DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
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REPLY TO
ATTENTION OF:

# DRAFT
# ENVIRONMENTAL IMPACT STATEMENT

# NAVIGATION IMPROVEMENTS
# DELONG MOUNTAIN TERMINAL, ALASKA

## Abstract

This draft Environmental Impact Statement (draft EIS) for Navigation Improvements, DeLong Mountain Terminal, Alaska, analyzes the impacts of constructing and operating navigation improvements at the DeLong Mountain Terminal (DMT) to reduce the costs of transporting fuel used in northwestern Alaska and loading ore concentrate from the Red Dog Mine. The DMT is an industrial site at Portsite in the Northwest Arctic Borough about 80 miles north of Kotzebue on the southeastern coast of the Chukchi Sea. Portsite is connected to the Red Dog Mine (the worlds largest zinc-producing mine) by the only major road in the region. Neither the mine nor the communities in the region are connected by road to each other or to a larger road system.

Several alternatives to meet project objectives, including building roads to existing land and sea-based infrastructure and building new infrastructure at and away from Portsite, were initially considered. Of those considered, the No-Action, Third Barge, Breakwater-Fuel Transfer, and Trestle-Channel alternatives were carried forward for detailed consideration in the EIS. The Trestle-Channel Alternative is the tentatively recommended plan. The Trestle-Channel Alternative would construct a 1,450-foot-long trestle from shore to a new offshore loading platform, and a 3.5-mile channel from the loading platform to the -53 feet MLLW depth contour that would allow navigation by bulk freighters and tanker ships. It would increase ore concentrate loading efficiency, and allow direct offloading of fuel from tanker ships.

Construction and long-term operation of the tentatively recommended plan would affect marine organisms and habitat over about 6,500 acres of sea bottom in the Portsite area. Long-term effects would not be significant to any biological resources of concern. Subsistence harvest of most resources would be unaffected, but there could be local effects to harvest potential of some marine mammal species.

**Lead Agency:** The U.S. Army Corps of Engineers, Alaska District is the lead agency. The U.S. Environmental Protection Agency and the Northwest Arctic Borough have participated in the process as formal cooperating agencies. Comments on the draft EIS may be directed to the point of contact below within 60 days from the date that the draft EIS is published in the Federal Register.



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**Navigation Improvements**
**DeLong Mountain Terminal Draft EIS**

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## Acronyms and Abbreviations

| | |
|---|---|
| AD | Anno Domini (years after the birth of Jesus Christ) |
| ADEC | Alaska Department of Environmental Conservation |
| ADFG | Alaska Department of Fish and Game |
| ADGC | Alaska Division of Governmental Coordination |
| ADNR | Alaska Department of Natural Resources |
| ADOT/PF | Alaska Department of Transportation and Public Facilities |
| AFA | American Fisheries Act |
| AHRS | Alaska Heritage Resources Survey |
| AIDEA | Alaska Industrial Development and Export Authority |
| AKNHP | Alaska National Heritage Program |
| ANCSA | Alaska Native Claim Settlement Act |
| ASRC | Arctic Slope Regional Corporation |
| AVEC | Arctic Village Electric Cooperative |
| BA | Biological Assessment |
| BCR | benefit to cost ratio |
| bgs | below ground surface |
| BLM | Bureau of Land Management |
| BO | Biological Opinion |
| BP | before present |
| CAR | Coordination Act Report |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| COE | U.S. Army Corps of Engineers |
| Corps | U.S. Army Corps of Engineers |
| CZMA | Coastal Zone Management Act |
| DOI | Department of Interior |
| DMT | DeLong Mountain Terminal |
| DMTS | DeLong Mountain Transportation System |
| EEZ | Exclusive Economic Zone |
| EFH | essential fish habitat |
| EIS | environmental impact statement |
| ER | Engineer Regulations |
| ESA | Endangered Species Act |
| FAA | Federal Aviation Administration |
| IRA | Indian Reorganization Act |
| MHHW | mean higher high water |

| | |
|---|---|
| MHW | mean high water |
| MLLW | mean lower low water |
| MLW | mean low water |
| MOA | Memorandum of Agreement |
| MSL | mean sea level |
| MSQS | Marine Sediment Quality Standards |
| MTL | mean tide level |
| NED | National Economic Development |
| NEPA | National Environmental Policy Act |
| NHL | National Historic Landmark |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic & Atmospheric Administration |
| NPDES | National Pollution Discharge Elimination System |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| NSB | North Slope Borough |
| NAB | Northwest Arctic Borough |
| PED | Planning, Engineering & Design |
| PSDDA | Puget Sound Dredge Disposal Analysis |
| PSPA | Pacific Seafood Processors Association |
| RPA | reasonable and prudent alternatives |
| SHPO | State Historic Preservation Officer |
| SL | screening levels |
| SVOC | semi volatile organic compound |
| t | ton |
| TCAK | Teck Cominco, Alaska, Inc. |
| TOC | total organic carbon |
| USACE | U.S. Army Corps of Engineers |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| VPSO | Village Public Safety Officer |
| WRDA | Water Resources Development Act |

# SUMMARY

This draft environmental impact statement (draft EIS) reports the studies and coordination conducted to determine whether the Federal government should participate in navigation improvements in Northwest Alaska. After public review, it will be revised and released for a second public review as a final EIS. The Northwest Arctic Borough, the U.S. Environmental Protection Agency, and the National Park Service are cooperating agencies in this EIS process.

Navigation improvements could meet two important economic needs by helping to lower fuel transportation costs in northern and western Alaska and by allowing ore concentrate to be shipped out more efficiently. The tentatively recommended plan would construct a new navigation channel, trestle, and loader at Portsite to meet those needs. Figure S-1 shows the location of Red Dog Mine, which produces up to about 1.5 million tons of zinc and lead ore concentrates each year, and of Portsite on the Chukchi Sea coast, where ore concentrate from the mine is transferred as bulk cargo to ships for transportation to smelters.

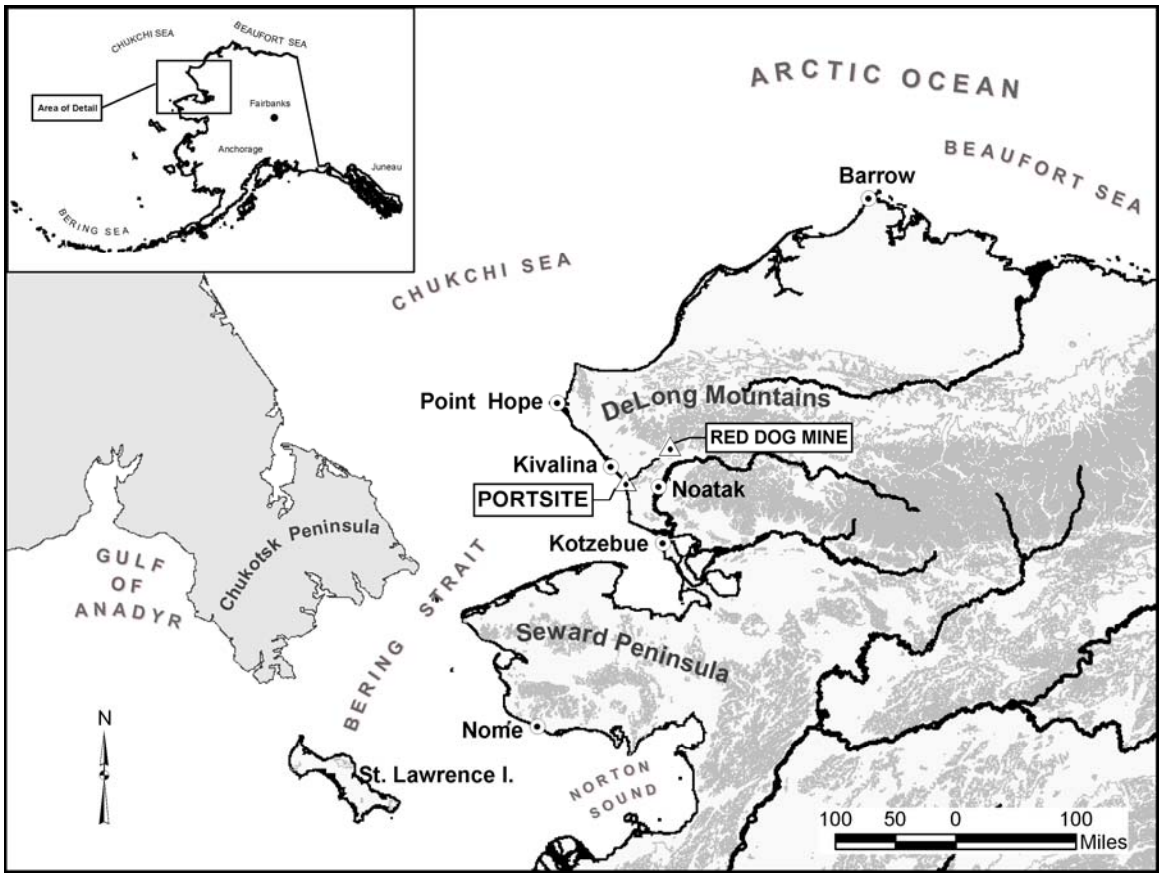


**Figure S-1.** Location of Portsite and Red Dog Mine**.**

Portsite is not an incorporated community. The name Portsite was locally generated as a convenient way to refer to the site. Portsite has no permanent population; all the people at Portsite are employed in mining-related activities. In this draft EIS, "Portsite" refers to the location of the existing facilities that load ore concentrate from Red Dog Mine. The facilities at Portsite that receive, store and load ore concentrate and that serve other seaport needs at Portsite are named the DeLong Mountain Terminal (DMT). The DMT facilities, along with the 52 miles of road that support transportation between Red Dog mine and Portsite are owned by the State of Alaska. Figure S-2 shows Portsite and its principal features.

Trucks haul ore concentrate 52 miles from Red Dog Mine to DMT storage buildings at Portsite where the concentrate is stored until the open-water season, which usually begins in late June or early July. During the open-water season (typically 90-110 days), the concentrate is loaded onto barges that are towed by tug to ships moored 3 to 5 miles offshore, where concentrate is transferred into the ships. About 250 barge trips are required to transfer a maximum of about 1.5 million tons of ore concentrate to bulk cargo ships each year. About 27 ships are loaded each year. The Chukchi Sea is too shallow for ships to be loaded directly at Portsite or to moor closer to shore.

Ocean-going barges deliver fuel to heat, generate electricity, and power vehicles in northwestern and northern Alaska. Each year they deliver about 20 million gallons to Portsite for Red Dog Mine and about 30 million additional gallons to communities in the region. Tanker ships could deliver fuel to northern and northwestern Alaska with less cost, but are not used because there are no ports deep enough for them to offload fuel directly into on-shore storage tanks.

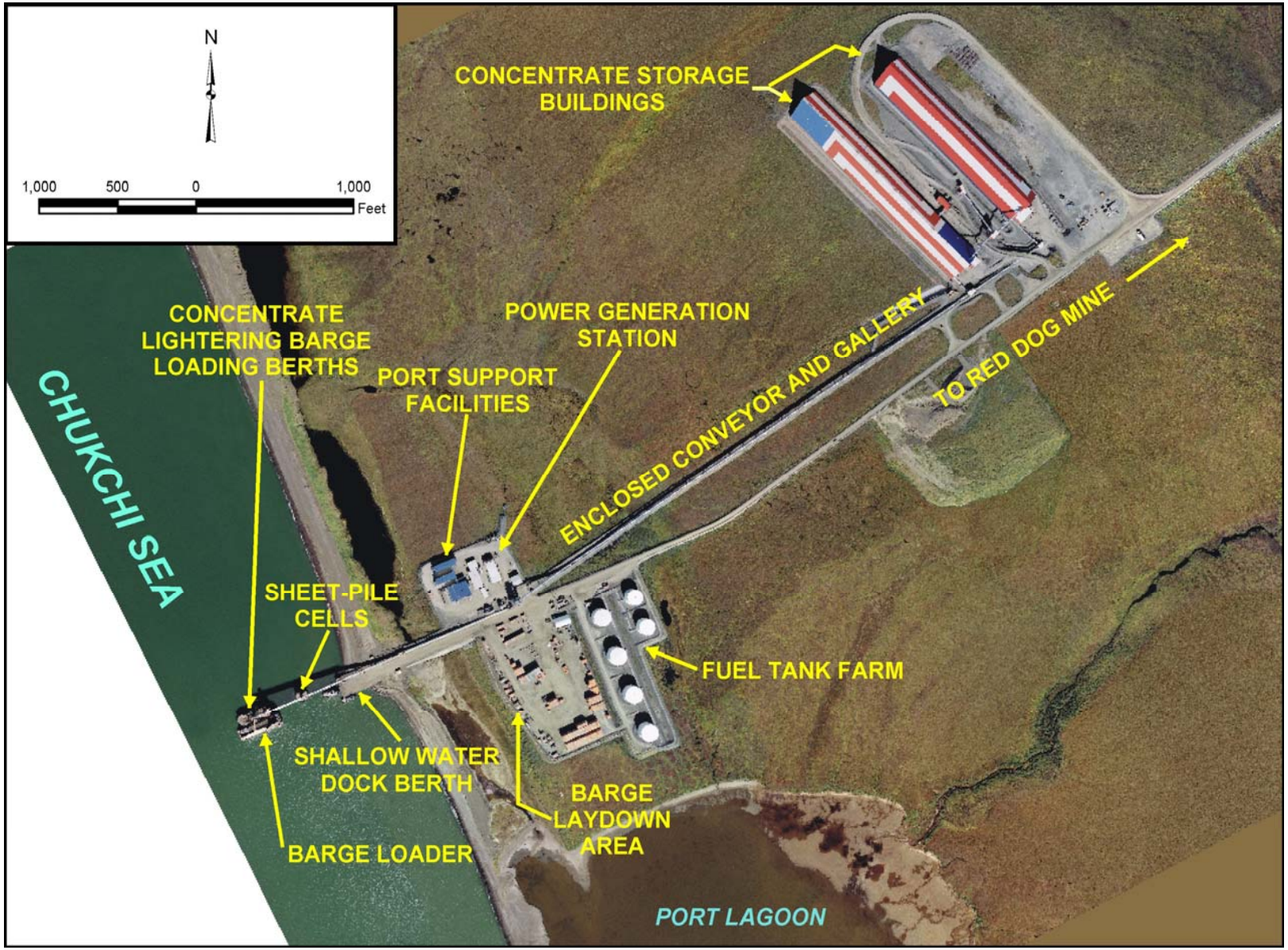


**Figure S-2.** Principal Facilities at Portsite.

## The Tentatively Recommended Plan

The tentatively recommended plan (the Trestle-Channel Alternative) would construct a new project to load ore concentrate directly into bulk cargo ships and to unload fuel from tanker ships. The project would be constructed just north of the existing loader. Figure S-3 shows the existing DMT facilities and the layout of the Trestle-Channel alternative. The Trestle-Channel alternative would consist of four components, which would be as follows:

**Loader and Platform.** A 300-foot-long platform would be constructed offshore from and just north of existing DMT facilities. The shoreward end of the platform would be about 1,400 feet from shore and the seaward end would be about 1,700 feet from shore. The deck of the completed loading platform would be about 40 feet above mean lower low water (MLLW; roughly sea level at low tide). The highest parts of the main structure would be 142 feet above MLLW. The platform would be a 90-by-300-foot deck constructed on clusters of piling driven into the sea bottom. One additional pile cluster would be placed seaward of the platform as a dolphin to moor the seaward end of ships at the loading platform. Piles in each cluster would be filled with concrete to strengthen them. The piling clusters would be constructed specifically to withstand Chukchi Sea ice loads. A pair of movable loaders on the platform would swing, extend, and contract to transfer up to 2,600 tons per hour of ore concentrate directly into bulk carriers. The platform also would be used to unload cargo and supplies for mining operations and fuel for mining and distribution to communities in western and northern Alaska.

Figure S-3 shows the general dimensions and layout of the loading platform that could be constructed for this alternative.

