DELONG MOUNTAINS TRANSPORTATION SYSTEM ADDITIONAL USE STUDY

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A multidisciplinary assessment and investigation of potential additional uses for the DeLong Mountains Transportation System (DMTS), located in Northwest Alaska, is presented in this paper. The report on which the paper is based was prepared for the Alaska Industrial Development and Export Authority (AIDEA) by CH2M HILL and its subconsultants, Sandwell, Alaska Planning Services, and Kevin Waring Associates. The study includes commodity market research, facility conceptual engineering and cost estimating, public participation and information gathering, institutional evaluations of appropriate operating and financial arrangements, and financial feasibility analysis.

Northwest Arctic Borough Socioeconomics

The population of Kotzebue, the largest community in the Northwest Arctic Borough (NAB), makes up 45 percent (2,751 residents) of the region's population. Earnings of Kotzebue residents account for about 63 percent of total region personal income. The rest of the region's residents are dispersed among 10 outlying villages, none larger than 600 residents. Levels of economic activity and personal income in the outlying villages are substantially below those in Kotzebue. The geographic distribution of population within the region has been relatively stable. Today's population distribution closely resembles the 1960 pattern.

Regional population grew steadily during the past 3 decades. All settlements increased in population, and total regional population nearly doubled from 3,133 residents in 1960 to 6,113 residents in 1990.

For the foreseeable future, the region's prospects are for modest economic growth. This could be negatively affected by state cutbacks in operating and capital expenditures. New large-scale resource development initiatives appear speculative and in any case, are not likely to affect existing distribution systems to the region's settlements.

COMMODITY MARKET ANALYSIS AND FORECAST

The following estimates are the result of extensive research efforts conducted primarily in NAB, the municipality of Anchorage, Fairbanks North Star Borough, and the Seattle area.

The baseline estimate of marine shipments of bulk fuels and other dry cargo to NAB destinations is shown in Table 1. The total shipment is estimated to be 35,250 tons, including 25,900 tons to Kotzebue and 9,350 tons to villages.

Future commodity shipments are expected to increase in proportion with population and income growth. Shipments for Kotzebue are forecasted to increase 3 percent annually, and shipments for outlying villages are forecasted to increase 2.5 percent annually. Bulk fuel and dry cargo forecasts are presented in this report in 5-year intervals for the period from 1995 to 2015.

Using this method, fuel shipments to the 10 NAB villages are forecasted to increase from 7,850 tons (2,151,000 gal) in 1994 to 12,845 tons (3,519,000 gal) by 2015 (Fig. 1).

DMTS EXISTING FACILITY ANALYSIS

The DMTS consists of a 52 mi, all-weather gravel road and a port on the Chukchi Sea shoreline, about 16 mi from the village of Kivalina. The road and port initially

TABLE 1 BASELINE (1994) MARINE CARGO TONNAGE OF NORTHWEST ARCTIC BOROUGH COMMUNITIES

Destination	*Fuels*	*Dry Cargo*	*Total*
Kotzebue	18,400	7,500	25,900
Villages	7,850	1,500	9,350
Total	26,250	9,000	35,250

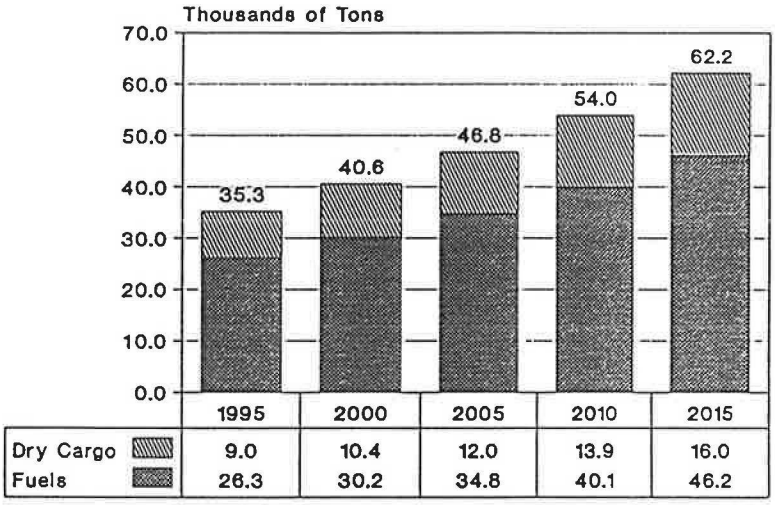

FIGURE 1 Marine cargo forecast, Northwest Arctic Borough communities, 1995–2015.

were developed to support the development of the Red Dog Mine, and the port facilities were constructed to be multipurpose. The facilities, which are shown in Figure 2, include the following:

