SEAFLOOR SURVEY PROTOCOL OVERVIEW

Seafloor Survey Applicability. The Seafloor Survey Protocol shall be used by the permittee to demonstrate compliance with the project area Zone of Deposit (ZOD) permit conditions. Seafloor surveying must be performed within one year of obtaining permit coverage and subsequently as required in Permit Table 7.

Purpose. The purpose of a seafloor survey is to 1) determine compliance with marine water quality criteria for residues (seafood processing waste deposits) on the seafloor; 2) evaluate the potential impacts on aquatic life, including the potential for bioaccumulation and persistence; 3) evaluate the expected duration of the deposit and any adverse effects; and 4) evaluate the potential transport of pollutants by biological, physical, and chemical processes. The permittee's historic and current discharge location(s) may have accumulated or be currently accumulating seafood waste deposits. Thus, the seafloor surrounding the current and all previous outfall terminus locations must be evaluated. The permit limits the allowed deposit of substances (seafood waste residues) to 1.0 acre, as allowed by 18 AAC 70.210(a). Thus, the seafloor survey of the project area ZOD is required to fulfill 18 AAC 70.210(c).

Project Area Zone of Deposit (ZOD)

Means the total area of the seafloor bottom in marine or estuarine waters within which DEC has authorized and limited the deposit of substances in exceedance of the water quality criteria in 18 AAC 70.020(b) and the antidegradation requirement in 18 AAC 70.015.

The project area ZOD includes the entire operating area of an onshore seafood processing facility, including those adjacent to the facility, including the following: seafood transfer devices; vessel and barge loading and unloading areas; offshore processing areas for supporting vessels and barges; bulkheads, ramps, floating walkways, docks, pilings, dolphins, anchors, buoys and other marine appurtenances; outfall terminus locations and the length of the outfall line(s) connecting the facility to the point(s) of discharge; previous outfall discharge locations that have no record of historical seafloor survey; and the bedland areas underlying and connecting these features.

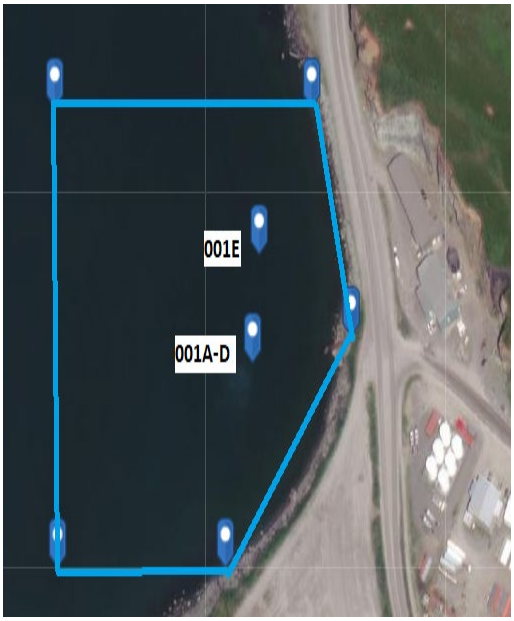
Seafloor Survey Protocol. The Seafloor Survey Protocol must be reviewed by the permittee and the permittee's surveyor. An equivalent method may be acceptable if it meets the survey purpose as well as the data gathering and reporting objectives contained herein. The Protocol method is set up as a two-part process. Alternate survey methods selected must be approved by DEC prior to implementation.

Part I: Seafloor Survey will determine the general location(s) and initial areal extent of seafood waste seafloor deposits. The Seafloor Survey results, information gathered, and observed seafood waste deposit location(s) shall be used to inform the Part II Seafloor Survey. The permittee may choose to perform a more discrete seafloor survey (closer grid spacing, varied methods) to gather

data as required in order to provide greater precision in defining the size and type of seafood waste deposits.

Adjusting the size of the Project Area ZOD: The Part I Seafloor Survey results may be used by the permittee to propose a modification to the authorized Project Area ZOD if the survey demonstrates that the authorized Project Area ZOD should be resized and/or relocated to more accurately capture the facility's seafood waste deposits. The areas of normal operational activity adjacent to the facility must be included in the authorized Project Area ZOD boundaries and are not subject to removal, as defined in the Project Area Zone of Deposit definition.

