United States
Environmental Protection
Agency

Office of Water
Criteria and Standards Division
Washington DC 20460

May 1984
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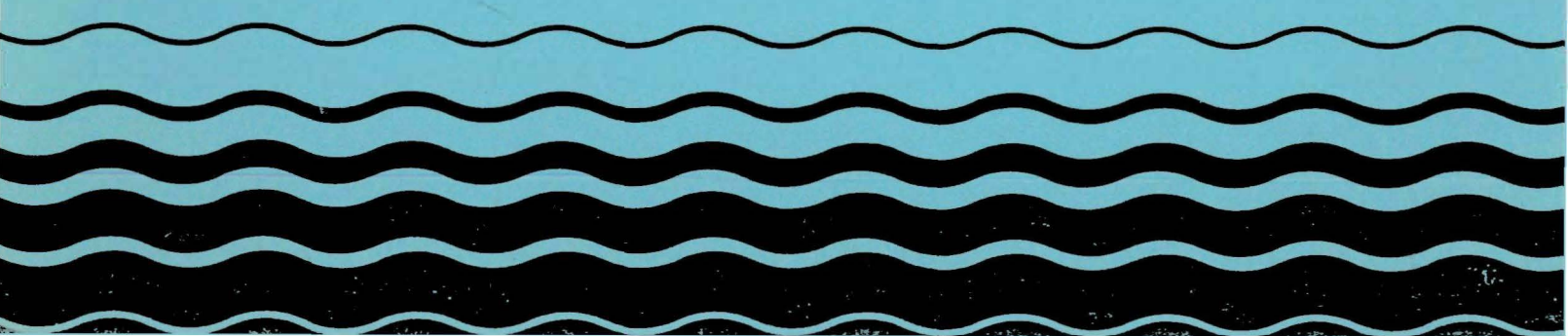
EPA

Environmental Impact Statement (EIS)

Final

Nome, Alaska Dredged Material Disposal Site Designation



FINAL
ENVIRONMENTAL IMPACT STATEMENT (EIS)
FOR
NOME, ALASKA DREDGED MATERIAL
DISPOSAL SITE DESIGNATION

MAY, 1984

U.S. ENVIRONMENTAL PROTECTION AGENCY
CRITERIA AND STANDARDS DIVISION
WASHINGTON, D.C. 20460

SUMMARY SHEET

ENVIRONMENTAL IMPACT STATEMENT FOR NOME, ALASKA

DREDGED MATERIAL DISPOSAL SITES

( ) Draft

(x) Final

( ) Supplement to Draft

ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF WATER REGULATIONS AND STANDARDS

CRITERIA AND STANDARDS DIVISION

1. Type of Action

   (x) Administrative/Regulatory Action

   ( ) Legislative Action

2. Brief background description of action and purpose

   The proposed action is the final designation of the Eastern Nome, Alaska interim designated Ocean Dredged Material Disposal Sites. The site will be used for the disposal of dredged material from the Nome, Alaska area. The purpose of the action is to provide an environmentally acceptable area for disposal of dredged materials, in compliance with EPA Ocean Dumping Regulations and Criteria.

3. Summary of major beneficial and adverse environmental and other impacts.

The principal beneficial effect is the provision of a designated environmentally acceptable area for the disposal of dredged material. Planning for dredged material disposal is enhanced since a permanently designated ocean disposal site is available for comparison with other dredged material disposal alternatives. An adverse environmental impact will result from burial and loss of some bottom organisms within the sites. Burial of bottom organisms outside the site boundaries will not occur. Other adverse environmental effects, such as mounding, changes in sediment texture, and disturbance of demersal fish, will be temporary, minor and restricted to the sites.

4. Major alternatives considered

The alternatives considered in the site evaluation studies and presented in this EIS were: (1) no action; (2) final designation of one or both of the interim designated sites; and (3) relocation of the sites to an alternate area.

5. Comments have been requested from the following:

Federal Agencies and Offices

Council on Environmental Quality
Department of Commerce
  National Oceanic and Atmospheric Administration (NOAA)
    National Marine Fisheries Service
  Maritime Administration
Department of Defense
  Army Corps of Engineers
Department of Health, Education, and Welfare
Department of Interior
  Fish and Wildlife Service

Bureau of Outdoor Recreation
Bureau of Land Management
Geological Survey
Department of Transportation
Coast Guard
Water Resources Council
National Science Foundation

States and Municipalities

Alaska Department of Environmental Conservation
Alaska Department of Fish and Game
Alaska Department of Natural Resources
Alaska Department of Transportation and Public Facilities
Alaska Office of Management and Budget
Alaska Office of the Governor
Alaska State Clearing House
Bearing Straits Native Corporation
City of Nome

Private Organizations

American Littoral Society
Audubon Society
Center for Law and Social Policy
Environmental Defense Fund, Inc.
National Academy of Sciences
National Wildlife Federation
Sierra Club
Water Pollution Control Federation

Academic/Research Institutions

Port of Nome Project
University of Alaska, Fairbanks
U.S. Department of the Army, Coastal Engineering Research Center

6. The Final statement was officially filed with the Director, Office of Environmental Review, EPA.

7. Comments on the Final EIS are due 30 days from the date of EPA's publication of Notice of Availability in the Federal Register which is expected to be MAY 25 1984.

Comments should be addressed to:

John M. Hill
Criteria and Standards Division (WH-585)
Office of Water Regulations and Standards
Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Copies of the Final EIS may be obtained from:

Criteria and Standards Division (WH-585)
Office of Water Regulations and Standards
Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

The Final statement may be reviewed at the following locations:

Environmental Protection Agency
Public Information Reference Unit, Room 204 (Rear)
401 M Street, SW
Washington, D.C. 20460

Environmental Protection Agency
Region X
1200 6th Avenue
Seattle, Washington 98101

U.S. Army Corps of Engineers
319 S.W. Pine Street
Portland, Oregon 97208

U.S. Army Corps of Engineers, Alaska District
Library
898 Pouch
Anchorage, Alaska 99506

Kegoyah Kozga Public Library
P.O. Box 1168
Nome, Alaska 99762

SUMMARY

The proposed action is the final desingnation of the Eastern Nome, Alaska interim designated Ocean Dredged Material Disposal Sites. This Environmental Impact Statement presents a resume of the information obtained during the site evaluation studies and the DEIS comment period.

PROPOSED ACTION

Two Nome, Alaska Ocean Dredged Material Disposal Sites (ODMDS) presently are interim designated and are more particularly described as:

Western ODMDS: A 0.30 nmi^2 site adjacent to shore, west of the entrance channel to Nome harbor, and with corner coordinates of 64°30'04"N, 165°25'52"W; 64°29'18"N, 165°26'04"W; 64°29'13"N, 165°25'22"W; and 64°29'54"N, 165°24'45"W.

Eastern ODMDS: A 0.37 nmi^2 site adjacent to shore, east of the entrance channel to Nome harbor, and with corner coordinates of 64°29'54"N, 165°24'41"W; 64°29'07"N, 165°24'25"W; 64°28'57"N, 165°23'29"W; and 64°29'45"N, 165°23'27"W.

The Eastern Nome, Alaska ODMDS, as delineated above, would have final designation for the disposal of dredged material. The site may be used for disposal of dredged material only after evaluation of each Federal project or permit application has established that the disposal is within site capacity and in compliance with the criteria and requirements of the Environmental Protection Agency (EPA) and the U.S. Corps of Engineers (CE) regulations.

The two sites have been used for dredged material disposal since 1923. This use has not resulted in adverse environmental effects outside the site boundaries. Some minor adverse environmental effects within the sites, principally temporary mounding, changes in sediment texture, and burial of bottom organisms, have resulted from their past use.

ALTERNATIVES CONSIDERED

Three alternates were considered; no action, permanent designation of one or both of the existing sites, and relocation of the sites.

No-Action: If no action is taken, the interim designation of the ODMDS would continue since there is no specific termination date. However, approval of the sites was conditional, pending completion of any necessary studies and evaluation of their suitability for continued use. The environmental studies have been completed with the results presented in EIS. Thus, in accordance with § 228.5(c) of the ODR, a decision regarding the continued use of the site is required and no action is considered an unacceptable alternative.

Final Designation of the Existing Sites: The existing sites presently are interim designated. Under this alternative, the sites would be given final designation. The sites have been in use for dredged material disposal for about 50 years. Based on examination of information during the DEIS comment period it was determined that although both sites were environmentally acceptable for continued use, the preferred alternative would be to de-designate the western site and give final designation to the eastern site.

Relocation of the Sites: Relocation of the sites to a near-shore similar environment; a mid-depth area; and a deepwater area was considered. An environmentally acceptable ODMDS could be located in each of these areas. However, the alternate areas do not offer any environmental advant-

ages over the existing sites. In addition, relocation to any of the alternate areas would increase the dredged material disposal costs. Because of the two foregoing factors, permanent designation of one or both of existing sites was preferred to relocation of the sites.

AFFECTED ENVIRONMENT

The existing sites are located adjacent to shore in the high-energy area of the shelf off Nome, Alaska, and in Norton Sound. The Shelf bottom in this area is irregular with holes, mounds, and bars, and slopes gradually to depths of 20m to 30m in the Chivikov Basin.

Waters of Norton Sound are of high quality, exhibiting high dissolved oxygen content and near neutral pH. Organic carbon and nutrients are indicative of a highly productive area. Nearshore, the waters are completely mixed throughout the year with surface ice forming in the winter. Offshore, a two-layer system is present in the summer with cold, saline water below 5 to 10m and warmer less saline water at the surface.

Varying thicknesses of Pleistocene to recent age sediments cover older bedrock offshore off Nome. In general, sediments near shore are coarse, poorly sorted, and form an irregular belt which extends parallel to shore. Strong currents remove fine sediments and tend to push them further from shore.

Norton Sound contains a variety of biological life. Continental Slope and open ocean areas of Southeastern Norton Sound support high populations of North Pacific oceanic, interzonal copepods. Zooplankton communities of nearshore coastal areas are composed of littoral and neritic forms adapted to wide ranges of temperatures and salinities. Mollusks, arthropods, and echinoderms appear to be the most abundant epifaunal invertebrates. The eight most abundant demersal fish are reported to be saffron cod, starry flounder, yellowfin sole, Alaska plaice, plain sculpin, toothed smelt, arctic cod, and the shorthorn sculpin. Norton Sound supports a salmon and herring fishery.

ENVIRONMENTAL CONSEQUENCES

The disposal of dredged materials at the existing eastern site (proposed to be permanently designated) will not effect human health, safety, and welfare. There may be a slight change in water quality, and a turbidity plume visible from shore during and in the immediate vicinity of the disposal operations. The high-energy nature of the sites will result in a return to ambient conditions shortly after the disposal operations.

While a minor mound may develop below a particular disposal, the mound will be lowered and smoothed as the sediments are dispersed over the site by wave and current actions. Any dispersion of sediments outside the site's boundaries will be in extremely thin layers.

Some bottom dwelling organisms will be trapped under the dredged material and be smothered. Others will be able to work their way to the surface of the sediments and survive. Demersal fish, being more mobile, will be able to escape the sediments as they reach the bottom. However, a few may be pinned down and destroyed. Free swimming fish and aquatic animals will be able to avoid or escape the decending plume of sediments. Under the preferred alternative the western site will be de-designated, which will avoid potential impacts on a bottom community that has been relatively undisturbed from dumping activities for at least the past six years.

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Chapter 1

PURPOSE OF AND NEED FOR ACTION

The proposed action in this Environmental Impact Statment (EIS) is the final designation of the Eastern Nome, Alaska Ocean Dredged Material Disposal Site (ODMDS) and the dedesignation of the Western Nome, Alaska ODMDS as shown in Figure 1-1 and more particularly described as:

Western ODMDS: A 0.30 nmi^2 site adjacent to shore, west of the entrance channel to Nome harbor, and with corner coordinates of 64°30'04"N, 165°25'52"W; 64°29'18"N, 165°26'04"W; 64°29'13"N, 165°25'22"W; and 64°29'54"N, 165°24'45"W.

Eastern ODMDS: A 0.37 nmi^2 site adjacent to shore, east of the entrance channel to Nome harbor, and with corner coordinates of 64°29'54"N, 165°24'41"W; 64°28'57"N, 165°23'29"W; 64°29'07"N, 165°24'25"W; and 64°29'45"N, 165°23'27"W.

The Eastern Nome, Alaska ODMDS's, as delineated above, would be designated for the disposal of dredged material. The site may be used for disposal of dredged material only after evaluation of each Federal project or permit application has established that the disposal is within site capacity and in compliance with the criteria and requirements of the Environmental Protection Agency (EPA) and the U.S. Corps of Engineers (CE) regulations.

PURPOSE AND NEED

The purpose of the proposed action is to provide the most environmentally acceptable ocean location for the disposal of materials dredged from the Nome, Alaska channel and harbor area. This EIS presents the information utilized in evaluating suitability of the two Nome, Alaska ODMDS's for final designation for continuing use and is based on one of a series of disposal site environmental studies. The environmental studies

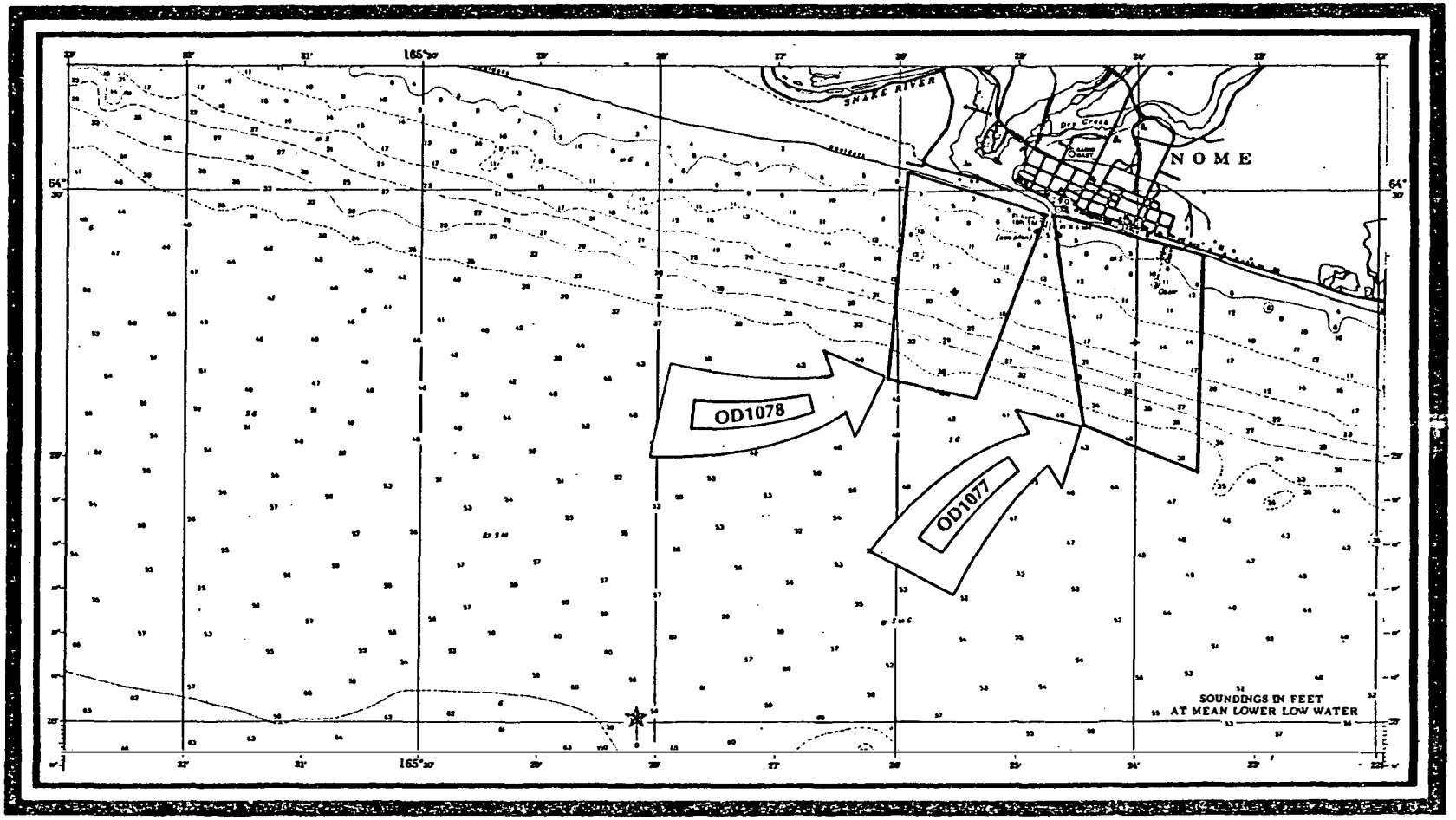

Figure 1-1. Nome, Alaska Dredged Materials Disposal Sites

and permanent designation process are being conducted in accordance with the requirements of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA) (86 Stat. 1052), as amended (33 U.S.C.A §1401, et. seq.); the EPA's Ocean Dumping Regulations and Criteria (40 CFR 220-229); and applicable Federal environmental legislation.