- A deep-sea anchorage for Panamax-class bulk carriers, located 4 to 5 mi offshore, that can accommodate four vessels.
- A deep-water barge dock for berthing barges used for load out and lightering of concentrates. A conveyor gallery and a 2,000 ton/hr barge loader is supported by three cellular structures, 74 ft diameter. The water depth at the deep-water dock is between 17 and 19 ft.
- A deep-water barge dock for off-loading petroleum products (using the south side of the second and third cellular piles) via a pipeline 12 in. in diameter, pumped directly to the storage tanks.
- A shallow-water barge dock to receive dry general cargo such as construction equipment, materials, and other supplies. The dock has a water depth of 14 to 15 ft at its seaward face.
- A truck dump station and concentrate storage building with required conveyor system for reclaiming and loading out concentrates. The storage building (320,625 ft^2) provides 400,000 tons of concentrate storage, which was historically sized to be equal to 9 months of mine production (when the port is closed to shipping during the winter months).
- Four fuel-oil storage tanks that provide 235,000 barrels of storage. This storage is equivalent to 9,862,000 gal (42 gal/barrel) or 36,000 tons (7.3 lb/gal for diesel oil no. 1).
- A personnel camp and support services facilities.

Accounting for a limited shipping season and weather delays, the berthing facility has a maximum practical load-out capacity of 1.3 million tons of concentrate. Current berth occupancy (accounting for use of the fuel-oil dock and shallow-water dock) is estimated to be 44 percent of practical capacity.

COMINCO ALASKA EXPANSION

The increase in concentrate throughput from the Red Dog Mine would not normally be considered additional use. However, any increase in concentrate throughput could directly or indirectly affect the availability of DMTS facilities for other uses in terms of increased berth occupancy, increased use of overland conveyor and shiploading systems, and increased traffic on the haul road.

Berth occupancy is projected to be 946 hours (out of a total practical berth availability of 1,512 hours) or 63 percent once these improvements have been completed. This projection includes an allowance for berth usage by freight and fuel barges. This is the baseline berth occupancy for existing uses assumed in this study.

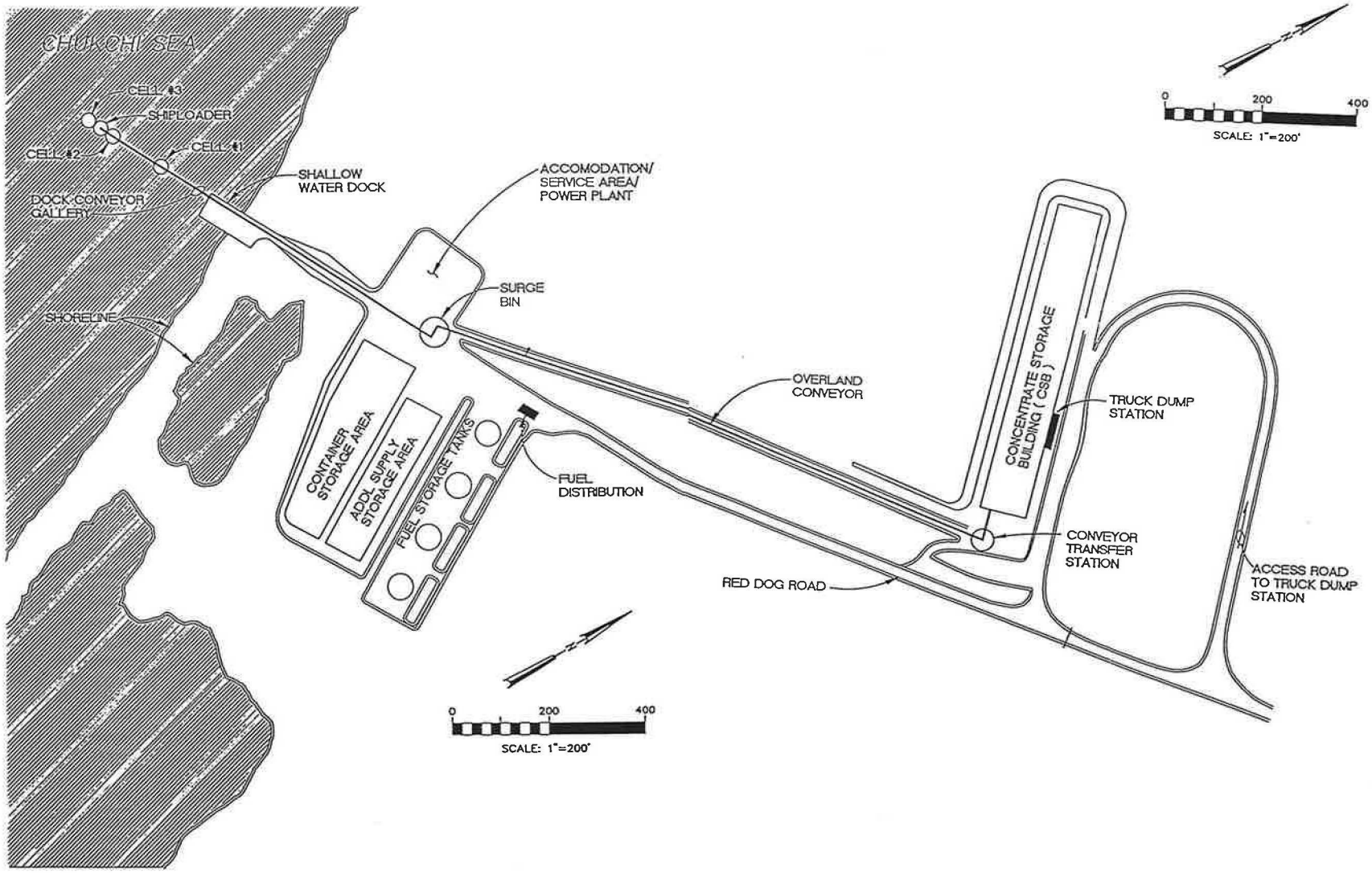

FIGURE 2 DeLong Mountains Transportation System additional use study.

