



# Fact Sheet

Date: September 14, 2001

NPDES Permit Number: AK-000027-2

## The U.S. Environmental Protection Agency (EPA) Plans To Reissue A Wastewater Discharge Permit To:

Alyeska Seafoods, Inc. (the "permittee")  
303 NE Northlake Way  
Seattle, WA 98105

### EPA Proposes NPDES Permit Reissuance.

EPA proposes to reissue a *National Pollutant Discharge Elimination System* (NPDES) permit to Alyeska Seafoods, Inc. The proposed permit sets conditions on the *discharge of pollutants* from the **Alyeska Seafoods - Unalaska facility** to Unalaska Bay and Iliuliuk Harbor, Alaska. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged and places other conditions on the facility.

This Fact Sheet includes:

- the tentative determination of EPA to issue the permit,
- information on public comment, public hearing, and appeal procedures,
- a description of the *facility* and proposed discharge,
- a map and description of the discharge location,
- a listing of past and proposed effluent limitations, schedules of compliance, and other conditions, and
- technical material supporting the conditions in the permit.

### EPA Invites Comments on the Proposed Permit.

EPA will consider all substantive comments before issuing a final NPDES permit. Those wishing to comment on the proposed permit may do so in writing by the expiration date of the Public Notice. After the Public Notice expires and the public comments have been considered, EPA Region 10's Office of Water Director will make a final decision regarding permit reissuance.

If no substantive comments are received, the tentative conditions in the proposed permit will become final and the permit will become effective upon issuance. If comments are received,

EPA will respond to the comments and the permit will become effective 30 days after its issuance date, unless a request for an evidentiary hearing is submitted within 30 days.

**Documents Are Available for Review.**

The proposed NPDES permit and related documents can be reviewed at EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday. To request copies and other information, contact the NPDES Permits Unit at:

United States Environmental Protection Agency, Region 10  
1200 Sixth Avenue, OW-130  
Seattle, Washington 98101  
(206) 553-1214 or  
1-800-424-4372 (from Alaska, Idaho, Oregon and Washington)

The fact sheet and proposed permit are also available at:

Alaska Department of Environmental Conservation  
Attn: Division of Wastewater Discharge  
555 Cordova Street  
Anchorage, Alaska 99501  
(907) 269-7500

and

Alaska Department of Environmental Conservation  
Attn: Division of Wastewater Discharge  
410 Willoughby Avenue, Suite 303  
Juneau, Alaska 99801  
(907) 465-5302.

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## 1 APPLICANT

Alyeska Seafoods, Inc. [Business Office]  
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Seattle, WA 98105  
(206) 547-2100

and

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P.O. 530  
Unalaska, AK 99685  
(907) 581-1211

Alyeska Seafoods, Inc., requested the reissuance of NPDES permit no. AK-000027-2 for its Unalaska onshore seafood processing facility on November 27, 2000.

## 2 TYPE OF FACILITY AND ACTIVITY

### 2.1 Facility Location and Description

Alyeska Seafoods owns, operates, and maintains the Alyeska Seafoods - Unalaska facility, a facility which conducts seafood processing and seafood meal reduction. Alyeska Seafoods - Unalaska facility is located in the City of Unalaska, Alaska. The facility lies at 53°52'44" N, 166°32'25" W, in Unalaska Island of the Fox Island group in the easternmost Aleutian Islands, USGS hydrologic unit number 19030102. The map in Appendix A shows the location of the Alyeska Seafoods - Unalaska facility. The diagram of the grounds of the facility in Appendix B shows the lay of the building, docks and outfall lines. The facility consists of (1) a large onshore facility which houses crab, finfish and surimi processing lines and a meal reduction facility, (2) product warehouses, (3) residential buildings, (4) a power house, (5) a tank farm, and (6) docks.

### 2.2 Process Description

Alyeska Seafoods - Unalaska facility processes surimi, minced and filleted pollock, headed/gutted and filleted Pacific cod, frozen crab (king, bairdi, and opilio) sections, frozen (bait) herring, black cod, and miscellaneous rockfish. Alyeska takes receipt of the seafood catch from fishermen along its dock, offloading the catch in large vacuum lines or baskets. Seafood is butchered by machine and by hand in any of several processing lines throughout the facility. Processing wastes (i.e., heads, offal, unusable tissue parts) are flumed to dewatering conveyors where they are transported to the meal plant for reduction to fish meal, a marketable secondary product. Water used in butchering, processing, and fluming is collected before final discharge and passed through a screening process to recover residual tissue pieces. Screened solids are returned to the meal reduction plant. Wastewater is discharged without further treatment through a subsurface outfall. The

facility processes in excess of 140 million pounds of raw seafood annually, of which over 90% is pollock.

### **2.3 Facility History and Performance**

The Alyeska Seafoods - Unalaska facility's NPDES permit expired May 31, 2001. Alyeska Seafoods bought the facility in 1985 and began operations in 1986; a seafood processor has operated on-site since the 1950s or earlier. The facility's screening treatment of its effluent was installed in 1992 in order to capture finfish and crab offal for reduction to meal thereby both producing a marketable by-product and decreasing discharges of biochemical oxygen demand (measured as *BOD5* and affecting the amount of dissolved oxygen, or *DO*, in the receiving water), total suspended solids (*TSS*), settleable solid seafood residues, and floating process residues to south Unalaska Bay. Alyeska Seafoods also installed a multi-port diffuser on its outfall in 1992 to improve initial dilution of the discharge. Alyeska Seafoods has contracted with vessels for the conveyance and at-sea disposal of stickwater and surimi wastewater (effluents which do not contain screenable solids) in order to meet its effluent limits during high-volume summer fisheries.

The facility processes in excess of 140 million pounds of raw seafood annually. A review of the facility's discharge monitoring reports shows that the facility's average flow is as much as 6.5 million gallons per day (MGD), of which 120,000 gal/day is stickwater and 3 MGD is non-contact wastewater. Sanitary wastewater is discharged to the City of Unalaska's sewage collection system. The effluent discharge ranges in temperature from a low of 6°C in the winter to a high of 17°C in the summer; pH ranges from 6.6 to 7.8.