Marine Protection, Research, and Sanctuaries Act

The MPRSA was enacted in October 1972. Title I of the MPRSA, which is the Act's primary regulatory section, authorizes the Administrator of EPA (Section 102) and the Secretary of the Army acting through the CE (Section 103) to establish ocean disposal permit programs for nondredged and dredged materials, respectively. Title I also requires EPA to establish criteria, based on those factors listed in Section 102(a), for the review and evaluation of permits under the EPA and CE permit program. In addition, Section 102(c) of Title I authorizes EPA, considering criteria established pursuant to Section 102(a), to designate recommended ocean disposal sites or times for dumping of nondredged and dredged material.

Ocean Dumping Regulations and Criteria

On 11 January 1977, EPA promulgated final Ocean Dumping Regulations and Criteria to implement MPRSA. The Regulations set forth criteria and procedures for the selection and designation of ocean disposal sites. In addition, the regulations designated 129 ocean sites for the disposal of dredged material to allow the CE to fully comply with the purpose and procedural provisions of the MPRSA. These sites could be used for an interim period by the CE, pending completion of site designation studies as required by the regulations. Use of the interim-designated sites by the CE would be dependent on compliance with the requirements and criteria contained in EPA's Ocean Dumping Regulations and Criteria.

Those sites given interim designation were selected by EPA in consultation with the CE, with the size and location of each site based on historic use. The interim designation would remain in force for a period not to exceed 3 years from the date of the final promulgation of the Regulations. However, due to the length of time required to complete the necessary environmental studies and operating restraints of both a technical and budgetary nature, environmental studies were not completed within the approved 3-year period. As a result, the Regulations were amended in January 1980 to extend the interim designation for some sites for a period not to exceed 3 years, while the remaining sites' interim status was extended indefinitely pending completion of studies and determination of the need for continuing use.

Corps of Engineers National Purpose and Need

Section 103 of Title I requires the CE to consider in its evaluation of Federal projects and 103 permit applications the effects of ocean disposal of dredged material on human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. As part of this evaluation, consideration must be given to utilizing, to the extent feasible, ocean disposal sites designated by the EPA pursuant to Section 102(c). Since 1977, the CE has used those ocean disposal sites designated by EPA on an interim basis. Use of these interim designated sites for ocean disposal has been an essential element in the CE's compliance with the requirements of the MPRSA and its ability to carry out its statutory responsibility for maintaining the nation's navigable waterways. To continue to maintain the nation's waterways, the CE considers it essential that environmentally acceptable ocean disposal sites be identified, evaluated, and finally designated for continued use pursuant to section 102(c). These sites will be used after each proposed ocean disposal of dredged material is reviewed and found in compliance with the criteria and requirements of the MPRSA and appropriate EPA and CE regulations.

CORPS OF ENGINEERS LOCAL NEED

In order to maintain the Nome, Alaska harbor entrance channel and turning basin, it is necessary to dredge about 12,000 to 20,000 yd^3 of sediment (sand and silt) each summer. An ODMDS is needed for the disposal of the dredged material. No dredging occurs during the winter months (October through early July), because of seasonal ice forming in the Snake River and waters of Norton Sound. Nome harbor is closed to ship traffic during winter (U.S. Army Corps of Engineers, 1974). The annual quantities of dredged material are expected to decline after construction of the City of Nome's proposed breakwater/port facility.

EPA's PURPOSE AND NEED

As previously stated, the CE has indicated a need for locating and designating environmentally acceptable ODMDS to carry out its responsibilities under the MPRSA and other Federal statutes. Therefore, in response to the CE's stated need, EPA, in cooperation with the CE, has initiated the necessary studies pursuant to the requirements of 40 CFR 228.4(e) to select, evaluate, and possibly designate the most suitable sites for the ocean disposal of dredged material. This EIS has been prepared to provide a resume of the information utilized and the evaluations made in the selection of a Nome, Alaska interim designated ODMDS for permanent designation. It is EPA's position that the site designation process, including the disposal site evaluation studies and the development of this EIS, fulfill all statutory requirements for the selection, evaluation, and designation of the ODMDS's. It is not anticipated that the CE will conduct any further environmental studies with respect to the selection and permanent designation of a Nome, Alaska ODMDSs.

Site Study

In mid-1977, EPA initiated environmental studies on selected nondredged material disposal sites. The CE, to assist EPA in its national program for locating and designating suitable sites for the ocean disposal of dredged

material, joined this effort in 1979 by providing contract funds. In addition, the CE agreed to provide technical review and consultation.

An appraisal of the existing technical information and data revealed it was sufficient for evaluation of the Nome, Alaska ODMDS and the adjacent ocean areas. Consequently, a field survey of the sites and adjacent areas was not planned or implemented. The site evaluations and this EIS were based on the existing information and data.

Site Designation

In accordance with the EPA's Ocean Dumping Regulations and Criteria, the site designation will be by promulgation through formal rulemaking. The decision on the final designation of a Nome, Alaska ODMDS will be based on appropriate Federal statutes, disposal site evaluation studies, supporting documentation, and public comments on the Draft EIS, Final EIS, and the public notice issued as part of the proposed rulemaking.

Chapter 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

The proposed action (chapter 1) is the final designation of an interim designated Nome, Alaska Ocean Dredged Material Disposal Sites (ODMDS). The Ocean Dumping Regulations and Criteria (40 CFR 220-229, amended December 19, 1980) approved certain ocean sites for disposal of dredged materials, including the Nome, Alaska sites. Approval was on an interim basis "pending completion of baseline or trend assessment surveys." The ODR states in part "....§228.5(3) If at anytime during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the citerial for site selection set forth in §§228.5-228.6, the use of such sites will be terminated as soon as suitable alternative disposal sites can be designated....."

This FEIS presents the findings from site evaluation studies of the Nome interim designated ODMDS and consideration of comments received on the DEIS. Utilizing this information, three alternatives were considered. These alternatives presented below include: (1) No Action; (2) Final Designation for Continuing Use of one or both of the Interim Designated Sites; and (3) Relocation of the ODMDS.

Non-Ocean disposal alternatives were not evaluated since the selection and designation of an environmentally acceptable ocean disposal site is independent of individual project requirements.

This does not mean that land-based disposal or any other feasible alternatives mentioned in the Environmental Protection Agency's (EPA) Ocean Dumping Regulations and Criteria (40 CFR §227.15) are being permanently set aside in favor of ocean disposal. The need for ocean disposal must be evaluated for each Federal project or permit application. These evaluations include the availability and environmental acceptability of other feasible alternatives.

NO ACTION

The interim designation of the Nome ODMDs does not have a specific termination date. If no action is taken, the interim designation of the existing ODMDS would continue for an indefinite period. However, the interim status provided in the ODR was not intended to remain indefinitely. The sites were approved for disposal of dredged material pending completion of any necesary studies and evaluation of their suitability for continued use. The environmental evaluation of the sites has been completed and, in accordance with §228.5(c), ODR a decision on its use is required. Thus, the no action alternative is not considered to be an acceptable alternative.

DETAILED EVALUATION OF SITES

The existing sites were evaluated to determine their suitability for final designation. The "Specific Criteria for Site Selection" (§228.6) and the "General Criteria for the Selection of Sites"(228.5) of the EPA Ocean Dumping Regulation and Criteria were used in this evaluation.

SPECIFIC CRITERIA EVALUATION

Section 228.6, ODR, stipulates 11 specific factors for the selection of disposal sites. These factors were applied to the Nome, Alaska ODMDSs with the following results.

(a)(1) Geographical position, depths of water, bottom topography, and distance from coast;

There are two existing interim designated ODMDS in the Nome, Alaska area. These are termed Western ODMDS and Eastern ODMDS (Figure 1-1).

Geographical Position

The Western ODMDS is located adjacent to and west of the entrance channel to the Nome, Alaska harbor. It abuts the shore and extends seaward covering an area of 0.30 nmi^2. Its corner coordinates area: 64° 30'04"N, 165° 25'52"W; 64° 29'18"N, 165° 26'04"W; 64° 29'13"N, 165° 25'22"W; and 64° 29'54"N, 165° 24'45"W.

The Eastern ODMDS is located adjacent to and east of the entrance Channel to the Nome, Alaska harbor. It abuts the shore and extends seaward covering an area of 0.37 nmi^2. It corner coordinates are: 64° 29'54"N, 165° 24'41"W; 64° 20'07"N, 165° 24'25"W; 64° 28'57"N, 165° 23'29"W and 64° 29'45"N, 165° 23'29"W;

Depth of Water

The Western ODMDS has a minimum water depth of about 1m along its shoreline boundary, and increases gradually in depth with increasing distance from shore to a maximum depth of 11m at its southern boundary.

The Eastern ODMDS has a minimum water depth of about 1m along its shoreline boundary, and increases gradually in depth with increasing distance from shore to a maximum depth of 12m at its southern boundary.

Bottom Topography

The bottom topography is similar for both of the sites. These sites reflect the general topography offshore from Nome, Alaska.

The gradient of the shelf from the shoreline to a depth of 13m is 1:120; the slope decreases to 1:400 from 13m to 18m; and exhibits a lower gradient onwards to the center of Chirikov Basin. The nearshore topography (Figure 3-2) is typical of this type of coastline (i.e., an irregular bottom with holes, mounds, and bars from the beach to depths of about 6m). Beyond 6m the bathymetry is more regular, and only minor topographic features occur to depth of about 13m; the shelf remains comparatively smooth to the center of the Chirikov Basin (the central depression of Norton Sound).

In attempts to understand the nearshore processes, Tetra Tech (1980) studied the stability of the offshore bathymetry by comparing the survey charts of 1900 and 1950; and preparing a map of bathymetric net change (Figure 3-2). The map shows that significant areas of accretion and erosion occur in bands parallel to shore with the pattern extending seaward nearly 2 nmi to depth of about 18m. The band close to the river mouth and beach represents a zone of sediment deposition from river discharge. The next band (about 610m wide) is erosional. A zone of deposition occurs further seaward.

Distance from Coast

The nearshore limits of the sites are determined by the boundary coordinates. For practical purposes, the northern boundary of each of the sites ajoins the shore or is in close proximity to it.

(a)(2) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases;

The two Nome, Alaska ODMDSs are located in Norton Sound. The living resources of the sites represent a small portion of the living resources of the Sound. There are no unique breeding, spawning, nursery, or passage areas of living resources in the sites (Department of Interior, 1982; National Marine Fisheries Service, 1983). However, feeding grounds for Grey Whales may reach to within 3,000 ft. of Nome's shoreline (National Marine Fisheries Service, 1983). The dredging disposal volumes are insignificant compared to the sediment transport that occurs annually; 13,000 and 650,000 yds^3 respectively. This represents 2% of the annual sediment transport in the area and therefore, if any impacts should occur, they will be of very short duration and minor in nature.

(a)(3) Location in relation to beaches and other amenity areas;

Both of the Nome, Alaska ODMDSs adjoin the shore at their Northern boundary. Thus, they are in close proximity to the beaches on either side of the entrance channel to the Nome harbor. The sites are not located in the near vicinity of other amenity areas.

(a)(4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the wastes, if any;

The Nome, Alaska ODMDSs have been used annually since 1923 for the disposal of dredged material resulting from the operation and maintenance dredging of Nome harbor. It is expected this disposal of dredged material will continue with dredged volumes estimated to be about 13,000 yd^3 annually.

DREDGED MATERIAL DISPOSAL VOLUMES

The two Nome ODMDS received dredged material from maintenance dredging of Federal navigation projects maintained by the CE. Prior to 1979, the harbor was dredged using government owned equipment. Dredging equipment consisted of one 0.75 yd^3 clamshell, two 62 yd^3 hopper barges, and a tugboat. A contractor 1.5 yd^3 clamshell dredge with flat top barge has been used from 1979 to present. Annual dredging of the harbor entrance channel and turning basin occurs each summer, from June through September, when 12,000 to 20,000 yd^3 of sediments are dredged and deposited at the two ODMDS. Due to the net eastern littoral drift, the eastern ODMDS is used almost exclusively. The CE has indicated that the western site has not been included in the past two (three-year) dredging contracts. (Personal communication with Steve Boardman, U.S. Army Corps of Engineers, Alaska District, Anchorage, Alaska, 1984.)

TABLE 2-1
COMBINED VOLUMES OF DREDGED MATERIALS, NOME DMDS

Date of Dredging	Volumes (yd^3)
1964 through 1972	15,030*
1973	14,350
1974	13,510
1974	60,000**
1975	12,000
1976	40,300**
1977	12,120
1978	9,330
1979	13,000
1980	17,647
1981 and 1982	13,000/year***

*Estimated average/year
**Emergency dredging as a result of storms
***Preliminary estimate

Source: Robbins, 1980

DREDGED MATERIAL COMPONENTS

No grain size or chemical tests have been conducted on dredged sediments. However, visual inspections indicate that sediments dredged from the Nome Harbor turning basin consist of silt and sand, whereas sediments from the entrance channel are predominantly sand (U.S. Army Corps of Engineers, 1980). The dredged material is not packaged in any way.