POTENTIAL DMTS ADDITIONAL-USE ALTERNATIVES AND RECOMMENDED FACILITIES

Three potential additional uses for DMTS are recommended:

- Transshipment (via barge to tanker aircraft) of fuel oil and dry general cargo (possibly in the future) to NAB villages;
- Shipment of concentrates and receipt of general support for other potential base metal mines that could be supported by the DMTS port; and
- Shipment of product and general support receipt for Western Arctic coal (Deadfall Syncline) mines.

Additional required facilities are shown in Figure 3.

Transshipment of Fuel Oil to NAB Villages

The fuel-oil transshipment additional-use project will rely on the DMTS port for receipt, storage, and distribution of fuel oil to NAB villages. Fuel from the tank farm will be pumped to a smaller storage tank (20,000-gal capacity) at a proposed DMTS airstrip about 1 mi upland from the tank farm on the south side of the haul road. From this smaller tank, fuel will be pumped into DC-4 or equivalent tanker aircraft, capable of carrying 3,000 gal, for delivery to the villages. Fuel at each village will be off-loaded from the aircraft, and the village will be responsible for to distributing the fuel to end users.

One additional barge shipment likely will be required to meet the villages' requirements. In using the DMTS port, no addition or modification will be made to the DMTS dock infrastructure. The alternative will use the same berth currently used by fuel barges and the same header and piping system currently used by Cominco Alaska to off-load the present fuel shipments and pump to the tank farm. Berth occupancy will be increased slightly from 63 percent to 64 percent.

The size of the airstrip will depend on the performance specifications of the aircraft anticipated to use it. It is recommended that the airport constructed initially accommodate the Douglas DC-6 and have a standard Alaska Department of Transportation and Public Facilities (ADOT&PF) length of 4,000 ft and a safety width area of 300 ft.

Shipment of Additional Mineral Concentrates

The development of additional mineral deposits in the vicinity of the DMTS road was also evaluated as part of this study. Prospects along the southern border of the National Petroleum Reserve (e.g., Drenchwater, Story Creek, Kivliktort Mountain, Lik, and Su) are examples of potential mining developments in the region. For purposes of this study, we chose to focus on the Lik Deposit because of its proximity to the DMTS road.

On the basis of an estimated annual production of about 250,000 tons of mineral concentrate from the Lik Mine, the required storage capacity for the nonshipping season would be about 190,000 tons. The storage arrangement for Lik concentrate would be similar to that for Cominco Alaska. This structure would be located in the spoil area immediately east of the Red Dog concentrate storage building (CSB). This location would allow trucks carrying Lik concentrate to use the existing haul road to the Red Dog CSB and would minimize disturbance of additional land.

Three to four vessels per shipping season would arrive at the port to load Lik concentrate. Scheduling of ship arrivals and related 42 barge transshipments is necessary to avoid congestion at the dock. Two additional fuel barge arrivals and two additional freight barge arrivals per year are also projected. An additional 351 berth occupancy hours would result from this alternative, and berth occupancy would increase to 83 percent of capacity.

Shipment of Western Arctic Coal

The proposed coal mine at Deadfall Syncline lies about 90 mi north of the Red Dog Mine and the DMTS road to the Chukchi Sea. Previous transportation studies have been based on production rates of up to 1 million tons a year. Mine developers are now projecting that the proposed mine could produce volumes of up to 3 million tons per year. Six options are presented in Section 16, ranging between 400,000 tons per year using existing DMTS facilities to 2.7 million tons per year using new facilities at the DMTS port.

If existing barge loading facilities are shared, and the Lik Deposit is not developed, an additional 580 hours of berth occupancy would result from the 400,000 ton per year option, the lowest throughput option considered. This level of usage would increase occupancy to an unrealistic 99 percent. More realistically, a separate loading facility would need to be developed for coal to be handled at the port.