The discharge monitoring reports indicate that the facility has reported full compliance with its permit effluent limits for the period of permit issuance to the present. The facility has reported an average monthly discharge of 33,837 lbs TSS/day and a maximum daily discharge of 81,625 lbs TSS/day based upon 86 analyses. The facility has reported an average monthly discharge of 17,195 lbs oil and grease/day and a maximum daily discharge of 39,731 lbs oil and grease/day based upon 40 analyses. The facility has reported a monthly average discharge of five-day biochemical oxygen demand for the period July through October of 62,711 lbs BOD5/day and a maximum daily discharge of 124,595 lbs BOD5/day. The facility has not detected total residual chlorine (TRC) in its effluent discharge.

## **3 PROPOSED DISCHARGE**

### **3.1 Nature, Amount, and Composition of Discharge**

Alyeska Seafoods - Unalaska facility discharges seafood processing wastewater consisting of relatively high levels of biochemical oxygen demand (*BOD5*), total suspended solids (*TSS*), settleable solid processing residues, floating residues, fish oils, and scum. The effluent discharge may also contain traces of disinfectants. These wastewater streams can be several degrees warmer than the receiving waters. The plant also discharges various non-contact cooling wastewaters from an air treatment scrubber, electrical

generators and refrigeration condenser units which may be as much as 5°C above ambient temperatures and may contain trace amounts of other pollutants.

### **3.2 Treatment of Wastewater Prior to Discharge**

The Alyeska Seafoods - Unalaska facility treats its final effluent wastewater with 1 x 10 millimeter slotted wedgewire screening, recovering all residual waste particles to one millimeter width prior to discharge. This screening and meal reduction reduces the facility's effluent discharges of BOD5 (estimated decrease of more than 70%), TSS (estimated decrease of more than 95%), settleable solid process residues (estimated decrease of more than 97%), and floating solid process residues (estimated decrease of more than 95%).

## **4 RECEIVING WATER**

### **4.1 Nature of Unalaska Bay, Iliuliuk Bay and Iliuliuk Harbor**

Unalaska Bay is located on the north, or Bering Sea side, of Unalaska Island in the eastern Aleutian Islands. It lies at roughly 54°N latitude, 166°30'W longitude. The bay is the foremost safe harbor and anchorage in the eastern Aleutian Islands and shelters both fishing and cargo vessels. It is about 790 air miles southwest of Anchorage and supports a national airport along its limited coastal bench.

Greater Unalaska Bay, consisting of a number of contiguous subsidiary bays, is 10.4 nautical miles (nm) wide at its mouth from Cape Cheerful on the west to Cape Kalekta on the east. It is roughly 11.6 nm from the mouth of the bay to its head at the south end of Captains Bay. Greater Unalaska Bay is approximately 87 square nm in area and has roughly 50 nm of shoreline.

Iliuliuk Bay is a contiguous and subsidiary bay on the southeast side of Unalaska Bay. It is approximately 1.4 miles wide and 2.7 miles long. Iliuliuk Bay is a steep-sided fjord bay with up to 80% of its width consisting of a relatively flat seafloor deeper than -100 ft, bordered by the mainland of Unalaska Island on the east, Dutch Harbor and Amaknak Island on the west, a convergence of these two islands separated by the entrance to the harbor on the south, and a relatively shallow sill of approximately -45 ft depth on the north.

Iliuliuk Harbor is a small, highly sheltered harbor approximately 500 yds across with narrow passage to Iliuliuk Bay through a reefed east channel and to Captains Bay through a hazardous south channel.

### **4.2 Beneficial Uses of Unalaska Bay, Iliuliuk Bay and Iliuliuk Harbor**

Designated beneficial uses for Alaska's marine waters are established by regulation and are found in the State of Alaska Water Quality Standards [18 AAC 70]. For marine waters of the state, these designated uses include: (1) water supply, (2) water recreation, (3) growth

and propagation of fish, shellfish, other aquatic life, and wildlife, and (4) harvesting for consumption of raw mollusks or other raw aquatic life [18 AAC 70.020(a)(2)].

### 4.3 Climate

The eastern Aleutian Islands are characterized by a maritime climate. Low-lying fog, overcast skies, rain, and drizzle dominate weather conditions along the islands. Average annual precipitation in the area is estimated to be about 58 inches, some of which falls as snow. Fog occurs frequently in the summer. Normal summer air temperatures range from 50 to 60°F while normal winter air temperatures range from 25 to 35°F.

Unalaska weather data indicate moderate to strong winds throughout the year (CH2M-Hill 1994, Evans-Hamilton 1993). Winds in winter and during storms are usually strong. Average wind speeds range from 10 to 22 mph between October and April and range from 6 to 9 mph between May and September. Wind velocities greater than 25 mph occur in every month of the year and velocities of more than 50 mph are not uncommon. Most gales originate from the north and east in the fall and winter. Local topography plays a major role in determining wind speed and direction.

### 4.4 Water Column

The waters of greater Unalaska Bay are both marine (outer) and estuarine (inner). Surface salinity ranges from around 20 ppt to nearly 33 ppt. Bottom water salinity is less variable, ranging from 25 ppt to 33 ppt.

Water temperatures in the bay range from 3° to 10° C near the surface and from 3° to 7° C near the seafloor.

Vertical gradients of temperature and salinity which cause stratification of marine and estuarine waters are strongly seasonal, forming in May and June, becoming more pronounced in July through middle-to-late September, and then rapidly returning to an unstratified condition in October.

Tides in greater Unalaska Bay are relatively small. The mean tidal amplitude (vertical distance from mean high water to mean low water) is approximately one meter. The maximum tidal amplitude is about two meters.