(a)(5) Feasibility of Surveillance and Monitoring;

Surveillance and monitoring of the sites can readily be accomplished because of the proximity to shore and the shallow depths of the sites.

The amount of dredged material disposed annually is relatively small. Much of the required surveillance information can be obtained through review of operational reports and ship logs. These can be confirmed by spot checks by shore observers, ship riders, or aerial observers.

The sites are easily reached within a minimum time. This, and the shallow depths of the site, facilitates the collection of necessary bottom and water volume samples for monitoring. Because of the shallow depths, parts of the site may be observed at low tide.

(a)(6) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;

The two Nome ODMDS are located in Norton Sound. There is no evidence that the physical characteristics of the sites differ from those of the remainder of the Sound. Thus, the dispersal, horizontal transport and vertical mixing characteristics of the sites and the prevailing current direction and velocity at the sites is similar to those of the Sound as described below.

The vertical stability of waters off Nome exhibits strong seasonal temperature and salinity variations. During the winter a single mixed layer exists. In summer a two-layer system is present with cold, saline water below 5 to 10m depths, with warmer, less saline water on the surface. The depth of the existing sites varies from 1m to 12m. Except for a small portion of their outer limits in mid-summer, the sites are in a single mixed zone.

Waves of 0.61m to 1.52m in height are likely to approach Nome from the west, to south and southeast, 40% to 50% of the time (Tetra Tech, 1980). Greater wave heights will occur during local storms. The waves, both prevailing and storm, will cause mixing and dispersion of the sediments at the two ODMDSs.

Bottom circulation off Nome is caused by a combination of regional currents, tidal currents, wave action, and motions from wind-driven and storm surge. These currents, generally ranging from 8 cm/s to 70 cm/s will result in mixing and dispersion of sediment at the existing sites.

The tide range averages 0.49m at Nome (NOAA, 1977), with maximum heights of 0.73m; tidal currents reach bottom velocities of 25 cm/s (Cacchione and Drake, 1979). The tidal currents, which are oscillatory in a generally east-west direction, will result in mixing of the sediments at the Nome sites.

Littoral Drift and Dispersion

The dredged material disposal sites at Nome extend into shallow water. Side-dumping barges are used to transport the dredged material, and can operate in water less than 3m deep (Tetra Tech, 1980). Consequently, consideration of littoral drift is important in the dispersal of dredged material at Nome. It is estimated that 650,000 yd^3 of sediments are transported annually at the site, of which a net easterly movement of 60,000 yd^3 occurs (Tetra Tech, 1980). The estimated annual disposal volume of 13,000 yd^3 represents 2% of the material that is transported. It can be concluded that littoral drift will be a primary force causing the dispersion of dredged materials. As a result, the CE almost exclusively uses the eastern ODMDS so as not to cause a back flow of sediments into the channel. In fact the western site has not been included in the past two (three-year) dredging contracts issued by the CE. In addition, it is apparent that the channel refilling is almost entirely a result of the enormous annual sediment transport.

However, this may be mitigated in the future when the City of the Nome completes their proposed 3,500-foot long breakwater/port facility. Contruction of the facility may also have a negative effect, however, in that the structure will likely prevent dredged material dumped in the western site from being transported out of the area to the west. There would be a resultant potential build up of material in the form of accretion zones on both the east and west shoreward ends of the proposed structure as the result of the change in littoral drift patterns.

(a)(7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);

The Nome ODMDS sites have been used for the disposal of dredged material annually since 1923. While there have been no site specific surveys, there have been no indications the disposal of dredged material over this period of time have materially altered the characteristics of the sites.

(a)(8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance, and other legitimate uses of the ocean;

The two Nome ODMDS are outside the navigational channel into the Nome harbor. While there is the need for navigational coordination during the dredging and disposal operations, it is not expected these operations will interfere with the shipping in the area. However, when the proposed breakwater/port facility is completed these operations may pose a navigational hazard within the western portion of the western dumping site.

Ice forms in the sound in the winter months. The surface waters near Nome during the summer range from about 10° to 15° with deeper layers in the range of 3 to 5°C. This generally limits recreational activities to fishing and boating. Except for some restriction to these activities in the vicinity of dredging and disposal operations, there should be no interference with recreational activities.

There are no desalinization operations that would suffer interference because of the dredged material disposal. There will not be any interference with activities in areas of special scientific importance.

Fishing, and fish and shellfish culture, could be affected by disposal of dredged material at the sites. It is expected that interference with these activities, which are discussed below, will be minimal. The two sites do not uniquely support fisheries, but commercial and subsistence shellfisheries do exist at the ODMDS.

Salmon

The commercial salmon fishery season extends from June 15 to September 30. Norton Sound fisheries began in 1961, and the number of salmon harvested have ranged from 40,524 to 350, 344 fish, with an average annual catch of approximately 170,000 salmon. Two species of salmon, Oncorhynchus keta (chum salmon) and O. gorbuscha (pink salmon), comprised 65% and 25%, respectively, of the total annual catch (Table 3-6) (Wolotira et al., 1977).

The commercial salmon fishery season generally coincides with the dredging season (June through September). There may be some interference with the commercial salmon fishing by both the dredging and disposal operations. Because of the relatively small area of the dredging and disposal operations, any interference with the salmon fishing should be minor. Any such interference can be minimized through close cooperation between the dredging operators and the salmon fisherman.

Shellfish

During the winters of 1979 and 1980 there were considerable decreases in the numbers of king crab caught by Nome residents. During the winter of 1978, 18,618 crabs were caught in the subsistence fishing ground, whereas in 1979 and 1980 only 224 and 213 crabs, respectively, were caught.

Reasons for the absence of crabs in nearshore waters off Nome are uncertain, but may be due to commercial fishery activities, environmental factors, and/or dumping of sediments dredged from Nome Harbor in the fishery grounds (Schwarz, 1981).

Since the existing sites have been in use since 1923 and were in use in 1978 (18,618 crabs caught), it does not appear disposal of dredged material at the existing sites was the cause for the decrease in the crab catch. Nevertheless, the effects of the disposal operations should be included in studies related to the decrease.

Herring

The commercial herring fishery in Norton Sound is manned by foreign gillnet fleets (Japanese) and local fishermen. Herring roe is the main harvested product. Commercial operations usually occur between May and June, after winter ice breakup, when herring are in spawning concentrations. Historical herring catches are shown in Table 3-7 (Wolotira, et al., 1977; Schwarz, 1981).

The commercial herring fishing (May-June) generally precedes the dredging season (June through September). Thus, any interence with the herring fishing by the disposal at the existing sites should be minimal.

(a)(9) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;

No site specific trend assessment or baseline surveys of the two Nome ODMDS have been made. However, a number of studies in the general area have been made for various purposes. It is believed the data collected in these studies is generally reflective of the water quality and ecology of the sites.

CHEMICAL CHARACTERISTICS

WATER COLUMN

Dissolved Oxygen - The dissolved oxygen concentrations in the water of northern Norton Sound have been reported to be uniformly high. The existing sites are in a shallow area where normal and storm mixing ensures similar dissolved oxygen levels in bottom and surface waters. A lowering of D.O. as a result of dredging disposal activity could potentially occur as a result of two processes: (1) Increase in phytoplankton as a result of nutrient release, and (2) Increase in Biological Oxygen Demand due to the introduction of organics. The oxygen sag caused by these processes should be short termed due to the site being located in an area of high mixing and high dissolved oxygen. Therefore, the affect should be easily assimilated without significant adverse impacts.

pH - The pH levels in Norton Sound have been reported to range between 7.4 and 8.1. There may be a slight depression of the pH in the immediate vicinity of the dredged material disposal. This depression, if any, will be of short duration.

Organic Carbon; Nutrients - The waters of Norton Sound are extremely productive and support extensive phytoplankton growth throughout the summer. Levels of dissolved organic carbon in seven samples collected near Nome were reported to be uniform. It appears that nitrogen depletion in the summer limits phytoplankton growth with phosphorus and silicic acid being present in excess. Organic carbon and nutrient data are insufficient to determine seasonality. However, the levels in winter are expected to be relatively high due to resuspension from bottom sediments.

The materials dredged are located in a high-energy area. It is not expected that the transfer of the sediments to an adjacent high-energy area will affect the organic carbon and nutrient levels of the Sound.

Trace Metals - It has been reported that total metal concentrations in Norton Sound are similar to those occurring in other oceanic areas, with levels of lead, cadmium, copper, and zinc being uniformly low. While the movement of the sediment may result in some measureable increase in the water column trace metals at the disposal sites, the concentrations should quickly return to ambient conditions due to the high-energy nature of the sites.

Petroleum and Chlorinated Hydrocarbons - Hydrocarbon levels in the surface waters of Norton Sound have been reported to be low (generally less than 1 ug/l). While no site specific measurements were made, it is expected the concentration of petroleum hydrocarbon are consistant with other areas of Norton Sound. The movement of the dredged material to the adjacent disposal areas is not expected to have any affect on the hydrocarbon levels of the area.

SEDIMENTS

The distribution of sediments off Nome, Alaska, is shown in Figure 3-3. The material dredged from the turning basin results from alluvial deposition from the Snake River. The material removed from the channel is primarly a result of shore erosion. The two disposal sites have been used for about 60 years; thus, the sediments in the disposal sites are probably quite similar to the materials in the channel. Continued use of the existing disposal sites is not expected to change this pattern.

Trace Metals - Levels of copper, cadmium, and zinc in sediments of Norton Sound near Nome have been reported to show a relationship with clay and organic carbon distributions in the sediments; in general, higher

concentrations occurring in finer-grained sediments. The levels of copper were reported to be similar to those found in the northeastern part of the Gulf of Alaska, whereas cadmium and zinc levels were higher in the Nome samples; lead was reported to be below detection limits in all Norton Sound sediments.

Total Organic Carbon - It has been reported that the total organic carbon content of Norton Sound sediments near Nome roughly parallels the distribution of silt and clay with finer sediments containing higher levels of organic carbon. It appears the local distribution of sedimentary organic carbon is influenced by increasing amounts of finer sediments offshore, and the inputs of fine-grained sediments in the runoff from the Snake River.

Petroleum and Chlorinated Hydrocarbons - Concentrations of sedimentary hydrocarbons primarily biogenic (terrigenous and marine) hydrocarbons, have been reported to be low. While analyses of petroleum or chlorinated hydrocarbons in the sediment were not reported, it is believed the concentrations of these are low at present.

BIOLOGICAL CHARACTERISTICS

Water column biota including phytoplankton, zooplankton, and nekton; and benthic biota composed of infaunal and epifaunal organisms, including demersal fish, could be affected by disposal of dredged material at the two Nome, Alaska sites. The effects are expected to be minor and restricted to the sites.

PHYTOPLANKTON

It has been reported that primary productivity and standing crop values in shallow-nearshore waters off Nome were similar to values reported for other Norton Sound Shelf waters. Except for some phytoplankton being

trapped in the disposal plume as it decends, the phytoplankton of the area should not be affected.

ZOOPLANKTON

Zooplankton communities of nearshore coastal areas are composed of littoral and neritic forms adapted to wide ranges of temperatures and salinity. There will be some entrapment of the zooplankton by the disposal plume during its decent. This entrapment is expected to be minor and restricted to the immediate vicinity of the disposal operation.

BENTHIC INVERTEBRATES

Site-specific studies have not been conducted at the sites; however, one investigation (Feder and Mueller, 1974) evaluated the infaunal and sessile epifaunal benthic species in the general vicinity of the DMDS. Benthic invertebrates inhabiting the study area encompassed 10 phyla, with echinoderms (sea stars, sea cucumbers, sea urchins, and brittle stars) being most common and contributing the greatest biomass. Other common invertebrate species were soft coral (Eunephthya rubinformia), clam (Astarte borealis), and several species of shrimp, including Pandalus hypsinotus. In general, the species are typical of those occurring in well-oxygenated, high-energy, sand-gravelly-rocky sedimentary regimes (Feder and Mueller, 1974).

The disposed dredged material will cover portions of the bottoms of the existing sites with layers of sediments of variable thickness. Some of the benthic invertebrates, being mobile, will be able to escape from or through these layers of sediments. Those that can not escape will probably be destroyed. Such destruction will be restricted to the disposal sites since the mixing in the high-energy environment will ensure that any sediments leaving the sites settle in very thin layers. It is expected that repopulation of the sites will occur between dredging cycles.

DEMERSAL FISH

It has been reported that demersal fish in Norton Sound and adjacent waters were represented by 14 families consisting of 51 species. Fish in the study area are ranked in order of abundance in Table 3-5. The eight most abundant were saffron cod, starry flounder, yellowfin sole, Alaska plaice, plain sculpin, tooth smelt, artic cod, and shorthorn sculpin.

The demersal fish are mobile and most should be able to escape the dredged material as it settles to the bottom. However, some will not escape and will be destroyed. Any destruction that occurs will be in the immediate vicinity of the on-going disposal operation and restricted to a small portion of the disposal sites total area.

(a)(10) Potentiality for the development or recruitment of nuisance species in the disposal sites;

There appears to be little if any potentiality for the development or recruitment of nusiance species in the disposal sites. Use of the sites for about 60 years has not indicated such development or recruitment.

(a)(11) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance;

There are no known significant natural or cultural features of historical importance in close proximity to the two Nome ODMDS.

GENERAL CRITERIA EVALUATION

Section 228.5, Ocean Dumping Regulations (ORD), stipulates five general criteria for the selection of disposal sites. These criteria were applied to the Nome, Alaska, ODMDS with the following results.

(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation;

The two Nome ODMDS are located in an area of exisitng subsistance fisheries and Arctic Char/Dolly Varden fisheries (U.S. Department of Interior, 1982). However, the areas of the sites, 0.30 nmi^2 and 0.37 nmi^2 respectively, represent only small areas in the much larger fisheries of Norton Sound. In addition, the disposal activity occurs after Salmon Smolts out-migrate in early Spring, and after the King Crab population has moved out to deeper water (U.S. Corps of Engineers, 1983). With minimum coordination between the dredging and disposal operators and the fishermen, it is expected that little if any interference with the fisheries or shellfisheries activities will be caused by the disposal activities. The sites are not located in regions of heavy commercial or recreational navigation. Vessel activity can be expected to increase in the future, if and when the City of Nome's proposed breakwater/port facility is constructed.

(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary or known geographically limited fishery or shellfishery;

The Nome ODMDS are located in a high energy environment. It has been estimated that littoral drift accounts for gross sand movement at a rate of 650,000 $yd^3/yr.$ or a net easterly sand movement of 60,000 $yd^3/yr.$,

(Tetra Tech, 1980). The dredged material disposal volume of 13,000 $yd^3/yr.$, represents 2% of the gross sand movement occurring as a result of littoral activity. Therefore, because of being located in this type of environment, the dredged material should be quickly mixed with the water and sediments at the sites. This mixing should result in a return to ambient conditions shortly after disposal operations. However, the proximity of the ODMDS to the channel to be kept clear may generate some concern of it being immediately refilled by the disposed of dredged material. Refilling of the channel with dredged material can be expected to occur primarily from material dumped in the western site. The level of this concern is reduced when the yearly disposal volumes are again compared against the estimated annual gross sand movement volumes. It is apparent that the need for annual dredging of the channel is caused by the much larger littoral activity.