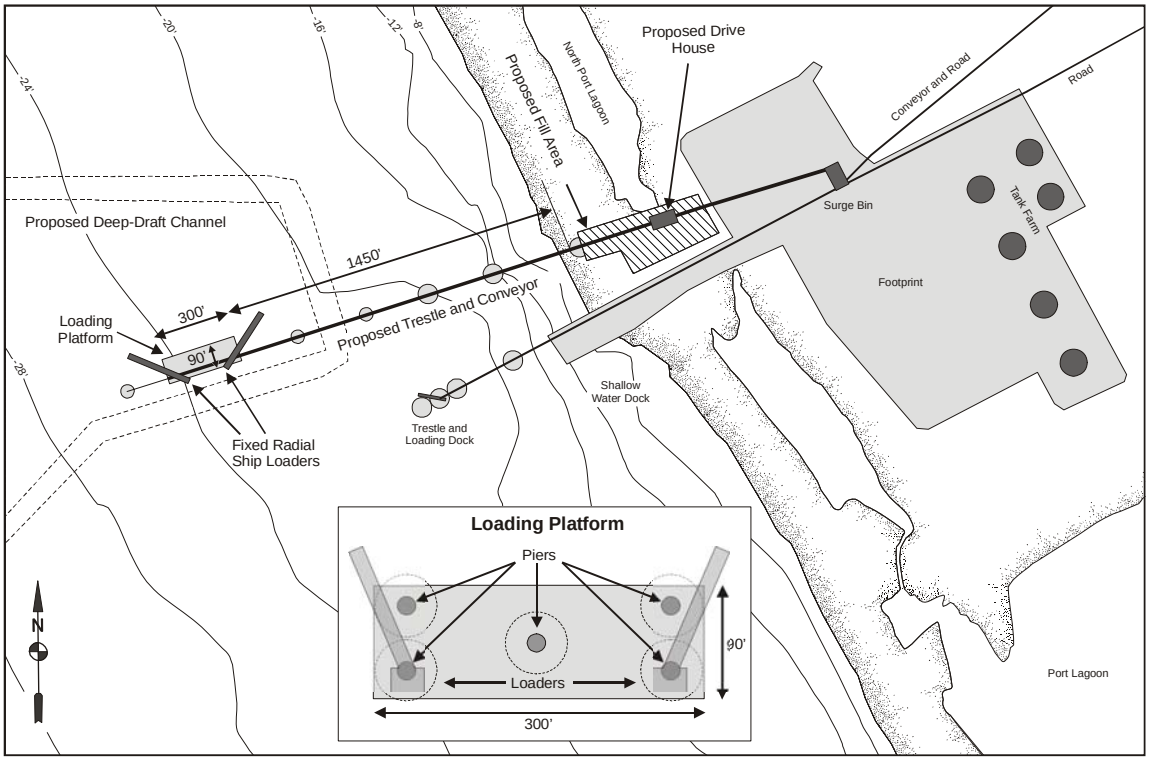


**Figure S-3.** Layout of the Trestle-Channel Alternative.

**Trestle.** The loading platform would be connected to shore by a 1,450-foot bridge-like trestle that would support the ore concentrate conveyor, fuel transfer line, electrical power, communication lines, a single-lane road, and other equipment and utilities connecting the platform with onshore facilities. It would be just north of the existing barge loader and trestle.

The trestle would be about 35 feet above the water. It would be constructed on five spans of a through-truss bridge (figure S-4). The trestle would be about 30 feet high (distance from underside to top of the structure) and about 20 feet wide. This would provide an 18-foot-wide by 22-foot-high passage for trucks and equipment. The gallery for the concentrate conveyor would be above the roadway. The conveyor gallery would be completely enclosed and would include a dust suppression vacuum system with pick-up points for a vacuum truck.

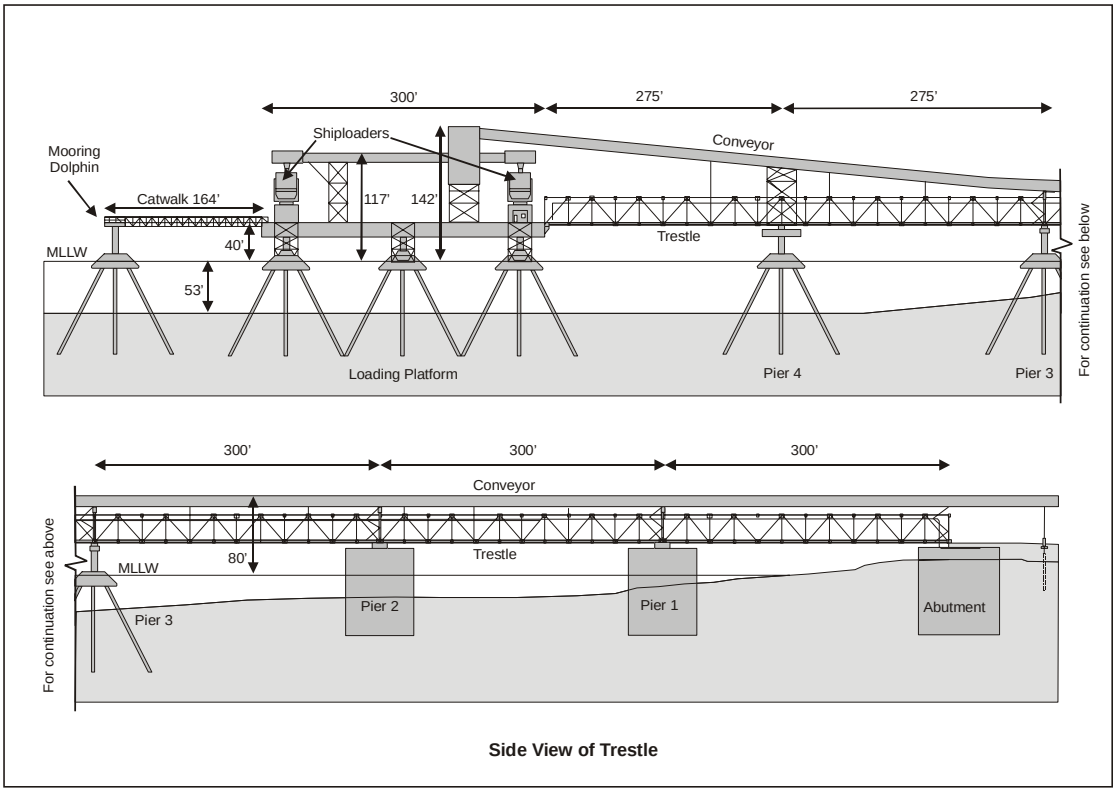


**Figure S-4.** Trestle-Channel alternative. Side view of the trestle, platform, and supports.

The abutment on shore would be set back from the sea to about 12 feet above MLLW to avoid affecting sediment transport along the beach. The first two trestle foundations (Piers 1 and 2 in figure S-4) would be 74-foot-diameter sheet-pile cells. The other marine foundations would be pilings like those used to support the loading platform. The contractor could be given the option of selecting another foundation type for the trestle, but areas affected and construction would be similar.

**Channel and Turning Basin.** A channel designed to be 53 feet below MLLW would be dredged from deep water to the loading platform. It would begin in water about 3.5 miles offshore and about 53 feet deep. This depth would allow safe passage of 45-foot-draft bulk cargo vessels that typically transport ore concentrate in the world market. Near the loading platform the channel would be widened to create mooring and turning areas. The channel would be about 250 feet wide across the bottom at its seaward end and would gradually widen to a bottom width of 760 feet in the turning and mooring area at the east (shoreward) end. The turning basin would allow fully loaded fuel tankers and empty bulk freight ships to turn at the dock so they could moor with the bow seaward. Figure S-5 shows the dimensions planned for the channel.

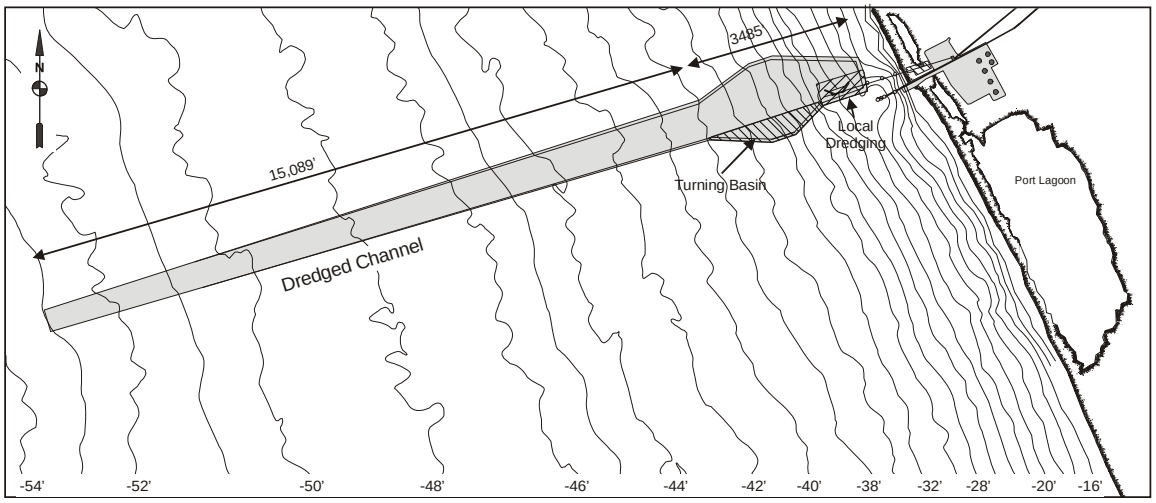


**Figure S-5.** Channel dimensions, Trestle-Channel alternative

The channel would be dredged with a side slope of 1 vertical to 3 horizontal. This is the same slope as the 4 vertical to 12 horizontal pitched roof commonly used in home construction. The material in the side slopes of the channel alignment is of various grain sizes. That side-slope material would gradually slump into the dredged channel to eventually slump to a stable slope estimated to be about 1 vertical to 10 horizontal slope. This is a gentler slope than a standard handicap access ramp commonly constructed for public buildings. While the channel would be designed to be 53 feet below MLLW, it would be dredged deeper during construction so that as the sides slumped into the channel it would still be usable to the design depth. Over-dredging to allow for the side slopes to slump is a common practice to ensure new channels remain navigable. Final slope is achieved by natural slumping rather than by dredging a 1-to-10 slope because dredging a smooth final slope at 1-to-10 is difficult and because the amount of slumping would vary along the channel due to differences in bottom material.

The total sea bottom disturbed by dredging to the design depth, including the 3 to 1 slopes would be about 330 acres. Over-depth dredging to allow for slumping would add about 8 more acres to the area affected. If all the slopes lay back to a 1-to-10 horizontal slope, the channel would affect a total of about 430 acres. Altogether, about 8.1 million cubic yards ($yd^3$) would be dredged during project construction. That would include about 6.2 million $yd^3$ dredged to take the channel and turning basin to 53 feet below MLLW. Over-dredging to allow for slumping would generate another 1.9 million $yd^3$.

Contractors generally are allowed to select the dredging method they believe would be most efficient and that best suits their capabilities, but site conditions indicate that hopper dredges would work best to remove the main volume of dredged material. Clamshell dredges probably would be used to work in corners and other more confined areas. Dredging would require work for three open-water seasons (approximately July through October each year).

The channel would gradually begin to fill in as the side slopes slumped and as sediment was deposited. That deposited material would be periodically dredged to re-establish the over-dredged depths. As in the initial construction dredging, the contractor would be allowed to select the method best suited for maintenance dredging requirements.

Hydrologists estimate that the first maintenance dredging would be required about 5 years after construction was completed. They estimate the following maintenance dredging would be required in the first 50 years after construction:

| Years After Construction | Dredge Quantity ($yd^3$) |
|---|---|
| 5 | 1,100,000 |
| 17 | 1,187,000 |
| 33 | 1,196,000 |
| 49 | 1,196,000 |

The deeper water of the turning basin and mooring area would reduce wave action on the beach and near-shore intertidal zone at the project, so sand and other material moving along the beach would accumulate shoreward of the turning basin. The natural movement (littoral drift) is driven by waves, and particularly by the larger waves associated with storms and strong onshore winds. This process carries sand and gravel southward along the beach at Portsite. Hydrologists estimate that about 26,000 $yd^3$ of beach material would accumulate annually shoreward of the turning basin. This material would be mechanically removed each year and placed near shore in the Chukchi Sea south of the project. This would prevent beach erosion south of the project and would help prevent material from eventually building up in the turning basin. A small dredge left at the site and operated for about a week each year would serve this purpose.

The 8.1 million $yd^3$ of dredged from the sea bottom would be placed in a disposal area offshore from Portsite. The disposal site would be a 5,600-acre rectangular area about 2 miles wide by about 4.3 miles long. Figure S-6 shows the location and dimensions of the tentatively recommended disposal area. Initial dredging would produce enough material to cover the bottom of the site to a depth of a little more than 1 foot if the material was distributed evenly. The bottom in the area ranges from -62 to -72 feet MLLW. The site is deep enough and far enough offshore to ensure that materials disposed of would not adversely affect navigation or currents. The tentatively recommended disposal site would keep the dredged material as close as is feasible to areas already developed at Portsite and to the other parts of the tentatively recommended plan.

Dredging in the years following construction would use the same site for disposal, but site use would be periodically reviewed to see whether better uses of the material had developed.

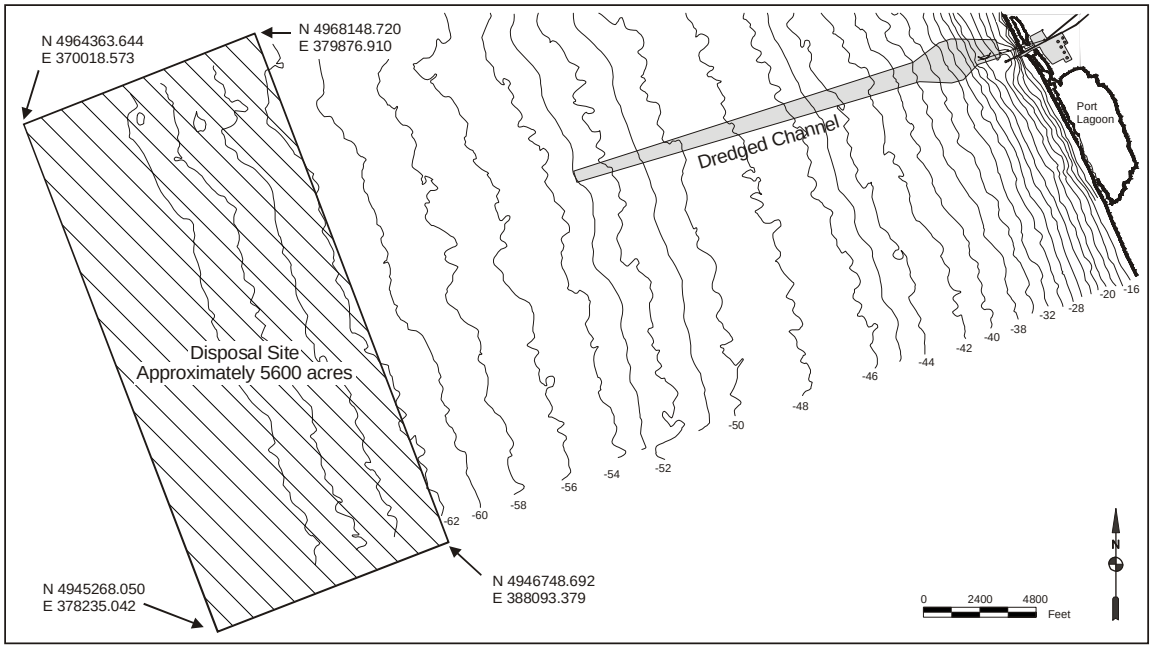


**Figure S-6.** Tentatively recommended offshore disposal site at Portsite.

Three additional disposal sites were evaluated (figure S-7). Site 2 in figure S-6 is the tentatively recommended site. Site 1 was not selected because it would have placed dredged material closer to Kivalina. Sites 3 and 4 would have placed the material in deeper water closer to areas crossed by the main migrations of walrus and bowhead whales and would have increased hauling distances, distance noise would be heard, total construction time for the project, and cost. None of the sites in figure S-7 were shown to be substantially more biologically productive than the others, and during the construction season, none contained large numbers of fish, shrimp, crabs, or other organisms especially important in subsistence or food for marine mammals.

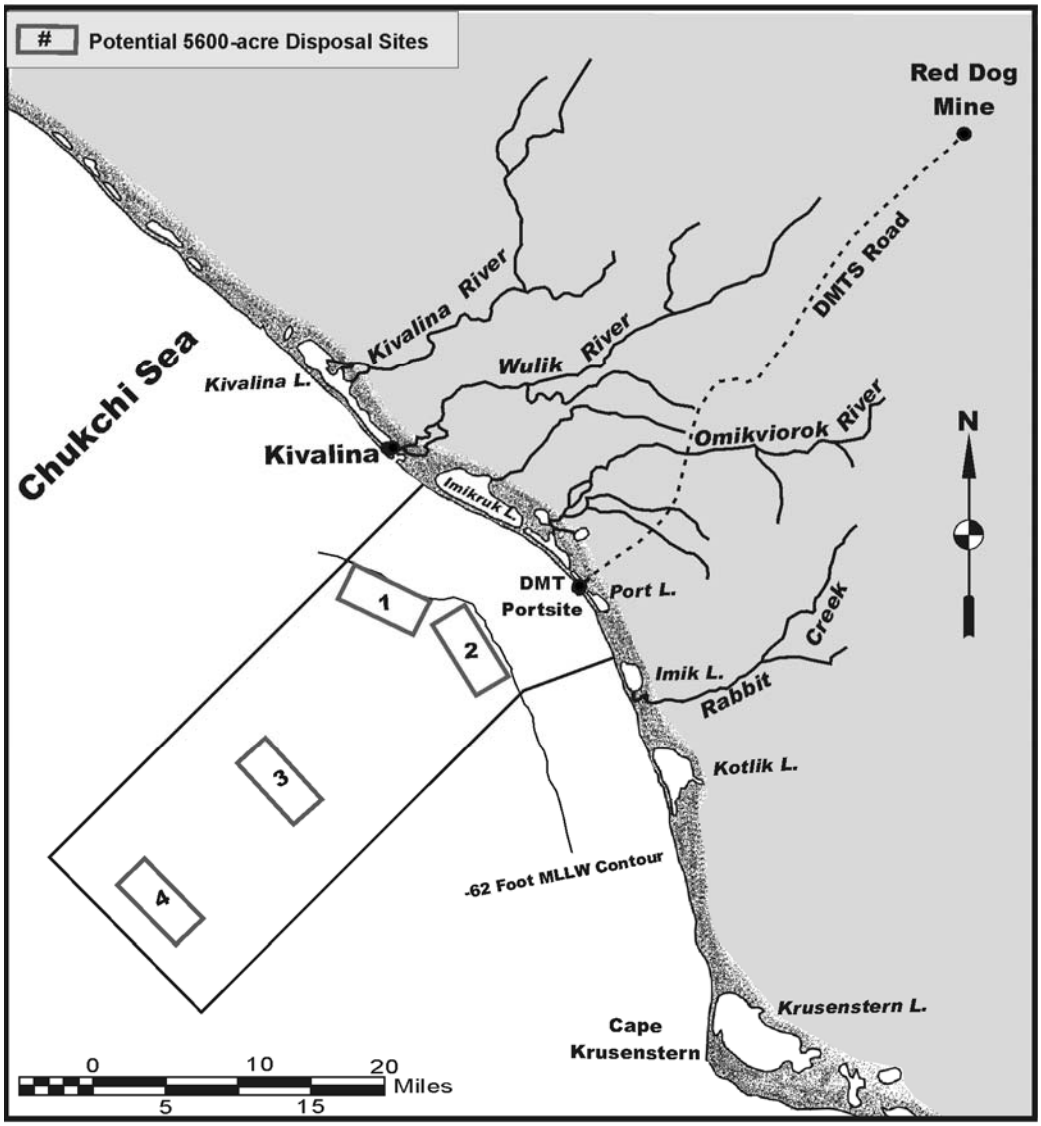


**Figure S-7.** Ocean Disposal Sites Considered.

**Other Project Features.** Onshore loading facilities would be modified or expanded to make the project work. The existing platform, now used for loading ore concentrate and the smaller one used now for receiving heavy shipments and for tug moorage would remain in use to serve barges delivering supplies, as a tug berth, and as a work site for spill response and other needs. The conveyor system would be modified or rebuilt for the new alignment to the trestle. A small area (about 2.5 acres) would be filled for the realigned conveyor and for the approach and abutment for the trestle. One additional acre would be filled for construction of another fuel storage tank to store gasoline for regional distribution. A new diesel generator would be added to power the new loader, one or more existing generators might be removed or replaced, and the existing generation building would be modified and expanded to accommodate the additional power generation.

