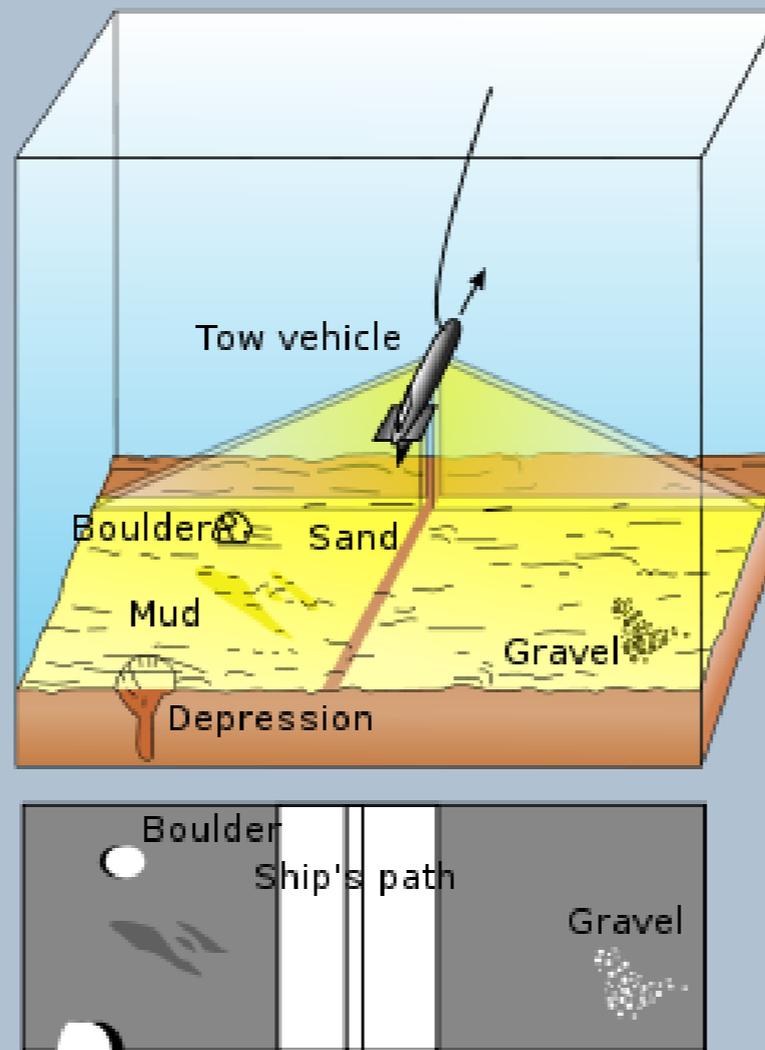


Module 5 – Sea Floor Surveys

MODULE 5



Survey Methods



Module 5 – Sea Floor Surveys

MODULE 5



AKG523000 Dive Survey Protocol

6.3.4 **Survey Protocol.** The ADEC survey protocol for using a diver to conduct a survey can be found in Appendix D. An operator can request a modification to the survey protocol to accommodate various survey methods including remotely operated vehicles (ROV), sonar, grab samples, or an underwater camera. The survey protocol will only be modified if ADEC determines that it is appropriate. The modified protocol may include changes in survey (1) stations, (2) times, (3) parameters, or (4) methods.

Module 5 – Sea Floor Surveys

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- Steve Haggitt - Haggitt Consulting
 - Will describe various survey methods approved by DEC
 - Other methods are also acceptable with approval

Guidance on Method Selection

MODULE 5



Selection of survey methods

CONDITION	DIVING SE, WT, PS, PC, L	VIDEO SE, PS, PC, L	GRAB SE, PS, L
Extreme depth	N/A OVER 120 fsw	200 MLLW MAX	200 MLLW MAX
High current	Less than 2 KNOTS	Over 3 + KNOTS	Less than 3 KNOTS
Low visibility	N/A UNDER 15 FEET	3 INCHES	0 INCHES
Large area	2 ACRES PER DAY	12 ACRES PER DAY	500 ACRES PER DAY

Operational limits and data collection capabilities of three methods of seafloor sampling. Spatial extent=SE, Waste thickness=WT, Particle Size=PS, Percent Cover=PC, Location=L, Feet of Seawater=fsw

Dive Survey Methods

MODULE 5



- Provides a robust visual assessment.
- The most commonly used survey method
 - Various Protocols
- Is the practical choice for surveys under 2 acres and less than 120 feet in depth.
- Limitations for diving include;
 - High currents
 - Low visibility
 - Extreme depths without additional equipment and training



Video Survey Methods

MODULE 5



- Most often employed when the physical area to be surveyed is not practical with standard dive methods.
- Used for situations where low light, poor visibility or high currents make diving not practical.
- Used for depths that exceed 120 feet MLLW.

Grab Sampling

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- Utilized in adverse conditions such as high current, zero visibility or extreme depth.
- Capabilities Include:
 - Grab sampling can provide grind size.
 - Provides rough estimates of spatial extent.
 - May be used to compliment diving or video survey methods.