It should also be stated that the city of Nome is planning to build a 3,600 - foot long causeway/breakwater and port. It is to be located along the western edge of the western ODMDS. When completed, it will attenuate the littoral drift to the extent that significantly less dredging will be required to keep the channel open. Since the deeper draft vessels will no longer use the harbor, but use the port facility, the frequency of dredging will be further reduced. Therefore, any present minor impacts will be mitigated upon the completion of the Nome breakwater/port.

The northern boundary of both sites is in close proximity to shore. It is expected that some of the disposed materials will reach the beaches. The sediment reaching the beaches will be a mixture of mostly background materials and the dredged material. There is no evidence for past disposal of dredged material to have resulted in any contamination of the beaches. This is probably because the past dredged material has been generally representative of alluvial sediments that have reached Norton Sound over the centuries. Continued disposal of this type of material is not likely to result in contaminated materials reaching the beaches. However, care will need to be exercised in the future to ensure that the dredged sediments are free from detrimental contaminants.

The two sites are not located in a geographically limited fishery or shellfishery.

(c) If at anytime during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in §§228.5 - 228.6, the use of such sites will be terminated as soon as suitable alternate sites can be designated;

The evaluations indicated that two existing sites meet the criteria of §228.5 - 228.6 with one possible exception. Some of the dredged material, mixed with the background sediments of the area will reach the beaches; see (b) above. Deposition of the mixed material should not be detrimental and may be environmentally advantageous from the beach nourishment standpoint.

Routine monitoring of the ODMDSs would reveal any changes that may result in the sites not meeting the criteria. If so, studies can be initiated.

(d) The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as part of the disposal site evaluation or designation study;

The two Nome ODMDS are small, being 0.30 nmi^2 and 0.37 nmi^2 respectively. These sizes and the present configurations lend themselves quite readily to the establishment of a monitoring and surveillance program.

(e) EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used;

The two Nome ODMDS have been annually used for the disposal of dredged material since 1923. Thus, they are historically used sites.

OTHER FACTORS TO BE CONSIDERED

There are no special environmental aspects of the two Nome ODMDS that are not covered by the Specific and General Criteria evaluation. However, those criteria do not address the economic aspects of the sites.

The two ODMDS are located adjacent to the dredging site and therefore represent the most economical ocean disposal sites. Movement of the sites along the shore or further out to sea would increase the disposal costs. For hypothetical purposes, a hauling cost of $\$0.10/yd^3/nmi$ has been assumed. Based on this figure and an average of 13,000 yds^3 per year, it is postulated that each nmi of additional hauling would add about $1,300 to the annual disposal costs.

RELOCATION OF THE ODMDS TO AN ALTERNATE OCEAN AREA

The relocation of the ODMDS to an alternative ocean area was considered during the site evaluation studies. It was determined that relocation would not result in environmental advantages and would add to the cost of dredged material disposal.

The two existing ODMDS are located adjacent to the dredging sites and therefore represent the most economical ocean disposal sites. Movement of the sites along the shore or further out to sea would increase the disposal costs. Additional increases in costs would result from losses in dredging equipment utilization time.

Near Shore Sites

Relocation of the sites eastward or westward along the shore would place the sites in locations practically identical to the present locations. The environmental aspects of disposal at the relocated sites would be quite similar to that at the existing sites. Hauling cost increases would be proportional to the number of nmi the sites were moved. Because the environmental aspects of disposal would remain the same while the disposal costs increased, relocation of the sites along the shore was eliminated.

Norton Sound Site

The relocation of the sites to a site in Norton Sound was considered. Such a site could be placed at a number of locations remote from shore; however, because of its depths (20 to 30m), the Chirikov Basin was considered as a possible location (Figure 3-1).

While a site in the Chirikov Basin would be periodically more stable than the existing sites, it would still exhibit some dynamic characteristics. There exists a two-layer system in the basin during the summer when dredged material is disposed of. The strong surface currents will cause the fine fraction of the material to be dispersed over large areas. The coarser material would reach the bottom, and gradual dispersion would result under normal conditions due to prevailing relatively low velocity bottom currents. However, during storm events, resuspension and wide dispersion of the bottom sediments would occur. Current scour depressions as deep as 2 meters can result from storm related water

movement near the seabed (Larsen, et. al., 1980). Figure 2-1 shows the Chirikov Basin to be located in a zone of high velocity bottom storm currents.

It is questionable whether the site would be found more desirable environmentally. Significant faunal activity occurs in this part of Norton Sound during periods of the disposal operations. Grey Whales, an endangered species are known to move through this area during the summer months (Department of the Interior, 1982). This Whale feeds on Benthic Invertebrates at depths normally between 30-70 feet. The disposal activity, although minor, could cause low level disruptions of the Whale's summer feeding and migration.

Therefore, a site in the Chirikov Basin was eliminated. The dredging and disposal costs would be increased and the environmental impacts, although of a minor nature, would cause this mid-shelf site to be a less desirable alternative.

Deepwater Site

Disposal of the dredged material off the continental shelf in deepwater would involve an extremely long haul through open water.

In addition, the Bearing Sea is a major Grey Whale feeding area during the summer months of June-September (U.S. Department of Interior, 1982). This period corresponds to the times in which ocean disposal would take place. Although, the volume of disposal material is minor, it could produce some low level impacts on this endangered species.

Because of the material increases in costs, safety risks, and environmental considerations, location of a site off the continental shelf can not be justified. Therefore, a site off the continental shelf was eliminated.

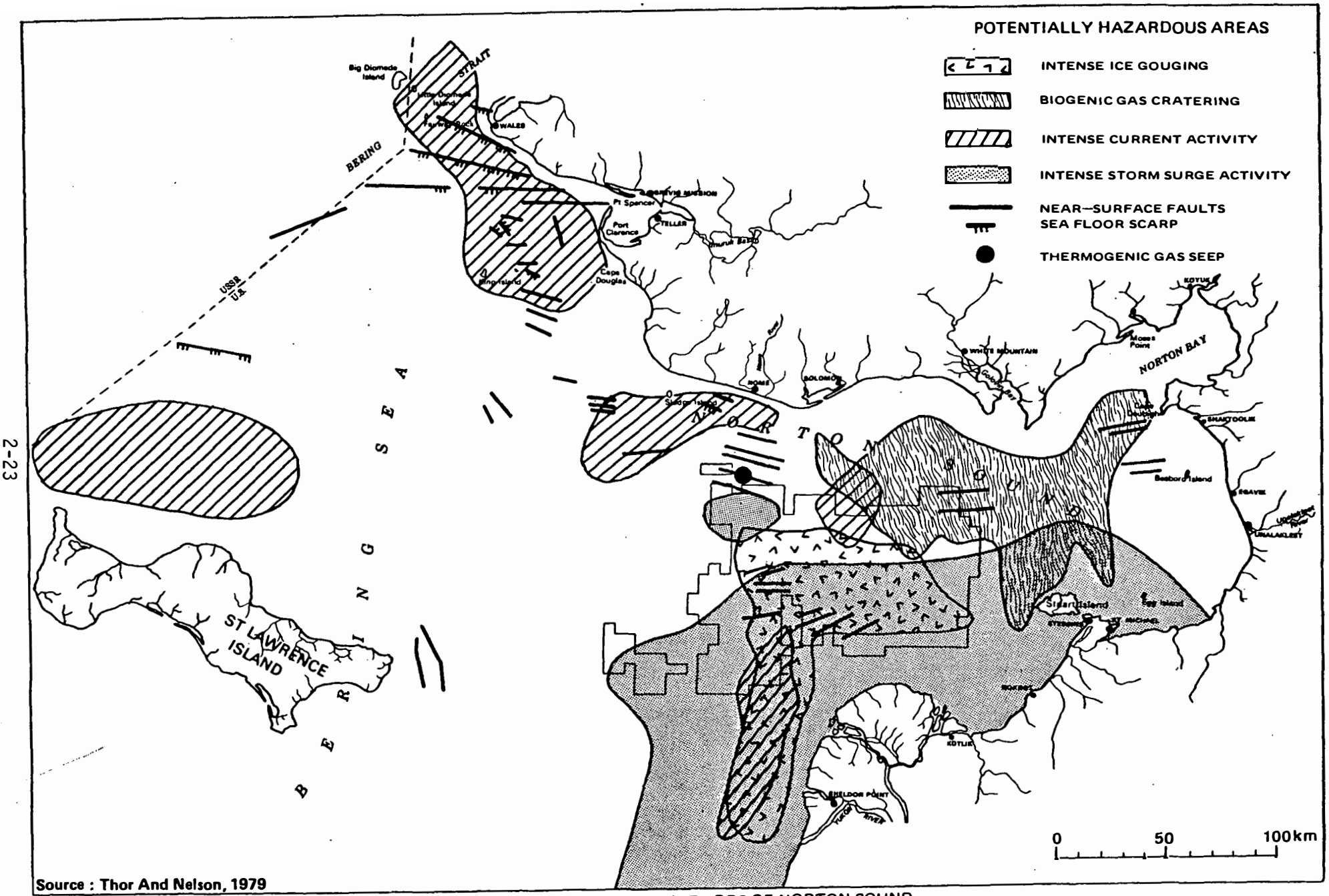

Figure 2-1 POTENTIAL NATURAL HAZARDS OF NORTON SOUND

EVALUATION CONCLUSIONS

Based on the site evaluation studies and comments received during the DEIS review period, the following conclusions were reached:

- The two existing Nome, Alaska ODMDS meet the General Criteria for (ORD §§228.5) for ocean disposal site selection with one exception. Some of the disposed dredged material may reach the beaches of the area. However, this exception is considered to be minor and the material reaching the beaches (large sand content) may be beneficial from a beach nourishment standpoint.

- Alternative sites have not been historically used and with the exception of a deepwater site are not off the continental shelf.

- The two existing Nome, Alaska ODMDSs meet the specific criteria (ODR §§228.6) for ocean disposal site selection. The alternative sites, while not evaluated in detail, would probably meet the specific criteria.

- The two existing Nome, Alaska ODMDSs have been historically used. This use since 1923 has not resulted in unacceptable environmental effects. Alternative sites have not been historically used; thus, the effects of dredged material disposal at alternate sites can only be postulated.

- The two Nome, Alaska sites are economically acceptable sites. Use of alternate sites would increase the dredging and disposal costs. These increased costs would be determined by the increased distance between the dredging area and the disposal sites.

- Surveillance and monitoring of the two existing Nome, Alaska ODMDS can be easily and economically accomplished. Except for near-shore alternative sites, surveillance and monitoring of alternative sites would be more complicated and costly.

- Because of prevailing west to east littoral drift patterns, there has been little use of the western ODMDS. The CE has not included the western site in the past two (three-year) dredging contracts.

- Because of the proximity of the ODMDS's to the channel, there is some concern of its being refilled by the dumped dredged material. The most likely situation to produce channel refilling from material just dredged is when the western site is used. Dumping in the western site would occur only during the few short periods of time when the normal west to east littoral drift pattern is reversed, and an east to west current predominates. Since these annomulous currents are of such short duration, it can be expected that at least some of the material dumped in the western site would be transported back into the channel upon return of the normal current pattern. Mitigation of this potential problem could be achieved by cessation of dumping activities during these short periods. If some unusual situation demanded that dumping continue during such occasions, the problem could also be mitigated to some extent by dumping in the eastern portion of the eastern site. Avoiding use of the western site would also preclude impacts on a bottom community that has been relatively undisturbed from dumping activities for at least the past six years. Availability of a potential control site such as this may be beneficial in any future monitoring efforts.

- If and when the City of Nome's proposed port facility is constructed, it will cause significant changes in the littoral drift patterns. Although the precise impact is not known, it is clear that accretion zones, will develop on both the east and west shoreward ends of the causeway. Since the structure will prevent dredged material dumped in the western site from being transported out to the west, there will be a build-up of this material over time.

- Construction of a port facility will have a positive effect on dredging operations in that the need for dredging will be reduced since deeper draft vessels will use the new harbor. By changing the

littoral drift patterns, the structure will also reduce the amount of sediment deposited in the entrance channel from the normal west to east transport.

- The conduct of dredge spoil disposal operation will create a potential nagivational hazard in the western portion of the western disposal site whenever the proposed new port facility is put into operation.

PREFERRED ALTERNATIVES

Based on the environmental evaluations, the preferred alternative is the de-designation of the western site and the final designation for continuing use of the eastern Nome, Alaska ODMDS, described as follows:

- Western ODMDS, boundary corner coordinates
  64° 30'04"N, 165° 25'52"W;
  64° 29'18"N, 165° 26'04"W;
  64° 29'13"N, 165° 25'22"W; and
  64° 29'54"N, 165° 24'45"W.

- Eastern ODMDS, boundary corner coordinates
  64° 29'54"N, 165° 24'41"W;
  64° 29'07"N, 165° 24'25"W;
  64° 28'57"N, 165° 23'29"W; and
  64° 29'45"N, 165° 23'27"W;

USE OF THE SITE

All future uses of the Nome, Alaska ODMDS for dredged material disposal must comply with the EPA Ocean Dumping Regulations and Criteria; and be within site capacity.

Permissible Material Loadings

The average annual disposal of dredged material (12,000 to 20,000 yds^3) is considered to be within the site capacity. One time disposals of up to 60,000 yd^3 also are considered to be within site capacity. Disposal of dredged material that would routinely exceed the annual average rate or exceed a one-time disposal of 60,000 yd^3 must be evaluated to ensure the disposals are within site capacity.

Dredged Material Quality

Dredged material proposed for disposal under each Federal project or permit application must be evaluated to ensure its quality is in compliance with EPA Ocean Dumping Regulations and Criteria.

Disposal Methods

In the past, hopper barges have been used to transport the dredged material to the disposal sites; and disposal accomplished by release from the barges. This method of disposal is acceptable for continued use. Other means of transport and release will be acceptable providing they do not result in material changes in the dredged material settling mechanics or excessive plumes.

Disposal Schedule

The present disposal schedule (June through September) is acceptable. Extensions of this schedule will be acceptable providing evaluations show that there will not be interference with other uses of the waters of the area, particularly fishing uses.

Winter disposals, particularly under icing conditions, must be thoroughly evaluated prior to implementation.

Monitoring the Disposal Sites

The CE District Engineer and/or the EPA Regional Administrator should established a routine surveillance and monitoring program for the site as early as is practical. Because of the nature of the site, no particular parameters or schedule is recommended. However, it is recommended that periodic checks of possible dispersion of the sediments and effects on benthic organisms and demersal fish outside the sites' boundaries be made.

Chapter 3

ENVIRONMENTAL SETTING

Nome is located on the west coast of Alaska and on the southside of the Seward Peninsula at the mouth of the Snake River. To the west is the Bering Sea. Adjacent to Nome and to the southeast is Norton Sound. The Penny River discharges to Norton Sound/Bering Sea northwest of Nome and the Nome River discharges to Norton Sound to the southeast.