Figure 1: Initial UniSea Project Area ZOD (Two-Part)



<u>Outfall 001A-E ZOD Vertex Coordinates:</u>

53.880417	-166.562695
53.880417	-166.559749
53.879433	-166.559307
53.878429	-166.560739
53.878429	-166.562695

<u>Outfall 002A / Outfall 003A ZOD Vertex Coordinates:</u>

53.88001	-166.550368
53.878796	-166.552449
53.87791	-166.549703
53.876683	-166.548415
53.876884	-166.548071
53.878122	-166.549388
53.878831	-166.551536
53.879817	-166.550095

Part II: Seafloor Survey, and any subsequent surveys as required by the seafloor monitoring schedule, shall be derived from the Part I Seafloor Survey results and shall refine the location(s), type, thickness, and mapping of seafood waste deposits. Continued surveying will document existing and ongoing seafood waste deposition as well as natural ambient dispersion and biological decay processes.

Appendix F – Table 1 Seafloor Monitoring Schedule

Survey Type	Sample Location	Survey Result Triggers	Frequency
Part I Seafloor Survey	Project Area ZOD	Report as required in Appendix F	The first year of permit coverage
Part II Seafloor Survey	Project Area ZOD	Report as required in Appendix F	The second year of permit coverage
Additional Part II Seafloor Surveys	Project Area ZOD	Previous Part II Seafloor Survey reporting ≥ **0.75 acre** of deposits	Required every year, See Part 1.8.3.5.2.1
	Project Area ZOD	Previous Part II Seafloor Survey reporting < **0.75 acre** of deposits	Required every two years, See Part 1.8.3.5.2.2.
Benthic Assessment Survey	Project Area ZOD	N/A	The third year of permit coverage

Part I Seafloor Survey Protocol

Survey Method: The permittee shall complete a seafloor survey (primarily an observation and photographic survey) of the entire project area Zone of Deposit (ZOD).

The permittee shall provide the surveyor a copy of the permit, any identified location(s) of seafood waste deposits as documented through previously conducted seafloor survey(s), and this Seafloor Survey Protocol. The permittee may use either a diver as a surveyor, a remotely operated vehicle (ROV) with high definition photographic capability (with still-image capture capability), or a high definition underwater video camera (with still-image capture capability) towed behind a vessel to obtain the required photographs.

The survey shall be completed on a 30 foot by 30 foot grid pattern (30 feet between transect lines and 30 feet between sample plots along each transect). A minimum of nine sample plots must be surveyed. The sample plots must be centered around the outfall and must be adequate to encompass all seafood processing waste coverage areas. The survey must continue beyond the boundaries of seafood processing waste found as "Trace" so that all deposits can be mapped as continuous, discontinuous, or "Trace" coverage. The permittee may choose to perform a more discrete seafloor survey (closer grid spacing, varied methods) to gather data as required in order to provide greater precision in defining the size and type of seafood waste deposits.

The permittee is required to collect continuous Wide Area Augmentation System (WAAS) enhanced Global Positioning System (GPS) location information (reported in decimal degrees, to the fifth decimal place, if available, using the North American Datum (NAD) 1983 or World Geodetic System (WGS) 1984 datum). The accuracy of coordinates shall be at least within ±50 feet (17 meters) while conducting the survey so that any vessel drift can be mapped and used comparatively in the Part II Seafloor Survey. The permittee is also required to collect depth information for each sample plot location, corrected to Mean Lower Low Water (MLLW).

Photographs are required on the designated grid spacing and, along with sample plot results, will establish the general locations of the seafood deposits and may be used for future adjustments to the initial project area ZOD. If seafood processing waste is visible farther than the initially mapped project area ZOD, the photographic survey shall continue beyond the initially mapped project area ZOD until seafood processing waste is no longer visible. Current technologies exist that allow the Part I Seafloor Survey to extend into water depths greater than -120 feet MLLW.