The circulation study of greater Unalaska Bay (CH2M-Hill 1994) indicated that the water circulation with the bay is driven primarily by winds (~90%) and secondarily by tides (~10%). This results in currents which are strongly seasonal and weakly semi-diurnal in direction and velocity. It is only during periods of low-speed winds that tidal currents might dominate the circulation patterns of the bay.

On a large scale, the modeling of circulation in greater Unalaska Bay indicates that wind-driven currents are 5 to 15 cm/sec along the western shores of Amaknak Island, the eastern shore of Hog Island and through the pass between the two islands, through the eastern



mouth of Captains Bay and Iliuliuk Harbor, and along the northeastern shores of Unalaska Bay proper. In other areas in the bay, the wind-driven currents range between 1 and 5 cm/sec. Currents in the deep basins of Captains Bay and Dutch Harbor-Iliuliuk Bay may be less than 1 cm/sec during much of the year (CH2M-Hill 1994; Evans-Hamilton 1993; SAIC 1992). The major difference between summer and winter wind-driven circulation patterns is the changes in current direction in many sections of the bay.

The circulation study of greater Unalaska Bay suggests that the flushing time required for 95% of the water at a given location in the bay to be replaced by ocean water from outside of the bay ranges from 20 days in central Unalaska Bay to 70 days at the head of Captains Bay. No appreciable differences in flushing times appear to result from changes in wind patterns between summer and winter over most of the year.

Captains Bay and Iliuliuk Bay-Dutch Harbor are the exceptions to these generalizations on flushing time. The replacement of the water in Captains Bay 113 meter-deep basin below a 29 meter deep sill requires the development of a pronounced hydraulic pressure head at the south end of the bay during the unstratified conditions of winter. Flushing of this deep basin occurs intermittently during strong, persistent winds or storms from the north. Similar processes constrain and renew Iliuliuk Bay-Dutch Harbor.

Three large freshwater streams enter greater Unalaska Bay, the Makushin River of Broad Bay, the Shaishnikof River at the head of Captains Bay, and the Iliuliuk River which drains Unalaska Lake east of Iliuliuk Harbor. All three streams are utilized by salmon for spawning. At least five other streams flow into greater Unalaska Bay year-round and more than thirty other streams seasonally flow into the bay.

#### **4.5 Seafloor**

Greater Unalaska Bay's subsurface topography, or bathymetry, is complex, consisting of five prominent sills (i.e., pronounced elevations in the seafloor) and four water basins (i.e., pronounced depressions). The northernmost basin is established by Chelan Bank in the north and extends from the Bering Sea into the mouth of Unalaska Bay. The second basin, in Unalaska Bay proper, extends from the mouth adjacent Eider Point along the western portion of the bay and divides into Nateekin Bay to the southwest and south Unalaska Bay (a.k.a. "Processor Bay"). Captains Bay is a very separate and distinct basin enclosed by steep coast on three sides; it is separated by sills across the west and east entrances of this bay. Iliuliuk Bay and Dutch Harbor constitute a single basin bordered by a sill extending from the Dutch Harbor spit east to Unalaska Island on its north side and by the convergence of Amaknak Island and Unalaska Island and the shallower Iliuliuk Harbor to the south.

This information suggests that the bays are typical of deep, steep-sided fjords with sills across their entrances. Circulation in the deep basins of such bays may be restricted seasonally due to a stratified water column and decrease bottom currents. Such basins may act as traps for settleable solids and nutrients and experience seasonal oxygen depletion.

## **5 BASIS FOR EFFLUENT LIMITATIONS AND MONITORING**

### **5.1 General Approach**

EPA followed the Clean Water Act, state regulations, and EPA's 1991 *Technical Support Document for Water Quality-Based Toxics Control* (TSD) to develop the proposed effluent limits.

In general, the Clean Water Act requires that the effluent limit for a particular pollutant be the more stringent of either the *technology-based* or *water quality-based limit*. This proposed permit includes both technology-based and water quality-based limits. Technology-based limits are established based upon the level of treatment that is achievable using available technology. Water quality-based limits are designed to prevent exceedance of the Alaska Water Quality Standards (AWQS) in the receiving water. Appendix C contains more detail about how EPA established these water quality-based limits on settleable solid seafood residues.

**5.2 Summary of Effluent Limitations, Past and Proposed**

<b>Table I: Comparison of Permit Limits</b>			
<b>Parameter</b>		<b>1996 Permit Limits</b>	<b>Proposed Limits</b>
<b>Seafood Processing Wastewater</b>			
BOD5, lbs/day	Monthly Average	90,000 (May 1 to Oct. 31)	90,000 (June 1 to Oct. 31)
	Daily Maximum	144,000 (May 1 to Oct. 31)	144,000 (June 1 to Oct. 31)
Settleable Solids	Maximum particle size	0.5 mm (process residues)	1 mm (finfish wastes) 0.5 inch (crab wastes)
Settleable Solids	Annual load - 1 acre zone of deposit	no limit	2,700,000 lbs/yr @ 1mm 10,800,000 lbs/yr @ 0.5 in
pH, standard units	Range	6.5 to 8.5	6.5 to 8.5
<b>Non-contact Scrubber, Condenser and Evaporator Wastewater</b>			
TSS, lbs/1,000 lbs	Monthly Average	1.5	no limit
	Daily Maximum	3.7	no limit
Oil and Grease, lbs/1,000 lbs	Monthly Average	0.76	no limit
	Daily Maximum	1.4	no limit
BOD, lbs/1,000 lbs	Monthly Average	3.8	no limit
	Daily Maximum	6.7	no limit
pH, standard units	Range	6.5 to 8.5	no limit
<b>Non-contact Cooling Wastewater</b>			
Temperature, °C	Daily Maximum	no limit	20 °C

Proposed permits limits for settleable solids are based on the proposed zone of deposit of one acre.