Selection Criteria: Diving

MODULE 5



- Diving Advantages
 - Clear Digital Photography
 - Time, Date and Location Stamped Video
 - Up Close inspections and measurements

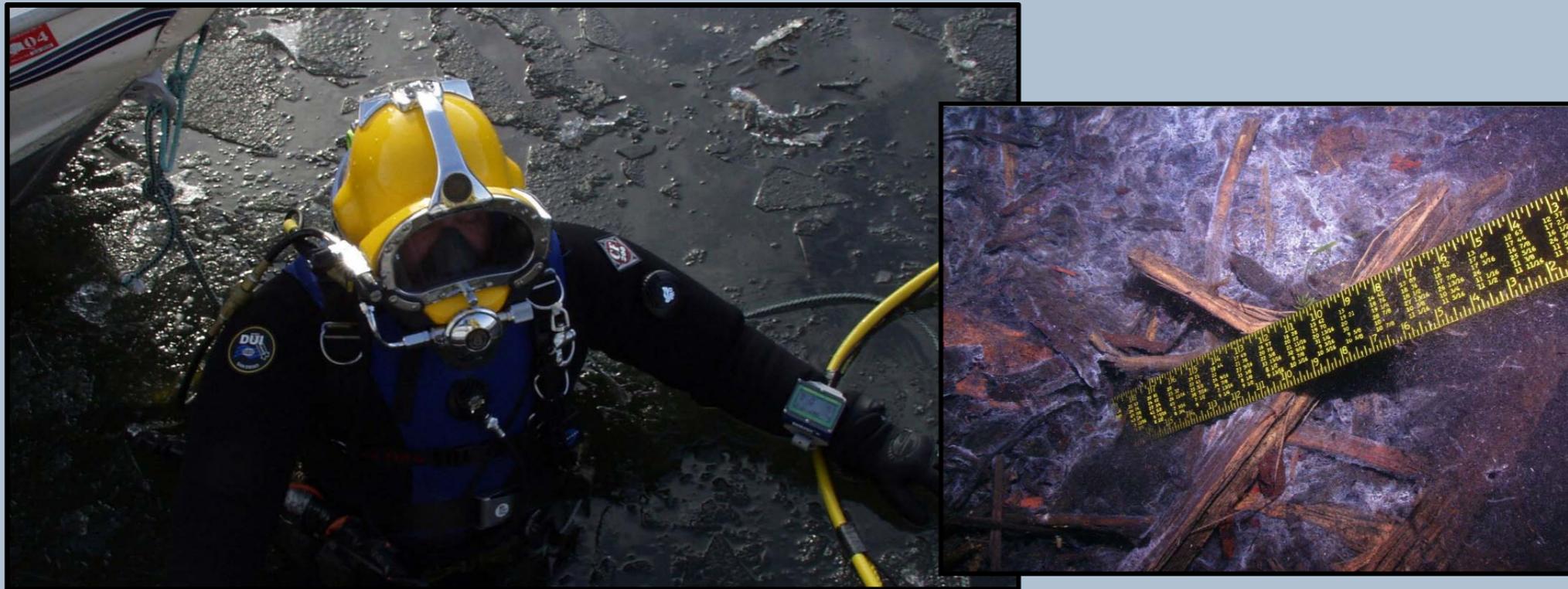


Selection Criteria: Diving

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- Diving Advantages
 - With Communication allows for two observers
 - Each survey may be recorded for review
 - Up Close inspections and measurements



Selection Criteria: Diving

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- Diving Advantages
 - Allows for a global view of conditions
 - Allows for the survey to adapt quickly to new conditions



Selection Criteria: Diving

- Diver Requirements

- Knowledgeable in the requirements of the Permit
- Experienced in Alaskan waters
- Commercial Diving Experience

MODULE 5



Selection Criteria: Video

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- Video Limitations
 - Depths under 200 feet MLLW
 - Currents under 3 knots
 - Visibility of at least 3 inches



Selection Criteria: Video

MODULE 5



- Video Limitations
 - Depths under 200 feet MLLW
 - Currents under 3 knots
 - Visibility of at least 3 inches



Selection Criteria: Video

MODULE 5



- Video Limitations
 - Depths under 200 feet MLLW
 - Currents under 3 knots
 - Visibility of at least 3 inches



Selection Criteria: Video

MODULE 5



- Video Advantages
 - DGPS Position overlays
 - Unlimited Dive Time
 - Able to cover large areas



Selection Criteria: Grab

MODULE 5



- Grab Sampling Limitations
 - Depths under 200 feet MLLW
 - Currents under 3 knots
 - Cannot determine thickness of waste discharge



Selection Criteria: Grab

MODULE 5



Advantages

- Large areas may be assessed
- Deployable in heavy currents
- Sediment samples may be utilized for a variety of testing purposes
- With proper sample density, may be used to define a rough estimate of the area of coverage.
- Provides grind size

Guidance on Method Selection

MODULE 5



- Diving Methods are preferred unless the following conditions warrant an alternate method:
 - High Currents (over 2 knots)
 - Low visibility (under 15 horizontal feet)
 - Extreme Depth (over 120 feet MLLW)
 - Physical Risk to the surveyor (risk must be identified)



Guidance on Method Selection

MODULE 5



- Video Survey Methods are the first alternate choice to diving methods. The Video system must include telemetry information to determine location and the survey date/time.
 - High currents over 2 knots and up to 3 knots
 - Low visibility less than 15 feet (down to 3 inches)
 - Depths over 120 feet and up to 200 feet MLLW



Guidance on Method Selection

MODULE 5



- Grab Sampling is the final choice for debris field mapping. It should only be used when conditions are too extreme to utilize Dive or Video survey methods such as:
 - Depths over 120 feet MLLW
 - Currents up to 3 knots
 - Visibility at zero inches