Two Ocean Dredged Material Disposal Sites (Western and Eastern) near Nome, Alaska were established in 1923 by the CE for disposal of sediments dredged from the Nome Harbor entrance channel and turning basin. The Western ODMDS is adjacent to shore, west of the entrance channel, with corner coordinates at 64° 30'04"N, 165° 25'52"W; 64° 29'18"N, 165° 20'04"W; 64° 29'13"N, 165° 25'22"W; and 64° 29'54"N, 165° 24'45"W, and has an area of 0.30 nmi^2. The minimal water depth is about 1m along the shoreline boundary, and increases gradually with increasing distance from shore to a maximum of 11m at the southern boundary.

The Eastern ODMDS is adjacent to shore, east of the entrance channel, with an area of 0.37 nmi^2. The corner coordinates of the DMDS are 64° 29'54"N, 165° 24'41"W; 64° 29'45"N, 165° 23'27"W; 64° 28'57"N, 165° 23'29"W; and 64° 29'07"N, 165° 24'25"W. Depths range from 1m the shoreline boundary, to 12m at the southernmost border.

The net littoral transport is from west to east; therefore, most material dredged from the harbor is disposed in the eastern ODMDS, minimizing sediment transport across the entrance channel. Dredged material disposal volumes range from 12,000 to 20,000 yd^3 annually.

Numerous baseline surveys have been sponsored by the Bureau of Land Management (BLM) to evaluate the environmental effects of proposed oil and gas developments in Norton sound. Table 3-1 summarizes the oceanographic surveys in Norton Sound (offshore Nome) from 1973 to 1979.

PHYSICAL CHARACTERISTICS

Physical oceanographic parameters determine the extent of mixing and sediment transport, and affect the chemical environment at a ODMDS. Strong temperature or salinity gradients inhibit mixing of surface and bottom waters. Waves aid mixing and resuspend bottom sediments, thereby affecting the turbidity of the water, and contribute to sediment transport. Currents (particularly bottom currents) determine the direction and extent of sediment transport inside and outside the ODMDS. Tidal currents may contribute to the transport of dumped material, but usually do not add net directional effects.

The gradient of the Shelf from the shoreline to a depth of 13m is 1:120; the slope decreases to 1:400 from 13m to 18m, and exhibits a lower gradient onwards to the center of Chirikov Basin. The nearshore bathymetry (Figure 3-1) is typical of this type of coastline (i.e., an irregular bottom with holes, mounds, and bars from the beach to depths of about 6m). Beyond 6m the bathmetry is more regular, and only minor topographic features occur down to depths of about 13m; the Shelf remains comparatively smooth to the center of the Chirikov Basin (the central depression of Norton Sound).

TEMPERATURE

The vertical stability of waters off Nome exhibits strong seasonal variations. During winter a single mixed layer exists with a temperature near 0°C and salinity of 30°/oo or higher (Schumacher et al., 1978; Cacchione and Drake, 1979). In summer a two-layer system is present with

TABLE 3-1
SURVEYS CONDUCTED IN NORTON SOUND

Survey Date	Participants	Sponsors	Purpose	Source
July 1973	Inst. of Mar. Sci. Univ. of Alaska	American Smelting and Refining Company	Collect baseline data to define the sedimentary, biological, and physical-chemical environment in the vicinity of Nome.	Hood et al., 1974
July and August 1976	Inst. of Mar. Sci. Univ. of Alaska	BLM/OCS	Describe the composition and spatial and temporal distribution of summer zooplankton community along the eastern coast of Norton Sound.	Neimark, 1979
March, April, August 1976	Inst. of Mar. Sci. Univ. of Alaska	BLM/OCS	Collect baseline data on zooplankton and micronekton populations in a wide variety of habitats in the Norton Sound and southeastern Chukchi Sea.	Cooney, 1977
September to October 1976	NOAA/NMFS	BLM/OCS	Baseline study to describe the composition, distribution, and apparent abundance of demersal fish, shellfish, and pelagic fish resources of the Norton Sound and Chukchi Sea.	Wolotira et al., 1977
September to October 1976	Inst. of Mar. Sci. Univ. of Alaska	BLM/OCS	Collect baseline information on the composition and distribution of the epifaunal invertebrates of Norton Sound, southeastern Chukchi Sea, and Kotzebue Sound.	Feder et al., 1977
March 1976 to September 1977	Alaska Dept. of Fish and Game	BLM/OCS	(1) Evaluate the subsystem use of Pacific herring fishery resources to coastal residence in Norton Sound and Kotzebue Sound. (2) Determine the spatial and temporal distribution of finfish resources in the nearshore coastal waters of Norton Sound.	Barton, 1978
1976 to 1978	U.S. Geological Survey	USGS/BLM	Describes the scour depressions in Norton Sound and their correlation with occurrences of strong currents, ice gorge furrows, major topographic shoals, and substrates of very fine sand to coarse silt.	Larsen et al., 1979
September to October 1976, July 1977, February to March 1978	U.S. Geological Survey	USGS/NOAA	Investigate sediment dynamics in Norton Sound to define the principal pathways and mechanisms of bottom and suspended materials transport.	Cacchione and Drake, 1979
April 1977 to March 1978	Dept. of Oceanogr. Univ. of Washington	BLM	Collect data to describe the velocity field, improve understanding of mixing processes, and the relative importance of various driving mechanisms which cause and influence water motion.	Schumacher et al., 1978
September 1976	Univ. of Alaska	BLM	Baseline survey of heavy metal concentrations in the water and surface sediments in Norton Sound and adjacent waters.	Durrell, 1977

Abbreviations

NOAA - National Oceanic and Atmospheric Administration
NMFS - National Marine Fisheries Service
BLM - Bureau of Land Management
OCS - Outer Continental Shelf
USGS - United Stated Geological Survey

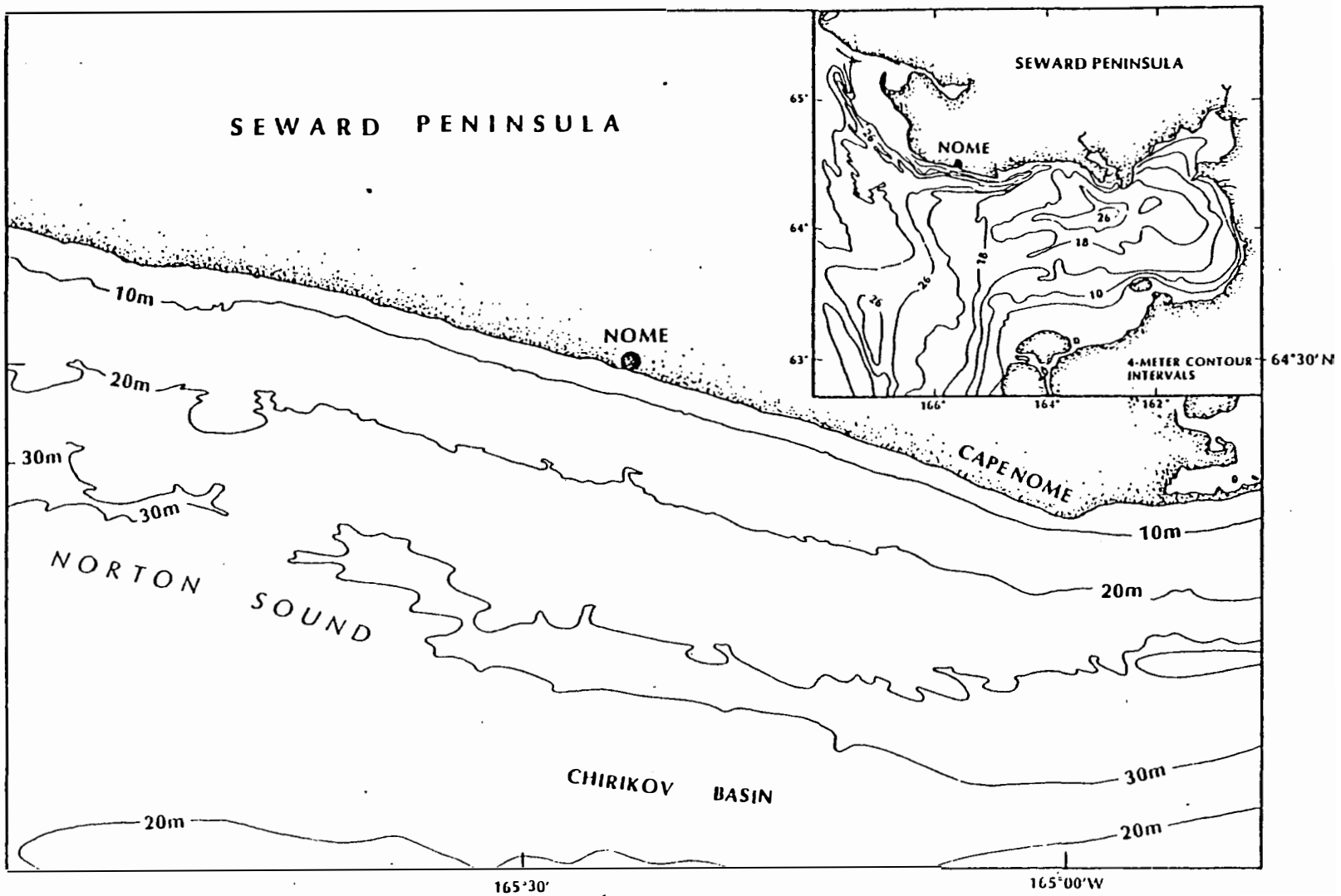

Figure 3-1. Nome, Alaska Nearshore Bathymetry
Source: Tetra Tech, 1980; Sharma, 1974

cold, saline water on the surface. Temperatures of surface waters near Nome during the summer of 1977 were 10 to 15°C, with salinities of 20°/oo to 30°/oo (Schumacher et al., 1978). The deeper layer was 3 to 5°C, with salinities greater than 30°/oo.

WAVES

Waves likely to affect the coastal area at Nome were evaluated in the "Port Feasibility Study" (Tetra Tech, 1980). Effective fetch is limited to less than 250 nmi, therefore large waves are unlikely. The 1970 U.S. Navy "Summary of Synoptic Meteorological Observations" and the NOAA 1974 "Climatic Atlas" suggest that waves of 0.61m to 1.52m in height are likely to approach Nome from west, to south, and southeast, 40% to 50% of the time. During local storms waves up to 2m heights and 11-second periods were observed (Cacchione and Drake, 1979). In a recent hindcast of the November, 1974 storm, based on synopic weather data, a maximum significant wave height of 17.8 ft. with a 12-15 second period was predicted (Resio, 1982).

Bottom circulation off Nome is caused by a combination of regional currents, tidal currents, wave action, and (occasionally) motions from wind-driven and storm surge. Regional currents are commonly toward the west, resulting from a counterclockwise gyre in western Norton Sound. The speed of this prevailing flow is relatively low compared to other water motions, and a measurement of about 50 km south of Nome showed a speed of 8 cm/s (Schumacher et al., 1978). The wave-created littoral currents at Nome are variable, with a net motion toward the east (Tetra Tech, 1980; Nebert 1974). Storms in Norton Sound add wave motions and wind-driven currents to the normal tidal oscillations. Scour depressions and sediment distributions suggest strong bottom currents (Larsen et al., 1979). Measurements near the bottom during a summer storm south of Nome recorded peak velocities of 70 cm/s (Cacchione and Drake, 1979). During calm weather, tidal currents dominate circulation.

In additon to normal conditions, severe storms occasionally produce large storm surges and current flows. Increases in water level of 8m have been measured, and significant sediment accretion and erosion indicates high-water velocities. Events of this nature were recorded in 1900, 1946, and 1974 (Tetra Tech, 1980).

TIDES

The tidal range averages 0.49m at Nome, with maximum heights of 0.73m; tidal currents reach bottom velocities of 25 cm/s (Cacchione and Drake, 1979). Tidal currents are oscillatory in an east-west direction. When ice covers all or part of Norton Sound during winter, high concentrations of suspended sediments persist, which imply that tidal flows alone are strong enough to resuspend fine particles (Cacchione and Drake, 1978). It is possible that ice sheets may intensify the tidal flows beneath the ice (Cacchione and Drake, 1979).

Tidal Drift and Dispersion

The dredged material disposal sites at Nome extend into shallow water and are completely within the region of active wave induced sediment transport. Side-dumping barges are used to transport the dredged material, and can operate in water less than 3 m deep (Tetra Tech, 1980). Consequently, consideration of littoral drift is important in the dispersal of dredged material at Nome. Littoral drift is eastward; thus, sediment accreation occurs on the west side of Nome River jetties and erosion exists on that east side.

In additon to littoral drift, there is a strong indication that random dispersal takes place in the littoral zone during storms. According to Sharma (1974) mass movement of sediment and active reworking results from storm waves. Thus, it is almost certain that dredged material deposited in the nearshore portions of the disposal sites will be transported on beaches in the area, at the immediate shore and to the east. It is estimated that

650,000 yd^3 of sediments are transported at the site, of which a net easterly movement of 60,000 yd^3 occurs (Tetra Tech, 1980).

Construction of the City of Nome's proposed breakwater/port facility is expected to significantly alter the littoral drift patterns. The effect will create a build up of dredged material dumped in the western site, and a reduction of material deposited in the entrance channel from the normal west to east transport.

GEOLOGICAL CHARACTERISTICS

Geological information relevant to a ODMDS include bathymetry, bottom and sediment characteristics, and dredged material characteristics. Bathymetry provides information on bottom stability, persistence of sediment mounds, and shoaling. The characters of the bottom and sediments strongly determine grain size distribution between background ODMDS sediments, and dredged material may be used as a tracer to determine its own area of influence. Changes in ODMDS sediment grain size caused by disposal might produce changes in the sediment chemical characteristics and in the composition of the benthic biotic.

The Nome coastal topography consists of a low relief plain, backed by steep coastal hills. The sea floor slopes gently southwestward from the beach, forming a broad basin (Chirikov Basin) with water depths to 37m.

BATHYMETRY

In attempts to understand the nearshore processes, Tetra Tech (1980) studied the stability of the offshore bathymetry by comparing the survey charts of 1900 and 1950, and preparing a map of bathymetric net change (Figure 3-2). The map shows that significant areas of accreation and erosion (both up to 2m) occur in bands parallel to shore; the pattern extended seaward nearly 2 nmi, to depths of about 18m. The band close to the river mouth and beach represents a zone of sediment deposition from river discharge. The next band (610m wide) is erosional. A zone of deposition occurs further seaward.