The proposed permit requires that finfish processing wastes shall be screened to approximately one millimeter (1 mm) in width and that crab processing wastes shall be ground to one half inch (0.5 in) width prior to discharge through on-site outfalls. The proposed permit further provides that all seafood processing solid waste residues shall be ground to one half inch (0.5 in) width prior to discharge at sea in depths greater than 120 ft MLLW and at a distance of one mile from shore. The proposed permit also prohibits discharges of waste streams that are not part of the normal operation of the facility, as reported in the permit application.

### 5.3 Technology-based Evaluation

Section 301 of the Clean Water Act requires particular categories of industrial dischargers to meet technology-based effluent limitation guidelines. The intent of a technology-based effluent limitation is to require a minimum level of treatment for industrial and municipal *point sources* across the country based on currently available treatment technologies while allowing a discharger to choose and use any available pollution control technique to meet the limitations. Where EPA has not yet developed guidelines for a particular industry, EPA can establish permit limitations using Best Professional Judgment (BPJ; 40 CFR §§ 122.43, 122.44 and 125.3).

EPA has determined that discharges of seafood processing wastes shall not exceed one half inch (0.5 in) width when processed and discharged in remote Alaskan locations. In the case of seafood processors discharging large quantities of solid seafood waste residues which produce persistent deposits of more than one acre on the sea floor, EPA has made a BPJ determination that finfish wastewater must be screened to approximately one millimeter (1 mm) width prior to discharge. In order to reduce the pollutant load, solid residues must be either screened, collected, and reduced to meal or transported for disposal from an underway vessel to offshore waters as designated by EPA and the State of Alaska.

EPA has previously required in-plant technology-based limits for individual process lines based upon national effluent guidelines for bottomfish, salmon, and herring processing. In administering the permit EPA has found that the separation, collection, and on-site utilization and burning of fish oils and the commingling of the various effluent streams for screening and final discharge through a single outfall support the use of more stringent water quality-based limits for biochemical oxygen demand (BOD5) and waste residues.

### 5.4 Mixing Zone and Other Variances to State Water Quality Standards

The State of Alaska, through ADEC, can authorize a number of site-specific variances to the Alaska Water Quality Standards. *Variances* to AWQS include site-specific water quality criteria (18 AAC §§ 70.220 and 70.235), a *mixing zone* wherein AWQS may be exceeded (18 AAC § 70.240), a *zone of deposit* wherein the AWQS criteria for settleable residues may be exceeded (18 AAC § 70.210), and short-term variances from the anti-degradation policy standard or the water quality criteria (18 AAC § 70.200). In addition, ADEC may exercise enforcement discretion in determining whether to initiate an enforcement action on a water quality violation (18 AAC § 70.900).

In the case of this permit, Alyeska Seafoods is applying for (1) mixing zones of 100 ft radius around the outfalls of Discharges 001 and 002 for temperature, color, turbidity, floating and suspended residues, and pH, (2) a mixing zone 230 ft wide and 12,200 ft long for the at-sea Discharge 004, and (3) a one acre zone of deposit on the sea floor around outfall 001 for settleable solids seafood processing residues. ADEC has indicated that it will approve such areas in its State certification of the NPDES permit. No mixing zone is required for Discharge 002.

## 5.5 Water Quality-based Evaluation

Water quality-based limits are derived from the Alaska Water Quality Standards to protect the water quality and beneficial uses of Alaskan waters. The NPDES regulation at 40 CFR § 122.44(d)(1) requires that permits include limits for all pollutants or parameters which “are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality.” The limits must be stringent enough to ensure that Alaska water quality standards are met, and must be consistent with any available wasteload allocation established in the assessment of a total maximum daily load of pollutant discharges to a receiving water. Based upon Alyeska Seafoods’ monitoring of its effluents and its receiving waters, water quality-based limits are justified for four pollutants: biochemical oxygen demand (BOD5), settleable solid seafood processing residues, temperature, and pH (a measure of the acidity or alkalinity of the wastewaters).

EPA Region 10 completed an assessment of the TMDL for settleable solids seafood processing residues for south Unalaska Bay, predicting wasteloads which would produce waste piles of different sizes on the sea floor around an outfall (EPA 1998). This TMDL provides the foundation for water quality-based limits of residues in this permit. Alyeska Seafoods has requested that the permit limits for settleable solid residues provide for a discharge of a combination of both screened finfish wastes and ground crab wastes. EPA has completed an assessment of allowable discharges of both screened and ground wastes for a zero acre, one acre and two acre zone of deposit (Table 1, above; Appendix C). At the publication of this draft permit, ADEC has tentatively approved a one acre zone of deposit. The permit limits are based on modeling results for a one acre zone of deposit, allowing for a safety factor.

EPA previously completed TMDL determinations for the discharge of biochemical oxygen demand into south Unalaska Bay and developed appropriate water quality-based limits on discharges of BOD5 at the facility. The facility has been able to meet these limits and water quality monitoring of south Unalaska Bay indicates that these limits have been protective of the Alaska Water Quality Standard for dissolved oxygen. The average monthly and maximum daily limits on BOD5 have been sustained in the current permit reissuance.

The most stringent State criteria for pH are those for the growth and propagation of fish, shellfish, and other aquatic life: pH may not be less than 6.5 or greater than 8.5, and may not vary more than 0.1 pH unit from natural conditions in the receiving water. Based on these criteria, the permittee may not discharge effluents for which the pH is less than 6.5 or greater than 8.5.

The most stringent State criteria for temperature are that the temperature of a discharge may not exceed 15°C or cause the weekly average to increase by more than 1°C. State criteria exist for color, turbidity, and floating residues... pollutants characteristic of the wastewater plume of seafood processors. It is EPA’s best professional judgment that the Alaska water quality criteria for temperature, color, turbidity, and floating residues will be met outside of the mixing zones. The EPA is proposing a maximum temperature limit of 20°

C for non-contact cooling water, based on a past 401 Certification from ADEC for a similar type discharge.