PROJECT CONSTRAINTS AND ASSESSMENT OF RISK

As with any endeavor in the Arctic, the critical factor affecting the development cost and schedule is the

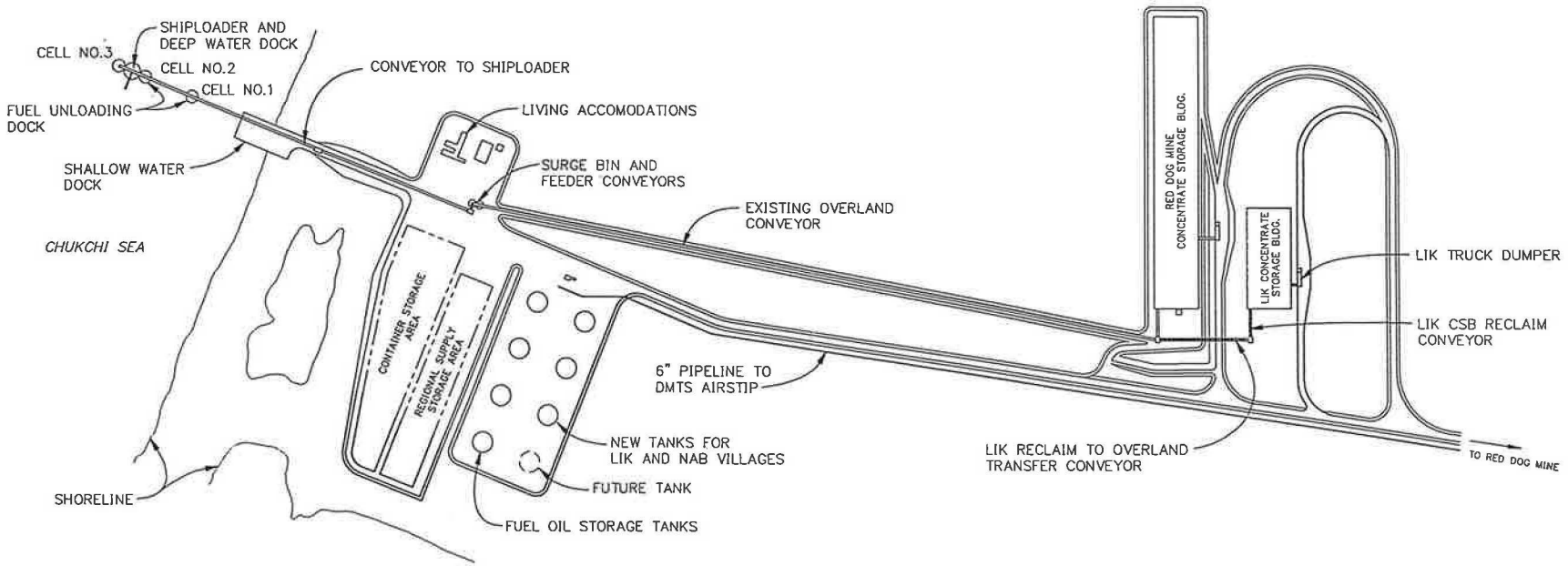

FIGURE 3 DMTS Port site layout of potential additional uses.

limited shipping season, generally from the beginning of July to the beginning of October. The following constraints affect implementation:

- Climatic, including meteorology, seasonality of shipping, and operating in cold weather;
- Coastal and oceanographic, including available water depth, and wind and wave climate; and
- Construction, including permafrost conditions and construction materials.

Permitting additional DMTS use, such as for fuel distribution, should be routine because there are no apparent extraordinary issues. A substantial amount of baseline data presently exists for the DMTS road and port area. Federal, state, and municipal permits likely would be required, and additional baseline data collection would be necessary.

Assessment of Project Risk

Potential project risks were identified by the project team and categorized by potential importance, based on the information currently available at this stage of the planning process. It is expected that some issues currently regarded as high risk will become issues of lower risk as the planning process continues and more information becomes available so that appropriate mitigating measures can occur.

Ten issues are identified as either high or medium risk. These should receive priority during the planning process from AIDEA, based on potential schedule and cost impact and customer value. A listing of these 10 issues follows:

- Changing governmental regulations concerning the transport and storage of fuels;
- Federal Aviation Administration (FAA) priority project listing;
- State budget appropriation for matching funds;
- Permitting delays;
- Limited subgrade geotechnical information;
- Design approvals and changes due to the number of agencies and parties involved;
- Reliability of fuel delivery service into NAB villages;
- Customer perception of cost of service;
- Competition for fuel sales using barges from Kotzebue; and
- Competition for fuel sales using air service from other airports.

Permitting Requirements

From a review of permits previously issued for the Red Dog Mine and DMTS and from conversations with regulatory agencies, a list of permits, approvals, and regulatory documents likely to be required for the additional development at the DMTS port site was prepared.

Development Schedules

Table 2 summarizes the development schedules for the various additional uses at the DMTS port site. It was assumed that the duration for some of the components could be reduced because of the availability of data and information from previous environmental impact statements (EISs) and the fact that a facility and operation currently exist.

Overall, development is estimated to require 54 months (4.5 years) assuming a January 1 start date for the fuel distribution system and airport. The Lik concentrate facilities at the port site were also estimated to require 4 to 4.5 years to develop. This may be less than the development time required to permit and construct a mining operation at the mine site.