Skipping the Part I Seafloor Survey: As found above in the 'Seafloor Survey Protocol Overview,' the size and location of a project area ZOD may be adjusted (be made smaller or larger or change in shape) based on the findings of a seafloor survey. The permittee may request a change to the project area ZOD by submitting a letter to the Department with a copy of the Part I survey. The Department's subsequent approval of a reduction in project area ZOD size could lead to less dive time during the Part II Seafloor Survey. On the other hand, the permittee may find that performing the Part I survey and hiring a survey company to return to the site to perform the Part II survey the following year may be an added expense. Therefore, the Protocol allows the permittee to elect to skip the Part I Seafloor Survey if the permittee wishes to perform a complete Part II Seafloor Survey of the entire project area ZOD during the first year of permit coverage. If choosing to skip the Part I Seafloor Survey, the permittee must submit a letter to the Department within 180 days of the permit effective date indicating the permittee's plans for conducting a Part II Seafloor Survey of the entire project area ZOD within 365 days of the permit effective date.

Part I Seafloor Survey Report

The permittee shall submit a Part I Seafloor Survey report to DEC containing the following information (due with the survey year's Annual Report):

1) **Facility Information**
   a) Permittee name, APDES permit number, facility address, and contact information.
   b) Type of waste treatment processes, product and by-product production process(es).
2) **Surveyor and Survey Information**
   a) Surveyor's name, signature, and contact information.
   b) Brief background of surveyor's previous work history performing seafloor surveys and mapping.
   c) Date and time the survey was completed.
   d) Name and USCG number of the vessel assisting in the survey.
   e) Name of the receiving water where the survey was completed.
   f) Continuous Global Positioning System (GPS) location information (as described in the survey method).
   g) Whether there are other seafood waste discharges occurring within 0.25 miles of the permittee's discharge location(s).
   h) Whether seafood waste discharge was occurring at the time of the survey.
   i) Description of methods used to:
      i) Establish linear transects,
      ii) Locate sample plot locations along the transects,
      iii) Estimate percent coverage at each sample plot (photograph location), and
      iv) Calculate the continuous and discontinuous coverage area(s) of seafood waste deposits.
3) **Previous Survey Information**
   a) Name of surveyor(s) who completed the previous survey(s).
   b) Name of receiving water.
   c) Date, time, and place of previous seafloor survey(s).
   d) Date of completion of any previous seafloor survey report(s) and first and last name(s) of individual(s) who performed the analysis and report writing.
   e) A narrative that describes the methods and results of previous survey(s), including:
      i) Total cumulative area(s) of seafood waste deposits,
      ii) Any available electronic or hard copy mapping of seafood waste deposits found
   f) Annual discharge load (pounds) at time of previous survey

g) Whether the permittee has performed mechanical raking or other pile reduction mechanisms.

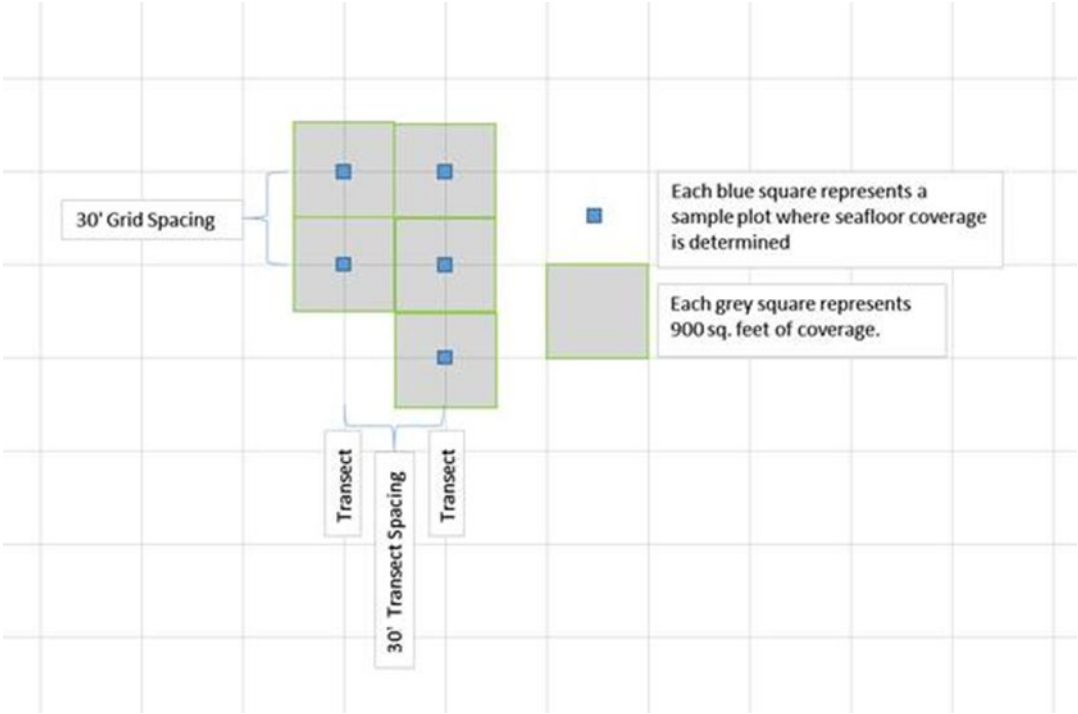
4) **Sample Plot Observations.** The Seafloor Survey shall be completed on a 30 foot by 30 foot grid pattern (30 feet between transect lines and 30 feet between sample plots (photographic image locations) along each transect) for the entire seafloor survey area. If the outfall is found to be broken or floating, the seafloor survey must encompass the permitted outfall location as well as below the discharge location(s) where the break/floating outfall was found. The Seafloor Survey is required to occur into water depths greater than -120 feet MLLW until seafood processing waste is no longer visible. At each sample plot, the surveyor shall use a three-foot by three-foot square to determine required items in the Seafloor Survey Report, which include the following:

   a) **Digital photograph.** Digital photographs representative of the sample plots must depict the nature and coverage of seafood processing waste deposit(s), if any, on the seafloor. Digital photographs or video shall capture images of natural sediment, natural sediment covering seafood processing waste, if observable, continuous and percentages of discontinuous seafood waste, and/or bacterial mats covering sediment. The surveyor must document whether they are able to differentiate between natural sediments or evidence of seafood waste residues based on observations and photographs. If the surveyor is unable to differentiate between natural sediments and fine particle size seafood processing waste, the surveyor shall conduct additional investigation, which may require grab samples. Photographs shall be of sufficient definition, clarity, and detail to clearly document the seafloor conditions and observations. Photographs shall include a digital date and time stamp or other verification of when the photograph was taken. The photograph log shall include the name of the seafood processor, survey date, and photographic sample plot location identifier. Photographs are not required for every sample plot; the surveyor may provide the amount of representative photographs to characterize distinctly different areas and seafood waste types, as described above.

   b) **Deposit Type.** Type of seafood waste deposits observed (e.g., bones, whole heads, fins & tails, ground seafood waste including average size (1.0-inch, 0.5-inch), fine screened seafood waste particles (residues), natural sediments (sediment sloughs, tidal sands), and/or sediments covering seafood waste.

      i) **Amount and Type of Seafood Waste Coverage.** The surveyor must estimate and record the percentage (Detectable to 100%, rounding as directed in the table below) of seafloor area(s) covered by recent seafood processing deposits and any historic deposits (decaying bones, Beggiatoa mats, etc.) at each sample plot location. The observation at the sample plot must also include a description of the types of observed seafood waste deposits.

      ii) Each three-foot by three-foot (3 ft by 3 ft) 'sample plot' represents 900 square feet (ft^2) of seafloor.



iii) The seafloor survey shall report each 3 ft by 3 ft sample plot's seafood waste coverage as directed in the table below, as follows:

(1) **Trace - Report**

Zone of Deposit	Result	Report
Within the project area ZOD	Detectable[1] – 9% (0.5 inch or greater thickness)	Trace
Outside the project area ZOD	Detectable[2] – 9% (no thickness threshold)	Trace

(2) **Discontinuous Coverage:** Within the project area ZOD, the surveyor shall use a seafood waste deposition threshold which is one-half inch or thicker as the minimum detection level. Outside the project area ZOD, no minimum detection level applies to the seafood waste deposit thickness. All 'Discontinuous' coverage will be calculated and reported as follows:

[1] Detectable seafood waste has typically been reported to be 2% coverage.

Discontinuous Coverage (not applicable to 1.0-acre limit)

Result	Report
10-14%	10%
15-24%	20%
25-34%	30%
35-49%	40%

Discontinuous Coverage (applicable to 1.0-acre limit)

Result	Report
50-54%	50%
55-64%	60%
65-74%	70%
75-84%	80%
85-94%	90%

Calculate the areal extent of discontinuous seafood processing waste deposits with 10 – 49% coverage and 50 - 94% coverage, as a percentage of each 900 sq. feet.