Antidegradation of Water Quality. In proposing to reissue this permit, EPA has considered the State’s antidegradation policy [18 AAC 70.015]. This policy states, in part, that in Alaska: “the existing water uses and the level of water quality necessary to protect the existing uses must be maintained and protected (and), if the quality of a water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality must be maintained and protected unless the department (ADEC)... allows the reduction in water quality...”. The permit, as stated above, allows and limits effluent discharges of temperature, pH, and residues. The limits in the draft permit are consistent with and protective of the State water quality standards and the water quality of the receiving water. EPA believes that the draft permit is consistent with the State’s antidegradation policy.

### 5.6 Summary of Effluent Monitoring

The Clean Water Act requires that monitoring shall be included in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations and to monitor effluent impacts on the receiving water. The Permittee will be responsible for conducting the monitoring and for reporting the results to EPA. Table II presents the proposed monitoring requirements based on the minimum sampling necessary to adequately monitor the facility’s performance. For comparison purposes, the table also shows the monitoring requirements in the past permit.

<b>TABLE II. Comparison of Monitoring Requirements</b>		
<b>Parameter</b>	<b>1996 Permit Frequency and Sample Type</b>	<b>Proposed Permit Frequency and Sample Type</b>
<b>Seafood Processing Water - Summer</b>		
Monitoring Months	August, September, October	July, August, September, October
Flow (mgd)	daily, record	daily, meter
BOD5 (mg/L; lbs/day)	2/week, 24-hr composite	2/week, grab or composite
TSS (mg/L; lbs/unit)	2/week, 24-hr composite	1/week, grab or composite
Settleable Solids (mg/L; lbs/day)	2/week, 24-hr composite	1/week, grab or composite
Oil and Grease,(mg/L; lbs/unit)	1/week, grab	no monitoring
pH	1/week, grab	1/week, grab
<b>Seafood Processing Water - Winter</b>		
Monitoring Months	January, February, March	February
Flow (mgd)	daily, record	daily, meter

<b>TABLE II. Comparison of Monitoring Requirements</b>		
<b>Parameter</b>	<b>1996 Permit Frequency and Sample Type</b>	<b>Proposed Permit Frequency and Sample Type</b>
BOD5 (mg/L; lbs/day)	1/week, 24-hr composite	1/week, grab or composite
TSS (mg/L; lbs/unit)	1/week, 24-hr composite	1/week, grab or composite
Settleable Solids (mg/L; lbs/day)	1/week, 24-hr composite	1/week, grab or composite
Oil and Grease,(mg/L; lbs/unit)	1/month, grab	no monitoring
pH	1/month, grab	1/week, grab
<b>Non-contact Scrubber, Condenser and Evaporator - Summer and Winter</b>		
Monitoring Months	January, February, March, August, September, October	no monitoring
Flow (mgd)	daily, record	no monitoring
Production Levels	daily, record	no monitoring
BOD5 (mg/L; lbs/day)	1/week, 24-hr composite	no monitoring
TSS (mg/L; lbs/unit)	1/week, 24-hr composite	no monitoring
Oil and Grease,(mg/L; lbs/unit)	1/month, grab	no monitoring
pH	1/month, grab	no monitoring
<b>Non-contact Cooling Wastewater - Summer and Winter</b>		
Monitoring Months	no monitoring	February, July, August, September, October
Flow (mgd)	no monitoring	daily, record
Temperature	no monitoring	daily, grab or probe

The permit requires weekly effluent monitoring of pollutant parameters for which a limit or condition exists within the permit (40 CFR §§ 122.41 and 122.44). Monitoring is conducted during five of the twelve months per year as sufficient to collect representative samples which quantify both concentrations and mass loading for the facility; the sampling months coincide with fishing seasons and attendant high levels of pollutant discharge.

Representative Sampling. The proposed permit requires sampling whenever a bypass, spill, or non-routine discharge of pollutants occurs, if such a discharge could cause a violation of an effluent limit.

## **6 BASIS FOR BEST MANAGEMENT PRACTICES PLAN**

The Clean Water Act and federal regulations authorize EPA to require *best management practices*, or BMPs, in NPDES permits. BMPs are measures for controlling the generation of pollutants and their release to waterways. For many facilities, these measures are typically included in the facility Operation & Maintenance plans (O&M) plans. BMPs are important tools for waste minimization and pollution prevention. EPA encourages facilities to incorporate BMPs into their O&M plans and to revise them as new practices are developed.

The proposed permit requires Alyeska Seafoods to develop and implement a BMP plan within 180 days of permit issuance. The Permittee must develop a materials balance assessment (i.e., a flow diagram) of its process, treatment and discharge lines and quantify the input and output streams of water and pollutants. The Permittee must consider the optimization of product recovery and chemical use, staff training aimed at controlling the discharge of pollutants to the receiving waters, spill prevention and control, and water conservation. The Permittee must document this assessment as a working document known as a BMP plan in accordance with the requirements of the permit.

## **7 BASIS FOR ENVIRONMENTAL MONITORING**

The proposed permit requires Alyeska Seafoods to monitor the receiving water for the discharge and accumulation of residues on the sea floor, sea surface and shoreline and for the degradation of dissolved oxygen concentrations in the water column. The purpose of this monitoring is to verify the assumptions made in developing permit limits regarding receiving water conditions and the effectiveness of permit limits. Based on the results of this study, EPA will determine whether or not to revise these permit limits when the permit is renewed.

Ambient monitoring of the residues on the sea surface and sea floor and of dissolved oxygen within the water column are important in monitoring the effect of the Alyeska Seafoods plant on the receiving waters. Daily surveys and records of the sea surface and sea shore for scum and other residues are required in the permit. Monitoring of settleable residues on the sea floor is required as an annual sea floor survey in the area around the outfall. Water quality monitoring of the receiving waters is required in the second and fourth years of the permit, and will verify the continue protection of the State water quality standard for dissolved gases in the bay and the efficacy of permit limits.