Study Design

MODULE 5

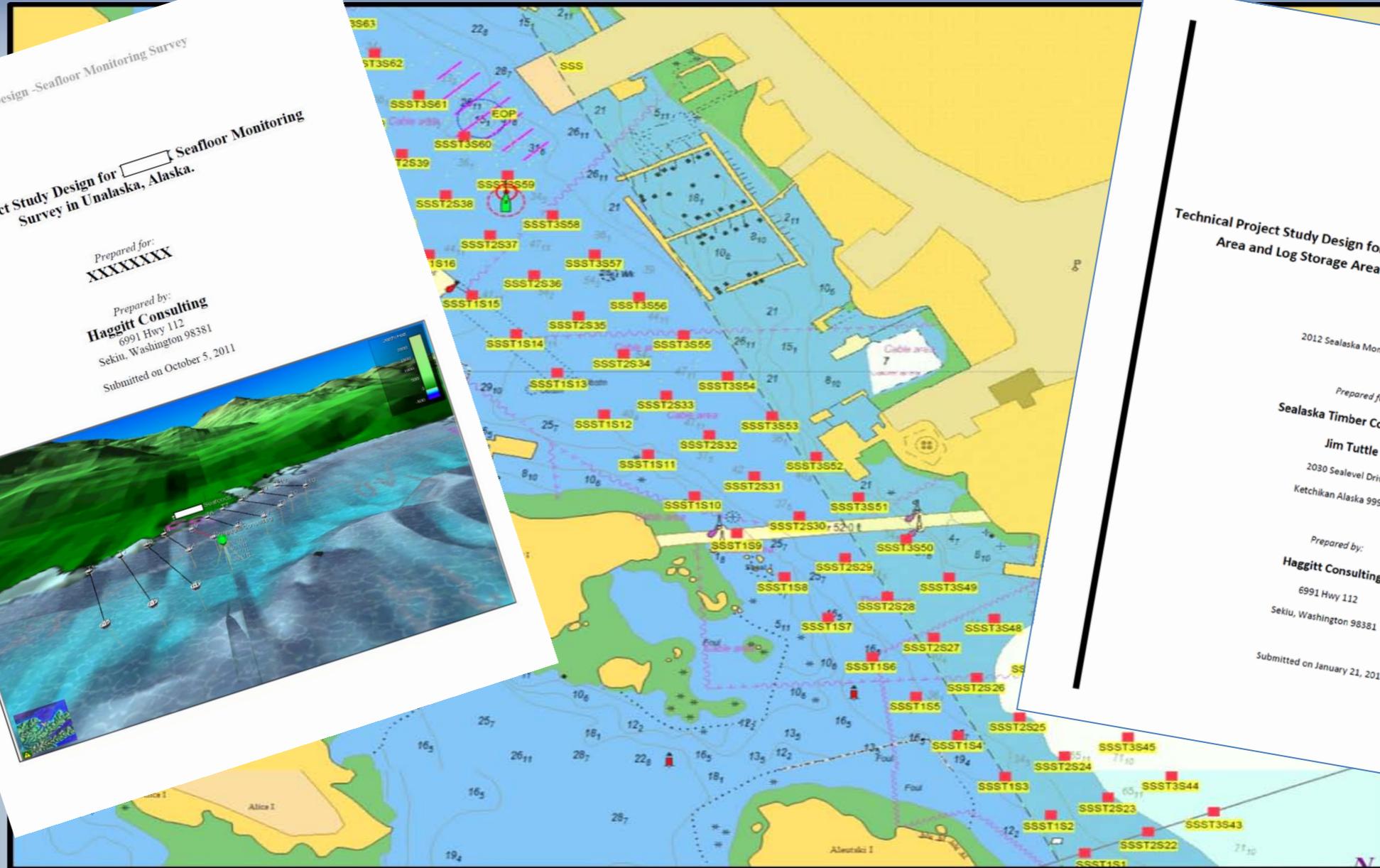
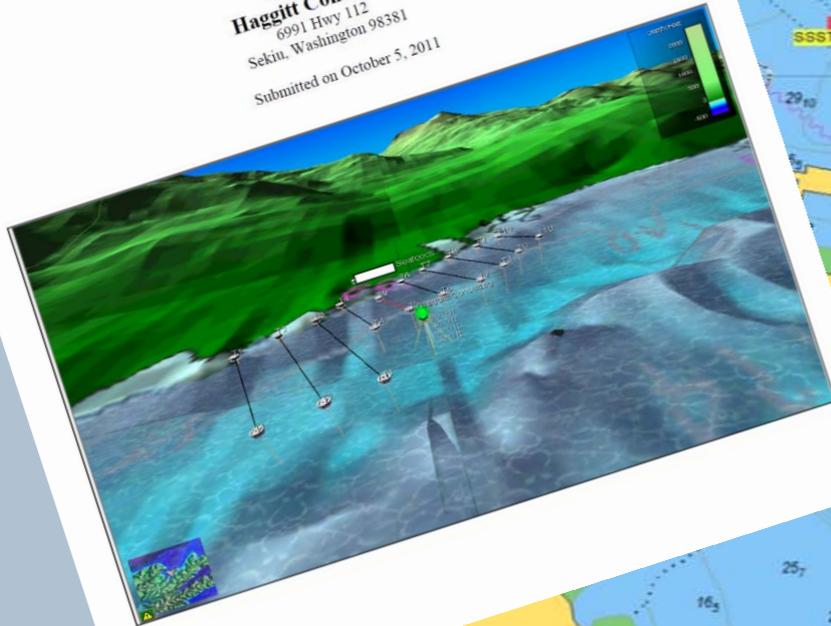


Seafloors Study Design - Seafloor Monitoring Survey

Technical Project Study Design for Seafloor Monitoring Survey in Unalaska, Alaska.