PROJECT COST ESTIMATES AND ANALYSIS

The cost estimates presented in this section are based on historical data (bid prices in the region for ADOT&PF airport projects between 1988 and 1994) and current information on prices of equipment and materials, labor rates, and cost of construction in Alaska or on published purchase and operating costs in the lower 48 states and Canada, factored to local conditions. The capital cost estimates are considered to be at a level of accuracy typical for feasibility studies. More detailed cost estimates would require additional site-specific investigations that are beyond the scope of this project.

The construction cost estimate includes all mobilization, demobilization, general conditions, design engineering, construction management, environmental planning, and permit application expenses.

Allowances for uncertainty of the cost estimate has been included as a project contingency. The project contingency was calculated based on a simulation analysis of the cost estimate using range estimates for each cost category. The project contingency is based on an assumption that the actual development cost will be less than the amount shown 80 percent of the time.

TABLE 2 DMTS ADDITIONAL-USE PROJECT DEVELOPMENT SCHEDULES

	Estimated Duration in Months	
Description of Component	DMTS Fuel Distribution	DMTS Regional Airstrip
Site selection and investigation	1–2	3–6
Environmental impact assessment statement	3–6	6–12
Permitting, obtaining approval	6–12	6–12
Detailed design	4–6	6–12
Construction A and startup	6–8	8–12
Total Duration B	20–34	29–54

(A) Includes procurement of supplies and equipment, mobilization, construction, commissioning, and demobilization.
(B) From notice to proceed.

That is, in 20 percent of the cases simulated, the costs are expected to be higher than the total shown. The contingency would need to increase if a higher level of certainty, that the cost estimate will not be exceeded, is needed. Cost estimates for the four project operational areas follow.

DMTS Fuel Distribution System

The fuel distribution system costs include all costs of structures and equipment related to delivering fuel to the DMTS port, storing it at the tank farm, and pumping it into tanker aircraft. The major cost items include additional fuel storage tanks and handing equipment.

The estimated capital costs for constructing a fuel distribution center at the DMTS port is $2.8 million. This budget includes a project contingency of $400,000, which represents 17 percent of base project cost. The range for project cost is estimated to be between $2.3 million and $3.2 million. The estimated annual operating and maintenance costs are estimated to be $147,090.

DMTS Regional Airport and Access Road

The regional airport and access road costs include all costs to construct a new airstrip upland of the DMTS port to accommodate tanker aircraft used for distribution of fuel to NAB villages. Major features include a 4,000- by 100-ft runway, a 400 ft^2 parking apron, a 400- by 50-ft taxiway, and a 4,000- by 36-ft access road.

The estimated capital costs for constructing a regional airport and access at the DMTS port is $5.3 million. This budget includes a project contingency of $492,000, which represents 10 percent of base project cost. The range for project cost is estimated to be between $4.1 million and $6.0 million (Fig. 5). The estimated annual operating and maintenance costs are estimated to be $148,600. In addition to this amount, $29,000 should be retained and invested annually to fund replacement of major equipment and structures.

Transshipment of Lik Mine Concentrate

Lik Mine concentrate transshipment costs include all storage, handling, and processing between the overland transport and the ocean transshipment operations. It is assumed that the existing overland conveyor, shiploader, and concentrate lightering systems are adequate for handling Lik concentrates. The costs focus primarily on a system that would feed Lik concentrate to the existing transshipment system and maximize use of DMTS facilities.

The estimated capital costs for constructing the storage and handling facilities for Lik mine concentrates at the DMTS port is $17.7 million. This budget includes a project contingency of $2.4 million, which represents 16 percent of base project cost. The range for project

Description of Risk Issue	Category of Risk
A. Management, Financial, and Administrative Issues	
Changing governmental regulations	High (Fuel Transport)
Public and political opposition	Low
FAA funding for project	High (Project not on List)
State of Alaska appropriation for project	Medium
Site acquisition/lease	Low
Permitting delays	Medium
Agency jurisdictions and conflicts	Low
B. Environmental and Geotechnical Issues	
Inclement weather and storms	Low
Hazardous waste disposal, site remediation	NA
Groundwater remediation	NA
Uncharted underground structures, pipelines, etc.	NA
Limited subgrade testing and data	Medium
Unanticipated archaelogical or hisorical findings	Low
C. Planning, Architecture, and Engineering Issues	
Design approvals and changes	Medium
Untested and unproven design features and innovations	NA
Project Controls (Planning, Scheduling, Estimating)	Low
D. Construction Contractor Issues	
Availability of qualified contractors or special skills	NA
Construction material requirements	Low
Change orders	Low
E. Structure, Equipment, and Material	
Availability and delivery	NA
Rejects, defects	NA
Condition of existing structure, equipment, and material	NA

Category of Risk:

FF: Fatal Flaw
High: Major Risk with Cost Implications
Medium: Important but not Major Risk
Low: Possibly Important but with Small Impact
NA: Not Applicable

FIGURE 4A Alaska Industrial Development and Export Authority alternative use study project risk assessment.

cost is estimated to be between $15.6 million and $19.3 million (Fig. 6). The estimated annual operating and maintenance costs are estimated to be $507,000. In addition to this amount, $522,000 should be retained and invested annually to fund replacement of major equipment and structures.