Discontinuous Coverage (not applicable to 1.0-acre limit) Example Calculations:

- Discontinuous Areas "A" – Six sample plots reported as 40% coverage

$$6 * 900\ ft^2 * 0.4 = 2{,}160\ ft^2$$

- Discontinuous Areas "B" – Twelve sample plots reported as 30% coverage

$$12 * 900\ ft^2 * 0.3 = 3{,}240\ ft^2$$

Total 10-49% discontinuous coverage: 2,160 + 3,240 =	**5,400 ft^2**
Report Acres: 5,400/43,560 =	**0.12 acres**

Greater than 50% Discontinuous Coverage Areas (applicable to 1.0-acre limit) Example Calculations:

- Discontinuous Areas "C" – Six sample plots reported as 60% coverage

  $6 * 900\ ft^2 * 0.6 = 3{,}240\ ft^2$

- Discontinuous Areas "D" – Eighteen sample plots reported as 80% coverage

  $18 * 900\ ft^2 * 0.8 = 12{,}960\ ft^2$

- Discontinuous Areas "E" – Seven sample plots reported as 90% coverage

  $7 * 900\ ft^2 * 0.9 = 5{,}670\ ft^2$

Total 50-94% discontinuous coverage: 3,240 + 12,960 + 5,670	**21,870 ft^2**
Report Acres: 21,870/43,560 =	**0.50 acres**

(3) **Continuous Coverage (applicable to 1.0-acre limit):** Transect squares with 95% - 100% coverage will be considered Continuous Coverage. Within the project area ZOD, the surveyor shall use a seafood waste deposition threshold which is one-half inch or thicker as the minimum detection level. Outside the project area ZOD, no minimum detection level applies to the seafood waste deposit thickness. All continuous coverage will be calculated and reported as follows:

Continuous Coverage (applicable to 1-acre limit)

Result	Report
95-100%	100%

Continuous Coverage (applicable to 1.0-acre limit) Example Calculations:

15 sample plots x 900 ft^2 each (15 * 900) = 13,500 ft^2 of continuous coverage = 0.31 acres

Total Coverage Areas Applicable toward 1.0-acre Limit

Total 50-94% discontinuous coverage	21,870 ft^2
Total 95-100% continuous coverage	13,500 ft^2
Total coverage counting toward 1.0-acre limit (21,870 + 13,500) =	35,370 ft^2
Total Acres: 35,370/43,560	**0.81 acres**

c) **Beggiatoa or other types of Bacterial Mats.** Document the absence or presence, as well as size and location, of Beggiatoa or other microbial mats observed on or near any seafood waste deposits or on the seafloor (if waste deposits are not evident). All Beggiatoa or other bacterial mat areas shall be counted according to the areal coverage percentage thresholds established in Part (4)(b) , as they represent seafloor impairment, unless the permittee provides the Department sufficient documentation and the Department agrees that the bacterial mats were not the result of seafood processing discharges and/or the subsequent nutrient enhancement as a result of the waste coverage.

d) **Sea Flora and Fauna.** General observations of quantity and types of macro sea fauna (sea life) and aquatic vegetation observed on the seafloor during the photographic survey. Include sea life observed adjacent to, on, or feeding on any seafood processing waste deposits during the survey. The surveyor shall mention any indication of change in sea life behavior from any previous observation or seafloor survey reports, and any other observations relevant to the condition of the benthic community or seafloor.

e) **Hydrology.** Report ambient tidal current velocity and direction at the time of the survey.

f) **Substrate.** Composition of substrate (soft sediments, cobble, gravels, solid rock, glacial silts, ground/screened seafood waste, etc.). If previous benthic assessments, dive surveys, or remediation actions have documented the presence of buried seafood waste, this waste must be included in the continuous coverage calculations if those buried areas are located directly adjacent to outfalls discharging seafood processing waste and wastewaters, or to other continuous coverage areas surveyed. The surveyor has the option to obtain new core samples to document whether seafood waste is or is not present at the previously identified locations.

g) **Water Depth.** (adjusted to MLLW, reported in feet) Must be reported at the seafloor and at the top of any waste pile observed.

h) **Plume Size.** An indication of an active or inactive discharge occurring during the time(s) of the survey. Include the approximate width and length of each outfall's effluent plume when discharge is occurring.

i) **Water Clarity.** A description of water clarity and changes in water clarity as a result of the discharge, if occurring.