The proposed permit requires the Permittee to submit study plans to EPA and ADEC for approval. The plan must address issues such as appropriate sampling location, variability in the receiving water, appropriate sampling and analytical methods, analytical variability, and quality assurance/quality control for sampling and analysis.



## 8 BASIS FOR ANNUAL REPORT

The proposed permit requires the Permittee to complete and submit an annual report which compiles effluent and environmental monitoring data and reports permit violations, upset conditions, by-pass conditions, plant or process changes, and corrective actions undertaken to improve wastewater treatment and pollution prevention at the facility. The annual report provides a comprehensive record of wastewater discharge at the facility and its effect on the receiving water. The annual report supports improved understanding and management of the discharges and discussion of these discharges by the applicant and government representatives. Title 40 of the Code of Federal Regulations provides the regulatory basis for this requirement at sections 122.41 (“Conditions applicable to all permits”), 122.44(i) (“Monitoring requirements”), and 122.48 (“Requirements for recording and reporting of monitoring results”).

## 9 PERMIT CONDITIONS FOR COMPLIANCE, RECORDING, REPORTING, AND OTHER GENERAL PROVISIONS

Sections § VI through VIII of the draft permit contain standard regulatory language that is required to be in all NPDES permits. The following sections of the permit are based largely upon 40 CFR Part 122, subpart C, “Permit Conditions” and on other referenced laws and regulations.

- Duty to Comply from 40 CFR § 122.41(a),
- Proper Operation and Maintenance from 40 CFR § 122.41(e),
- Duty to Mitigate from 40 CFR § 122.41(d),
- Toxic Pollutants from 40 CFR § 122.41(a)(1-2), § 122.44(b, e), and § 125.3,
- Removed Substances from 40 CFR § 122.41(a)(1) and (o) and CWA § 405(A),
- Need to Halt or Reduce Activity not a Defense from 40 CFR § 122.41(c),
- *Bypass* of Wastewater Treatment from 40 CFR § 122.41(m),
- *Upset* Conditions from 40 CFR § 122.41(n),
- Inspection and Entry from 40 CFR § 122.41(i),
- Penalties for Violations of Permit Conditions from 40 CFR § 122.41(a)(2-3),
- Duty to Provide Information from 40 CFR § 122.41(h),
- Records Contents from 40 CFR § 122.41(j)(3),
- Submittal of Reports from 40 CFR § 122.41(h, j, and l),
- Retention of Records and Reports from 40 CFR § 122.41(j)(2),
- On-site Availability of Records and Reports from 40 CFR § 122.41(i)(2),
- Availability of Reports for Public Review from 40 CFR § 122.1(e) and § 122.7(1) and 40 CFR § 2.101,
- Planned Changes from 40 CFR § 122.41(l)(1),
- Changes in the Discharge of Toxic Substances from 40 CFR § 122.42(a),
- Anticipated Noncompliance from 40 CFR § 122.41(l)(2),
- Reporting of Noncompliance from 40 CFR § 122.41(l)(6-7) and § 122.44(g),
- Permit Actions from 40 CFR § 122.44(c) and 40 CFR § 122.61 - § 122.64,
- Duty to Reapply from 40 CFR § 122.41(b),
- Incorrect Information and Omissions from 40 CFR § 122.41(l)(8),

- Signatory Requirements from 40 CFR § 122.41(k),
- Property Rights from 40 CFR § 122.41(g),
- Severability from 40 CFR § 124.16,
- Transfers from 40 CFR § 122.41(l)(3),
- Oil and Hazardous Substance Liability from 40 CFR § 125.3, 40 CFR part 300, 33 CFR § 153.10(e), and section 311 of the Act,
- State Laws from 40 CFR § 122.1(f) and section 510 of the Act, and
- Reopening of the Permit from 40 CFR § 122.41(f) and § 122.44(c).

## 10 OTHER LEGAL REQUIREMENTS

### 10.1 State Water Quality Standards and Certification

EPA is requesting State officials to review and provide appropriate certification to this NPDES permit pursuant to 40 CFR § 124.53. Since State waters are involved in the draft permit, the provisions of Section 401 of the Clean Water Act apply, requiring EPA to seek State certification that the permit is protective of the State Water Quality Standards before issuing a final permit. This certification by the State ensures that federally issued permits are in compliance with the laws of the State (see 40 CFR § 124.55). In particular, ADEC must provide written stipulation for a water quality study of the receiving water and authorization of mixing zones and a zone of deposit in its certification of the permit. In accordance with 40 CFR § 124.10(c)(1), public notice of the draft permit has been provided to the State agencies having jurisdiction over fish, shellfish and wildlife resources, and over coastal zone management plans.

### 10.2 Endangered Species Act

Endangered species found in the vicinity of the discharge include Eskimo curlew (*Numenius borealis*), American peregrine falcon (*Falco peregrinus anatum*), Aleutian shield-fern or Aleutian holly-fern (*Polystichum aleuticum*), short-tailed albatross (*Diomedea albatrus*), humpback whale (*Megaptera novaeangliae*), right whale (*Eubalaena glacialis*), and blue whale (*Balaenoptera musculus*). Threatened species found in the vicinity of the discharge include Spectacled eider (*Somateria fischeri*), Steller's eider (*Polysticta stelleri*), Aleutian Canada goose (*Branta canadensis leucopareia*), and Steller sea lion (*Eumetopias jubatus*). Pursuant to 40 CFR § 122.49(c), EPA has concluded that, with the exception of the Steller's eider, the localized effluent discharges authorized by this permit will have no effect on the continued existence of these endangered or threatened species and will not adversely affect their critical habitat.

The EPA has concluded that the localized effluent discharges authorized by this permit are likely to adversely affect Steller's eiders. EPA has initiated consultation with USFWS on the potential effects of this permit action on Steller's eiders, and is applying the conclusions and reasonable and prudent measures developed in the Service's biological opinion on the permitting of seafood processors throughout Alaska (USFWS 01/17/01; Attachment A to draft permit). EPA will initiate additional consultation with NMFS or USFWS should new information reveal impacts not previously considered, should the

activities be modified in a manner beyond the scope of the original opinion, or should the activities affect a newly listed threatened or endangered species.