Transshipment of Western Arctic Coal

The costs for transshipping of Western Arctic coal include all storage, handling, and processing between the overland transport and the ocean transshipment operations. Costs have been prepared for a number of throughput options, including use of a terminal similar to the existing DMTS facility, a modified terminal, and a new terminal. The options that were considered are described as follows, and Table 3 presents a summary of annual throughputs and costs for the options.

1. Transshipment of coal would take place whenever the port is not transshipping lead-zinc concentrates. There would be no change to existing DMTS port facilities; however, new storage and reclaim facilities would be added for coal.

2. Existing DMTS facilities would be dedicated to coal transshipments only. The existing conveyor system and shiploader would be used, with no modifications to existing equipment.

3. Similar to Option 2, the existing DMTS facilities would be dedicated to coal transshipments only, but with minimal modifications to the existing reclaim, overland,

Description of Risk Issue	Category of Risk
F. Construction Logistics and Transportation	
Laydown area limitations	NA
Traffic congestion (haul road)	Low
Access to site	NA
Transport difficulties for construction materials	Low
Interference with other work	NA
Maintenance of services during construction	Low
Tie-ins/cutovers with utilities	NA
G. Safety and Hazards during Construction	
Safety to contractor	Low
Safety to adjoining structures	NA
H. Start-Up and Commissioning	
Testing and test planning and scheduling	NA
Malfunctions and failures	NA
Inadequate documentation and/or training	NA
I. Operating Company Selection and Issues	
Fuel Barge Contract from Refinery to DMTS port tanks	Low
Air carrier contract from DMTS tanks to Village	Low
Site Operations and Conflicts	Low
J. Customer Service	
Customer perception of level of service	Low
Reliability of Service (Delays into Villages)	High (Weather and Cold)
Customer perception of cost of service	Medium
K. Competition Issues	
Impact to Kotzebue Fuel Customers	Low
Impact to Kotzebue General Cargo Customers	Low
Impact to General Cargo Customers in Villages	Low
Competition from Barge Service into Kotzebue	Medium
Competition from Air Carriers elsewhere	High (Prospect Service)

Category of Risk:

FF: Fatal Flaw
High: Major Risk with Cost Implications
Medium: Important but not Major Risk
Low: Possibly Important but with Small Impact
NA: Not Applicable

FIGURE 4B Alaska Industrial Development and Export Authority alternative use study project risk assessment.

and shiploading conveyor system, such as increasing belt speeds and increasing barge volume capacity to take on 6,000 tons of coal.

4. Transshipment of coal and lead-zinc concentrates would take place concurrently. As much as possible, the existing facility would be used for coal transshipments, but the coal load-out system would be a separate operation from concentrate load out.

5. This option has the same features as Option 4, except a new facility would be constructed for coal transshipment, completely separate from existing DMTS facilities.

6. A new facility would be constructed to allow coal to be loaded directly into Panamax bulk carriers by a shiploader; lightering operation would not be required.

PUBLIC/PRIVATE FINANCING PLAN

Based on information obtained in interviews with potential funding sources, we recommend that AIDEA be the developer and primary source of capital funds for the fuel distribution system and that the ADOT&PF develop, fund, and operate the airport improvements with federal and state grant funds and state general funds.

Fuel Distribution System

The following is specifically recommended for financing the fuel distribution system:

TABLE 3 WESTERN ARCTIC COAL ANNUAL FACILITY THROUGHPUT CAPACITIES DEVELOPMENT COSTS FOR DMTS FACILITIES

Option No.	Annual Throughput (tons per year)	Project Cost ($)
1	405,500	$5,620,000
2	876,400	$6,182,000
3	1,708,500	$7,498,500
4	1,800,000	$38,546,000
5	1,800,000	$47,222,000
6	2,730,000	$115,979,000

- AIDEA should assume lead responsibility in planning, financing, constructing, and negotiating ownership/usage rights for DMTS port improvements.
- AIDEA should provide financing for the needed improvements with general obligation bonds, supplemented by other funds as available.
- AIDEA should advance funds for preconstruction engineering, permitting, and EIS preparation, to be recovered from bond revenues.
- All facilities should be operated by a lessee who is selected by competitive bid.

The finance plan provides that AIDEA seek a single lessee/operator through a competitive bid proposal process. The key bid terms include the following:

- A fixed lease fee, determined by AIDEA, to cover AIDEA debt service, maintenance reserves, and other AIDEA administrative expenses;
- A variable component consisting of the operator's surcharge to cover operating expenses, including fuel purchase and inventory costs, and profit; and
- An operator agreement to offer specified fuels for public sale, delivered to the airport at a guaranteed price (e.g., equal to Cominco's delivered cost free on board Red Dog port), plus the operator's surcharge.

These bid terms allow competition among marine and air transport services, but do not preclude the facility operator from providing marine and/or air transport services to deliver fuel from a fuel source outside the region to NAB village destinations; nor do these terms preclude a regional business entity such as NANA Development Corporation from participating as lessee/operator or joint venturer. Marine and air transport companies now serving the region will still have opportunity to compete.