5) **Sample Plot Observations Map** - A map or representative drawing (with an identified scale, including a north arrow) shall be developed that depicts the facility and the seafloor area surveyed, including the transect grid. Each sample plot location must be identified on the map and correlated[2] to the information required in 4.a-i (above). The total cumulative area(s) of both the continuous and discontinuous coverage shall be reported in square feet and in acres to the nearest tenth of an acre. The map must include:

[2] Correlating data - Portions of the information required by #4 may be identified by numbers or letters on the map. The numbers are then used to correspond to the data gathered for each sample plot location and presented in a table format or Excel spreadsheet.

a) The locations of any seafood processing waste deposits, including the outer boundaries of any continuous and/or discontinuous coverage areas, in relation to the discharge location(s), mapped seafloor area boundaries, transect grid, and outfalls, including:

   i) **Continuous Coverage:** The relative location and estimated size (ft2 and acre) of any continuous coverage areas (95% - 100% coverage) of seafood waste.

   ii) **Discontinuous Coverage:** The relative location and estimated size (ft2 and acre) of any discontinuous coverage areas (10% - 94% coverage) of seafood waste.

   iii) **Trace Coverage:** The relative location and estimated size (ft2 and acre) of any trace coverage areas (less than 10% coverage, or floating seafood residues) of seafood waste.

   iv) **Beggiatoa (or other bacterial) Mats:** The relative location and estimated size (ft2 and acre) of any Beggiatoa or other bacterial mats discovered during the photographic survey.

   v) **Outfalls and Water Intakes:** Coordinates of beginning and end points for all outfalls/intakes (including pipes that do not belong to the permittee, and the permittee's inoperative pipes), description and condition of the outfall(s) (Outfall System Inspection Protocol - corrosion, condition of cathodic protection for metal outfalls, bends, or breaks), depth of outfall(s) at MLLW, and outfall diffuser description(s), if any.

   vi) **Permanent Markers (if any):** The location of surface or subsurface permanent survey marker monuments, if any.

6) **Change Sheet.** A change sheet at the end of the seafloor survey report attached by the permittee, documenting any changes to the seafloor survey report as required by the permittee. Or, the two documents may be submitted in red-line track changes. Seafloor Survey Reports shall be certified by the survey project manager and signed by a principal officer or duly authorized representative of the permittee. The survey project manager shall certify that the survey data is true and accurate, and document review of any changes to the original seafloor survey report.

7) **Explanation of Information Not Reported.** If select information required was not obtained, the Seafloor Survey Report must include an explanation as to why the information could not be obtained and submit alternate methods as to how the data should be obtained. If seafloor surveys or other available evidence submitted by the operator are not sufficient to determine the amount of seafood processing waste deposit coverage, DEC will, in its discretion, require the operator to conduct additional surveys or other monitoring for that purpose.

8) **Electronic File Submittal.** A copy of the Seafloor Survey Report must be submitted in Adobe Acrobat or Microsoft Word to DEC with the survey year's Annual Report. If GIS files are developed, shape files with supporting metadata shall also be submitted to DEC.

Part II Seafloor Survey Protocol

Seafloor Survey Method: The Part II Seafloor Survey area will be based on the initially identified location(s) of seafood processing waste deposit coverage areas reported in the Part I Seafloor Survey report. Results of the Part I report will be used to establish the initial transects for the Part II - Seafloor Survey. If observations from the Part I report did not reveal any evidence of seafood processing waste deposits, then the Part II - Seafloor Survey will minimally encompass a 200 foot by 200 foot area surrounding the outfall terminus.

The permittee shall provide the surveyor completing the Part II Seafloor Survey a copy of the permit, the discharge locations, the Part I Seafloor Survey report, and all other pertinent data collected (i.e., previous benthic assessments, seafloor surveys, US Army Corps of Engineers-required seafloor surveys, etc.). The permittee should provide the surveyor information on any maintenance completed that could have affected seafloor deposits. Additionally, the permittee shall inform the surveyor of any change in discharge locations since the Part I Seafloor Survey, or last Part II Seafloor Survey, was completed.