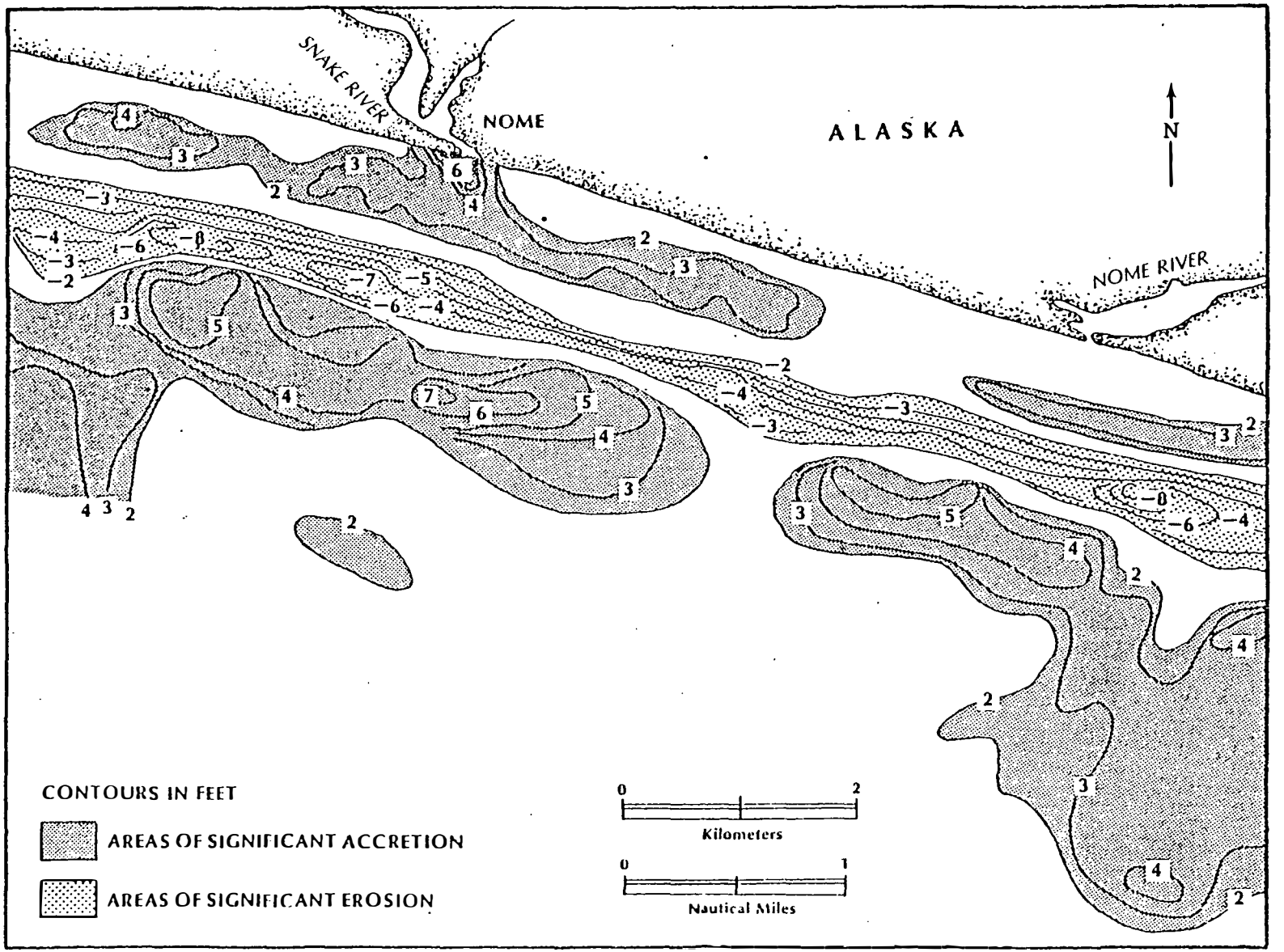

Figure 3-2. Net Bathymetric Change Between 1900 and 1950 Near Nome, Alaska
Source: Tetra Tech, 1980

SEDIMENTS

Varying thicknesses of Pleistocene to Recent Age sediments cover older bedrock offshore of Nome. At least six changes of sea level have resulted from Marine transgressions-regressions caused by glaciation (U.S. Bureau of Mine, 1969). Nelson and Hopkins (1972) indicated that glaciers extended approximately 3 to 4 nmi beyond the existing shoreline, and are the sources for glacial drifts on the Nome coastal plain and for the sediments occurring immediately offshore. Further offshore there is a complex relationship between glacial deposits and marine silt and clay, probably from the Yukon River Delta (Figure 1-2), in the mid-south shore of Norton Sound.

Larsen et al., (1979) described the area east and seaward of Nome as fine-grained sand, with a marked change to a mixture of fine- and medium-grained sand occurring to the west. Sediment in the Chirikov Basin southeast of Nome consists typically of coarser sediments; sediments from Seward Peninsula sources are 65% to 78% sand, 20% to 30% silt, and less than 8% clay.

Sharma (1974) conducted a detailed study of the sea floor from Nome River to Cripple River (Figure 3-4), and from the shore to a depth of 29m. In general, sediments near the beach are coarse, poorly sorted, and form an irregular belt which extends parallel to shore (Figure 3-3). Particle size distributions suggest that there are three types of surface sediments: relict gravel, muddy sand, and a mixture of gravel, which have been reworked by transgressions and regressions, and from which fine (clay and silt) sediments have been winnowed. Strong currents remove the fine sediments and prevent deposition of contemporary sediments. The nearshore relict gravel grades offshore into sand and muddy sands. Sands are prevalent near the river mouths, and as bars along the beaches. The mixed sediments are derived from relict gravel and Holocene sands.

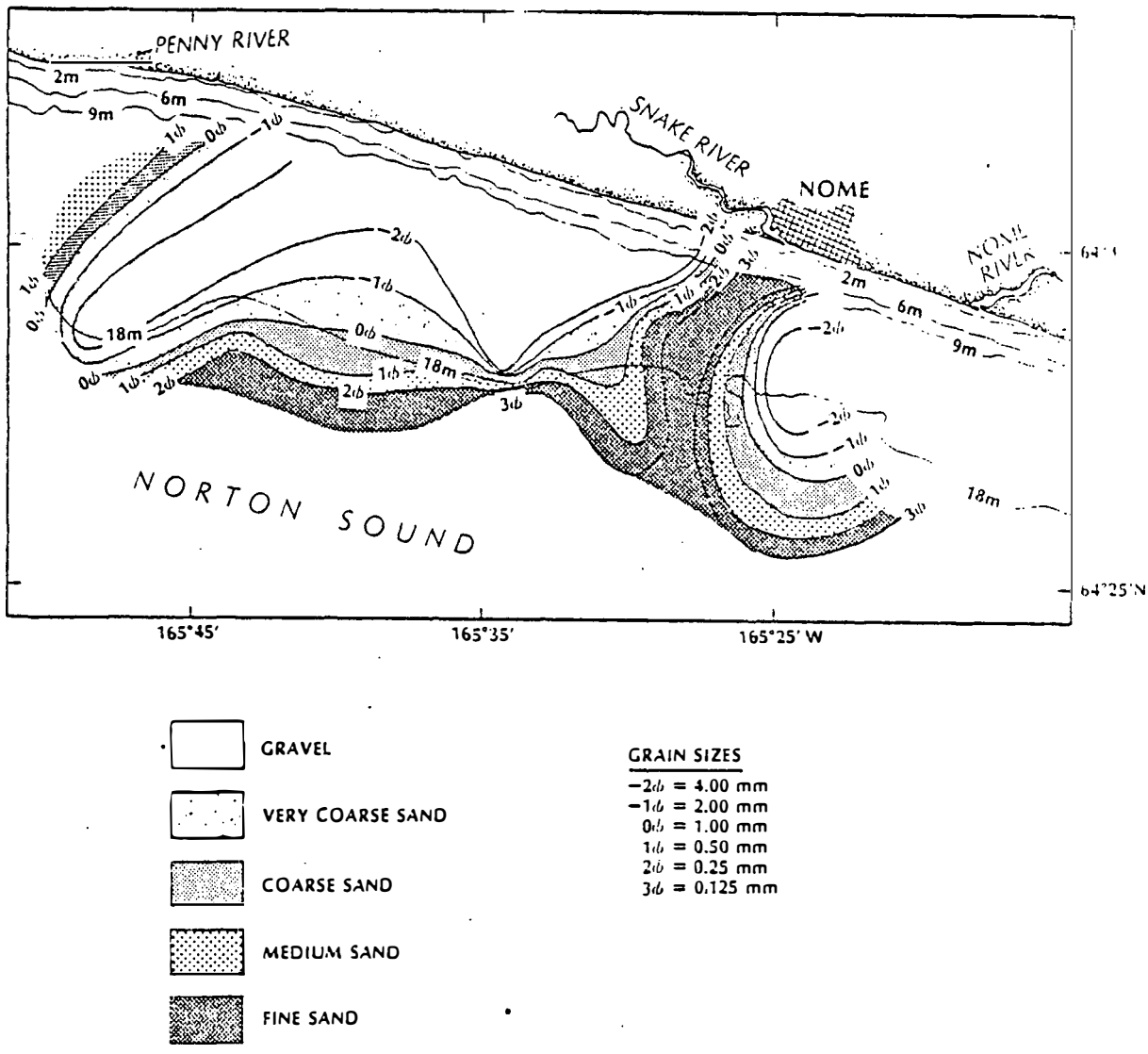

Figure 3-3. Median Grain Size Variations of Surficial Sediments
Source: Sharma, 1974

CHEMICAL CHARACTERISTICS

WATER COLUMN

Dissolved Oxygen- Hood and Burrell (1974) reported that dissolved oxygen concentrations in the water of northern Norton Sound were uniformly high, as expected in waters of high primary productivity. Frequent summer storms mix the near shore shallow waters thoroughly, and prevent creation of a seasonal pycnocline. Thus, dissolved oxygen levels in bottom waters are similar to surface values. The effect of the winter-spring ice cover on dissolved oxygen levels is not known.

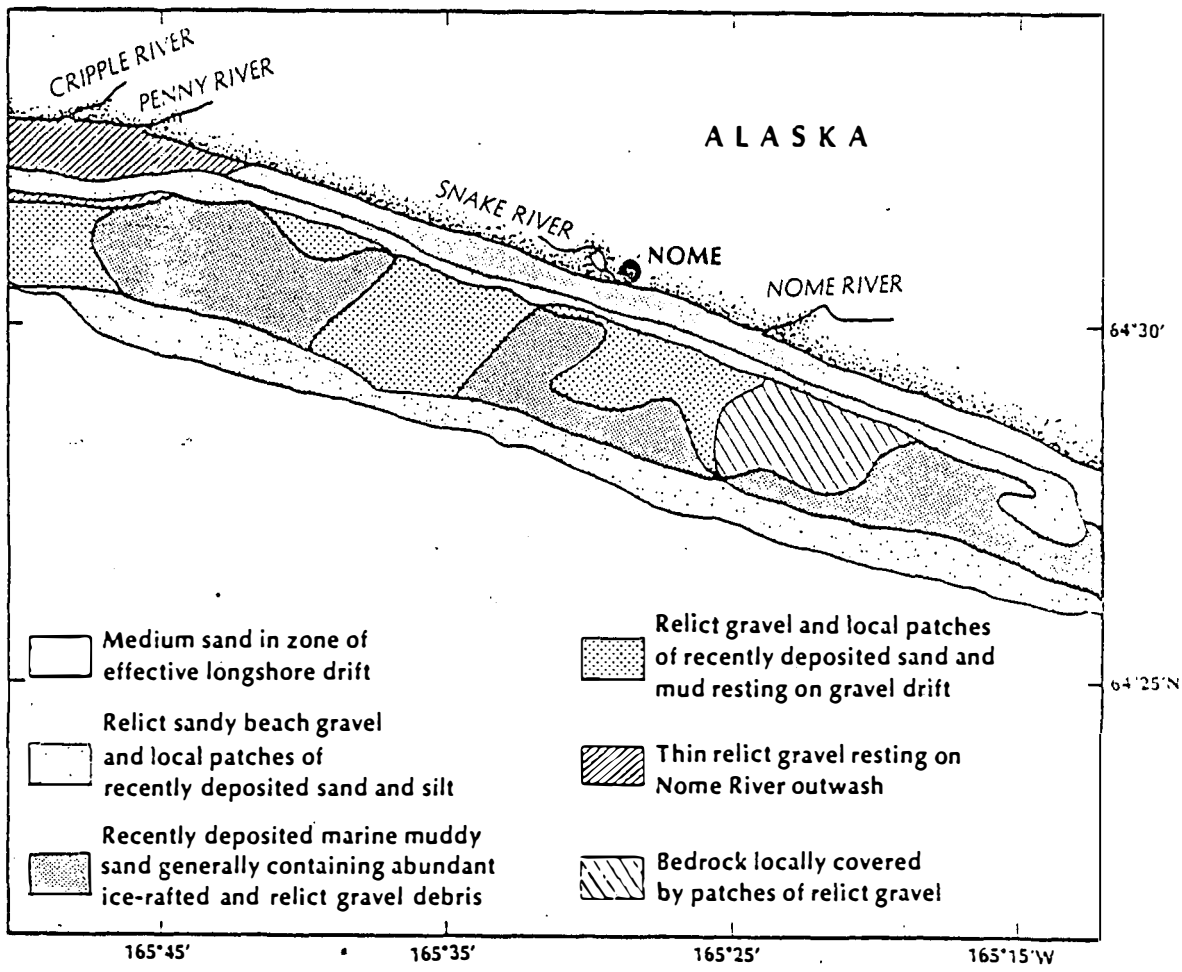

Figure 3-4. Particle Size Distribution of Surface Sediments Near Nome, Alaska
Source: Sharma, 1974

pH - Hood and Burrell (1974) reported that levels of pH is Norton Sound ranged from 7.7 to 8.1, well within the normal summer limits found in other coastal areas at northern latitudes.

Organic Carbon - Levels of dissolved organic carbon in seven water samples collected near Nome were uniform, ranging from 2.90 to 2.68 mg C/liter (Hood and Burrell, 1974). Particulate organic matter in the same samples was much lower, and ranged from 0.090 to 0.197 mg C/liter. Concentrations were higher in Norton Sound than those in the southern Bering Sea and Chukchi Sea, but well within the range of other oceanic waters. Organic carbon data are insufficient to determine seasonality.

Nutrients - The waters of Norton Sound are extremely productive and support an extensive phytoplankton growth throughout the summer. Sources of nutrients include freshwater runoff and coastal upwelling (Boisseau and Georing, 1974). Nitrogen depletion in the summer appears to limit phytoplankton growth in Norton Sound. Phosphorus and silicic acid are present in excess (ibid.). Nutrient concentrations have not been measured during the winter; however, levels are expected to be high due to nutrient release from bottom sediments.

Trace Metals - Total metal concentrations (dissolved and particulate) in Norton Sound are similar to those occurring in other oceanic areas. Levels of lead, cadmium, copper, and zinc are uniformly low (Hood and Burrell, 1974), and are typical of areas removed from known sources of pollution. The seasonality of trace metal levels in Norton Sound has not been determined. However depletion of trace metals in nearshore waters during the summer might be expected due to the increased runoff from the Snake and Nome Rivers, and to the elevated levels of suspended matter which may act as metal scavengers.

Petroleum and Chlorinated Hydrocarbons - Detailed analyses of hydrocarbons in surface waters of Norton Sound revealed low levels (generally less than 1 ug/kg), primarily of biogenic (terrigenous and marine) hydrocarbons (Shaw, 1977). Petroleum hydrocarbons have not been measured, but are expected to be quite low, because the area is remote from known sources of pollution.