**Project Construction.** Main project features, including the channel and other dredged areas, the trestle, and the loading platform could be constructed in three construction seasons. Engineers estimate the project could be in operation 4 years after the beginning of the first full construction season.

Limited on-land construction might be possible during the winter. With one exception, all work in the Chukchi Sea would be accomplished during the open-water season. The only exception would be construction of the near-shore pilings for the trestle, which would be placed through the ice because water that close to shore is so shallow that construction from a barge or from shore would be too likely to be delayed or damaged by waves and other site conditions. Construction work above the sea on the trestle and loading platform could continue into the winter, but could be restricted to avoid primary marine mammal hunting periods.

**Project Operation.** The completed project would load the same number of bulk freighters each year as are loaded now and would offload fuel from four or five tankers per year. The existing operation off-loads fuel from four or five ocean-going barges each year, so the total number of deliveries would be about the same. The shipping season would be the same as now, beginning soon after ice is out of the Bering Strait and after the bowhead migration has passed. Ore concentrate stored over the winter would be loaded more quickly than with present operations because ships could be loaded faster and weather would affect loading less often. Ships could arrive and moor at the loading platform any time waves were less than about 6.5 feet and winds were 20 knots or less. Ships could remain at the platform and continue to load or unload with 6.5-foot waves and sustained wind speeds of up to 30 knots.

After construction, shipping and loading operations would be much quieter than now. Ships waiting to be loaded would wait in the same mooring areas, but instead of 250 barge trips and about 1,500 hours of operation by four tugs, ships would be assisted to the mooring berth by two tugs, and after loading would be assisted back out to sea by two tugs. Hours of tug operation each year would be significantly reduced.

**Project Cost and Benefits.** Dredging the federal channel and turning basin would cost an estimated $75 million dollars, with annual maintenance costs estimated at $1,245,000. Costs would be shared between the Federal government and the non-Federal sponsor. The non-Federal sponsor would pay all costs of constructing, maintaining, and operating "local service facilities," which would include the trestle, loading platform, alterations to the conveyor and utilities systems, a new 1.5 million gallon fuel storage tank, and other on-land project features. Total estimated cost for the non-Federal sponsor project components would be about $155,500,000. Annual operation and maintenance costs of the project would be about $6,550,000. The project would produce estimated annual benefits of $26,898,700, primarily derived from lower fuel transportation costs and more efficient ore concentrate loading.

## Need for the Action

The tentatively recommended plan would be constructed to meet two main needs: It would allow ore concentrate to be loaded at Portsite more efficiently and it would reduce the cost of transporting fuel into northwestern Alaska.

Loading ore concentrate more efficiently means several things: It means there would be better assurance that all the stored ore concentrate could be loaded each season; that there would be less ore concentrate lost into the environment because it would be loaded directly onto ships instead of being loaded once onto barges, then again onto ships; and that it could be loaded at less cost.

Reducing fuel transportation costs means that fuel could be brought into Portsite for less cost and could be distributed to communities throughout northern and western Alaska at less cost.

Savings in fuel transportation and ore concentrate loading would more than pay for the costs of construction and maintenance.

## Public Participation and Concerns

The Corps of Engineers, interested government agencies, and the people of northwestern Alaska met in a series of meetings at the beginning of this study to identify central issues and concerns that should be considered in this draft EIS. Meetings, correspondence, and coordination since those initial meetings have further clarified and focused those issues and concerns.

Principal issues and concerns were in the following areas:

- Biological – how navigation improvements would affect fish and wildlife and their habitats.
- Environmental hazards – how navigation improvements would affect potential for environmental contamination.
- Cultural – how navigation improvements would affect traditional practices, including subsistence harvests and cultural resources and practices.
- Economic and social – how navigation improvements would affect existing and future income to the region, jobs, costs of goods and services, land development, and future mining and industry.

People of northwestern and northern Alaska who participated in the draft EIS process also suggested that the Corps should look at ways to lower fuel transportation costs and costs of shipping ore concentrate without constructing at Portsite. The Corps also considered the No-Action Alternative (not making any navigation improvements), an alternative to add a third barge to transfer ore concentrate, and an alternative to construct

a combination of breakwater to protect barges as they were loaded and an offshore fuel transfer system to tanker ships delivering fuel.

The remainder of this summary is largely devoted to providing information and answers to concerns and questions raised by concerned people and agencies. It first addresses the question of whether there are feasible alternatives to improvements at Portsite. It then identifies other alternatives at Portsite and compares them; and finally, the summary discusses project impacts related to issues and resources to the people who are interested in this action.

## Alternatives to the Tentatively Recommended Plan

The following alternatives to the tentatively recommended plan were initially considered.

**Highway or Railroad to the Existing Road System.** Alternatives that would connect the DeLong Mountain Transportation System (DMTS) to the existing Alaska Highway or railroad system would be so expensive that their construction would cost more than the economic benefits they would produce. Those alternatives were eliminated from detailed consideration.

**Highway or Railroad to a New Port in Northwestern Alaska.** Constructing new port facilities at Nome or Kotzebue and a road or railroad to connect them to the existing DMTS was considered. At least 250 miles of road would be required to connect DMTS to Kotzebue and at least twice as much to connect with Nome (figure S-8). New storage and loading facilities would be required at Nome or Kotzebue, and a channel similar to the tentatively recommended plan would be required. Costs for construction would be far greater than savings and economic benefits. These alternatives were eliminated from detailed consideration because they would cost too much to construct and operate. A new port closer to Red Dog Mine and the existing DMTS would be too costly to develop as a transportation alternative to support development in the foreseeable future, and was eliminated from further consideration.

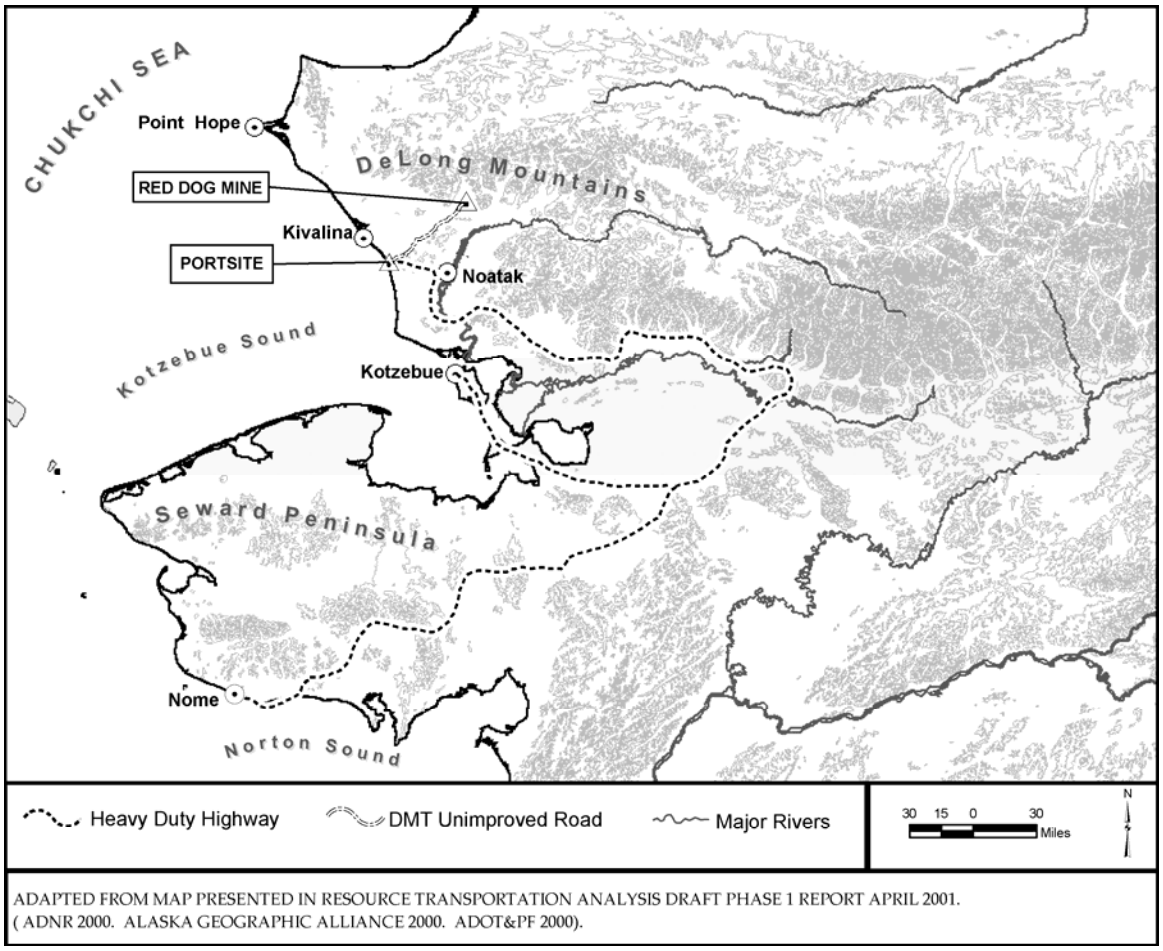


**Figure S-8.** Possible road corridors to Nome and Kotzebue.

**Alternatives to Reduce Fuel Costs.** Several alternatives were suggested to reduce fuel costs. Natural gas or coal could be developed to replace some of the diesel fuel used now, but coal would be too expensive to develop for regional use in the foreseeable future, and natural gas has not been found in sufficient quantities to be economically developed. Wind generation is being developed in northwestern Alaska as a supplement to diesel generation, but is much more expensive to develop there than in the contiguous United States, is more expensive to operate, and is not consistent enough to replace diesel for base electrical generation. There is no indication that any of these alternatives for heating or electrical generation would, in the foreseeable future, economically replace a substantial portion of the petroleum now being used in northwestern Alaska, so they were not considered in detail.

**The No Action Alternative.** The alternative of not changing existing structures or activities (the No-Action Alternative) is considered in every EIS. In this EIS, the No-Action Alternative would leave Portsite and DMT as they are now. Existing facilities and operations would not be altered by federal action.

**Third Barge Alternative.** Current DMT operations use two barges to lighter ore concentrate to bulk cargo ships moored offshore. Adding a third lightering barge and additional tugs to move it would not greatly increase loading efficiency, but could help ensure that stored concentrate could be loaded if one of the other lightering barges was damaged. This alternative was considered in detail, but is not recommended because it would not be better economically or environmentally than the No-Action Alternative.

**Breakwater-Fuel Transfer Alternative.** This alternative would construct a breakwater offshore of the existing DMT loader at Portsite so that barges could be loaded in rougher seas. This would increase the number of days per year that ore concentrate could be loaded and would ensure that all the stored concentrate would be loaded each year. Figure S-9 shows the approximate dimensions and layout of the breakwater.

The breakwater would be a 2,800-foot straight rubblemound breakwater parallel to shore about 695 feet seaward of the third sheet-pile cell of the existing loading facility (figure S-9). It would be constructed at a depth of about 24 feet. The top would be about 10 feet above sea level. The base would be about 200 feet wide and would cover about 13 acres of sea bottom. The breakwater would be constructed of 10-ton armor rock overlying quarry rock and bedding stone layers.

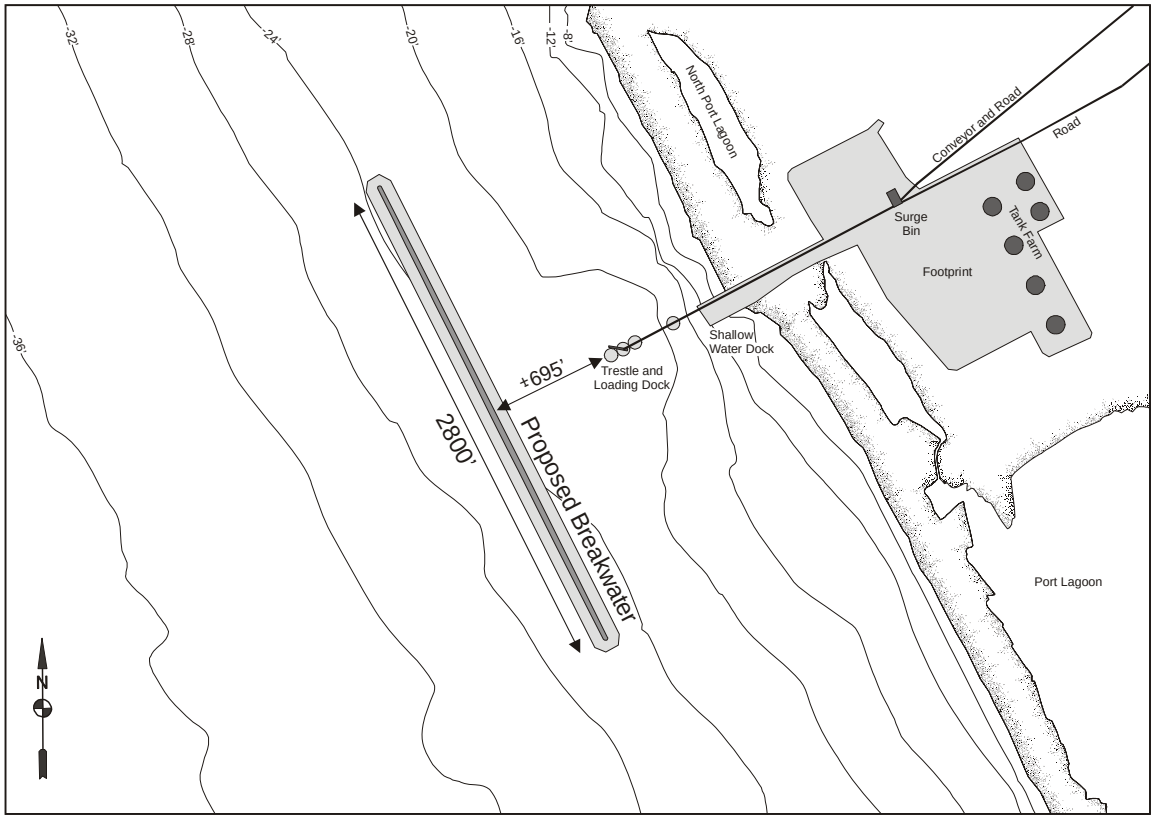


**Figure S-9.** Breakwater component of the Breakwater-Fuel Transfer Alternative.

**Fuel Transfer Component.** This part of the Breakwater-Fuel Transfer Alternative would construct and operate a new onshore pumping station and a pipeline from the pumping station to a mooring area about 10,000 feet offshore in water at least 43 feet deep to offload fuel from ocean-going tankers. The 20-inch-diameter steel pipeline would be in a tunnel or buried. Tankers bringing fuel to Portsite would tie off to mooring buoys, raise a flexible pipe from the bottom, and fuel would be pumped to the DMT fuel storage tanks. When the tanker was unloaded, the ship would return the flexible pipe to the ocean floor. At the end of each season, a mechanical device called a "pig" would be used to clean the pipe before it was filled with inert gas. This would prevent fuel spills if the pipeline or the fuel line were ruptured during the off-season. The flexible pipe and buoys also would be removed at the end of each shipping season and reinstalled at the beginning of the next shipping season. Figure S-10 shows the approximate alignment and a general layout for the fuel transfer system.