ADOT&PF staff were contacted to determine whether fuel transfer, pipeline, and storage facilities might be eligible for federal Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) funds. The preliminary indication was that these transportation facilities were not the type of improvements ordinarily funded under ISTEA, but that ISTEA did incorporate some leeway for funding innovative transportation concepts. Further contacts are recommended as the project proceeds.

Airport and Access Road Improvements

The following is specifically recommended for financing airport and access road improvements:

- The ADOT&PF should plan, finance, construct, and obtain ownership interest in the proposed airstrip and airstrip access road improvements.
- Federal and state capital grants from the current program should fund airstrip and airstrip access road improvements, supplemented by other funds as needed and available.

Airport Projects

FAA's Airport Improvement Program (AIP) is typically the primary source of funding for airport improvement construction, including planning and engineering

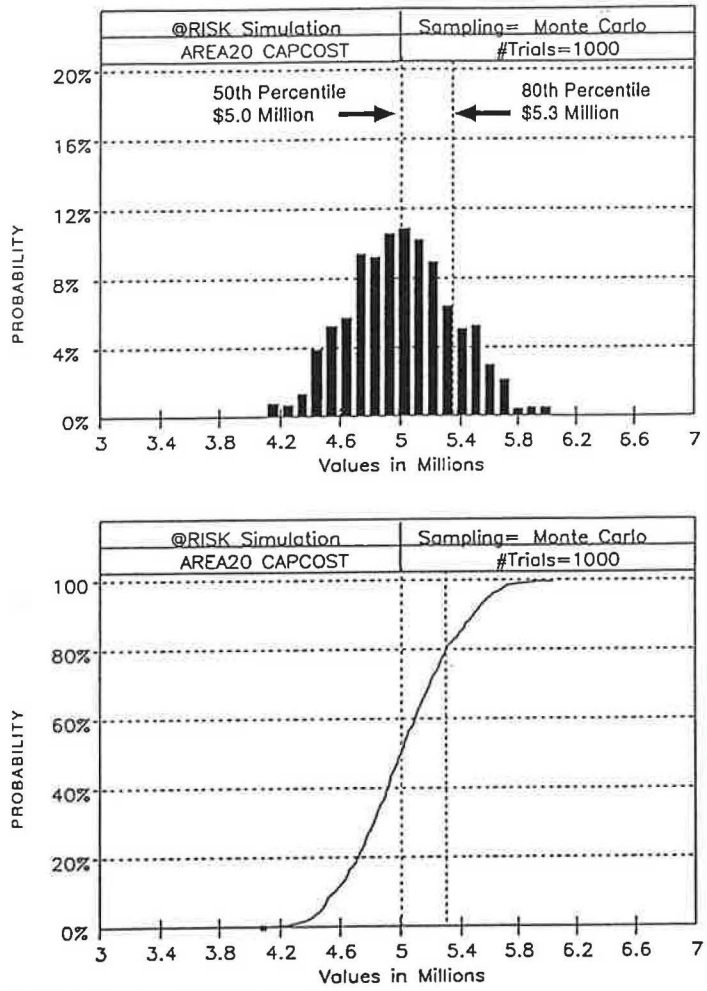

FIGURE 5 DTMS Regional Airport and access road risk adjusted capital costs.

expenses. The program funds 93 percent of approved projects, to be matched by state/local funds amounting to 7 percent of project costs. Eligible costs include property acquisition, engineering and EIS preparation costs, and airport and related on-property project construction costs.

Airport Access Road

The 4,000-ft airstrip access road between the port facility and the airport tract would not qualify for AIP funds. Therefore, the road would need to be funded with state general fund grant revenues or with ISTEA grant funds (also up to 93 percent federal and 7 percent state general funds).

Airport Operations

ADOT&PF would fund operation and maintenance out of general funds, which it generally does with state-owned airports throughout the state.

Airport Access Road Maintenance

ADOT&PF staff indicate that, under present fiscal conditions, the state might not be able to absorb annual maintenance costs for the airport access road. If the state is unable to fund these operating and maintenance costs, the costs could be funded by an additional fuel surcharge collected and paid by the Area 10 facility lessee/operator or by NAB. In any case, in operational