SEDIMENTS

Trace Metals - Sediments of Norton Sound near Nome have been analyzed for copper, cadmium, lead, and zinc (Sharma, 1974). Levels of copper, cadmium, and zinc show relationships with clay and organic carbon distributions in the sediments; in general, higher concentrations occur in finer-grained sediments. Copper varies from 7 to 32 ppm, cadmium from 1.0 to 10.5 ppm, and zinc from 37 to 400 ppm. The levels for copper were

similar to those found in the northeastern part of the Gulf of Alaska, whereas cadmium and zinc levels were higher in the Nome samples (Burrell, 1977). Lead was below detection limits in all Norton Sound sediments.

Total Organic Carbon - The total organic carbon (TOC) content of Norton Sound sediments near Nome roughly parallels the distribution of silt and clay with finer-textured sediments containing higher levels of organic carbon (Sharma, 1974). The local distribution of sedimentary TOC is influenced by two factors: the increasing amounts of finer sediments offshore, and the inputs of fine-grained sediments in freshwater runoff from the Snake River. Thus, TOC levels generally increase with increasing distance from shore, although an area of relatively high TOC exists downstream from the mouth of Nome River. TOC levels in all sediments analyzed generally are low, ranging from 0.356% to 1.568% (Sharma, 1974).

Petroleum and Chlorinated Hydrocarbons - Sediments have not been analyzed for petroleum or chlorinated hydrocarbons. Detailed analyses of sedimentary hydrocarbons in other areas of Norton Sound revealed low concentrations, primarily of biogenic (terrigenous and marine) hydrocarbons (Kaplan et al., 1978). Levels and speciation of hydrocarbons in site sediments are expected to be similar.

BIOLOGICAL CHARACTERISTICS

Biota in the water and benthic environments of Norton Sound (and in the vicinity of the two sites) are described in this subsection. Water column biota include phytoplankton, zooplankton, and nekton; benthic biota are composed of infaunal and epifaunal organisms, including demersal fish. Benthic biota, especially the infauna, are generally sessile and cannot readily emigrate from an area of disturbance. The infauna, therefore, can be important indicators of environmental conditions. Plankton comprise the primary base for many marine food webs, but plankton and nekton are generally not adversely affected by dredged material disposal.

PLANKTON

Phytoplankton

Boissaeu and Goering (1974) studied the standing crop and primary productivity in shallow-nearshore waters off Nome during July 1973. Surface chlorophyll a values ranged from 0.81 to 1.38 mg/m^3. Primary productivity in surface waters showed a distribution similar to that of chlorophyll a. The average surface value was 5.36 $mgC/m^3/hr$. Primary productivity and standing crop values each were similar to values reported for other Norton Sound Shelf waters (McRoy et al., 1972).

Zooplankton

Continental Slope and open ocean areas of southeastern Norton Sound support high populations of North Pacific oceanic, interzonal copepods. Dominant species include Calanus plumchrus, C. cristatus, and Eucalanus bungii bungii (Cooney, 1977, Motoda and Minoda, 1974).

Zooplankton communities of nearshore coastal areas are composed of littoral and neritic forms adaped to wide ranges of temperatures and salinities. The copepod, Acartia clausi, and cladocerans, Podon sp. and Evadne sp., dominate, both in frequency of occurence and numbers (Neimark 1979, Cooney 1977). These species are endemic to the highly variable environment. Species diversity in the coastal zone community is low, due to long-term seasonal, and to short-term physical variations (e.g., storms).

BENTHIC INVERTEBRATES

Site-specific studies have not been conducted at the sites; however, one investigation (Feder and Mueller, 1974) evaluated the infaunal and sessile epifaunal benthic species in the general vicinity of the ODMDS. Benthic invertebrates inhabiting the study area were represented by 10 phyla, with echinoderms (sea stars, sea cucumbers, sea urchins, and brittle stars)

being most common and contributing the greatest biomass. Other common invertebrate species were soft coral (Eunephthya rubiformia), clam (Astarte borealis), and several species of shrimp, including Pandalus hypsinotus. In general, the species are typical of those occurring in well oxygenated, high-energy, sand-gravelly-rocky sedimentary regimes (Feder and Mueller, 1974).

Before the advent of oil and gas developments in Norton Sound and adjacent waters, qualitative baseline benthic invertebrate studies were conducted under the sponsorship of BLM (Feder and Jewett, 1977). Epifaunal invertebrates in Norton Sound were represented by 13 phyla, 26 classes, and 186 species; of these, mollusks, arthropods, and echinoderms were most abundant, with 74, 45, and 27 species, respectively (Table 3-2). The same three phyla also dominated the invertebrate biomass, but in reverse order: echinoderms, arthropods, and mollusks contributed 80.3%, 9.6%, and 4.4%, respectively, of the total biomass (Table 3-3). The majority of the species identified are associated with the Boreal Pacific region.

DEMERSAL FISH

Wolotira et al., (1977) studied the distribution and abundance of demersal fish in Norton Sound and adjacent waters. Demersal fish were representated by 14 families consisting of 51 species. Gadidae, Pleuronectidae, and Cottidae were the dominant families, representing approximately 95% (19,228 metric tons) of the total fish biomass (Table 3-4). Fish in the study area are ranked in order of abundance in Table 3-5. The eight most abundant species were the saffron cod (Eleginus gracilis), starry flounder (Platichthys stellatus, yellowfin sole (Limanda aspera), Alaska plaice (Pleuronectes quadrituberculatus), plain sculpin (Myoxocephalus jaok), toothed smelt (Osmerus mordax dentex), arctic cod (Boroeogadus saida), and the shorthorn sculpin (Myoxocephalus scorpius groenlandicus). The saffron cod was the only fish present at all sampling stations. Most of the dominant fish species were found in highest relative abundance where bottom waters were warmer than 4° and shallower than 30m.

TABLE 3-2
EPIFAUNAL INVERTEBRATE SPECIES COLLECTED FROM NORTON SOUND
IN ORDER OF DECREASING ABUNDANCE

Phylum	Class	No. of Species	Percent of Species
Mollusca	Polyplacophora	3	1.61
	Pelecypoda	27	14.52
	Gastropoda	43	23.12
	Cephalopoda	1	0.54
	Totals	74	39.79
Arthropoda	Pycnogonida	1	0.54
	Crustacea	44	23.12
	Totals	45	23.66
Echinodermata	Asteroidea	14	7.53
	Echinoidea	2	1.08
	Ophiuroidea	8	4.30
	Holothuroidea	3	1.61
	Totals	27	14.52
Annelida	Polychaeta	10	5.38
	Hirudinea	1	0.54
	Totals	11	5.92
Chordata	Ascidiacea	9	4.84
	Thaliacea	1	0.54
	Totals	10	5.38
Ectoprocta	Cheilostomata	2	1.08
	Cyclostomata	2	1.08
	Ctenostomata	5	2.69
	Totals	9	4.85
Cnidaria	Hydrozoa	1	0.54
	Scyphozoa	1	0.54
	Anthozoa	3	1.61
	Totals	5	2.69

TABLE 3-2. (continued)

Phylum	Class	No. of Species	Percent of Species
Porifera	Demospongia	2	1.08
Rhynchocoela	Unidentified	1	0.54
Sipunculida	---	1	0.54
Echiura	Echiuridea	1	0.54
Priapulida	---	1	0.54
Brachiopoda	Articulata	1	0.54
	Grand Totals	188	100.59

Sources: Feder and Jewett, 1977; Feder and Mueller, 1974

This is supportive of other finfish studies conducted in Norton Sound (Barton, 1978).

FISHERIES

The two sites support no know finfisheries, but commercial and subsistence shellfisheries exist at the ODMDS.

Salmon

The commercial salmon fishery season extends from June 15 to September 30. Norton Sound fisheries began in 1961, and the number of salmon harvested have ranged from 30,524 to 350,344 fish, with an average annual catch of approximately 170,000 salmon. Two species of salmon, Oncorhynchus keta (chum salmon) and O. gorbuscha (pink salmon), comprised 65% and 29%, respectively, of the total annual catch Table 3-6 (Wolotira et al., 1977).

TABLE 3-3

COMPOSITION BY BIOMASS OF THE DOMINANT
EPIFAUNAL INVERTEBRATE SPECIES COLLECTED IN NORTON SOUND
(grams)

Phylum	Percent of All Phyla (Total Species)	Dominant Species	Common Name	Percent of Phylum (Dominant Species)	Percent of All Phyla (Dominant Species)
Echinodermata	80.3	Asterias amurensis	Sea star	68.29	54.83
		Gorgonocephalus caryi	Basket star	8.76	7.03
		Lethasterias nanimensis	Sea star	7.06	5.66
		Evasterias echinosoma	Sea star	4.93	3.95
		Leptasterias polaris acervata	Sea star	4.23	3.39
		Strongylocentrotus droebachiensis	Sea urchin	4.17	3.34
		Totals	. . . . .	97.44	78.20
Arthropoda	9.6	Paralithodes camtschatica	Red King crab	41.90	4.01
		Hyas coarctatus alutaceus	Spider crab	10.53	1.01
		Pagurus trigonocheirus	Hermit crab	10.02	0.96
		Telmessus cheiragonus	Crab	8.62	0.83
		Pagurus capillatus	Hermit crab	6.14	0.59
		Argis lar	(Crangonid) Shrimp	5.66	0.54
		Totals	. . . . .	82.87	7.94
Mollusca	4.4	Neptunea heros	Gastropod	69.57	3.01
		Neptunea ventricosa	Gastropod	11.17	0.48
		Beringius beringi	Gastropod	6.00	0.26
		Serripes groenlandicus	Greenland cockle	5.43	0.24
		Totals	. . . . .	92.17	3.99

Source: Feder and Jewett, 1977

TABLE 3-4
BIOMASS OF DEMERSAL FISH COLLECTED
IN NORTON SOUND BY MAJOR TAXONOMIC GROUPS
(September and October 1976)

Family	Common Name	Biomass (metric tons)	Percentages of Taxa Biomass
Gadidae	Cod	12,544	62.0
Pleuronectidae	Flatfish	5,328	26.3
Cottidae	Sculpins	1,346	6.7
Clupeidae	Herring	181	0.9
Osmeridae	Smelt	368	1.8
Zoarcidae	Eelpouts	186	0.9
Cyclopteridae	Snailfish	10	<0.1
Stichaeidae	Pricklebacks	130	0.6
Agonidae	Poachers	78	0.4
Other Fish		50	0.2
Totals		20,221	100.0

Source: Wolotira et al., 1977

Herring

The commercial herring fishery in Norton Sound is manned by foreign gillnet fleets (Japanese) and local fisherman. Herring roe is the main harvested product. Commercial operations usually occur between May and June, after winter ice breakup, whereas herring are in spawning concentrations. Historical herring catches are shown in Table 3-7 (Wolotira et al., 1977).

TABLE 3-5
THE 20 MOST ABUNDANT DEMERSAL FISH SPECIES IN NORTON SOUND
(September and October 1976)

Rank	Species	Common Name	CPUE* (kg/km)[1]	Percentage of Fish CPUE[2]
1	Eleginus gracilis	Saffron cod	6.56	60.5
2	Platichthys stellatus	Starry flounder	1.83	16.9
3	Limanda aspera	Yellowfin sole	0.59	5.4
4	Pleuronectes spp	Alaska plaice	0.35	3.2
5	Myoxocephalus jaok	Plain sculpin	0.29	2.7
6	Osmerus mordax dentex	Toothed smelt	0.20	1.8
7	Boreogadus saida	Arctic cod	0.17	1.6
8	Myoxocephalus scorpius groenlandicus	Shorthorn sculpin	0.17	1.6
9	Clupea harengus pallasi	Pacific herring	0.10	0.9
10	Gymnocanthus tricuspis	Arctic staghorn sculpin	0.08	0.7
11	Myoxocephalus quadricornis	Fourhorn sculpin	0.08	0.7
12	Enophrys diceraus	Antlered sculpin	0.08	0.7
13	Lycodes turneri	Polar eelpout	0.06	0.6
14	Limanda proboscidea	Longhead dab	0.06	0.6
15	Lumpenus fabricii	Slender eelblenny	0.04	0.4
16	Agonus acipenserinus	Sturgeon poacher	0.04	0.4
17	Lycodes palearis	Wattled eelpout	0.04	0.4
18	Liopsetta glacialis	Arctic flounder	0.04	0.4
19	Megalocottus platycephalus	Belligerent sculpin	0.03	0.3
20	Acantholumpenus mackayi	Pighead prickleback	0.03	0.3
Totals			10.84	100.0

*CPUE = Catch per unit effort = kg/km trawled

1 = overall catch per unit effort

2 = percentage of catch per unit effort, total fish

Source: Wolotira Jr. et al., 1977

TABLE 3-6
COMMERCIAL SALMON CATCHES IN NORTON SOUND
(1962 to 1976, 1979)

Year	Total Fish					Catch Area Total
	King	Red	Coho	Pink	Chum	
1962	7,286	18	9,156	33,187	182,784	232,431
1963	6,613	71	16,765	55,625	154,789	233,863
1964	2,018	126	98	13,567	148,862	164,671
1965	1,449	30	2,030	220	36,795	40,524
1966	1,553	14	5,755	12,778	80,245	100,345
1967	1,804	--	2,379	28,879	41,756	74,818
1968	1,045	--	6,885	71,179	45,390	124,499
1969	2,392	--	6,836	89,949	82,795	181,972
1970	1,853	--	4,423	64,908	107,034	178,218
1971	2,593	--	3,127	4,895	131,362	141,977
1972	2,885	--	450	45,143	101,235	149,713
1973	1,918	--	9,282	46,499	119,098	176,797
1974	2,951	--	2,092	148,519	162,267	315,829
1975	2,321	--	6,218	32,820	216,443	257,802
1976	2,206	11	6,709	87,889	96,102	192,917
1979	10,706	--	31,438	167,411	140,789	350,344

Sources: Wolotira et al., 1977; Schwarz, 1981.

TABLE 3-7
COMMERCIAL HARVEST OF PACIFIC HERRING IN NORTON SOUND
(metric tons)

Year	Local Inhabitants	Japanese Fleets	Total
1968	0	125	125
1969	0	1,270	1270
1970	7.3	54	61.3
1971	17.7	621	638.7
1972	15.3	11	26.3
1973	32.3	25	57.3
1974	3.1	720	723.1
1975	2.0	5	7.0
1976	7.7	NA	7.7
1979	4.0	1,168	1,172

NA = not available

Sources: Wolotira, et al., 1977;
Schwarz, 1981

During the winters of 1979 and 1980 there were considerable decreases in the numbers of king crab caught by Nome residents. During the winter of 1978, 18,618 crabs were caught in the subsistence fishing ground, whereas in 1979 and 1980 only 224 and 213 crabs, respectively, were caught. Reasons for the absence of crabs in nearshore waters off Nome are uncertain, but may be due to commercial fishery activities, environmental factors, and/or dumping of sediments dredged from Nome Harbor in the fishery grounds (Schwarz, 1981).

Chapter 4

ENVIRONMENTAL CONSEQUENCES

The two Nome, Alaska interim designated sites have been used for disposal of dredged material for about 60 years. This past use has resulted in only minor temporary environmental effects within the site boundaries with no evidence of any environmental effects outside the site boundaries. It is expected continued use of the sites will result in the same pattern of environmental consequences.