Prepared for:
XXXXXX

Prepared by:
Haggitt Consulting
6991 Hwy 112
Sekiu, Washington 98381
Submitted on October 5, 2011



Technical Project Study Design for the 2012 Tolstoi Bay Ship Moorage Area and Log Storage Area Seafloor Monitoring Survey

2012 Sealaska Monitoring Season

Prepared for:
Sealaska Timber Corporation
Jim Tuttle
2030 Sealevel Drive
Ketchikan Alaska 99901

Prepared by:
Haggitt Consulting
6991 Hwy 112
Sekiu, Washington 98381
Submitted on January 21, 2012

Study Design

MODULE 5



- Transects may be in a radial array or a parallel array:
 - Radial Transect must use a minimum of 5 transects and be spaced no greater than 30 degrees apart. It is also acceptable to use a 15 degree spacing interval if the input source is at a long distance from the distal edge of the waste area.
 - Parallel Transects must use a minimum of 5 transects and be spaced no greater than 75 feet apart to document continuous coverage.

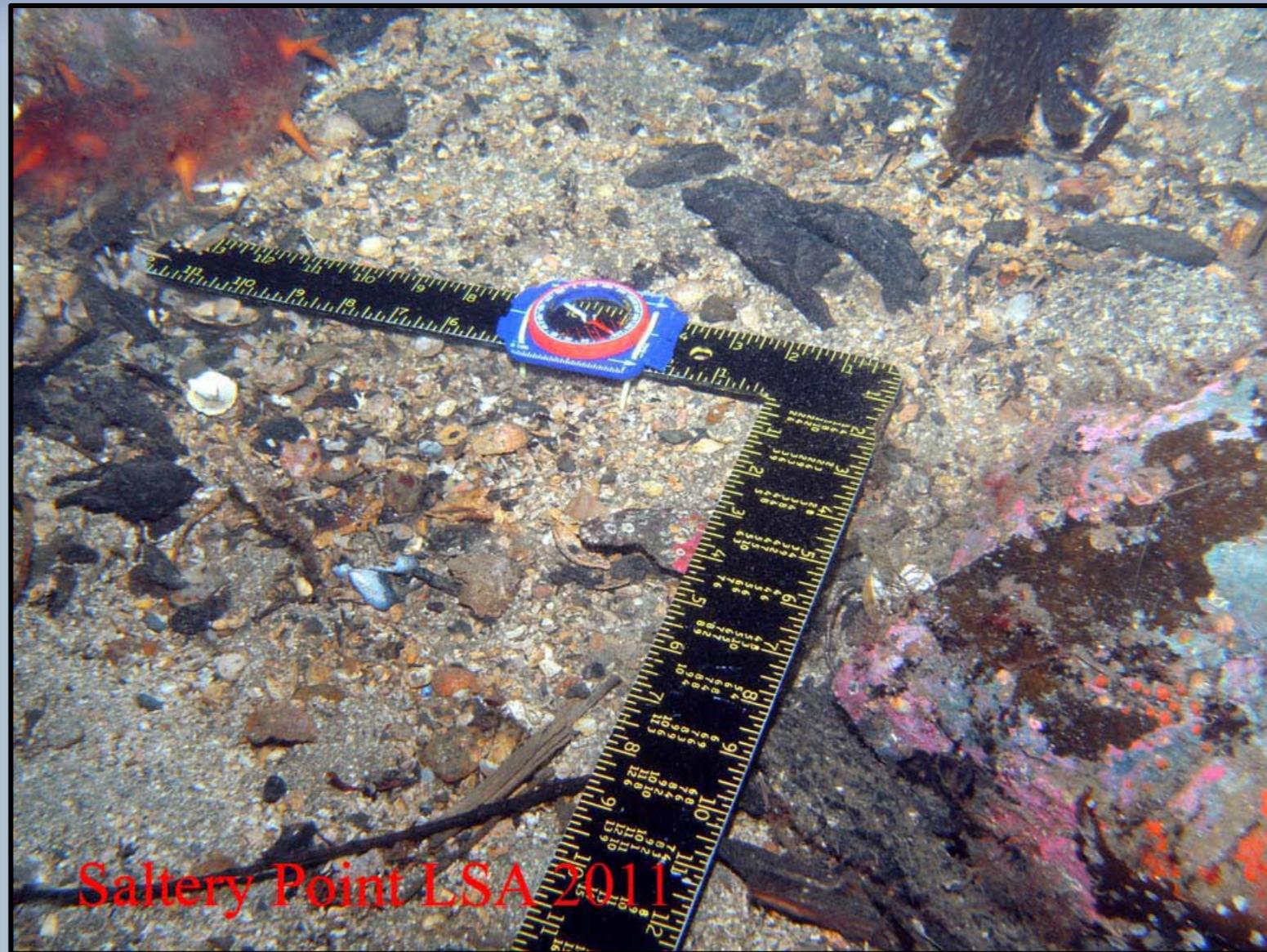
Sample Points

MODULE 5



- Both parallel and radial transects are sampled at a frequency of every 15 feet. Sample points are a Quadrate that measures three feet by three feet square, and includes:
 - Water Depth
 - Thickness of Debris
 - Percent of Cover of Debris
 - Substrate Type
 - Operational Debris
 - Native Vegetation and Marine Life
 - Current speed and visibility are also recorded along with time of sampling.