About four tanker deliveries per year could unload about 50 million U.S. gallons of fuel to supply Portsite, Red Dog Mine, and most of the communities of Northwest Alaska. The existing fuel barge facility would be used to transship fuel into 5-million-gallon or smaller barges for delivery to communities in Northwest Alaska. Initial breakwater cost is estimated at $69.4 million with annual maintenance costs of about $425,000. The fuel transfer component first cost would be about $77.2 million, with annual maintenance and operating costs of about $4.2 million. The total average annual costs for this alternative would be about $13.5 million per year, including the 50-year amortized cost of construction and annual costs of maintenance. The benefit-cost ratio would be about 1.16.

While this alternative was considered in detail, it is not recommended for construction. It would produce less economic benefit than the Trestle-Channel alternative. It also would not greatly improve ore concentrate loading efficiency, although it would help ensure that all the concentrate was loaded each year.

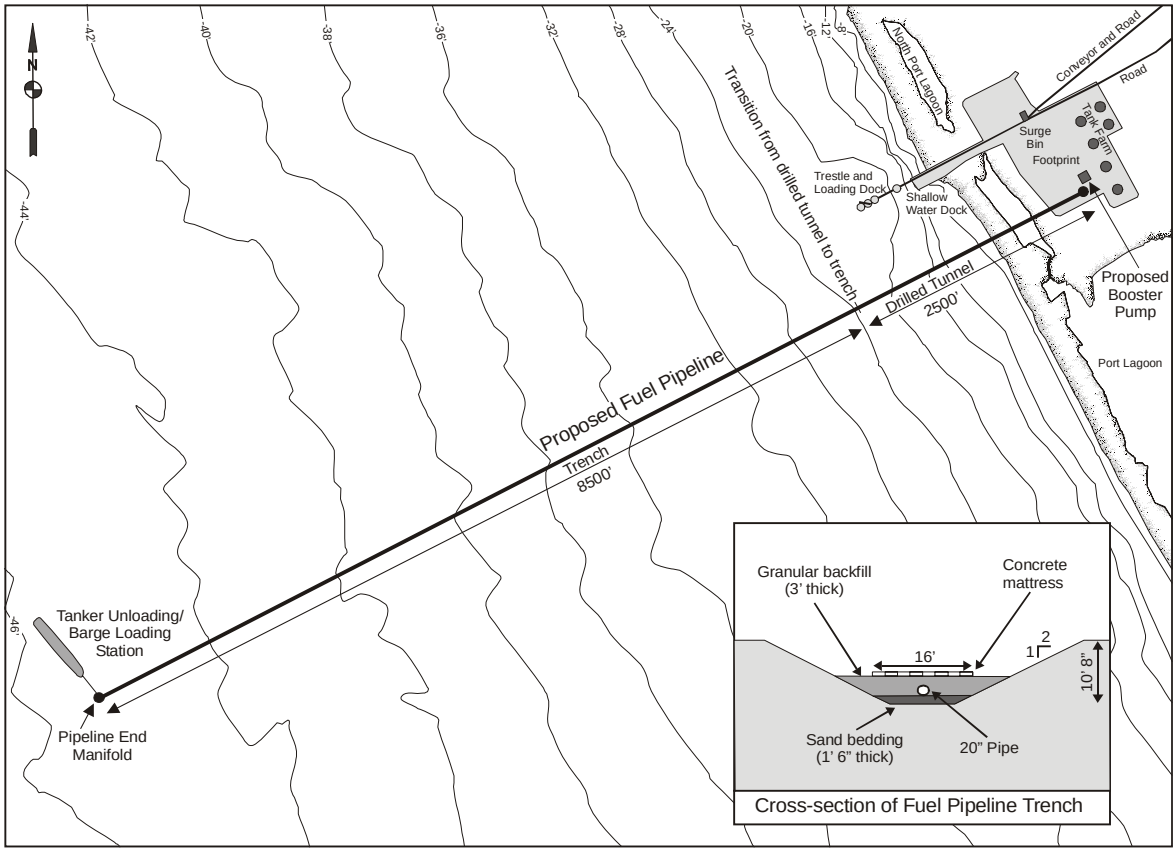


**Figure S-10.** Fuel Transfer alternative at Portsite.

## Affected Environment and Environmental Consequences

Evaluation of potential environmental effects is focused on the four alternatives considered in detail, which are:

The Trestle-Channel Alternative (the tentatively recommended plan)
The No-Action Alternative
The Third barge Alternative
The Breakwater-Fuel Transfer Alternative

Evaluation of effects considers the *direct effects* of alternatives on the people and resources; *indirect effects* that could result if an action caused or induced additional effects; and *cumulative effects* that are the sum of existing environmental effects plus effects of an action, plus reasonably foreseeable future effects.

**Land Use.** Portsite and the Red Dog Mine are in the Northwest Arctic Borough (NAB). Boroughs in Alaska are similar to counties in much of the rest of the United States, but with political structure and powers that may be substantially broader. Boroughs in Alaska also are substantially larger than most counties. The NAB is the second largest borough in Alaska. It encompasses almost 36,000 square miles of land and almost 2,000

square miles of coastal waters. That makes the NAB about half the size of the states of Washington or Idaho, and almost exactly the same size as Indiana.

This Indiana-sized borough has a total population of about 7,000 people, about 1 person for every 5 square miles. By comparison, Wyoming, the least populated of the 50 states, has about 5 people per square mile (about 25 times the population density of the NAB) and Indiana has about 170 people per square mile. Native Americans make up about 83 percent of the population of the NAB. The NAB has no railroads, no deepwater ports (and only two port systems for shallow-draft vessels), no developed harbors, no highways, no paved roads except for two mile-long streets through the middle of Kotzebue, and no improved roads outside the communities and their immediate vicinity except for the 52-mile-long DMTS road. By comparison, Wyoming has about 27,000 miles of roads and highways and Indiana has about 93,000 miles.

There is no highway or road connection from the NAB to the rest of Alaska. Essentially all goods shipped to and from the borough are transported by sea or air, and ice limits marine commerce to about 4 months of the year. Two airports in the borough are capable of landing heavy commercial air carriers: one is at Kotzebue and the other is at Red Dog Mine. Transportation between communities is almost entirely by aircraft and boat during the open water season and by aircraft and snow machine when waters are frozen. The ice goes out on most rivers and lakes in May or June and on the Chukchi Sea in June or July. Rivers and lakes begin freezing in late September and waterborne transportation ends on rivers of the region and in the Chukchi Sea by about the end of October.

Land Ownership. Most of the land in NAB is owned by the Federal government, Native corporations, and the State of Alaska. None of the alternatives considered in detail would affect land ownership.

Communities. The Trestle-Channel Alternative and the Breakwater-Fuel Transfer Alternative could reduce fuel delivery cost to bulk transfer facilities as far north and east as Kaktovik and as far south as communities in Norton Sound and along the Yukon River. Lower fuel prices would be unlikely to induce significant community growth, but could result in locally valuable savings to schools, electric producers, and others. Effects, both direct and cumulative, on communities could be beneficial but would be less than significant in terms of community viability or long-term development.

Transportation and Transportation Facilities. None of the alternatives considered in detail would require support from additional roads, airport, or any other major transportation facilities at Portsite, at the existing Red Dog Mine, or in the surrounding region. Fuel is delivered to regional hubs in northwestern Alaska from Puget Sound, Washington, and Cook Inlet, Alaska. There are other ready markets for that fuel, so if fuel is delivered from other sources by ship, economic effects to existing distributors would be minor. Fuel from the regional hubs, places like Nome and Kotzebue, is delivered to storage tanks in smaller communities by barges that can operate in the water depths at those communities. With the Trestle-Channel and Breakwater-Fuel Transfer alternatives, fuel for the region could be distributed from Portsite to other transportation

hubs in northern, western, and northwestern Alaska and then be redistributed the same way it is now. Fuel in the Kotzebue area could be delivered by barge directly from storage tanks at Portsite rather than from Kotzebue, but it would be more likely to be redistributed through Kotzebue. Transportation of other goods or people would not be affected by any of the alternatives considered in detail.

Regional Planning Consistency. Each alternative considered in detail would be consistent with regional transportation planning and coastal zone management plans.

Visual Resources. The Trestle-Channel and Breakwater-Fuel Transfer alternatives would add additional structures at Portsite, which would cause a minor, local increase in visual impacs.

**Subsistence.** Subsistence is the non-commercial hunting, fishing, and gathering of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools and handicrafts, and for trade barter, or sharing. Data collection and presentation here focuses on reporting from Kivalina because Portsite is closer to Kivalina than any other community and because people from Kivalina harvest a large proportion of the plants and animals in the coastal region around Portsite.

People in other communities of Northwest Alaska also hunt or gather food in the general region around Portsite or share subsistence resources with those who do. People from Kotzebue, Noatak, and Point Hope, in particular, identified at least some connection with subsistence resources around Portsite. People in each community used the same subsistence resources as at Kivalina, but in different proportions related to availability of resources and cultural preferences.

Access to Subsistence Resources. None of the alternatives considered in detail would affect movement by people traveling to reach subsistence resources on land. During the open water season, people traveling by boat past Portsite might need to detour seaward about one-quarter to one-half mile to go past project features for both the Breakwater-Fuel Transfer and the Trestle-Channel alternatives. None of the alternatives considered in detail would affect travel on ice that was shorefast.

The Chukchi Sea in the Portsite area is ice-covered from late October though June. The ice pack is attached to shore (shorefast) for varying distances offshore during that period. During most of the ice season, and during most years, ice within a half-mile of the shoreline at Portsite is shorefast. Wind or current can sometimes break ice loose closer to shore and produce an actively moving zone within one-half mile of shore. When the ice pack is moving north or south along the coast in that zone, it may pile up against the existing DMT loading structures. This may cause open leads in the ice pack down current. Those leads may disappear in a short distance as the ice pack shifts, but in some conditions they may persist.

The Breakwater-Fuel Transfer Alternative would affect ice movement farther offshore, out to more than 1,400 feet from shore, and would produce bigger open leads in moving

ice than occur now. The Trestle-Channel Alternative would not have the solid mass of a breakwater, but could create leads in moving ice out to about 2,000 feet offshore. Those leads in the moving ice could adversely affect access from shore to the ice pack when the ice pack was moving and for a period after it stopped. Ice leads may close soon after they form or may persist for miles down-current, depending upon winds, temperature, currents, bottom contours, and other factors.

How far leads caused by structures at Portsite may persist cannot be predicted with available information, and data to make a useful estimate cannot be obtained. Leads formed by the Breakwater-Fuel Transfer and the Trestle-Channel alternatives could at times temporarily affect access across the Chukchi Sea ice pack and could cause short-term adverse effects to subsistence activities on the ice.

Terrestrial Plants and Animals. None of the alternatives considered in detail would cause more than minor, local effects to land plants or animals used in subsistence.

Fish. The principal fish harvested for subsistence in the Portsite area are Dolly Varden char, grayling, whitefish, burbot, and several species of Pacific salmon. Saffron cod and smelt are occasionally harvested, and sometimes large numbers of cod are caught with hook and line when they move into Kivalina Lagoon.

None of the alternatives considered in detail would harm or otherwise affect freshwater fish. Salmon, Dolly Varden, and other anadromous fish that migrate to and from the Wulik, Noatak, and other rivers of northwestern Alaska would not be affected by any of the alternatives considered in detail. None of the activities associated with construction or operation would prevent anadromous fish from leaving or returning to home streams, and none of the alternatives would affect habitat critical to those fish.

Saffron cod and other marine fish that may be harvested for subsistence by people fishing through the ice would be affected locally and temporarily in marine waters about 15 miles from Kivalina, the closest community. They could be displaced during summer construction activities, but those activities would stop long before winter when marine fish are harvested in local subsistence.

Marine Mammals. In the southeastern Chukchi Sea, bowhead whales and beluga whales from the Beaufort Sea stock are harvested for subsistence in the spring as they move northward through leads in the ice pack. Migrating belugas of the Chukchi Sea stock also are harvested at the trailing edge of the melting ice pack later in the spring or in early summer. Seals are harvested in open leads as the polar ice pack begins to open and continues as it recedes northward in the late spring. Ringed seals also are harvested at breathing holes in the ice. Walrus are harvested from open boats at the edges of the ice pack. Polar bears are taken occasionally on the ice or adjacent lands along the southeastern Chukchi Sea coast when the ice pack is present. Marine mammals are occasionally harvested from the open ocean well after the ice pack has receded, but this is a minor component of the marine mammal harvest in that region.

There is no indication that the existing DMT facilities at Portsite have affected broad regional patterns of subsistence harvest of any marine mammal. There is no indication that existing DMT facilities have caused more than occasional minor alterations in local distribution and abundance of seals, walrus, or polar bears or in the availability of those animals to hunters. Any local effects would be most apparent in harvests by hunters from Kivalina, the closest coastal community.

None of the alternatives considered in detail, including the tentatively recommended plan, would cause more than local minor effects to distribution or subsistence availability of walrus, polar bears, or seals.

Subsistence harvests of belugas and bowhead whales may be affected by many factors, including weather, ice conditions, marine conditions, broad changes in population movement, and localized changes of near-shore migration paths. Increased human activity in coastal waters also may cause local changes in migration and habitat use. As a result, the harvest of beluga and bowhead whales varies greatly from year to year throughout northwestern and northern Alaska and longer-term trends also may reflect many different influences.

*Existing effects on belugas*. In other marine waters of Alaska, and in other seas of the world, belugas have adapted to industrial and transportation noises after they have learned that those noises do not represent a direct threat (Huntington and Mymrin 1996). While data from the Beaufort Sea, Cook Inlet, and other locations indicates that the presence and operation of marine transportation facilities has not caused long-term avoidance by belugas, the Kivalina combined spring and summer beluga subsistence harvest declined immediately before the facilities were constructed and have remained below preconstruction levels in most years since. Reports by Kivalina hunters indicate that either belugas of both spring and summer stocks have not yet become acclimated to structures or activities at Portsite or that some other factor has reduced beluga harvest by hunters from Kivalina since construction began at Portsite in the late 1980's.

The Kivalina harvest data (table S-1) do not contradict views expressed by some hunters of the community about DMTS facility effects on beluga harvest, and by inference, on localized behavior and movements of belugas. The data are far from conclusive because there are too many other factors that could have affected beluga harvest in that period. Those factors may include: long term changes in ice conditions, beluga mass mortality reported in Siberian waters, and changes in beluga response to increased noise and activity. Table S-1 shows just how much variation there has been in beluga harvest by hunters from Kivalina from one year to the next.

**Table S-1.** Annual harvest of belugas by Kivalina hunters from 1959 through 2004, by stock source.

| Subsistence Year | Spring (Beaufort Sea) Stock | Mixed Stock | Summer (Eastern Chukchi Sea) Stock |
|---|---|---|---|
| 1958-1959 | | | 7* |
| 1959-1960 | | | 14* |
| ** | | | |
| 1964-1965 | | | 6* |
| 1965-1966 | | 12*** | |
| ** | | | |
| 1971-1972 | | 10*** | |
| ** | | | |
| 1982-1983 | | 27*** | |
| 1983-1984 | | 28*** | |
| ** | | | |
| 1986-1987 | ** | | 0 |
| 1987-1988 | 5 | | 1 |
| 1988-1989 | 0 | | 0 |
| 1989-1990 | 0 | | 1 |
| 1990-1991 | 0 | | 1 |
| 1991-1992 | 10 | | 0 |
| 1992-1993 | 3 | | 0 |
| 1993-1994 | 3 | | 0 |
| 1994-1995 | 3 | | 0 |
| 1995-1996 | 7 | | 0 |
| 1996-1997 | 0 | | 1 |
| 1997-1998 | 0 | | 0 |
| 1998-1999 | 11 | | 0 |
| 1999-2000 | 43 | | 1 |
| 2001-2004 | 6 | | 3 |

***** Kivalina hunters hunted only summer belugas up to 1966, when emphasis shifted to hunting spring belugas.
****** Data not available, or not recorded.
*** Although mixed stock, these were predominantly spring belugas.
**Note 1**: In the years prior to the 1987, the counts of beluga harvested were not separated by stock source.
**Sources**: Alaska Beluga Whale Committee 2001; Burch 1985; Patterson 1974; Saario and Kessel 1996.

Because we cannot develop data to determine the cause of beluga harvest declines by Kivalina hunters before and after construction at Portsite, we conclude that construction and operation of the existing facilities at Portsite may be related to reductions in the beluga harvest by Kivalina hunters.

*Impact Uncertainty. In accordance with Council on Environmental Quality guidance for evaluating high-risk, low-probability effects, this analysis will assume that there is a causal relationship between reductions in beluga harvest by Kivalina hunters and the construction and operation of existing DMTS facilities at Portsite. That relationship has not been tested by organized research, but is held by many marine mammal hunters of the area and is a useful assumption to examine potential high-risk, low-probability outcomes.*

There is at least a low probability that the existing Portsite facilities have been a factor in reduced beluga harvest by Kivalina hunters. That harvest decline may be culturally

important and may have significantly affected the people who used those belugas. This potential for impact is not apparent in harvests by hunters from other communities that hunt belugas in the southeastern Chukchi Sea.

Any effects from the existing facilities and operations at Portsite would be cumulative to other causes for subsistence harvest decline in the region. As stated previously, those factors may include: long term changes in ice conditions, beluga mass mortality in Siberian waters, and changes in beluga response to increased noise and activity.