The Part II Seafloor Survey shall use parallel transects 30 ft apart, with sample plot locations each 30 feet along each transect, and report the information in the Part II Seafloor Survey Report section below. The number and length of transects must be adequate to encompass all seafood processing waste coverage areas found in the Part I Seafloor Survey and extend to all areas of seafood processing waste observed by the surveyor while performing the Part II Seafloor Survey.

If feasible, at least five permanent markers (e.g., large rock outcrops, boulders, etc.) must be established at suitable locations, provided there are sufficient land/facility and/or locations available. If markers/monuments are not established, the Part II Seafloor Survey report shall record why they were not established and identify methods to establish repeatable transects. GPS coordinates derived using WAAS technologies, or another technology with equivalent or better position accuracy, must be recorded for each underwater marker.

The surveyor must establish transect lines with a surveyor's tape or other precise methodology extending in a perpendicular direction from the permanent marker(s). If seafood processing waste deposit coverage extends more than 15 feet beyond the Part I Seafloor Survey transect locations, then transects must be added or lengthened to identify the extent of seafood processing waste deposits.

At each sample plot, the surveyor shall use a three-foot by three-foot square to determine required items in the Seafloor Survey Report.

Part II Seafloor Survey Report

The permittee shall submit the Part II – Seafloor Survey Report to DEC containing the following information (due with the survey year's Annual Report).

The Part II Seafloor Survey report must gather and report the same data parameters as found in the Part I Seafloor Survey report listed above, including:

1) Facility Information
2) Surveyor and Survey Information
3) Previous Survey Information
4) Sample Plot Observations Data as required in Part I - 4.a – 4.i.

Additional Part II Sample Plot Observation Requirements. At each sample plot, the surveyor must also collect the following data:

j) **Seafood Waste Deposit Thickness.** Determine and record whether the estimated seafood processing waste deposit thickness is greater than or less than 0.5-inch (1/2") thick at each sample plot. If seafood waste is visible, but less than ½" thick, record as "Trace.

k) **Report of Anoxic Conditions.** Anoxic conditions often form in the seafood processing waste deposits as the material decomposes. The surveyor should identify and document whether gas is being released from undisturbed seafood processing waste deposits or is released when measuring seafood waste pile thickness.

l) **Dissolved Oxygen and Other Gases.** When gas is observed escaping from the seafloor in the vicinity of the outfall or the seafood waste deposit pile, the surveyor is required to collect water samples or measure directly for dissolved oxygen. Sampling or measurement shall be conducted six inches or less above the seafloor/seafood waste deposit where the greatest amounts of gas release are observed.

5) Sample Plot Observations Map
6) Change Sheet
7) Explanation of Information Not Reported
8) Electronic File Submittal

If seafloor surveys or other available evidence submitted by the operator are not sufficient to determine whether coverage exceeds the authorized ZOD, DEC will, in its discretion, require the operator to conduct additional surveys or other monitoring for that purpose.

Approved Sampling Methods

A combination of sampling methods may be used to gather the information required in this Seafloor Survey Protocol as long as all data gathering and reporting objectives are met.

Sediment Grab Samples

A sediment grab sample is often used to supplement a dive survey, video by ROV, or benthic analysis by sediment profile imaging. Grab sampling surveys may be performed instead of a dive survey in areas where a dive survey is not practical due to limiting ambient conditions, very low visibility, or dangerous diving conditions. Grab sampling should not be used when bottom substrate is composed of large boulder-type material or bedrock. Various types of sample collection devices and techniques are available. Usually, surveyors are able to push a tube core sampler into the waste pile. In other circumstances, core samples are obtained from a bottom grab sampler known as a Van Veen Grab Sampler. Obtaining core samples of the top foot of the seafloor has a number of advantages. The benthic life successional stage may be determined if background samples are also obtained, including infaunal and epifaunal species, species densities, and level of invasive species. Additionally, the true thickness of seafood or other solids deposited on the bottom can be measured, depending on the type of grab sampler used. Beggiatoa bacteria may be positively identified through coring/grab sampling if present. Subsurface grain size and type of substrate can be identified. Grab sampling must be augmented by a photographic method, such as a video seafloor survey, to document the presence or absence of macro flora and fauna and to map the contours of the ZOD. Alternatively, the grab sampler would need attached depth and location instrumentation in order to provide a contour map of the ZOD and seafloor.