The draft permit, fact sheet and consistency determination will be submitted to the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) for review at the time of public notice. EPA is requesting concurrence from USFWS and NMFS on the draft permit, and will consider their comments in the final permit decision.

### **10.3 Fishery Conservation and Management Act**

The Magnuson-Stevens Fishery Conservation and Management Act requires EPA to consult with NMFS with respect to the reissuance of this NPDES permit concerning its impacts on any essential fish habitat and to provide a description of the measures proposed to avoid, mitigate, and offset the impact of this permitted discharge on such habitat. EPA finds that the permitted discharge will comply with Alaska Water Quality Standards outside of the authorized zones of variance, that decreases in marine life within these zones will be compensated by increases in the abundance of marine life in surrounding zones of organic enrichment, and that issuance of this permit is not likely to adversely affect any species in the vicinity of the discharge. EPA provides this fact sheet to describe the discharge, the draft permit, and the permit's limits, conditions, and measures of mitigation.

### **10.4 Coastal Zone Management Act**

The applicant has certified that the activities authorized by this draft permit are consistent with the Alaska Coastal Management Plan. The draft permit, fact sheet and consistency determination will be submitted to the State for review at the time of public notice. Pursuant to 40 CFR § 122.49(d), requirements for State coastal zone management review and approval must be satisfied before the permit may be issued.

### **10.5 Pollution Prevention Act**

It is national policy that, whenever feasible, pollution should be prevented or reduced at the source, that pollution which cannot be prevented should be recycled in an environmentally safe manner, and that disposal or release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner. The Permittee will discharge at the facility in accordance with best management practices which will address the provisions of the Pollution Prevention Act.

### **10.6 Oil Spill Requirements**

Section 311 of the Clean Water Act prohibits the discharge of oil and hazardous materials in harmful quantities. Discharges specifically controlled by the draft permit are excluded from the provisions of Section 311 because these discharges are limited to amounts and concentrations which are deemed to be protective of State water quality standards. However, this permit does not preclude the institution of legal action or relieve the

Permittee from any responsibilities, liabilities, or penalties for other unauthorized discharges of toxic pollutants which are covered by Section 311 of the Act.

## 11 MODIFICATION OF PERMIT LIMITS OR OTHER CONDITIONS

When EPA receives information that demonstrates the existence of reasonable cause to modify the permit in accordance with 40 CFR § 122.62(a), EPA may modify the permit. "Reasonable cause" includes alterations or additions to the facility or activity, new federal regulations or standards, new state water quality standards, the completion or modification of total maximum daily loads or wasteload allocations for the receiving water of the facility (also, see 40 CFR § 122.44(d)((1)(vii)(B)), failure of the permit to protect state water quality standards, a change in a permittee's qualification for net limits, any relevant compliance schedule, the need to incorporate or revise a pretreatment or land application plan, when pollutants which are not limited in the permit exceed the level which can be achieved by technology-based treatment, the correction of technical mistakes and legal misinterpretations of law made in determining permit conditions, and the receipt of new information relevant to the determination of permit conditions. Minor modifications to a permit may be made by EPA with the consent of a permittee in order to correct typographical errors, change an interim compliance schedule, allow for a change in ownership, change a construction schedule, or delete an outfall. Pursuant to 40 CFR § 122.63, such minor modifications may be made without public notice and review.

## 12 PERMIT EXPIRATION

This permit will expire five years from its effective date. In accordance with 40 CFR § 122.6(a), the conditions of an expired permit continue in force under 5 U.S.C. § 558(c) until the effective date of a new permit when a permittee submits an application for permit reissuance 180 days before the expiration of the permit. Permits which are continued because EPA has not reissued a new permit remain fully effective and enforceable.

## 13 GLOSSARY OF TERMS AND ACRONYMS

§ means section or subsection.

AAC means Alaska Administrative Code.

ADEC means Alaska Department of Environmental Conservation.

*Average monthly discharge* means the average of "daily discharges" over a monitoring month, calculated as the sum of all daily discharges measured during a monitoring month divided by the number of daily discharges measured during that month. It may also be referred to as the "monthly average discharge."

*Best management practices* ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment

requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or **waste** disposal, or drainage from raw material storage.

*BOD5* means biochemical oxygen demand, five-day.

*Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

°C means degrees Celsius.

*CFR* means Code of Federal Regulations.

*Cooling water* means once-through non-contact cooling water.

*CWA* means the Clean Water Act, (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483 and Public Law 97-117, 33 U.S.C. 1251 et seq.

*Daily discharge* means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

*Daily maximum discharge* means the highest allowable "daily discharge" and is also referred to as the "maximum daily discharge."

*Discharge of a pollutant* means any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source" or any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation.

*Discharge Monitoring Report* ("DMR") means the EPA uniform national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by "approved States" as well as by EPA.

*DO* means dissolved oxygen.

*Effluent limitation* means any restriction imposed by the Director on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States," the waters of the "contiguous zone," or the ocean.

*EPA* means U.S. Environmental Protection Agency.

*ESA* means the Endangered Species Act.

*°F* means degrees Fahrenheit.

*Facility* or activity means any NPDES “point source” or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the NPDES program.

*lb* means pound.

*Maximum* means the highest measured discharge or pollutant in a waste stream during the time period of interest.

*Maximum daily discharge* limitation means the highest allowable “daily discharge.”

*MGD* means million gallons per day.

*mg/L* means milligrams per liter.

*Mixing zone* means the zone of dilution authorized by ADEC under 18 AAC 70.032 wherein pollutant concentrations may exceed the criteria of the Alaska Water Quality Standards for the proscribed pollutants.

*MLLW* means mean lower low water.

*mg/L* means milligrams per liter.