*Existing effects on bowhead whales.* The majority of the bowhead population that uses the Chukchi Sea migrates through leads well offshore from the coastline, but a few bowheads occasionally use near-shore leads. Traditional knowledge explains that if several leads are available, bowhead will choose the lead farthest from shore. At Point Hope, 80 miles north of Portsite, recurring spring leads in the Arctic ice pack often bring bowheads close to the coast. This certainly contributes to the fact that Point Hope hunters are successful harvesters of bowheads in Alaska waters. Bowheads travel close to shore less often near Portsite. Kivalina hunters have harvested eight bowheads since they recommenced hunting them from Kivalina in 1966.

Kivalina hunters harvested five bowheads in the 19 years they were hunted before Portsite construction began and three bowheads in the 16 years since it was completed. The average harvest was slightly higher before DMTS construction at Portsite, with one bowhead taken about every 4 years (0.26/year) before construction and one about every 5 years (0.19/year) after, a difference of 0.07 bowhead whales per year, or about one bowhead whale every 14 years. The small difference in harvest success could have been caused by a number of factors not associated with DMTS at Portsite, and the differences are too small to strongly suggest any probable effect from existing DMTS facilities.

*Construction effects on beluga and bowhead whales*. Construction of the tentatively recommended plan or the Breakwater-Fuel Transfer Alternative would avoid times when bowhead whales and belugas are migrating northward through the southeastern Chukchi Sea. Construction sounds would travel farther than existing sounds of operation, but the main migration of both bowheads and belugas would be far to the north or west during noise and activity from summer and autumn. Belugas or bowheads migrating through or near Portsite after the first construction season also would be aware of alterations in the sea bottom and in marine structures. Those same changes to the sea bottom and the completed marine structures would be there for the remainder of the project life. This means that effects of construction and operation would be similar.

Other construction activities would have little apparent effect on subsistence harvest of belugas because the main beluga migration would be past Portsite during construction activities. Late migrants from the eastern Chukchi Sea stock of belugas occasionally move past Portsite later in the summer, when the ore concentrate is being loaded. Traditional knowledge tells us that these late migrants may move farther offshore to avoid the noise and activity, and therefore, may be less available for subsistence harvest by hunters from Kivalina. Beluga harvest data tell us that hunters from Kivalina harvest

an average of one beluga from the summer migrants about every 2 years. This suggests that on average, the 1-year construction period for the fuel transfer terminal and mooring system could lessen the chance for subsistence harvest of one of these summer belugas. The longer construction season for the tentatively recommended plan (the Trestle-Channel Alternative) could lessen the chance for subsistence harvest of two of these summer belugas.

*Impact Uncertainty. In accordance with Council on Environmental Quality guidance for evaluating high-risk low-probability effects, this analysis will assume that construction activities for the Breakwater-Fuel Transfer Alternative at Portsite would reduce the harvest of summer eastern Chukchi Sea belugas by one during the 2 years of construction and that the construction activities for the tentatively recommended plan would lessen the harvest by two. This loss would be in addition to any previous effect that might have resulted from operation of the existing facilities.*

*Project operation effects on beluga and bowhead whales.* Operation of the Breakwater-Fuel Transfer Alternative or the Trestle-Channel Alternative would be similar to the existing operation; however, the presence of the additional structures could affect harvest of belugas and bowhead whales by Kivalina hunters in some way that cannot be predicted with scientific knowledge and cannot be quantified by traditional ecological knowledge.

Information related to fuel spills, spill response capabilities, and the potential for large spills to marine waters to affect a wide range of marine-based resources is provided in Section 4.6.5. That information indicates that increasing fuel volumes transferred and the number of fuel transfer events at DMT could increase potential for marine fuel spills as fuel was transferred between vessels and storage facilities on land. Spill potential from lightering barges would be eliminated, however, and potential for fuel spills from tugs would be greatly reduced. Potential for fuel spills with the tentatively recommended plan is about the same as for existing operations at Portsite. There is a low potential for a spill large enough to impact subsistence activities for as much as 1 year following the spill. Belugas and other marine mammals would not be particularly susceptible to effects of an oil spill, however, because the spring-early summer marine mammal migration would have almost entirely passed Portsite before fuel transfer begins each year.

*Impact Uncertainty. In accordance with Council on Environmental Quality guidance for evaluating high-risk low-probability effects, this analysis will assume that operation of the Breakwater-Fuel Transfer Alternative at Portsite would reduce the combined spring and summer harvest of belugas by some undetermined amount during project operation. This loss would be in addition to any previous effect that might have resulted from operation of the existing facilities. From 1987 to 1999, Kivalina harvested an average of just under three belugas each year. In 2000, exceptional marine and ice conditions apparently trapped a large number of belugas near Kivalina and allowed them to strike more than 90 belugas and recover 43. If the exceptional 2000 harvest is not included, then Kivalina has harvested an average of a little less than three belugas per reporting year since construction began at Portsite. Harvest of some percentage of*

*those three belugas per year might be at risk to some undetermined degree for the life of the project if the presence of the Breakwater-Fuel Transfer Alternative or presence of the Trestle-Channel Alternative affected subsistence harvests. Belugas are sometimes seen close to the existing DMTS loading facilities at Portsite, so there apparently is at least some degree of acclimation to the existing facilities. This indicates there would likely be some degree of acclimation to additional facilities at Portsite and a continued, although possibly reduced, presence of belugas that might be harvested by hunters from Kivalina. Because the potential for harvest reduction cannot be determined with available data or data that can be reasonably obtained, this analysis uses the low-probability, high-impact assumption that the direct consequences of this action would be to eliminate harvest of beluga whales by hunters in the Kivalina area. This is not a forecast or prediction. Rather, this assumption is a tool for analyzing effects when the likelihood for those effects is unknown.*

If Kivalina hunters no longer harvested belugas near Kivalina, they would lose an average of 3 belugas each year. Belugas may weigh as much as 3,000 pounds, but average weight is considerably less. If harvested belugas weighed 2,000 pounds each, and 75 percent of the weight was usable as food, then Kivalina would lose 4,500 pounds of food in an average year. This equates to an average loss of about 12 pounds of food per person each year. As a "worst-case," this does not indicate a significant effect on caloric intake. People who eat beluga flesh, however, may get dietary benefits that go beyond mere caloric intake. Those benefits cannot be accounted for in any meaningful way by the preceding figures. The cultural benefits derived from taking and using belugas also cannot be quantified.

The foregoing high-risk low-probability impact evaluation indicates that the maximum impact of the Trestle-Channel Alternative or the Breakwater-Fuel Transfer Alternative on subsistence harvest of beluga whales would result in less than significant losses of caloric intake to the people of Kivalina and unquantifiable, but potentially important losses of other dietary and cultural benefits. Those non-caloric dietary and cultural impacts could, if beluga harvest was greatly reduced from present levels, constitute significant local dietary and cultural impacts.

There is no indication that beluga subsistence harvests by other communities of northwestern Alaska would be adversely affected if belugas avoid future navigation improvements at Portsite. Regionally, adverse effects from the hypothetical loss in harvest of a maximum of three belugas per year would appear to be less than significant to subsistence dietary and cultural needs.

None of the reasonably foreseeable futures actions identified in Section 4.12.5 would be likely to affect subsistence beluga harvests and would not add cumulatively to existing effects and potential future effects of this alternative.

Bowheads migrate north past Portsite in the spring as well-defined leads begin to appear in the Arctic ice pack. Construction would be timed to avoid loud noises or intensive activity on the Chukchi Sea during bowhead migration. Bowheads might know about

changes in the sea bottom and about new loading structures being constructed, but during construction, they would be in the Beaufort Sea, much too far from Portsite for sounds of construction to be detected by even the most sensitive instruments, and much too far away to see construction activities. More information about how far sounds can be detected is sections 3.4.8 and 4.8. Information about how marine mammals may react to noise is in Section 4.9.

Bowheads migrating past Portsite after construction began could cross the dredged material disposal area and the low mounds of silt, sand, and gravel there. They could also swim over the channel, which would be about 2 to 25 feet deeper than the surrounding bottom for as much as 3 miles offshore and next to the loading platform as much as 30 feet deeper than the surrounding bottom. Traditional ecological knowledge tells us that bowheads would detect these changes, while reports of bowhead behavior in the Beaufort Sea indicate that bowheads do not go any great distance to avoid underwater pipelines and other man-made structures. The North Slope Borough limits activities that require transportation through the Beaufort Sea during critical periods of bowhead movements, but careful development has continued in the Beaufort Sea for many years. That development, planned to avoid major bowhead movements, has had no apparent affect on subsistence harvest of bowheads by coastal communities along the Beaufort Sea.

*Impact Uncertainty. Operation of the Breakwater-Fuel Transfer or Trestle-Channel alternatives would lead to uncertainties in impact analysis of subsistence resources. Therefore, in accordance with Council on Environmental Quality guidance for evaluating high-risk low-probability effects, this analysis will assume that operation of the Trestle-Channel Alternative at Portsite would reduce the harvest of bowhead whales by some undetermined amount during project operation. This loss would be in addition to any previous effect that might have resulted from operation of the existing facilities. From 1987 to 1999, Kivalina harvested an average of one bowhead whale every 5 years. Some percentage of that harvest might be at risk to some undetermined degree for the life of the project if the presence of the trestle, channel, or disposal area affected bowhead migration behavior. Harvest of bowhead whales since DMTS facilities were constructed indicates that bowheads have at least partially acclimated to existing facilities or that ice conditions at least sometimes overcome any tendency by bowhead whales to avoid Portsite. This indicates there would likely be some degree of acclimation to additional facilities at Portsite and at least use of leads in the ice that would make bowhead whales accessible to Kivalina hunters during operation of the Trestle-Channel Alternative. This indicates a continued, although possibly reduced, presence of bowhead whales that might be harvested by hunters from Kivalina.*

If future project operations eliminated all future harvest of bowhead whales, that effect could result in significant losses of caloric intake to people in the community of Kivalina and unquantifiable, but potentially important losses of other dietary and cultural benefits. Those non-caloric dietary and cultural impacts could, if bowhead harvest was greatly reduced from present levels, constitute significant local dietary and cultural impacts.

There is no indication that bowhead subsistence harvests by other communities of northwestern Alaska would be adversely affected if bowheads avoided future navigation improvements at Portsite. Regionally, adverse effects from the hypothetical loss in harvest of a maximum of one bowhead per 5 years would appear to be less than significant to subsistence dietary and cultural needs of the region.

None of the reasonably foreseeable futures actions identified in Section 4.12.5 would be likely to affect subsistence bowhead harvests, and would not add cumulatively to existing effects or potential effects of navigation improvements at Portsite.

**Air Quality.** The No-Action and Third Barge alternatives would not affect existing air quality. The Breakwater-Fuel Transfer Alternative and the tentatively recommended plan (Trestle-Channel Alternative) would increase dust and diesel emissions at Portsite during construction in the summer and autumn, but would not affect air quality during the remainder of the year and would not affect air quality away from Portsite. Operation of the Trestle-Channel Alternative would require additional electrical generation at Portsite, which could affect diesel exhaust emissions. Additional effects would be minor, local, and limited to the loading season (July through October) when the additional generation would be required to power ore concentrate loading equipment. Construction and operation of the Trestle-Channel Alternative would meet applicable air quality standards.

**Oceanography.** The No-Action and Third Barge alternatives would not affect existing sea bottom contours, currents, or other oceanographic conditions.

Bathymetry and Currents. Structures, dredging, disposal, and materials placement for the Breakwater-Fuel Transfer Alternative and the tentatively recommended plan (Trestle-Channel Alternative) would cause local changes in bottom configuration and currents in the immediate project area. Those changes would not affect currents or bottom contours away from the project area and would not cause rip tides or other unsafe conditions associated with currents.

Ice. The Breakwater-Fuel Transfer Alternative and the tentatively recommended plan (Trestle-Channel Alternative) would not affect ice formation except in small areas adjacent to structures. Channels and dredged material disposal features would not affect ice or ice movement. Structures for both alternatives, including breakwater and pilings for a loading platform, would be most likely to affect sea ice during the fall when it is first forming and in the spring during breakup when large sheets of shorefast ice sometimes break loose and drift with the current. During winter the trestle pilings might stabilize shorefast ice in their immediate vicinity, but if shorefast ice was to break loose, the moving ice could strike trestle pilings, the breakwater, or other structures, which could form open leads on the down current side. Leads formed in new, thin ice in the fall would soon freeze closed. Leads formed in broken ice during spring breakup could close quickly or could remain open for extended distances, depending on the prevailing temperatures, wind, and currents.

Sediments and Water Quality. Existing DMTS loading operations at Portsite release ore concentrate into the marine environment, which may be reflected in higher levels of metal concentrations in surface sediments at the loader than in surrounding surface sediments. None of the alternatives considered in detail would increase contamination in bottom material at or near Portsite. The Trestle-Channel Alternative would decrease loss of ore concentrate at Portsite during loading and lessen potential for future contamination.

The Trestle-Channel Alternative would dredge 8.1 million $yd^3$ from the bottom to create a channel and place the material in an offshore disposal site. Some of that dredged material would remain in the water several hours before it settled to the bottom. Depending upon velocity of the currents, enough of that material might be present so that it could be visible several miles down-current from the disposal site. One reason for selecting a large disposal site oriented parallel to shore was so that material could be disposed of at the up-current end, which would keep most of the effects inside the disposal site.

Petroleum Spills. None of the alternatives considered in detail would affect potential for spills on land except at the DMT facilities at Portsite. Effects of spills on land would be limited to the industrial area at Portsite. Containment structures and available clean-up capability would prevent widespread effects from an on-land spill. The principal concern is that additional fuel transfer and storage at Portsite could affect potential for fuel to be spilled into the Chukchi Sea.

In 16 years of operation at Portsite, the largest single spill of petroleum products into marine waters was about 40 gallons of hydraulic fluid from a ship loader on the DMT loading platform. During the project life to date, with more than 200 million gallons of fuel offloaded to Portsite, the largest single spill of diesel (or similar jet fuel) into marine waters was 0.13 gallons (about 1 pint). This record is due in part to the relative simplicity of the existing fuel transfer system and to exceptional operating standards that require fuel lines to be inspected at least weekly throughout the operating season and hourly during fuel transfer operations. Operation procedures and operator training also apparently have contributed to this record.

The likely maximum, probable, and average magnitude of potential for petroleum spills are estimated using U.S. Coast Guard methodology for determining spill response capability requirements. Those estimates may not be good predictors of actual spills, but are useful as tools for understanding potential. Worst-Case Discharge (WCD) volumes are used to determine minimum response capabilities for spills to water. Maximum Most Probable Discharge (MMPD) and Average Most Probable Discharge (AMPD) volumes are calculated to estimate potential spill volumes likely to occur at marine-based facilities. Those figures for the existing facilities and for the three action alternatives considered in detail are presented in table S-2.

**Table S-2.** Fuel Spill Potential for Marine Waters at Portsite (all units are gallons).

| Alternative | WCD | MMPD | AMPD |
|---|---|---|---|
| Existing Facilities | 40,000 | 4,000 | 400 |
| No Action Alternative | 40,000 | 4,000 | 400 |
| Third Barge Alternative | 40,000 | 4,000 | 400 |
| Breakwater- Fuel Transfer Alternative | 200,000 | 20,000 | 2,000 |
| Trestle-Channel Alternative | 46,000 | 4,600 | 460 |

There is less guidance for estimating potential for fuel spills over the life of a project. Appendix 10 of the draft EIS uses an approach based on work by a number of others for a variety of fuel storage and transfer facilities. That evaluation notes that the Trestle-Channel and Breakwater-Fuel Transfer alternatives would handle substantially more fuel than the existing facilities. It also recognizes that fuel in the self-unloading barges and tugs in the existing operations pose an added risk of spills that would be largely eliminated if ore concentrate could be loaded directly into ships.

There is a low risk that a WCD-sized spill into marine waters would occur during the first 50 years of any of the alternatives considered in detail, including the alternative of no change to existing operations. There is a reasonable likelihood that an MMPD-sized fuel spill would occur in marine waters during the first 50 years of any of the alternatives considered in detail, including the No-Action Alternative of no change to existing operations. The analysis in appendix 10 indicates that the Breakwater-Fuel Transfer Alternative would present a substantially higher risk of a large fuel spill than any of the other alternatives. It also estimates that potential for a large fuel spill from the Trestle-Channel Alternative would be about the same as from existing operations.

If there was a large petroleum spill into marine waters at Portsite, it would probably be from fuel transfer operations or from damage to one of the lightering barges used to transfer ore concentrate from Portsite to ships moored offshore. Those barges carry up to about 75,000 gallons of diesel. All of the potential for large petroleum spills is associated with diesel or jet A fuel, which is very similar to diesel. There is very little risk that existing operations would spill fuel into marine waters except during the active shipping season, usually between July and October.

Existing DMT cleanup plans and equipment are designed to handle fuel spills up to 170,000 gallons into marine waters. An MMPD diesel fuel spill of 4,000 gallons could be contained and cleaned up in a few days during reasonably good weather conditions. Any residue would quickly evaporate and disperse. A spill during or just before a storm would not be cleaned up as efficiently. A low-probability, high-risk circumstance would be an MMPD 4,000-gallon spill in a wave environment that would prevent cleanup. High waves would bring the spilled fuel onto the beach near Portsite. That volume of fuel, if it all went onto the beach, would be enough to oil 15 acres of beach 0.01 inch deep. The lighter components of diesel fuel tend to evaporate rapidly, and about 40 to 65 percent of spilled diesel typically evaporates in a few days. In the water, most of the remaining diesel disperses rapidly in a high-wave environment and would rapidly disperse to well below toxic levels. Residual petroleum on the beach would affect the very sparse

intertidal marine beach communities and could cause oiling of birds that use the beach. Marine mammals do not commonly use beaches near Portsite, and this volume of fuel would be toxic to marine organisms only in the immediate vicinity of the spill. Residual levels would be too low to affect marine mammals in the next migration following any open-water spill event.