Sample Points



Saltery Point LSA 2011

Seafloor Percent Coverage

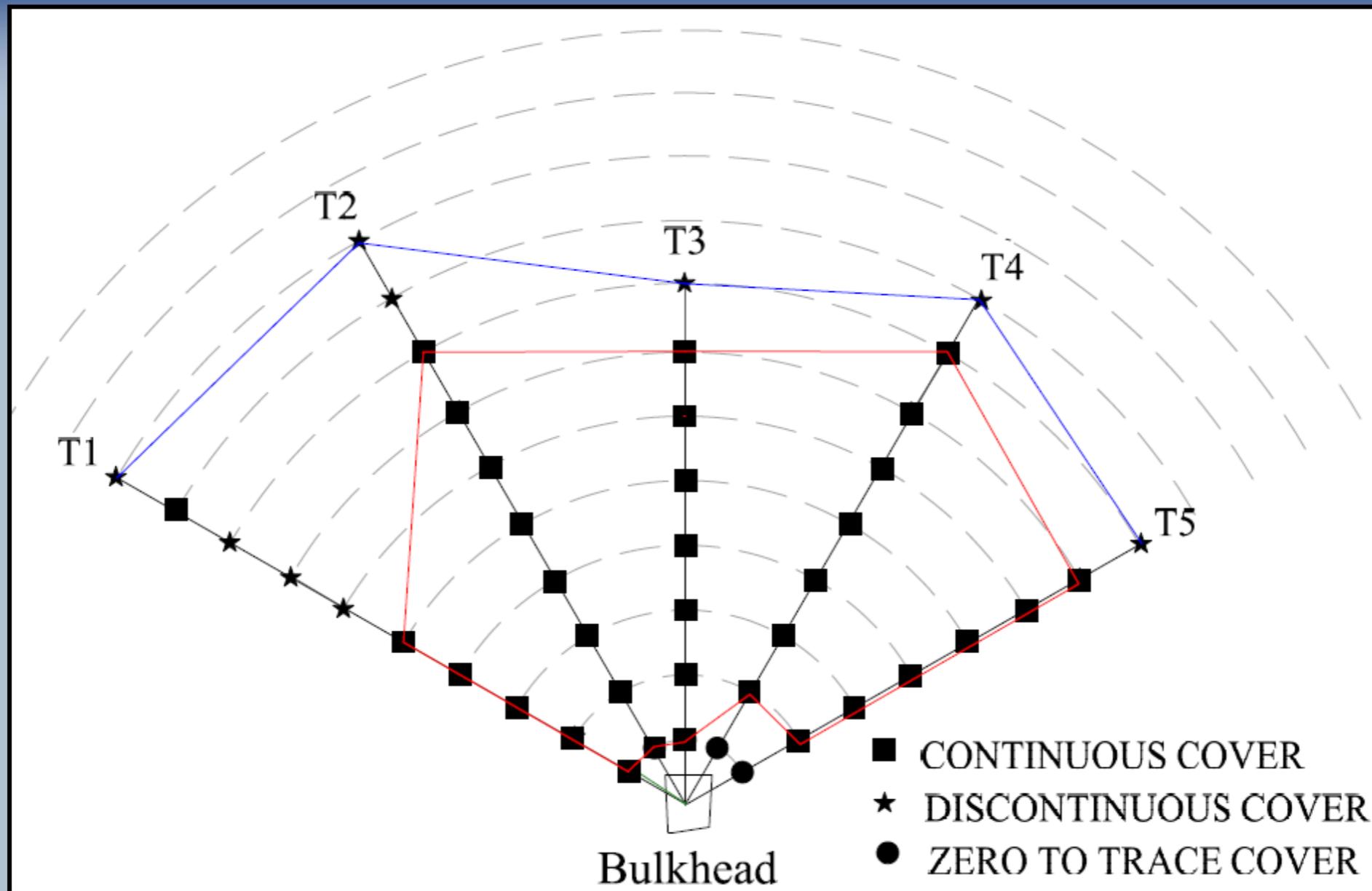
MODULE 5



- Three levels of coverage
 - Continuous
 - 100% coverage in 3'X3' square
 - Discontinuous
 - Between 10% and 100% of coverage in 3'X3' square
 - Zero to Trace
 - Less than 10% coverage in 3'X3' square
 - Minimum detection level
 - 1/2" if from a ground waste discharge