EFFECTS ON PUBLIC HEALTH AND SAFETY

Both the principal dredging area and the disposal sites are located in a high-energy area. Any materials reaching the dredging area are subjected to mixing and dilution. Transfer of the dredged material to the adjacent disposal sites results in further mixing and dilution. This mixing and dilution reduces dredged material constituents to an extremely low level, negating the possibility of any harmful material being bioaccumulated in the human food chain to the point of affecting human health.

Minor navigational interferences may result from the dredging and disposal operations. Communication between the dredging/disposal operations and other users of the waters will prevent navigational hazards from developing. When the City of Nome's proposed breakwater/port facility is completed, dredging and disposal operations may pose a navigational hazard in the western portion of the western dumping site.

EFFECTS ON AESTHETICS

The plume from the disposal of the dredged material will result in turbidity which will be visible from shore. The turbidity will be transient with a return to ambient conditions within a short time.

EFFECTS ON THE ECOSYSTEM

Because of the relatively small amount of dredged material disposed of annually in relation to the sites' sizes, the effects are expected to be minimal within the sites and non-existant outside the site boundaries. The sites have been used since 1923 without reported effects on the ecosystem.

Physical/Chemical Effects

There may be a slight reduction in the pH and the dissolved oxygen concentration in the waters in the immediate vicinity of the dredged material release. This reduction will be short-lived with a quick return to ambient conditions due to the mixing experienced in a high-energy environment.

Turbidity near the disposal operations will be increased due to the fines in the disposal plume created by the settling solids. The turbidity will decrease with increasing distance from the disposal as the fines settle, are mixed with, and diluted into the waters of the sites. It is not expected turbidity resulting from the disposal operation will be distinquishable outside the sites from that naturally occurring in the area.

The waters surrounding the sediment particles may be enriched with nutrients and other elemental/compounds. This water may be released during the disposal operations. However, any release of materials from the settling particles will be quickly assimilated into waters of the sites.

Mounding at the sites is not expected. While there might be a slight buildup in a particular area of the sites immediately following the dredged material release, the material will be dispersed over the sites' area by the prevailing and tidal currents, waves, and storms. Any dispersion outside the sites' boundaries will be in extremely thin layers. This situation will change, however, with construction of the City of Nome's

proposed breakwater/port facility. This structure is expected to significantly alter the littoral drift patterns. The effect will create a build up of dredged material dumped in the western site, and a reduction of material deposited in the entrance channel from the normal west to east transport.

Biological Effects

Some bottom dwelling organisms will be trapped in the immediate vicinity of the dredged material disposal and smothered. Others will be able to work their way through or away from the initial impact area and survive. Based on experience at other dredged material disposal sites, recolonization of the impact area should occur between dredging cycles. No effects on bottom organisms is expected to occur outside the site boundaries.

Demersal fish, being more mobile than other bottom dwellers, will be able to escape the decending sediments. However, a very few may be pinned down and destroyed.

Free swimming fish and aquatic animals will not be affected by the materials that settle on the bottom. They should be able to avoid the decending plume. Except for the minor need to avoid the plume, the free swimmers will not be affected by the dredged material disposal at the sites.

UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS AND MITIGATING MEASURES

The only unavoidable adverse environmental effect associated with disposal of dredged material is the burial and possible distruction of some of the bottom organsism within the site. At any one time, the burial will be in the immediate vicinity of the disposal operation. Because of the dispersion characteristics of high-energy sites any sediment leaving the sites will settle in such thin layers that burial of bottom organisms will not occur.

Experience of other dredged material sites has shown that recolonization of bottom organisms occur between dredged material disposal cycles. This tends to mitigate the adverse environmental effects within the sites resulting from the burial of the bottom organisms. While there may be some decrease in the abundance of organisms within the sites, the species diversity within the sites should remain similar to that outside the sites.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable commitment of resources because of dredged material disposal at the Nome, Alaska ODMDS's are expected to minimal and are:

- Loss of energy required to transport the dredged material from the dredging area to the disposal sites
- Loss of economic resources due to costs of the disposal operation.
- Loss of some bottom organisms within the sites due to burial.

Chapter 5

COORDINATION

The Draft EIS was prepared by William C. Shilling, P.E., Chief, and David M. Lee, Environmental Engineer of the Ocean Dumping EIS Task Force. It was based on information collected and summarized for EPA under contract by Interstate Electronics Corporation. The major portion of the information is reproduced in the EIS as Chapter 3. Support during the preparation of the Draft was provided by Edith R. Young and in the Final by Bonita Judon. The Preliminary Draft EIS underwent internal review by EPA and the Corps of Engineers. Revisions incorporated in this Final EIS were prepared by John M. Hill, of the Ocean Dumping EIS Task Force.

Endangered Species Act of 1973
Section 7 Coordination

Formal coordination has been initiated by letter to the Washington, D.C. National Marine Fisheries Service Office, and U.S. Fish and Wildlife Service Office, and will be completed before final site designation. EPA finds no adverse effects on endangered or threatened species.

Coastal Zone Management Act
Federal Consistency Evaluation

The State of Alaska has been contacted and requested to provide this office with the elements of their State Coastal Zone Management Plan which are applicable to the Nome site designation EIS consistency evaluation. They have responded with three program standards which are part of the basis for project review in Nome. An evaluation of how the proposed action pertains to these standards can be found in Table 5-1. Coordination with the State will be completed before final site designation.

TABLE 5-1

Consistency Evaluation

Alaska Coastal Management Program Standard	Evaluation
6AAC 80.040 Coastal Development:	Development of Alaska's coastal resources will be enhanced by designation of an Ocean Dredged Material Disposal Site (ODMDS). Site Designation limits the effects of dredged material disposal to one ocean location (that has been historically used), while facilitating maintenance of the channel and harbor for shipping uses. The disposal of dredged materials will comply with the criteria and requirements of the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (CE) regulations.
6AAC 80.130 Habitats:	The biological implications of the action were considered in the EIS evaluation [General Criteria 228.5(b); specific criteria 228.6(a)(8),(10),(11)]
6AAC 80.140 Air, Land, and the Water Quality:	The preferred alternative in the FEIS is for one of the two Nome ODMDS to be designated for disposal of dredged material and the other to be de-designated. The site may be used for disposal of dredged material only after evaluation of each Federal project or permit application has established that the disposal is within site capacity and in compliance with the criteria and requirements of the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (CE) regulations. In addition, it is expected that each Federal project and disposal activity will comply with the regulations and procedures of the Alaska Department of Environmental Conservation with respect to air, land, and water quality.

COMMENTS ON THE DRAFT EIS

The following persons submitted written comments on the Draft EIS. Their letters and responses can be located in Appendix A.

Letter Number	Commenter
1	Frank S. Lisella, Ph.D. Chief, Environmental Affairs Group Environmental Health Services Division Center for Environmental Health Department of Health and Human Services Atlanta, Georgia 30333
2	Robert L. Grogan Associate Director Office of Management and Budget Division of Governmental Coordination Office of the Governor State of Alaska Juneau, Alaska 99811
3	Paul Gates Regional Environmental Officer Office of the Secretary United States Department of the Interior P. O. Box 120 Anchorage, Alaska 99510
4	Joyce M. Wood Chief, Ecology and Conservation Division Office of the Administrator National Oceanic and Atmosperic Administration United States Department of Commerce Washington, D.C. 20230

Chapter 6

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APPENDIX A

COMMENTS AND RESPONSES TO COMMENTS ON THE DRAFT EIS

The Draft EIS (DEIS) was issued on November 25, 1983. The public was encouraged to submit written comments. This appendix contains copies of written comments received by EPA on the DEIS and the Agency response to these comments. The written comments are keyed to the responses by notations in the margins of the letters. The EPA sincerely thanks all those who commented on the DEIS.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333

December 16, 1983

Mr. John M. Hill
Criteria and Standards Division (WH-585)
Office of Water Regulations and Standards
Environmental Protection Agency
401 M Street, S.W.,
Washington, D.C. 20460

1-1 We have completed our review of the Draft Environmental Impact Statement (EIS) for Nome, Alaska, Dredged Material Disposal Site Designation. We are responding on behalf of the U.S. Public Health Service.

1-2 The two existing Ocean Dredged Material Disposal Sites (ODMDS) proposed for final designation meet the specific and general criteria for ocean disposal site selection with one major exception. Some of the disposed dredged material may reach the beaches of the area. We have concerns about this possibility, since both existing sites abut the shoreline immediately in front of the village of Nome, Alaska. Based on site evaluation studies, this problem was considered by EPA to be minor because the material reaching the beaches (high sand content) may be beneficial for beach nourishment. However, it was stated that a field survey of the sites and adjacent areas was not planned or implemented because existing technical information was determined to be sufficient for appraisal purposes.

1-3 It was also noted that the DEIS did not address public opinions regarding this upcoming decision. The final EIS should clarify the potential impacts these sites may have upon the residents, including aesthetics, convenience of subsistence fishing, and possible distraction of tourist visits. Since the two sites represent small areas (0.30 nmi^2 and 0.37 nmi^2) in the much larger fisheries of Norton Sound, the turbidity caused by dumping, the unnecessary beach nourishment along the beach in front of the village, and barge movement in close proximity to local residents and fishermen could have negative impacts upon the livelihood of residents.

1-4 Although these two ODMDS sites have been used for about 60 years without serious impacts, we are concerned with the future use of these sites in such close proximity to Nome. Therefore, we believe further investigation of our concerns in preparing the final EIS would be in the best interest of local residents.

1-5 It is stated on page 2-7 that chemical tests have not been conducted on dredged sediments. We recommend that dredged material components be appropriately characterized before making a final decision on ODMDS designation of the proposed sites.

We appreciate the opportunity to review this DEIS. We would appreciate receiving a copy of the final document when it becomes available. If you should have questions regarding our comments, please contact Mr. Ken Holt of our staff at (404) 452-4161 or FTS 236-4161.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

OFFICE OF THE GOVERNOR

POUCH AW
JUNEAU, ALASKA 99811
PHONE (907) 465-3562

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERMENTAL COORDINATION

January 5, 1984

John M. Hill
Criteria and Standards Division
(WH-585)
Office of Water Regulations and
Standards
Environmental Protection Agency
401 M Street SW
Washington, D.C. 20460

Dear Mr. Hill:

SUBJECT: NOME DREDGED MATERIAL DISPOSAL DRAFT EIS
STATE I.D. NO. AK831129-43

2-1 The Division of Governmental Coordination has completed review of your consistency determination and the supporting information on the above proposal pursuant to Section 307(c) of the Federal Coastal Zone Management Act as per 15 CFR 930, Subpart C.

As currently planned, we agree that the project is consistent to the maximum extent practicable with the Standards of the Alaska Coastal Management Program (ACMP).

If changes to the original proposal are made during its implementation, you are required to contact this office to determine if a review of the revision is necessary.

2-2 The DEIS does not address the impacts of dredged material disposals in relation to a major causeway and port facility which is presently in the permit process. A comprehensive review of this proposal is not possible without this information and the EIS will require major revision.

2-3 The EIS must also include a consistency determination as required by Section 307(c)(3) of the Federal Coastal Zone Management Act as per 15 CFR 930 Subpart C before a final consistency determination can be issued.

If you have any questions, please contact me or Dorothy Douglas at 465-3562.

Thank you for your cooperation with the Alaska Coastal Management Program.

Sincerely,

Robert L. Grogan
Associate Director

sn/1413

United States Department of the Interior

OFFICE OF THE SECRETARY
P. O. Box 120
Anchorage, Alaska 99510

ER 83/1463

January 9, 1984

~~Colonel Neil E. Saling, Jr.~~
~~District Engineer, Alaska District~~
~~Corps of Engineers~~
~~Pouch 898~~
~~Anchorage, Alaska 99506~~

Dear MR. Hill:

3-1 In response to your recent request, we have reviewed the draft Environmental Impact Statement for the Nome Alaska Dredge Material Disposal Site Designation, Western Alaska OCS. We have no comments to offer on the draft statement.

Sincerely,

Paul Gates
Regional Environmental Officer

JOHN M. HILL
CRITERIA AND STANDARDS DIVISION (WH-585)
ENVIRONMENTAL PROTECTION AGENCY
401 M ST. SW
WASHINGTON DC 20460

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

OFFICE OF THE ADMINISTRATOR

January 16, 1984

John M. Hill
Criteria and Standards Division (WH-585)
Office of Water Regulations and Standards
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Mr. Hill:

4-1 This is in reference to your draft environmental impact statement on the Nome, Alaska Dredged Material Disposal Site Designation. Enclosed are comments from the National Oceanic and Atmospheric Administration.

Thank you for giving us an opportunity to provide comments which we hope will be of assistance to you. We would appreciate receiving four copies of the final environmental impact statement.

Sincerely,

Joyce M. Wood

Joyce M. Wood
Chief, Ecology and Conservation Division

Enclosure

JMW:dma

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Washington, D.C. 20230

N/ORM1:BR

January 13, 1984

TO: PP2 - Joyce Wood

FROM: N - Paul M. Wolff

SUBJECT: DEIS 8311.16 - Nome, Alaska Dredged Material Disposal Site Designation

The subject DEIS has been reviewed within the areas of the National Ocean Service's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects. My staff has contacted the Office of the Governor, Office of Management and Budget in Alaska, which has advised us that they will comment directly to EPA.

RESPONSES TO WRITTEN COMMENTS

1-1 EPA appreciates the review and comments provided by the Department of Health and Human Services

1-2 Although some dredged material may reach beaches in the Nome area, the Agency does not consider such deposition to be detrimental. Routine site monitoring would reveal any adverse changes, and would initiate oppropriate evaluation studies.

1-3 No significant public concerns have been expressed in relation to the past disposal actions, nor have there been any expressed in response to the DEIS. There are no significant impacts projected for future dredging and disposal actions that would adversely effect residents in the Nome area. If the City of Nome's proposed breakwater/port facility is completed there should actually be reduction in the level of dredging and disposal activities. See also the answer to the preceeding comment.

1-4 See the two preceeding responses.

1-5 Any dredged material disposed of at the site must meet the requirements of Section 227.13 of EPA's Ocean Dumping Regulations, 40 CFR 227. Disposal cannot take place until the Corps of Engineers issues a permit following its regulatory procedures under Section 103 of the Marine Protection, Research and Sanctuaries Act ("MPRSA"), 33 U.S.C. §1403.

2-1 EPA appreciates receiving the State of Alaska's preliminary review of facts contained in the EIS relating to coastal zone consistency. The Agency will communicate directly with the State regarding its evaluation of the impact of the proposed action on the Alaska Coastal Management Program (ACMP)

COMMENTS (Cont'd)

2-2 Information in the DEIS relating to the City of Nome's proposed port facility has been modified in the Final as the result of conversations with the City of Nome, the Corps of Engineers, and project personnel of TAMS, the design engineering firm hired by the City.

2-3 See comment 2-2, above.

3-1 EPA appreciates the Department of the Interior's review of the DEIS.

4-1 EPA appreciates the National Oceanic and Atmospheric Administration's review of the DEIS.