**Freshwater Resources.** None of the alternatives considered in detail would cause more than minor, local effects to groundwater or freshwater systems. None of the alternatives would be constructed in a designated floodplain hazard area, although all the alternatives would be in areas that could be periodically inundated by storm surges, which could reach 12 feet above sea level. All features in storm surge prone areas are engineered to survive surges of that magnitude. None of the alternative would incorporate features that would affect storm surge runoff or other hydraulic characteristics.

Much of the Northwest Arctic Borough, including the area around Portsite, is wetlands. The tentatively recommended plan would fill or otherwise modify 2.5 acres of wetlands, predominantly wet tundra and moist tundra. The Breakwater-Fuel Transfer Alternative would fill or modify about 1 acre of similar wetland.

**Noise.** The effects of sounds on marine mammals, fish, and other organisms was one of the most frequently expressed concerns during scoping for this study. The people of the Northwest Arctic Borough and the North Slope Borough to the north were especially concerned about noise. Many of those people hunt and fish for most or at least a substantial part of their food and are well aware of how quickly seals, whales, and terrestrial animals respond to any careless sound during a stalk, and how fish may flee from sound transmitted through the water.

Existing facilities and operations at DMT produce various kinds of noise. Largest noise sources are the loaders, the tugs moving ore concentrate offshore to bulk carrier ships, and the bulk carriers themselves. Because the bulk carriers moor 3 to 5 miles offshore, tugs used in ore concentrate transfer and the ships themselves produce noise that is heard farther from shore than any other source. Sound measurements indicate that tug sounds would be detectable 10.5 miles offshore from Portsite, and sounds from departing ships could be heard to about 20 miles offshore. Other sounds from DMT loader and onshore facilities typically cannot be detected as far offshore.

Construction would add noise to the environment around Portsite during the open water season, but would not greatly change the distance noise was heard both in the water and in the air. Transporting dredged material to a disposal site, however, would increase the distance noise could be heard offshore. Using the disposal site identified in the tentatively recommend plan would increase the distance sounds can be detected by instruments by about 2 to 3 miles.

The tentatively recommended plan would decrease noise produced and the distance noise was heard during operation in the open-water season. It would produce about the same

amount of noise as existing facilities when ice was present, but it could produce more noise when the ice pack was actively moving.

**Biological Resources**

Vegetation and Algae. None of the alternatives considered in detail would have more than a minor, local effect on vegetation. The suspended bottom material at the disposal site for the tentatively recommended plan would cause short-term local reductions in primary productivity of plankton. There are no kelps or attached algae in the Chukchi Sea near Portsite.

Marine Invertebrates. The most common marine invertebrates near Portsite are sea stars, small polychaete worms, and small clams. Several species of crabs and shrimp were identified as potentially important for commercial or subsistence users or important to marine mammals that are, in turn, important to subsistence users. The most important of those crustaceans are king, helmet, and lyre crabs and shrimp species of the family Crangonidae. Shrimps and crabs are present during the late winter and spring as marine mammals are migrating northward past Portsite and are known to be important food for bearded seals. King crabs and lyre crabs were rarely collected in the summer at Portsite and are known to move into deeper, saltier water in the summer. Summer collections of shrimp indicated that part of that population also moves farther offshore after the ice goes out.

Collection data from the project area and life history information for the principal species indicate that dredging for the tentatively recommended plan would not cause more than local and minor effects to crab and shrimp populations, but could disrupt bottom habitat used by shrimp and crab. There is no evidence that this degree of disturbance would affect local invertebrates after the open water dredging season, but numbers might not be as high in the dredged and disposal sites during the 3 years of dredging.

Several sites were evaluated for disposal of dredged material. Collection data from the region and from those sites indicate that marine invertebrate communities are not particularly diverse or rich in any of those sites and are generally similar among the potential disposal sites.

Fish. None of the alternatives considered in detail would affect freshwater fish or spawning habitat used by anadromous fish.

Continuing existing operations at Portsite (the No-Action Alternative) and Third Barge Alternative would not affect marine or anadromous fish. Noise, activity, minor habitat modification, and potential low levels of contamination beneath the loader are similar to conditions common to developed marine sites. There is no evidence that this level of effect alters fish populations, viability, or regional distribution. Existing operations have not spilled fuel into marine waters in quantities that would affect fish. If a fuel was spilled at the 4,000-gallon fuel spill calculated as the Maximum Most Probable Discharge

(MMPD), it could cause minor, local toxic effects to fish. Spills of this magnitude in the open ocean, however, have not been reported to cause fish kills (Appendix 10).

The Breakwater-Fuel Transfer Alternative and the tentatively recommended plan would cause additional noise, activity, habitat modification, and turbidity in marine waters. Marine and anadromous fish may avoid construction noise and activity and sediment plumes produced by dredging and disposal of dredged material, but effects would be confined to construction areas and the waters immediately down current. Regional fish movement and distribution, including out-migration and return of Dolly Varden and other anadromous fish to home streams, would not be affected.

Habitat alteration could cause redistribution of fish that use the areas proposed for dredging and disposal. There would be little effect on saffron cod and other species that prefer near-shore habitat. Effects would be minor and temporary to fish that range over broad areas, including salmon, other anadromous fish, and herring. Others, including soles and pricklebacks are less mobile and would be expected to disperse into the surrounding habitat. Fish are able to swim away from operating dredging operations and from dredged material being disposed of . Continued exposure to high sediment loads can injure fish, but they have been shown to move away from unusually high levels of suspended material.

Several sites were evaluated for disposal of dredged material. Collection data from the region and from those sites indicate that marine fish populations are not particularly abundant and are generally similar among the potential disposal sites.

Marine Mammals. Two concerns related to development at Portsite expressed most frequently during scoping for this study were that development at Portsite would adversely affect marine mammals and that development would affect subsistence harvest of marine mammals and other animals important to subsistence. This section addresses the specific concerns about marine mammals identified during scoping, review of statements made by knowledgeable people of the northwestern and northern coasts of Alaska and the western Chukchi Sea, and review of the scientific literature.

Much of the traditional knowledge about marine mammals and a considerable part of the scientific data were acquired during subsistence hunting and from analysis of subsistence-harvested marine mammals. The consequences to subsistence that would be caused by navigation improvement alternatives at Portsite are discussed in section 4.3 of the main draft EIS and earlier in this summary. Effects to the marine mammals themselves, rather than harvest and use of those mammals, is discussed in this section.

*Beluga whales*. Two stocks of beluga whales migrate past the Portsite area during their northward spring and summer migrations. The Beaufort Sea stock moves northward through leads in the Chukchi Sea ice pack, generally in April and May and summers in the Beaufort Sea. This stock is estimated to have a population of at least 32,453. The Chukchi Sea stock moves northward through the Chukchi Sea at the southern edge of the receding ice pack, typically in June and sometimes into early July. The main migration

of both stocks usually is well offshore from Portsite, but individuals and smaller groups may come much closer to shore. The main autumn migrations to wintering grounds are through the western Chukchi Sea, far from Portsite.

Neither of the main migrations would be affected directly by noise and activity associated with construction or operation of existing or future facilities at Portsite because both main migrations are well past Portsite when the DMT is operating and when construction would be active.

Belugas at least occasionally sense the presence of existing DMT facilities at Portsite and may move farther offshore to avoid them. There is insufficient data to determine that they move away from those facilities, but also insufficient data to determine that they do not. There is a body of traditional ecological knowledge that indicates this is the case. If belugas avoid the existing DMT facilities at Portsite, this could at least in some years affect the ability of people hunting nearby to harvest them. Avoidance, however, would not cause any appreciable adverse effect to the belugas themselves. Belugas often are held up temporarily by ice conditions, and following available leads must often cause them to move closer or farther from shore. There is no indication that these relatively minor local diversions cause more than minor, temporary adverse effects to beluga whales.

If the Breakwater-Fuel Transfer Alternative or the Trestle-Channel Alternative (tentatively recommended plan) is constructed, belugas may sense the presence of either and avoid it. If so, the they might move farther offshore as they pass Portsite. There is no indication that existing facilities at Portsite have caused more than local effects to beluga movements, and there is no indication that new navigation facilities at Portsite would cause more than minor local effects on beluga movement.

*Bowhead whales*. The western Arctic stock of bowhead whales is the only remaining bowhead stock in the Alaskan Arctic Ocean. This stock migrates from the Bering Sea through the central and eastern Chukchi sea to the Beaufort Sea each spring and returns to the Bering Sea each autumn. Bowheads may appear in the Chukchi Sea as early as March and may be present as late as June, but the migration peak is generally in April and May. Autumn migration southward is through the central and western Chukchi Sea, far west of Portsite and its influences.

The great majority of the bowhead population migrates northward through leads in broken pack ice well offshore of the Portsite, but individuals or small numbers may occasionally migrate through leads that form along the shear zone between drifting pack ice and the anchored shore-fast ice. Those leads typically form intermittently 3 or more miles offshore from Portsite, but sometimes are closer to shore.

Traditional knowledge tells us that bowhead movements may be affected by new structures or other changes in the marine environment. The presence of the DMT structures at Portsite may affect movement and distribution of bowhead whales in the immediate Portsite area, but there is no indication of more than local avoidance. This is

consistent with observations in the Beaufort Sea and elsewhere, which do not indicate that the presence of structures or changes to the sea bottom have caused more than localized changes in bowhead movement or behavior. Additional changes at Portsite from channel dredging, disposal of dredged material, or new marine facilities for the tentatively recommended plan or one of the other alternatives could affect a broader area of the Chukchi Sea, but those changes all would be close to Portsite. Those changes could affect bowhead movement and distribution close to Portsite, but there is no indication that they would cause broader effects on movement or distribution.

Traditional ecological knowledge also tells us that bowheads have acute hearing ability and avoid unusual sounds. Observations of bowheads in the Beaufort Sea have shown avoidance of strong sounds from construction and other activities. Existing loading and transportation activities at Portsite produce strong sounds from about early July through late October. Those sounds could cause bowheads to avoid Portsite during that July through October period if any were present in the southeastern Chukchi Sea during that time. The main bowhead migration, however, is far north of Portsite before DMT loading operations begin and before in-water construction would begin each year. Bowhead whales far to the north may be able to somehow sense the presence of activities and structures at Portsite, but they appear to tolerate similar, but much closer, activities in the Beaufort Sea.

Construction of the tentatively recommended plan (Trestle-Channel Alternative) or the Breakwater-Fuel Transfer Alternative would produce noise of similar strength, but from more sources. Some sounds from dredged material disposal also would be generated farther offshore and might increase by several miles the distance those sounds might travel offshore during the 3-year construction season. It would not produce stronger sounds than are generated by existing transportation in the southeastern Chukchi Sea. Construction would be scheduled to conclude each spring before bowhead whales began their migration through the southeastern Chukchi Sea and to recommence only after the ice pack and main bowhead migration was complete in the southeastern Chukchi Sea. Effects from noise of construction would be similar those of existing operations.

The channel and turning basin would be dredged and the trestle and loading platform would be constructed at times when bowheads were far north of the Portsite area in the Beaufort Sea. Bowheads might sense activities beyond the range that they can be detected by humans or man-made instruments and react accordingly. No other direct effects of construction would be expected.

The completed channel would extend to about 3.5 miles offshore and could be sensed by the occasional bowheads passing by Portsite that close to shore. The channel 3 miles offshore would be less than 10 feet deep, with gently sloping sides. The offshore end of the channel, while detectable, would not be a major change where the bottom already is more than 45 feet deep.

The disposed dredged material would raise the bottom in the disposal area by a few feet in some areas, which might be sensed by bowheads migrating north. Suspended solids

and turbidity from each construction season would have settled during the winter, long before the spring migration that occasionally brings a few bowheads closer to Portsite, and would have no affect on water clarity or quality during the migration period. Changes from channel dredging would not present a substantial obstacle to bowhead passage, although their perception of environmental change could lead bowheads to react and move farther offshore. If bowhead movement patterns were altered by environmental changes, then they would move offshore into waters closer to the path followed by the main body of migrating bowheads. If ice conditions did not allow a bowhead to readily shift its course farther offshore, then it might be held up in its migration north until a pathway opened. Minor delays are frequent in the northward migration of bowheads and are unlikely to cause more than minor, local, short-term adverse effects to bowheads.

Periodic maintenance dredging would have the same potential for effect as construction dredging, although for a shorter period and with smaller potential for change in area and bathymetry.

Operation of the Trestle-Channel Alternative would greatly reduce tug activity in the Chukchi Sea and would produce less noise than existing operations. This would have little or no beneficial effect, however, because bowheads are far from Portsite during the loading season when the tugs operate.

The existing facilities and operations at Portsite have no apparent effect on the invertebrates that bowhead eat or on any of the other important aspects of bowhead life history. Construction of the tentatively recommended plan would temporarily reduce abundance of invertebrates along the channel alignment and in the dredged material disposal area. Altogether, about 6,500 acres would be affected by dredging and disposal of dredged material. Those areas are not regularly used by feeding bowhead, but might be encountered by northward-migrating bowhead whales well east of the main migration route. Those whales might find less food at the disposal site than elsewhere during the 3 construction years and for a year or more afterward. This might affect a maximum of about 4 miles of the thousands of miles the bowheads travel each year and could cause them to move a mile or two west or east to find better forage. This would be a minor, local effect to bowhead whales.

Mitigation measures would be taken to minimize effects of the Trestle-Channel Alternative to all bowhead whales and particularly to avoid effects to the main body of whales migrating north in each spring. These actions are:

- Construction, operation, and maintenance dredging and other construction for this alternative would not begin until after the main bowhead migration was well past Portsite. Any winter construction would cease before the first bowheads entered the Chukchi Sea. These restrictions are similar to and consistent with restrictions on activity that are used to protect these same whales in the Beaufort Sea.

- The dredged channel would be a wide and relatively shallow bottom feature that would develop smooth, gently sloping sides in the years immediately after construction so it would be similar to the natural, gently sloping bottom in this region of the Chukchi Sea.
- The dredged material disposal area would be kept as close to shore as possible to stay away from the main bowhead migration route.
- Dredged material would be spread thinly over the disposal area so the bottom would not have large mounds or other features very different from the natural bottom.
- The sea bottom near the existing loader would not be dredged, so the minor surface accumulation of ore concentrate there would not be transported offshore to the disposal site.

Those mitigation measures would help ensure that the Trestle-Channel Alternative would not affect bowhead whales in the main migration route. Even with the mitigation measures, we cannot be sure that the bowheads that occasionally travel east of the main migration would not sense the Trestle-Channel Alternative. Those whales might sometimes come close enough to the project so that even without the noise of construction and operation they might sense the project and avoid it. This could cause them to move farther offshore as they passed Portsite. Avoiding Portsite could cause them to swim farther in their migration or to be held up to wait for leads to open in the ice farther offshore. Both potential effects could make the bowheads less available to local hunters, but would not cause more than minor short-term adverse effects to the bowheads themselves.

Experience with bowheads and in-water development in the Beaufort Sea indicates that bowheads may move away from noise and activity, but there is no indication that they have made major changes in migration routes or other movements. This strongly suggests that if bowheads avoided the Trestle-Channel Alternative, they might move farther offshore toward the main migration route and then continue on the northward migration.

Existing and reasonably foreseeable development has not caused, and is not likely to cause, more than minor effects to bowhead whales in the Chukchi Sea. Effects from existing conditions at Portsite, effects of the Trestle-Channel Alternative if it was constructed, and reasonably foreseeable actions in the region would cause no more than minor biological effects to bowhead whales in the Chukchi Sea. Potential effects to subsistence hunting of bowhead whales are addressed in section 4.3.7 of the draft EIS.

*Gray whales***.** Gray whales of the eastern Pacific stock migrate each spring along the western coast of North America from the central Baja Peninsula, Mexico, to feeding grounds in the Bering and Chukchi seas (section 3.5.4.1). The principal feeding areas for gray whales in the eastern Chukchi Sea are in the resource-rich Bering Strait area, and a relatively small offshore area near Point Lay and Wainwright. Gray whales typically do

not feed near the Portsite area, but sometimes pass through the general Portsite area during summer as they migrate to feeding grounds in the Point Lay/Wainwright area.

Gray whales probably are more likely than any other whale species to be struck by vessels near Portsite because they migrate through the eastern Chukchi Sea during the shipping season, but no collisions or vessel strikes have been reported. Gray whales migrate great distance through and close to busy industrial areas. They apparently are well acclimated to man-made sounds and activity. There are no data that indicate existing structures or operations at Portsite have any discernable effect on gray whales, although whales may avoid strong sounds and other activity. There also is no traditional knowledge or local observations that indicate any direct impact of existing operations to gray whales.

Construction of the Breakwater-Fuel Transfer or Trestle-Channel alternatives would produce sounds, activities, and sediments that sometimes could displace gray whales from the construction areas during their summer migration north. Displacement would be temporary (three construction seasons) and would affect a part of the Chukchi Sea that is not critical to gray whale biological requirements.