Dive Survey Radial Study Design

MODULE 5

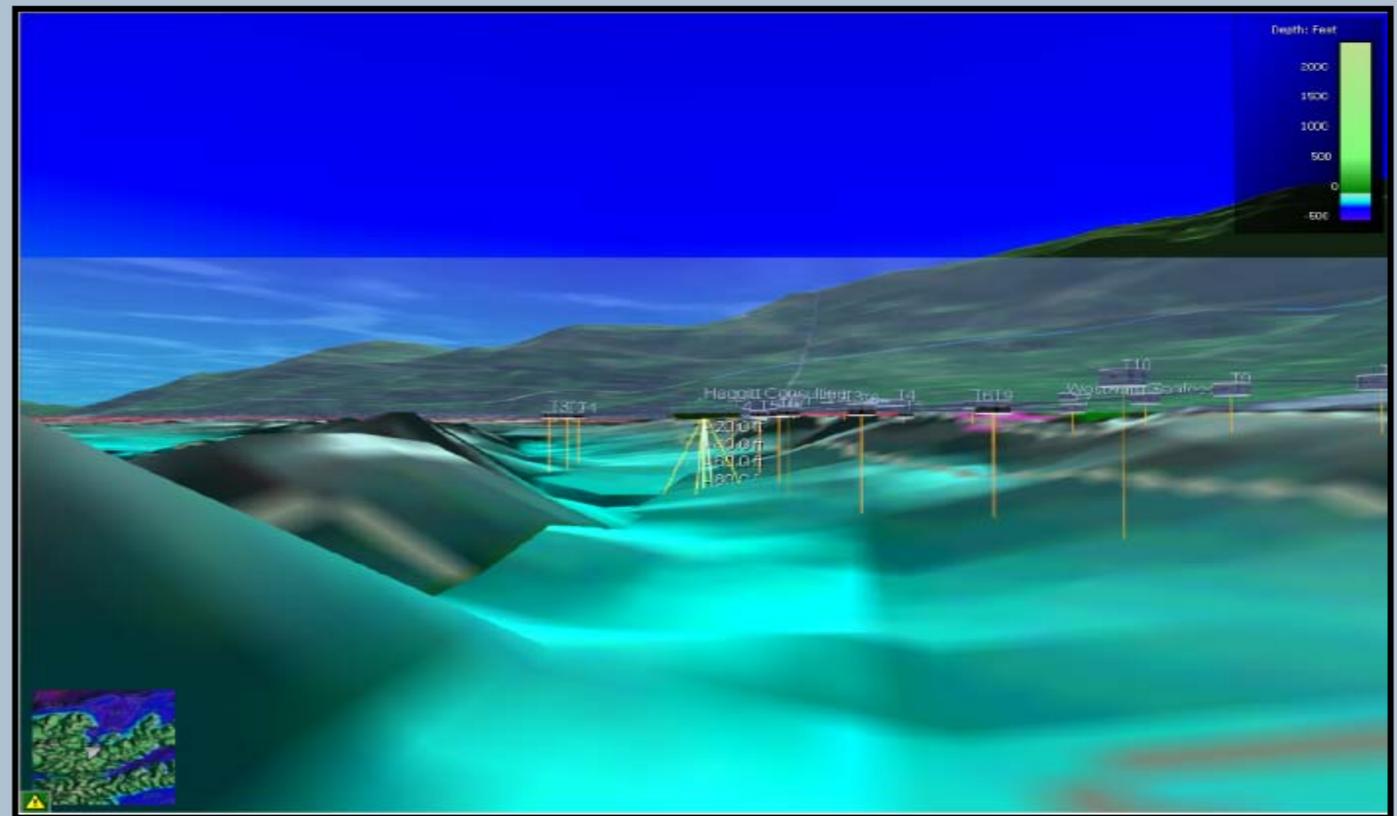


Guidance for Study Design

MODULE 5

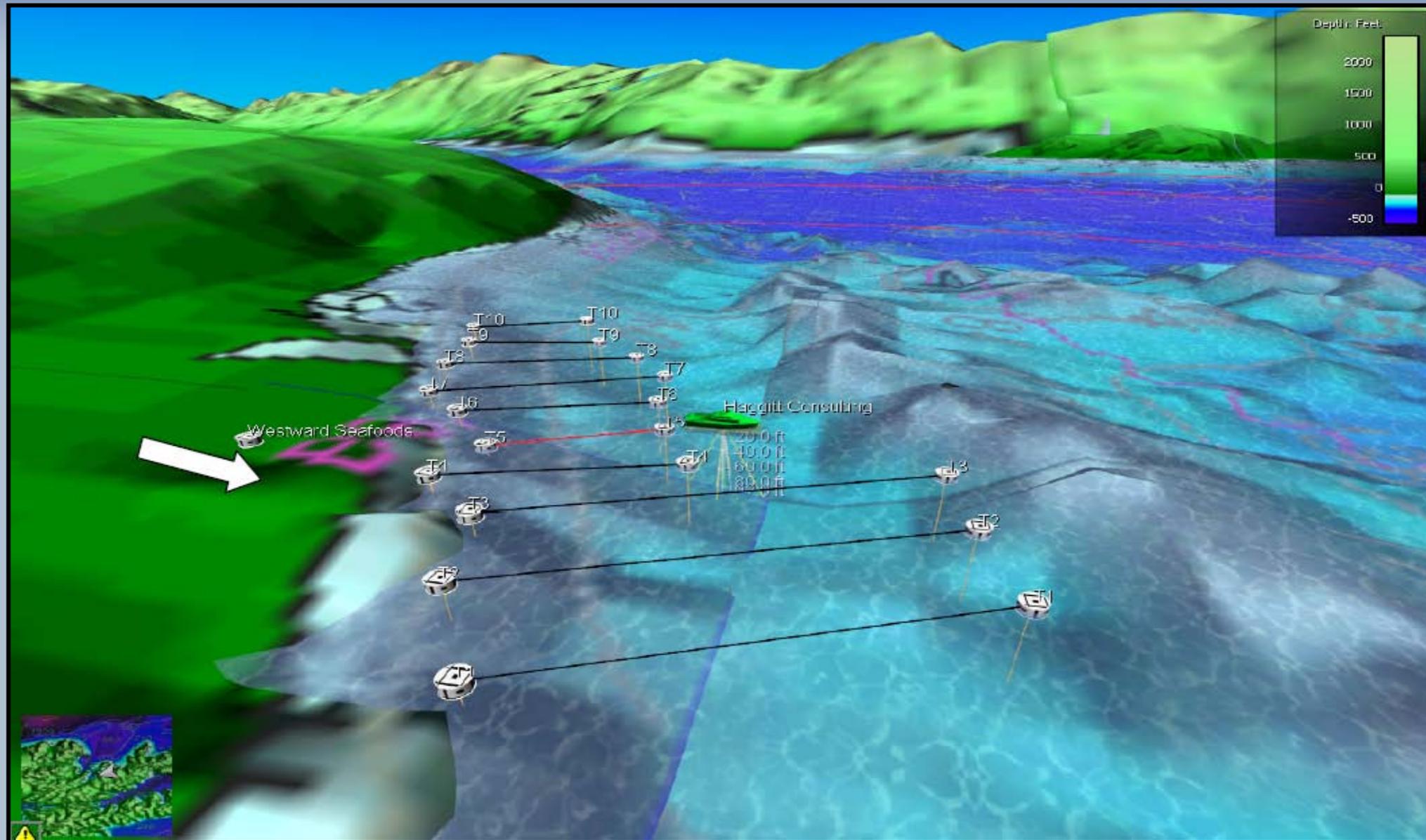


- A study design considers site conditions and determines the appropriate method that will be used.
- Factors affecting the study design configuration are:
 - Current Speed
 - Bathymetric Conditions
 - Input Source Location
 - Physical Barriers
 - Input Type
(point source or nonpoint source)