Benthic Analysis by Sediment Profile Imaging

The benthic analysis by sediment profile imaging (SPI) method has been used in large areas of seafood processing waste coverage or areas of fine material (screened seafood waste) coverage to assess the health of the benthic community in the deposit area. The sediment profile camera works by burying a knife-edged probe that houses a digital camera into the seafloor area being examined, including into the seafood waste deposit area(s). The probe is normally fitted with water depth and location instruments to provide seafloor contour information. The probe has a Plexiglas faceplate cover to collect images of the sediment profile. An internal strobe light is mounted inside to provide illumination. The probe housing the camera descends into the sediment at a slow, controlled rate to prevent disturbance of the sediment-water interface. After an appropriate time delay, the strobe and camera are activated to obtain a cross sectional image of the upper 20 cm of the sediment column. Depth of penetration by the probe depends on the substrate consistency (i.e., density and hardness of the sediment, thickness and type of seafood waste deposits) and the probe width. The probe is fitted with lights, a plan view camera, and a laser generated scale to allow determination of the size of objects in the picture that is taken.

This survey method provides information that meets some data objectives, including: benthic life evaluation, estimations of anoxic condition and depth of anoxic conditions, presence or absence of Beggiatoa bacteria, thickness of waste to the limit of the probe, estimation of coverage areas of any seafood waste deposits, water depth, visual appearance of the bottom, and the total area of the seafood waste deposits. However, the method does have its limitations. The method is only suitable for sediments that can be penetrated by the knife probe, requires vessels large enough to handle the probe, and is susceptible to currents moving the vessel. The method is not suitable for characterizing deep waste deposits, and the costs to complete the survey are usually higher than for other survey methods.

Outfall System Inspection Protocol

Purpose: The purpose of the outfall system inspection is to verify outfall functionality, ensuring compliance with authorized discharge locations.

The permittee shall perform an operational inspection of the outfall system(s), using such techniques as pressure testing, visual, ROV, dye testing, or diver inspection, during each Seafloor Survey to ensure that the outfall system is operable and functioning as designed. The permittee shall record the inspection methods and results and keep the records at the facility and available upon request. Verification of the inspection shall be included in the submittal of the inspection year's Annual Report (See Permit Part 1.11).

The permittee shall cease discharging from a severed, failed, or leaking outfall system as soon as possible, but no more than ten days past discovery of the severance, failure, or damage, with the allowance of enough time to process seafood already offloaded to the facility. Discharging shall be discontinued if the system is unable to be repaired within ten days. Any failure of the outfall system shall be verbally reported to DEC within 24 hours of discovery, and written notification is required within five days of discovery in accordance with Appendix A, Part 3.4 (Twenty-four Hour Reporting).

Permittees shall record:

- Evidence of breaking or dragging
- Outfall condition and remaining life
- Evidence of leaks by use of fluorescent dye, in-line leak detector monitoring , hydrostatic testing, or pneumatic testing
- System operability
- Cathodic protection
- Log of outfall system repairs
- Photographs of breaks, leaks, damage, floating, etc.
- Pressure tests (both hydrostatic and pneumatic), when performed, must always be performed under controlled conditions, following an approved test plan, and documented in a test record. A single approved test plan could be used for several similar tests, but for each test a separate test record is required.

FLUORESCENCE DETECTORS

Fluorescence forms the basis of one of the most widely used and effective approaches to seafloor outfall leak detection. The use of this approach requires the medium's natural ability to fluoresce or the addition of fluorescent tracers to the medium being detected. Large leak sources have often been located by visual observations from divers or cameras within the water. However, subsea fluorescence technology can provide a more effective detection system and is less restricted by depth while offering the potential to reduce the quantity of dye required. These detectors can be point sensors and have been used successfully with ROVs, and they can provide an indication of leak size from the relative signal intensity. Turbidity within the water column, however, can impede recognition of the desired medium.