Trestle and loader construction noise and activity could temporarily displace gray whales from the Portsite area for the 3-year construction period. The sounds of construction probably would be heard at about the same distance that gray whales are able to sense on-going operations at Portsite. Operation of the Trestle-Channel Alternative would produce less noise and could have less potential to affect gray whales than existing operations. Direct and cumulative effects would be minor and local.

Harbor porpoise range or migrate past Portsite after the ice pack recedes in late spring and summer. They also may range through the area during the entire open water season. Harbor porpoise response to noise and activity has not been documented in the Arctic Ocean, but they are likely to avoid strong sounds. The existing operations at Portsite have had no apparent effect on this small cetacean. There are no data or traditional information sources indicating that effects of new or expanded navigation facilities at Portsite would directly or cumulatively affect harbor porpoises.

*Ringed seal*. Ringed seals are the smallest of the Arctic seals. They migrate with the advancing and retreating ice and may inhabit near-shore areas including shorefast ice during winter. Large numbers of ringed seals typically are in the Portsite area during the winter. They are common within about 4,000 feet of the existing bargeloader where they often are seen basking on the ice in spring.

Existing operations at Portsite have had no apparent effect on ringed seal presence distribution, or life cycle requirements. Aerial counts and observations from the existing loader detected no differences between distribution of ringed seals on the ice near Portsite and ringed seal numbers and distribution on the ice in other comparable areas.
Normal operating noises during winter when ringed seals are present consist of low-level background generator noise, vehicles, and early spring maintenance on the conveyor and

barge loader. From traditional knowledge, we know that ringed seals are likely to avoid noise and activity from hunters.

At Portsite, where seals are not hunted within about 1 mile of the bargeloader, the on-going noise of winter and spring operations did not keep ringed seals from basking within 900 yards of the loader, so where ringed seals are not hunted and where people do not approach too closely, they may become accustomed to at least some noise and activity. They also were observed to be only temporally disturbed by even the very loud sounds from blasting conducted 2 to 3 miles away, indicating that even very strong sounds from Portsite do not cause major changes in ringed seal behavior or distribution in the waters farther offshore from Portsite. Ringed seal, however, probably avoid or less frequently use the habitat within a few hundred yards of the existing loader. The diminished use of habitat could cause minor adverse effects to ringed seals in that small area of habitat.

Ringed seals mostly eat small Arctic cod and other fish that sometimes gather in large schools under the ice. Existing DMT structures and loading activities at Portsite do not appear to have affected food resources of ringed seals at Portsite or to have affected distribution more than locally.

Ringed seals leave the Portsite area during and shortly after breakup and are not present when the tugs, barges, and ships are loading ore concentrate during the summer, so construction for the Breakwater-Fuel Transfer Alternative or the Trestle-Channel Alternative would not affect them. Ringed seals might avoid the immediate area of the trestle and loading platform because of its physical presence, but based on observations near the existing bargeloader and the experience of researchers in the Beaufort Sea (Mouton et al. 2002, 2003, 2005), the distance of avoidance would not be more than about 1 mile. Construction noise might increase the distance that ringed seals avoid DMT structures at Portsite for part of one winter during construction of near-shore trestle supports in February and March. This noise would be temporary and might affect the local distribution of ringed seals for about 2 months prior to the main ringed seal migration.

Some hunters were concerned that a dredged channel at Portsite might disrupt the natural ecology of the area and affect the ability of ringed seals to find food. Food for ringed seals could be reduced in a small area close to Portsite, but would not be affected in the great majority of their range. The fish they eat are highly mobile and are known to be closely associated with ice rather than a specific type of bottom. The local effects of new construction on the sea bottom would be unlikely to have much effect on distribution or abundance of fish associated with the ice pack.

There is no indication that existing or reasonably foreseeable actions, including construction and operation of the Trestle-Channel Alternative would cause more than minor local adverse effects to ringed seals in the southeastern Chukchi Sea. Reasonably foreseeable actions would not cumulatively add to effects of the Trestle-Channel Alternative to cause more than minor local effects to ringed seals.

*Bearded seal*. Most bearded seals in the Bering and Chukchi seas migrate north and south with the receding and advancing ice front. Traditional knowledge and experience of hunters in the southeastern Chukchi Sea also relate that juveniles sometimes stay behind during the open water season and occasionally are seen near the mouths of rivers and streams.

There is little indication that the existing DMT facilities or their operation are more than locally affecting bearded seals in the Portsite area. Observed bearded seal densities and distribution on the southeastern Chukchi Sea ice during spring migration were about the same off Portsite as in similar water depths along the coast to the north and south, and as many as 500 have been counted in one afternoon from the DMT loader at Portsite. Late in the Chukchi Sea ice breakup, bearded seals carried toward Portsite on ice floes may move farther offshore to avoid structures and activity. This would represent a minor shift in distribution during a short period of the late spring migration.

The distance bearded seals stayed offshore was the same at Portsite as it was to the north or south when data were collected in the spring, so they apparently were not being displaced farther offshore by existing structures at Portsite. This suggests that the presence of additional near-shore structures at Portsite would not greatly displace bearded seals. If the trestle from the Trestle-Channel Alternative extended an additional 1,050 feet offshore, then it might be expected to displace bearded seals a maximum of 1,050 feet farther offshore or offshore to the next lead in the ice. Altogether, that would push bearded seals out of as much as 50 acres of otherwise available habitat. This would be a negligible biological effect, considering the area of available similar habitat in the southeastern Chukchi Sea.

Some seal hunters expressed concern that a dredged channel and disposal area offshore of Portsite might affect the ability of bearded seals to forage, resulting in fewer seals in the area. Bearded seals feed mostly on benthic invertebrates including crabs and shrimp. Dredging and disposal would disrupt about 10 square miles of benthic habitat, much of which is used by bearded seals in the southeastern Chukchi Sea. Recolonization of dredged and disposal areas can be rapid in temperate waters, but new colonizers are unlikely to represent the same assemblage as the original inhabitants. Recolonization typically is slower in Arctic waters. The dredged and disposal areas may largely recolonize in one year, but maintenance dredging 5 years after initial dredging would disrupt the channel area and part of the disposal area again. Maintenance dredging schedules after initial maintenance dredging would allow the area to recolonize between dredging events.

Bearded seals would lose partial value of up to 9.5 square miles of potential food producing habitat during each dredging event and for one or more years after each dredging event. If there was less food in the dredged and disposal areas, then bearded seals might move into adjacent habitat. This could put additional pressure on resources in those areas, increase competition, and reduce food intake by bearded seals in this segment of their migration. Migrating seals are affected by comparable displacement from natural events associated with ice movement, opening and closing of leads, and

other natural events as the ice recedes each spring. Bearded seals in their northward migration are spread over thousands of square miles and are able to move great distances among the ice floes and leads. The small percentage of habitat affected and the mobility of bearded seals during this period indicates that effects on food availability would be localized and of minor biological importance. Reasonably foreseeable future actions would not add significantly to potential effects of the Breakwater-Fuel Transfer or Trestle-Channel Alternative to bearded seals.

*Pacific walrus*. Pacific walrus normally migrate north along the receding edge of the pack ice through the central Chukchi Sea in June. Traditional knowledge tells of walrus feeding near Portsite, but Portsite is far off the usual migration route of the species and observations of feeding in the Portsite area are rare. The main body of walrus migration is well past Portsite before shipping begins at Portsite. There is no indication in traditional knowledge or in the scientific literature that existing facilities or operations at Portsite have adversely affected walrus or their distribution.

None of the alternative considered in detail would have more than minor local effects on walrus because walrus typically do not migrate through the Portsite area, and therefore, the habitat affected would not typically be used by walrus. Even if walrus did pass to Portsite, the only effect would be short-term avoidance of an insignificantly small area of their habitat.

*Polar bear*. Polar bears are migratory and are generally found along the margins of polar ice where there are concentrations of ringed and other seals. Most polar bears of the Chukchi Sea population migrate south in winter with the advancing ice. The pregnant females move to inland or offshore denning areas, but most males, juveniles, and non-birthing females typically follow ringed seal concentrations south, with many bears moving south along the coastline. Coastal waters of the southeastern Chukchi Sea are not used by a large number of polar bears and there are no identified sites of particular importance to them. They are seen occasionally by hunters of the region and sometimes are seen close to communities or Portsite.

Polar bears in the Chukchi Sea tend to follow concentrations of ringed seals and migrate northward along with the seals with the receding ice pack each spring and summer. The occasional polar bears that range into the Portsite area typically are gone before operations begin at Portsite, so the existing DMT operations at Portsite have not had any observable effects on polar bears.

Construction of the Breakwater-Fuel Transfer or the Trestle-Channel alternatives could temporarily displace polar bears from the Portsite area, or the activity could attract them. Either effect would be minor because polar bears are sparsely distributed near the southeastern Chukchi Sea coastline. If new structures at Portsite from the Breakwater-Fuel Transfer or the Trestle-Channel Alternative caused open leads to form, those leads could attract ringed seals and the polar bears that feed upon them. Potential for effects would be minor because:

- Polar bears are uncommon in the Portsite area, while ringed seals are both abundant and widely distributed. Observers on the existing loader in 2000 counted as many as 9,000 ringed seals in a single day.
- Leads caused by islands only form when ice is moving. Ice close to shore at Portsite where structures would be built is land-fast most of the time until active breakup begins.
- Large persistent leads (including the Point Hope Polynya) often are present in the Portsite area and offer other leads to attract both seals and polar bears.

Terrestrial Mammals. Caribou and moose seasonally occupy tundra habitat near Portsite and are seasonally common in the hills and on the tundra inland from the Portsite. Moose may be in the Portsite area year round. Caribou are more migratory and their abundance varies from season to season and year to year.

Other larger terrestrial mammals in the Portsite area include Arctic fox during winter, and red fox, musk oxen year round, grizzly bears during summer, and Dall sheep in the mountains of the region. Arctic fox range across the shorefast ice while red fox live and prosper among the Portsite buildings. Musk oxen range among the hills behind Portsite and do not come into contact with Portsite. Grizzly bears hibernate in the hills behind Portsite during winter and sometimes patrol the beaches north and south of Portsite where they feed on marine mammal carrion during summer. A variety of small mammals including Arctic hares, ground squirrels, lemmings, voles, and weasels live on the tundra around Portsite.

None of the alternatives considered in detail would affect terrestrial mammals or their habitat outside of a few acres in the developed Portsite area.

Birds. Portsite is on a coastal migration route for many species of birds including waterfowl, seabirds, and terrestrial birds. During the spring migration, thousands of ducks, geese, loons, and other water birds typically migrate north along the coast and sometimes fly very low along the beach and over near-shore ice.

According to traditional knowledge, many ducks and geese in the spring migrate along the coast when the wind is strong from the north and migrate more inland when winds are calm or are more southerly. Sea ducks and sea birds, including eiders and murres (crowbills), generally migrate along offshore leads and mostly far from land. Some species of sea ducks, including oldsquaw and black scoter, commonly spend the summer on lagoons along the coast of Northwest Alaska including the Portsite area.

The existing facilities have reduced the value of a relatively small habitat area near Portsite. Birds, including migratory waterfowl may fly into the existing loader or other structures and wires at Portsite, but no bird-strike mortality was observed by biologists at the site during studies for this draft EIS, and none have been reported. Passing birds, including waterfowl, are seen to fly over or around existing facilities, as they may also

sometimes avoid humans and other structures in their environment. There is no indication that Portsite and operations there have caused more than minor, localized effects to birds or their habitat or that other development in the sparsely populated region has cumulatively caused significant effects to migratory waterfowl or other birds of the region.

A trestle and loader 1,050 feet farther seaward than the existing loader might increase the distance some waterfowl fly around or over the trestle. Daylight is present almost around the clock during the spring migration, and the trestle would be fully visible to migrating waterfowl, except on foggy days. Birds, however, would be more likely to strike the trestle at least occasionally.

## Special Status Resources

**Threatened and Endangered Species.** Three species of special Federal status are found in and near the southeastern Chukchi Sea and might be at least seasonally present in the general Portsite area. Those species are two threatened sea ducks (Steller's and spectacled eiders) and the endangered bowhead whale.

Steller's and spectacled eiders migrate north through the eastern Chukchi Sea to nesting habitat on Arctic tundra. They typically migrate north by flying low along offshore leads, but they can be blown inshore during extended storms and may fly north along the coastal beaches. Steller's eiders do not typically use airspace near Portsite except under those conditions. Portsite and associated shipping lanes are not near any area designated as critical habitat for Steller's eiders. According to traditional knowledge, Steller's eiders are seldom seen in the Portsite area, but a few small flocks were seen during the wildlife surveys at Portsite in 2000. Steller's eiders may have historically nested on the coast of northwestern Alaska, but none are known to nest near Portsite and no nests were identified during surveys near Portsite or Kivalina.

Spectacled eiders also migrate north across the Chukchi Sea along offshore leads. According to biologists who tag and track spectacled eiders, Portsite is far from their migration route and they might only rarely be seen in the Portsite area. This is supported by local traditional knowledge. The closest designated critical habitat for spectacled eiders to Portsite is the Ledyard Bay molting area near Cape Lisburne, almost 100 miles from Portsite. Existing facilities at Portsite and associated mining and transportation facilities have apparently not affected Steller's or spectacled eiders or their habitats.

The tentatively recommended plan was evaluated for potential to affect Steller's and spectacled eiders. The trestle and loading platform for this alternative would extend about 1,750 feet offshore. Eiders are known to collide with obstacles on other parts of their range and there is at least some potential that they could strike the loader, trestle, or associated structures. Potential for adverse effects to Steller's and spectacled eiders is evaluated in the USFWS draft biological opinion (Appendix 5) and is summarized here.

The USFWS estimates that 18 adult spectacled eiders would be taken during the economic life of the tentatively recommended plan. Over the 50-year economic life of the project, this equates to an average of 0.36 adult spectacled eiders taken per year. This level of loss would not significantly affect the likelihood of survival and recovery of the spectacled eider.

The USFWS also estimates that 3 adult Steller's eiders would be taken during the economic life of the proposed project. Over the 50-year economic life of the project, this equates to an average of 0.06 adult Steller's eiders taken per year. The Service believes that this level of loss would not significantly affect the likelihood of survival and recovery of the Alaska-breeding population of the Steller's eider.

Bowhead whales migrate through ice leads in the Chukchi Sea on their way to the Beaufort Sea from late March through June. The majority of the population migrates far offshore from Portsite, but occasionally a few bowheads migrate through leads close to Portsite. Their autumn migration from the Beaufort Sea to their winter area in the Bering Sea is down the Siberian shore of the western Chukchi Sea.

During informal consultation, the National Marine Fisheries Service determined that construction of the alternatives would not have an adverse impact on bowhead whales.

**Essential Fish Habitat.** Essential fish habitat for the five North American species of Pacific salmon present in the Chukchi Sea includes marine, estuarine, and freshwaters used by these species. Adult Pacific salmon may use coastal waters near Portsite as a migration corridor to nearby rivers including the Wulik River, and juveniles may feed in marine waters near Portsite during their migration south. Although not abundant, pink salmon are the dominant salmon species near Portsite and the fry of this species typically migrate alongshore during the first few weeks of marine life.

The migrating fry could move farther offshore than normal to avoid construction activity. Post construction operations would not affect the migration of pink salmon fry, but bypass dredging and discharge could temporarily delay migration and temporarily alter habitat for a few hundred feet near Portsite. The affected habitat does not represent unique or unusually important habitat for Pacific salmon.

**Cultural Resources.** Two historic properties are recorded at Portsite. NOA-00074 is George Onalik's reindeer corral and camp. It was determined to be ineligible for the National Register of Historic Places. NOA-00307 is a grave and an ice cellar and is eligible for the National Register of Historic Places. The tentatively recommended plan would not affect NOA-00307. The fill area of the trestle would be placed within the boundaries of NOA-00074 and would disturb parts of the reindeer corral feature of this site. This would be a minor or negligible effect to cultural resources.

Construction of the trestle, loading platform, and channel would not be expected to cause effects on cultural resources in the marine environment off Portsite because the potential for cultural resources in the offshore areas of the Portsite is low.

## Environmental Justice

Executive Order 12898, directs Federal agencies to address disproportionately high and adverse human health and environmental effects on minority and low income populations. Most recent demographics show that 87 percent of the population of the Northwest Arctic Borough are minorities and that at least some communities in the borough are low income populations.

The tentatively recommended plan would not cause disproportionate direct monetary effects to minority populations, but there is a risk that some part of beluga and bowhead whale subsistence harvest could be reduced in the immediate vicinity of Portsite. If that harvest was reduced, it would disproportionately affect the minority population of nearby Kivalina.

There is uncertainty about potential for the tentatively recommended plan to adversely affect the take of beluga and bowhead whales by Native hunters from the predominantly Native population at Kivalina. High-risk low-probability evaluation indicated that if either of those alternative actions caused all harvest of those marine mammals to be lost, then the each member of the community of Kivalina would lose an average of about 12 pounds of beluga and about 48 pounds bowhead flesh each year, based on recent harvest data.

Loss of beluga and bowhead whale flesh and related cultural values, if it occurred as a result of either alternative, would be a disproportionate effect on a minority population, as defined by Executive Order 12898. The potential for all or some portion of that loss to occur cannot be predicted with available data and data cannot be obtained to narrow the range of uncertainty.

## Secondary Effects

One of the concerns most often voiced during scoping for the draft DeLong Mountain Terminal EIS was that construction of new navigation facilities could open the lands inland from Portsite to new mining and other development. This concern was stated in many different ways, sometimes narrowly focused on specific problems or resources, sometimes broadly stated in terms of “setting a new baseline for development.”