Guidance for Study Design

MODULE 5



Guidance for Study Design

MODULE 5



- In situations where the discharge point may be subject to movement, such as a ship based discharge point or in the case where a fixed discharge point has been relocated, a parallel pattern is typically used to define the area of waste.



Guidance for Study Design

MODULE 5



- A preliminary study design; or a survey pattern that has been in use for years is always subject to field adjustments. Factors that require on-site field adjustment are:
 - Continuous cover extending more than 15 feet perpendicular to a transect.
 - Transects may be extended or shortened to define the edge of coverage.
 - Patterns may change their transect bearings to best quantify the shape of a developing waste pile.

Quality Assurance Project Plan

MODULE 5



- Each seafloor survey location requires development of a QAPP or QAP (Quality Assurance Plan)
- The QAPP will contain enough information to reconstruct the seafloor survey from notes, field records, dive plans and still/video photography.

Analysis - Calculations

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- Area calculation methods that are approved by ADEC are contained in the permit. In addition to the methods described in the permit, alternate methods have also been approved by ADEC such as computer aided drafting (CAD) area calculations.
- It is important to remember that the calculations of the area of coverage are based on the accuracy of the measurements recorded in the survey.

Guidance for Data Analysis

MODULE 5



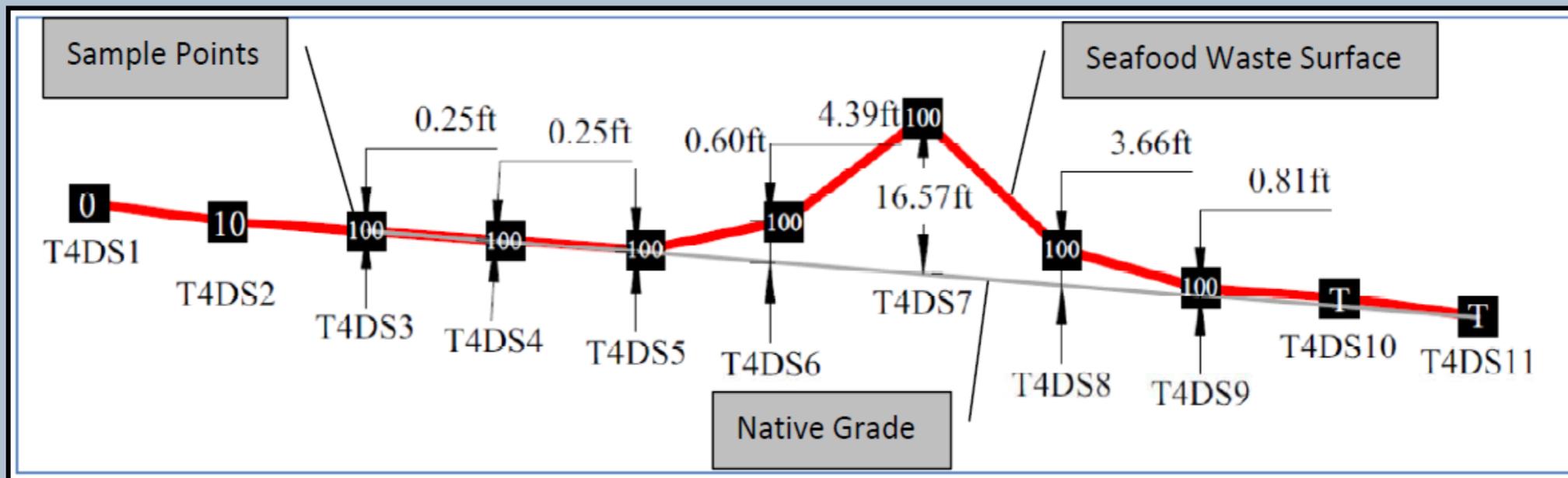
- The calculations of area are of the “footprint” of the debris pile or area.
- The distance measurement over the top of a seafood waste pile is not the same as the measurement of the distance of the footprint.
- The distance measurement over the top of a pile, extends the line to include the height.
- This measurement must be corrected before the area calculation can be made.

Guidance for Data Analysis

MODULE 5



- Sample points include information on the depth of the surface of the pile every 15 linear feet.
- The depth recorded at the beginning and end of the pile are used to determine the native grade under the pile.