*ml* means milliliter.

*NMFS* means National Marine Fisheries Service.

*National Pollutant Discharge Elimination System* (“NPDES”) means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of CWA.

*OW* means EPA’s Office of Water.

*P.L.* means (U.S.) Public Law.

*Point source* means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

*Pollutant* means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

*Process wastewater* means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

*QAPP* means quality assurance project plan.

*Schedule of compliance* means a schedule of remedial measures included in a "permit", including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the CWA and regulations.

*sp.* means species.

*Sanitary wastes* means human body waste discharged from toilets and urinals.

*Seafood* means the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

*Seafood process waste* means the waste fluids, organs, flesh, bones, and chitinous shells produced in the conversion of aquatic animals and plants from a raw form to a marketable form.

*Settleable solid process residues* means process waste solids that gravimetrically settle out of the process wastewater and accumulate on the bottom of a wastewater discharge collection sump (which typically has a residence time of 15 minutes).

*Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

*Technology-based limit* means a permit limit or condition based upon EPA's technology-based effluent limitation guidelines or EPA's best professional judgment.

*TSS* means total suspended solids.

*USFWS* or *FWS* means U.S. Fish and Wildlife Service.

*Upset* means an exceptional incident in which there is unintentional and temporary noncompliance with permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused

by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

*Variance* means any mechanism or provision under section 301 or 316 of CWA or under 40 CFR part 125, or in the applicable "effluent limitations guidelines" which allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of CWA. This includes provisions which allow the establishment of alternative limitations based on fundamentally different factors or on sections 301(c), 301(g), 301(h), 301(i), or 316(a) of CWA.

*Water depth* means the depth of the water between the surface and the sea floor as measured at mean lower low water (0.0).

*Water quality-based limit* means a permit limit derived from a state water quality standard or an appropriate national water quality criteria.

*Waters of the United States* or waters of the U.S. means:

- (a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- (b) All interstate waters, including interstate wetlands;
- (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
  - (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes;
  - (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
  - (3) Which are used or could be used for industrial purposes by industries in interstate commerce;
- (d) All impoundments of waters otherwise defined as waters of the United States under this definition;
- (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;
- (f) The territorial sea; and
- (g) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

*Zone of deposit (ZOD)* means an area of the bottom in marine, coastal, or estuarine waters in which ADEC has authorized the deposit of residues in exceedence of the water quality criteria of 18 AAC 70.020(b) and the antidegradation requirement of 18 AAC 70.0101(c).



## 14 REFERENCES

ADEC. 1994. Waterbody Recovery and Pollution Prevention Plan for Unalaska Bay, Alaska. Alaska Department of Environmental Conservation, 410 Willoughby Avenue, Juneau, Alaska.

Enviro-Tech Diving. 1998. Diver survey of the Alyeska Seafoods outfall, 1998. Enviro-Tech Diving, Inc., 1127 NW 45<sup>th</sup> Street, Seattle, Washington.

USEPA. 1991. Technical support document for water quality-based toxics control. Office of Water, Washington, D.C. EPA/505/2-90-001.

USEPA. 1993. Guidance manual for developing best management practices (BMP). Office of Water, Washington, D.C. EPA/833/2-93-004.

USEPA. 1996. NPDES permit writers' manual. Office of Wastewater Management, Washington, D.C. EPA/833/B-96-003.

TetraTech. 1996. Total maximum daily load (TMDL) for seafood residues in the waters of Alaska. USEPA Region 10, Office of Water, 1200 Sixth Avenue, Seattle, Washington. September 30, 1996.

APPENDIX A - Location of the Alyeska Seafoods - Unalaska facility

APPENDIX B - Diagram of the Alyeska Seafoods - Unalaska facility

## APPENDIX C - Synopsis of Modeling the Discharge of Settleable Solid Seafood Residues

### TECHNICAL BRIEF FOR EXPANDED SEAFOOD MODEL RUNS

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September 30, 1996.

In support of the development of a general NPDES permit for shore-based, near shore, and offshore seafood processors, Tetra Tech prepared an ocean discharge criteria evaluation (ODCE) report in July 1994. The report concentrated on characterizing the effluent being discharge from the covered facilities and its potential effect on receiving waters. The report also developed preliminary modeling predictions for the deposition of solid seafood waste residues on the sea floor.

Technical directive No. 12 directed Tetra Tech to expand the modeling assessment of the deposition of settleable solid seafood waste residues from processors using different particle size assumptions. Tetra Tech was also directed to determine endpoints for maximum discharges which produce deposition areas of zero, one, and two acres using the case scenarios defined in the previous ODCE.

To accomplish this task, three general cases were modeled (i.e., 0.5 inch, 0.38 inch, and 0.04 inch maximum particle size) and the results are presented in Tables 1, 2, and 3, respectively. No changes in the WASP5 model were required to perform these model simulations, however, the input files used for each model run were modified as needed and are described below. Results of the predicted areal coverage of solid wastes for both the WASP output, based on the number and area of grids, and SURFER, based on contours of depth accumulation, are reported. In general, the determination of the endpoints for maximum discharges that produce zero, one, and two acre waste piles are based on the areas estimated by SURFER, the 3-dimensional contouring software.

Table 1 depicts the area and thickness of a waste pile which results from discharging seafood waste solids that have been ground to a maximum particle size of 0.5 inch. The assessment assumes that 60% of the loading mass of particles is 0.5" in diameter, 20% is 0.25", and 20% is 0.125".

Table 2 depicts the area and thickness of a waste pile which results from discharging seafood waste solids that have been ground to a maximum particle size of 0.375 inch. The assessment assumes that 60% of the loading mass of particles is 0.375" in diameter, 20% is 0.188", and 20% is 0.094".

Table 3 depicts the area and thickness of a waste pile which results from discharging seafood waste solids that have been ground to a maximum particle size of 0.04 inch (= 1 mm). The assessment assumes that 100% of the loading mass of particles is 0.04" in.