Evaluating secondary effects addresses both what might happen and how much an action might “open the door” for future actions. For example, if the bridge crossing a river cleared away all the obstacles to land development across the river, then it might have a much greater effect than if the bridge cleared away only one obstacle and there were still significant additional costs, landownership problems, and permit requirements to be resolved before development. The question to be addressed here is: How much would new navigation facilities at Portsite “open the door” or “set a new baseline” for new mining and other development locally and in the Northwestern Alaska region?

The following potential developments were evaluated to determine whether the tentatively recommended plan would change the likelihood that they would be constructed or implemented:

1. Increased through-put from Red Dog Mine
2. New zinc mining in the DeLong zinc belt
3. Other metallic mining in the area
4. Coal mining in northern NAB and NSB
5. Development of land transportation corridors
6. New airport at Portsite
7. Trans-shipment of goods for communities
8. Fuel transfer to communities
9. Road system from DMTS to communities
10. Kivalina Relocation

In each case, the construction of new navigation facilities at Portsite would not have enough economic influence to cause or lead to additional growth.

### Cumulative Impacts

There are, altogether, more than 600 miles of shoreline between Kotzebue to the south of Portsite and Barrow at the northern-most tip of Alaska. Almost all the coastal waters along that shoreline are as shallow as or more shallow than the waters off Portsite, which typically reach depths of 20 to 25 feet within a half-mile offshore and depths of 45 to 50 feet about 3.5 miles off shore. This means that between Kotzebue and Barrow there are more than 1,800 square miles of water similar in depth to the 0.5 square mile of bottom that would be disturbed by dredging for a channel for any alternative considered in detail. Essentially none of those 1,800 square miles of sea bottom has been disturbed by development.

The proposed disposal area is in 60 to70 feet of water, which is 5 to 7 miles off shore, with similar bottom composition and conditions beginning within a half mile of shore and continuing offshore into deeper water well beyond 10 miles off shore. This band of habitat similar in composition and extending from Kotzebue to Barrow represents more than 5,700 square miles of sea bottom undisturbed except by very limited fishing and the much greater sediment redistribution mechanisms of ice and marine mammals.

That summarizes all the in-water coastal development in the miles of coast and near-shore waters between Kotzebue and Barrow. Considerably less than 0.001 percent of the coastline is developed now, and considerably less than that area would be developed or disturbed by development even if the proposed action is constructed. Dredging the channel would impact less than .003 percent of the shoreline habitat in roughly similar depth, and dredged disposal would temporarily affect less than .02 percent of the bottom in similar depths in that expanse. Because there is essentially no other development in that area, these totals represent the cumulative impact of the proposed action and other

impacts of existing development. The tentatively recommended plan would not, together with existing development, cause significant cumulative impacts.

Cumulative impacts were considered along with direct impacts in evaluations of environmental consequences and are presented under individual resource and issues headings.

## Potential Mitigation Measures

Concerns raised during scoping and in coordination with agencies, tribal councils, and other stakeholders were used during analysis of potential impacts of project construction, operation, and maintenance to identify measures that might avoid or reduce project impacts. This section identifies those suggested measures. The notes following each potential measure identify why the measure might work to avoid or minimize impacts. The final decision about all project elements, including mitigation measures, will be made by the Federal decision maker at the end of the planning process and will consider comments received during public review. The tentatively recommended plan identified in Section 2.3 includes mitigation measures initially identified as part of the draft proposed action. Mitigation measures will be added to or removed from the proposed action after public review of the draft EIS.

The following is an annotated list of mitigation alternatives that were considered for implementation for alternatives considered in detail. Implementation for the No-Action and Third Barge alternatives would not require mitigation within the scope of this draft EIS because they are not Federal actions.

> *Establish timing windows to avoid work in or near the Chukchi Sea from March 15 until notification from the NANA subsistence committee (about June 30).* The majority of marine mammals harvested for food are taken during this period. Avoiding or minimizing activity on the Chukchi Sea during this period would prevent noise and activity from affecting hunts for bowhead whales, the Beaufort Sea stock of beluga whales, seals, and polar bear, all of which are hunted almost exclusively during that period. Restrictions would affect construction schedules and could add to construction costs, but costs are not quantifiable with available information *Recommendation:* Tentatively recommended in the draft EIS for all Federal actions.
>
> *Monitor marine mammals during and after construction to look for problems and potential for modifications to the project features or operations.* Available data do not predict substantial project effects to fish and wildlife. This could be checked, and corrective measures could be implemented, if experts knowledgeable of subsistence resources were employed to monitor project effects during critical periods. Monitoring would be directed principally toward determining abundance of marine mammals offshore from Portsite and the distance offshore of bearded seal. Monitoring could be established with the assistance of regional subsistence experts. Cost to the project: about $100,000

per year for 5 years. *Recommendation:* Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Install a seasonal observation post on any new loader to assist marine mammal hunters.* The loader deck would be a stable platform 40 feet above the Chukchi Sea that would provide visibility for miles offshore. A modified, insulated steel shipping container or other structure could be fitted with a window, electrical wiring, and perhaps other features to create a place where subsistence hunters could maintain a watch for marine mammals from the platform. Cost to the project sponsor: unknown. *Incremental evaluation*: No Federal cost. *Recommendation:* Concept appears to be workable, but interest by local hunters is uncertain. Decision deferred until after public review of the draft EIS. Could only be implemented for the Trestle-Channel Alternative.

*Minimize free-strung wires and other structural components likely to result in bird strikes.* Wires and other structural components that are hard to see could increase the chances for strikes by migratory waterfowl. These components may be reduced or avoided during project design. Cost to project: unknown. *Recommendation:* Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Restrict lighting in conditions that would increase probability of bird strikes or use hood lights to avoid attracting or disorienting birds.* Intense lighting can disorient or temporarily blind birds, increasing potential for bird strikes. Hooding work lights or restricting their use at night has been shown to reduce bird strikes at some locations during migratory periods. Cost to project: included in construction costs. *Recommendation:* Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Paint the trestle, platform, and loaders a color highly visible to birds.* Bird eyes have light reception cones for reds, blues, and greens, and are able to see colors. A brightly painted trestle might be more visible to birds than a gray trestle and could reduce the potential for bird strikes in fog. Marine mammals are colorblind and would not be able to distinguish those colors. Bright colors on a trestle at Portsite would not affect marine mammals but would be selected to contrast with the spring and autumn landscape. They could be visually intrusive to people at Portsite and Kivalina and to people passing through the area. Cost to project: included in project construction costs. *Recommendation:* Tentatively recommended in the draft EIS for the Trestle-Channel Alternative; pending public review.

*Require open ocean ballast water exchange or ionization to prevent introduction of invasive marine species.* Ballast water in the bulk carriers could introduce marine organisms from other parts of the world. This has caused invasive species problems in warmer marine waters of the world, including the Pacific Northwest of the United States. Marine organisms tend to ride Pacific Ocean currents

northward from the west coasts of the United States and Canada. Nuisance organisms that have reached those coasts are likely to drift progressively northward until they reach the Chukchi Sea, if they can survive the long winters, cold temperatures, ice gouging, and other severe conditions. Distance, and these natural barriers, apparently have prevented invasion by exotic species of marine organisms. There also is no reported indication that ballast water from Portsite loading operations, which began more than 15 years ago, has introduced invasive species. Open ocean exchange of ballast water or ionization does not appear to be required to avoid invasive species introduction. Cost to the project: unknown. *Recommendation:* Not recommended. Not enforceable with existing regulations, and there is no indication that this action would reduce or avoid impacts.

*Protect archeological resources by conducting site-specific cultural resources surveys prior to construction or monitoring during construction.* Cultural resources surveys after design is completed or monitoring during construction would ensure that historical resources were avoided or protected. Cost to project: about $30,000. Work is the minimum required to meet cultural resource protection requirements. *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Require cultural resource and social awareness training for all construction workers.* Construction personnel unfamiliar with the importance of cultural properties, including historical sites near Portsite, or the potential for their activities to affect subsistence harvesting could unintentionally cause adverse effects. Proper training could minimize this potential. Cost to project: about $20,000. *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Require dredged material to be disposed of in the up-current part of any ocean disposal site.* Most dredged material would quickly sink to the bottom, although currents could carry at least small amounts away from the disposal area. Currents offshore from Portsite rarely exceed 1 mile per hour during the summer dredging season. Restricting disposal to the up-current part of the disposal area during periods of relatively strong currents would minimize dispersal of sediment outside the designated disposal area. This alternative might add a half-hour or more to each round trip with dredged material, or several hundred hours of transportation time to the project. *Recommendation*: Not recommended, pending completion of the dredged material site disposal plan for the Trestle-Channel alternative.

*Monitor dredged material plume at and down-current from the disposal site.* Data collected during initial dredged material disposal operations could be used to modify disposal operations if required. Cost to project: about $50,000. *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Restore littoral transport by removing the existing solid-fill dock or with by-pass excavation/dredging.* The existing solid-fill dock at Portsite interrupts the natural long-shore drift of sediments and appears to have caused beach erosion south of the dock. The dock is needed for Portsite operations and could be replaced by another structure, but moving material that accretes on the north side of the dock to the south side of the dock during annual bypass dredging could mitigate these effects less expensively. Cost to project: included in by-pass dredging feature of the tentatively recommended plan. *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Conduct annual by-pass dredging to maintain beach processes south of Portsite.* Wave reduction caused by the trestle channel alternative would allow sediment to build up shoreward of the turning basin. Annual bypass dredging would maintain natural sediment transport processes and would prevent beach erosion to the south. This would increase existing bypass dredging sufficiently to fully restore long-shore transport. Dredging would be evaluated and volumes would be adjusted to maintain natural processes. Dredging would be timed to avoid subsistence activities and anadromous fish out-migration events. Cost to project: $325,000 *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Work with Noatak to evaluate feasibility of a road between the DMTS road and Noatak*. Cost of shipping to Noatak threatens the economic viability of the community. Lack of an alternate airport sometimes delays crew changes and re-supply for Portsite and the Red Dog Mine. A road connecting Noatak and the DMTS road could reduce both problems. This is outside the scope of the EIS, but the non-Federal sponsor could agree to work with Noatak and other stakeholders to study the feasibility of a road. The sponsor could also agree to help develop funding and participation by other State and Federal agencies if a road appeared to be feasible. There would be no cost to the project. *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Involve regional distributors in fuel distribution planning to support local and regional employment and economic objectives.* Regional fuel distribution out of Portsite could affect distributors that now do business in Northwest Alaska. Involving them in specific plans to meet fuel distribution objectives would allow those distributors to maintain or grow their position in this business. No cost to the project. *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

*Encourage construction contractors to hire locally as job positions allow.* Federal regulations regarding local hire incentives in construction contracts for Federal projects are subject to change but frequently permit contract language that encourages contractors to hire local labor. The strongest incentives consistent

with Federal regulations, such as small and disadvantaged business set asides, minority hire goals and evaluation of proposed subcontracting plans during the source selection process could be considered for insertion in contract documents. No cost to the project. *Recommendation*: Tentatively recommended in the draft EIS for the Breakwater-Fuel Transfer and Trestle Channel alternatives.

## Unresolved Issues

**Endangered Species.** The Corps of Engineers is working with the U.S. Fish and Wildlife Service to determine how best to implement measures to minimize impacts on listed eiders and to monitor impacts after construction. Results of that coordination will be reported in the Service's final Biological Opinion and will be reported in the final EIS.

**Mitigation for Effects on Subsistence.** Evaluation of impacts indicates potential for the tentatively recommended plan to cause significant impacts to subsistence harvest of two whale species. Consideration of mitigation for social effects of this potential loss was deferred until after public review of the draft. It was deferred so that the interested public could be fully informed of the tentatively recommended plan and its potential impacts as a basis for mitigation discussion. Mitigation of effects on subsistence harvest will be discussed during and following public review of the draft EIS. Results will be incorporated into the final EIS.

**Compliance with Laws and Executive Orders.** Coordination and other actions to identify and comply with applicable laws, regulations, and Presidential Executive Orders is conducted concurrently with the National Environmental Policy Act process for preparing an EIS. The current status of that coordination for the tentatively recommended plan is documented in table S-3.

**Table S-3.** Compliance status of the tentatively recommended plan.

| Federal Statute | Status of Compliance |
|---|---|
| Clean Air Act, as amended (42 U.S.C. §§ 7401-7671g) | Partial Compliance. The non-Federal sponsor must obtain a permit to construct the new emission sources associated with increased electrical generation capacity and modify the existing permit to operate them. |
| Clean Water Act, as amended (33 U.S.C. §§ 1251 et seq.) | Partial Compliance. The Section 401 Water Quality Certification is expected from the Alaska Department of Environmental Conservation following the final coastal consistency determination. |
| Coastal Zone Management Act (16 U.S.C. §§ 1451-1464) | Partial Compliance. A final consistency determination will be issued by the Alaska Department of Natural Resources after review of the final EIS. |
| Endangered Species Act of 1973 as amended (16 U.S.C. §§ 1531 et seq.). | Partial Compliance. Formal consultation with the US Fish and Wildlife Service will be completed when the biological opinion is finalized. |
| Estuary Protection Act (16 U.S.C. §§ 1221 et seq.) | Full Compliance. |
| Federal Water Project Recreation Act as amended (16 U.S.C. §§ 460l-12-460l-22, 662) | Not Applicable. No Federal lands or programs for conservation for fish and wildlife or cost-sharing agreement for recreational purposes are involved. |
| Fish and Wildlife Coordination Act (16 U.S.C. §§ 661 et seq) | Partial Compliance. The draft Coordination Act report is appended to the DEIS. The final EIS will append the final Coordination Act report to complete compliance requirements. |
| Land and Water Conservation Fund Act as amended (16 U.S.C. §§ 460l-4 et seq) | Not Applicable. The project does not utilize funding related to the act and no properties, or facilities acquired or developed via this act would be affected. |
| Magnuson-Stevens Fishery Management and Conservation Act (16 U.S.C. §§ 1801 et seq) | Partial Compliance. Full compliance of the act will be achieved after review of the final EFH analysis in the final EIS. |
| Marine Mammal Protection Act U.S.C. §§ 1361 et seq; 1401-1407, 1538, 4107) | Full Compliance. |

**Table S-3.** Continued.

| Federal Statute | Status of Compliance |
|---|---|
| Marine Protection, Research and Sanctuaries Act as amended (33 U.S.C. §§ 1401-1445; 16 U.S.C. §§ 1431 et seq; also 33 U.S.C. §§ 1271) | Partial Compliance. Full compliance with the act will be achieved when EPA concurs with the District Engineer's final decision to select and utilize an ocean disposal site for dredged material. |
| Migratory Bird Conservation Act (16 U.S.C. §§ 715 to 715s) | Not Applicable. The project does not involve land acquisition or use of land acquired, developed, maintained or managed using Migratory Bird Conservation funds. |
| Migratory Bird Treaty Act as amended (16 U.S.C. §§ 703-712) | Full Compliance. |
| National Environmental Policy Act as amended (42 U.S.C. §§ 4321-4347) | Partial Compliance. Full compliance will be achieved when the record of decision is signed. |
| National Historic Preservation Act as amended (16 U.S.C. §§ 470 et seq) | Partial Compliance. The Alaska State Historic Preservation Officer (SHPO) has been consulted about potential to affect historically properties. Full compliance will be achieved after designation of the recommended plan. |
| 1899 Rivers and Harbors Appropriation Act as amended (33 U.S.C. §§ 401, 403, 407) | Partial Compliance. The sponsor may need to obtain a permit under this act to place sponsor-owned structures in navigable waters of the United States. The U.S. Coast Guard has been consulted and will review the project and determine if a permit is required and define appropriate marking requirements during the public review process. |
| Watershed Protection & Flood Prevention Act as amended (16 U.S.C. §§ 1001 et seq; 33 U.S.C. §§ 701b) | Not Applicable. The proposed navigation improvements project does not include or affect any flood control or flood prevention components or any existing soil conservation projects. |
| Wild and Scenic Rivers Act as amended (16 U.S.C. §§ 1271 et seq) | Not Applicable. There are no wild and scenic rivers that would be affected by the proposed navigation improvements at Portsite. |
| Wilderness Act (16 U.S.C. §§ 1131 et seq) | Not Applicable. The proposed navigation improvements at Portsite would not affect any designated wilderness area or the Alaska Maritime National Wildlife Refuge. |

**Table S-3.** Continued.

| Executive Orders and CEQ Memos | Status of Compliance |
|---|---|
| Floodplain Management (E.O. 11988) | Full Compliance. |
| Protection of Wetlands (E.O. 11990) | Full Compliance |
| Environmental Effects Abroad of Major Federal Action (E.O. 12114) | Not applicable |
| Protection and Enhancement of Environmental Quality (E.O. 11514 and 11991) | Full Compliance. |
| Environmental Health and Safety Risks to Children (E.O. 13045) | Full Compliance. |
| Environmental Justice in Minority and Low-income Populations (E.O. 12898) | Full Compliance. |
| Consultation and Coordination with Indian Tribal Government (E.O. 13175) | Partial Compliance. The Corps of Engineers offered and conducted government-to-government consultation. Consultation will be completed following review of the final EIS. |
| Analysis of Impact on Prime and Unique Farmlands (CEQ Memo Aug. 11, 1980) | Full Compliance. |