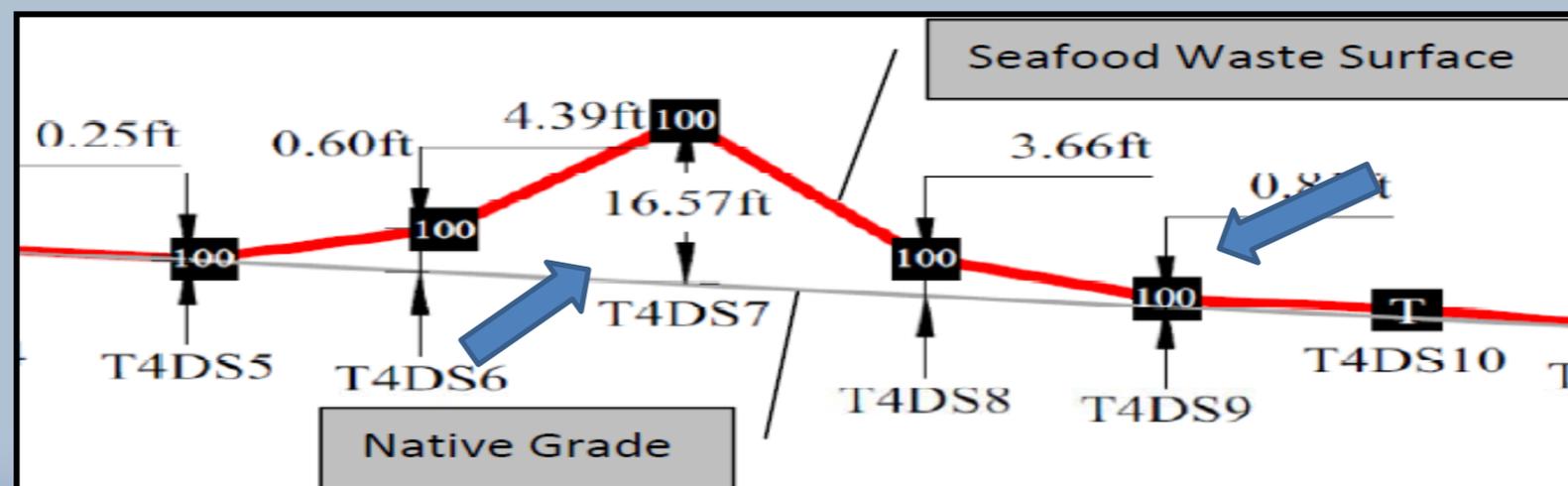


Guidance for Data Analysis

MODULE 5



- This method provides the pile thickness at any given point, and also provides the accurate footprint of the debris.
- In the example, transect 4 measured 74.39 ft across the top of the pile (T4DS5-T4DS7), the native grade for this transect (T4DS5-T4DS9) was only 61.69 ft.



Guidance for Data Collection

MODULE 5



- To ensure accuracy of measuring pile thickness by using the surface depth of the pile, each sample point is photographed and the time stamp is used to correct the depth to MLLW.
- The time is used by a computer program that adjusts the nearest tidal station to the coordinates of the debris pile.
- A standard rigid ruler is used to measure thickness of debris up 24 inches. After that, tactile measurements become subjective.

Guidance for Data Collection

MODULE 5



- Bias and Errors:
 - Common errors associated with diving methods include:
 - Measurements of long distances:
 - Measuring long distances underwater in limited visibility can be impacted by weaving and vertical changes of the seafloor as a result of bathymetry.
 - Navigational errors:
 - Magnetic influences may impact the divers direction and result in transect interval distance errors; a key component to the area calculations.

Accountability

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- Seafloor surveys are conducted in a changing environment, the surveyor must use the best methods available to delineate the coverage at the site on the day of the inspection.
- When it becomes necessary to change transects patterns, number of transects or the method the survey uses, the surveyor must clearly describe the reasons for the changes in the report.
- Whenever possible significant changes should be approved by DEC and the client in advance.

Seafloor Survey Reporting

MODULE 5



- Survey results are submitted to DEC according to permit requirements
 - AKG520000 -With Annual Report
 - AKG523000 - Within 60 days of completion of survey
 - Individual permit - according to permit

Report Submissions

MODULE 5



HAGGITT CONSULTING
2011 Bark Monitoring Survey Report

Saltery Point LSA

WATER WAY: SUKKWAN STRAIT 12 TIDELAND: ADL 106228

HAGGITT CONSULTING
2007 Bark Monitoring Video Survey Report

Schulze Cove
LTF/LSA

A1. Quality Assurance Project Plan

for

2007 Alaska Log Storage and Transfer Facilities Assessment

Prepared for:

Alaska Department of Environmental Conservation
Division of Water
410 Willoughby Avenue
Juneau, Alaska 99801

Prepared by:

Haggitt Consulting
6991 Hwy 112
Sekiu WA, 98381

And

Germano and Associates, Inc
12100 SE 46th Place
Bellevue, WA 98006

This quality assurance project plan (QAPP) has been prepared according to guidance provided in *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5, EPA/240/B-01/003, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, March 2001) to ensure that environmental and related data collected, compiled, and/or generated for this project are complete, accurate, and of the type, quantity, and quality required for their intended use.

Approvals:

Joseph Germano, Ph.D.
Field Survey Co-Leader
Germano & Associates

Date

Steve Haggitt
Field Survey Co-Leader
Haggitt Consulting

Date

Howard Jones
Lead Taxonomist
Marine Taxonomic Services, Ltd.

Date

Mark Harris
Project Manager
Analytical Resources, Inc.

Date

Future Seafloor Surveys

MODULE 5



- Pre-discharge seafloor survey
 - For new permanent facilities constructed on land
 - Pre-discharge survey guidance developed
 - Assist in placement for discharge point
 - Provides base-line data to assess impacts

Future Seafloor Surveys

MODULE 5



- Benthic analysis/sampling while conducting seafloor surveys
 - Will assess impact on receiving water and seafloor
 - Pre-discharge baseline data
 - Frequency and Type are under development
 - Cost is one of the factors being used in the determination

Future Seafloor Surveys

MODULE 5



Development of Additional Survey Protocols

Diving in waters more than 120 feet MLLW

Remote Operated Vehicles

Grab Samples

Side Sonar

Discharges of Screened Waste

End of Module 5

MODULE 5