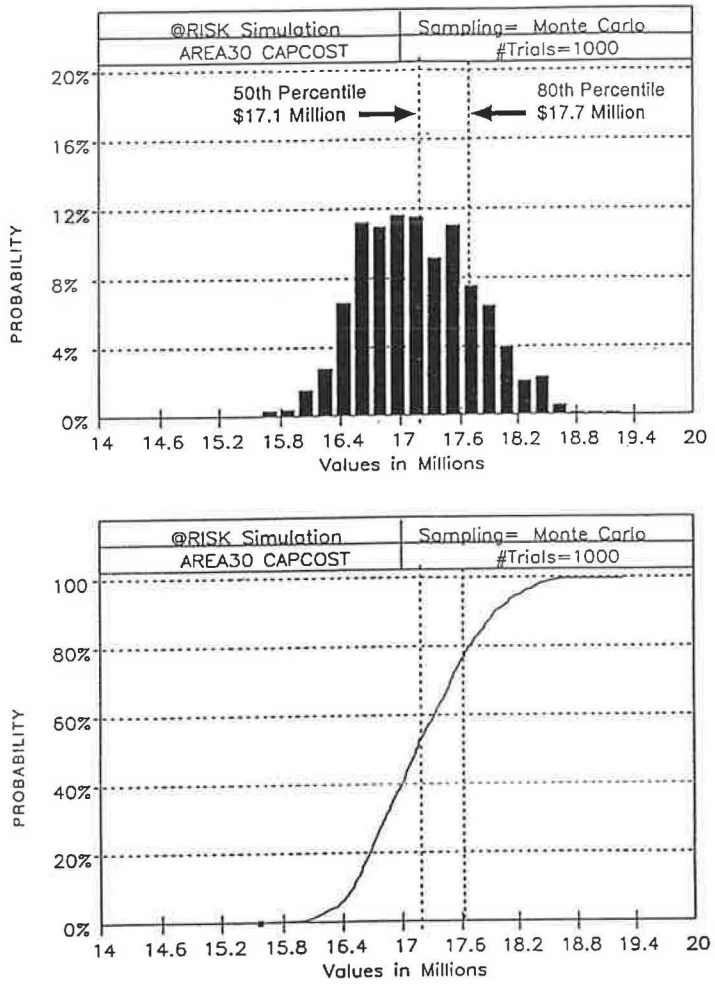

FIGURE 6 LIK Concentrate Storage and Handling System project cost range.

terms, AIDEA may want to combine airport access road maintenance with Red Dog Mine road maintenance.

Financial Analysis

This section presents the financial analysis of supplying fuel oil to 10 NAB villages using existing and additional DMTS facilities. Projected revenues and costs are compared on an annual basis (pro forma income statement format) for 4 years: 2000, 2005, 2010, and 2015. Sensitivity analyses are also performed to identify how the projections of net revenue vary because of changes in key revenue (market) and cost (development and operations) assumptions.

Bond Issue and Debt Service

The project cost for the fuel distribution system are the costs used for calculating annual debt service payments. Other project costs are assumed to be financed by other parties such as the FAA with matching funds provided by the state of Alaska. The total amount of the bond issue includes a 2.5 percent allowance for bond issuance expenses and a 11.1 percent (calculated net) allowance for interest during construction. A price contingency of $360,313 has also been included.

The total amount to be included in the bond is $3.6 million compared with the total base project cost estimate of $2.8 million. The annual debt service payment is calculated on the basis of a 20 year schedule

TABLE 4 ALASKA INDUSTRIAL DEVELOPMENT AND EXPORT AUTHORITY PRO FORMS INCOME STATEMENT, 2000, 2005, 2010, AND 2015

(Future Year Dollars Including Inflation)	2000	2005	2010	2015
Operating Revenue	4,878,460	6,554,510	8,804,116	11,826,556
Operating Expense				
Fuel Cost (FOB Refinery)	2,242,212	3,012,538	4,046,482	5,435,630
Barge Cost (Refinery to DMTS)	358,754	482,006	647,437	869,701
Tanker Cost (DMTS to Village)	1,446,820	1,718,368	2,040,883	2,423,928
DMTS Facility Operations				
Wages and Benefits	73,755	87,598	104,039	123,566
Materials - Structural Maintenance	17,210	20,440	24,276	28,832
Materials - Mechanical Equipment	11,063	13,140	15,606	18,535
Utilities and Fuel	6,146	7,300	8,670	10,297
Major Maintenance	72,637	86,270	102,461	121,692
Total DMTS Facility Operations	180,811	214,747	255,052	302,922
Total Operating Expense	4,228,597	5,427,659	6,989,854	9,032,180
Net Operating Income	649,862	1,126,851	1,814,262	2,794,375
AIDEA Loan Interest Payment	309,154	271,288	214,350	128,735
Net Income	340,708	855,563	1,599,912	2,665,640
AIDEA Principal Payment	75,183	113,049	169,986	255,601
Net Cash Flow	265,526	742,515	1,429,926	2,410,039
Key Financial Ratios:				
Operating Margin (%)	6.98	13.05	18.17	22.54
Working Ratio (%)	86.68	82.81	79.39	76.37
Debt Service Coverage	1.69	2.93	4.72	7.27

and an 8.5 percent interest rate. The annual debt (principal and interest) payment is calculated to be $384,000.

Pro Forma Income Statement

A pro forma income statement appears in Table 4 for 2000, 2005, 2010, and 2015. The data shown are in future year's dollars. The projections indicate sufficient cash flow to support repayment of the debt to AIDEA in all years. Key financial ratios are calculated for each of the 4 years.

Debt Service Coverage

The debt service coverage ratio is the ratio of net operating income to the sum of principal and interest payments. This is a measure of the strength of a company to repay the annual interest and principal payments. In year 2000, we project that the company will have 1.69 times the required payment in net operating income.

Break-Even Revenue and Cost Projections

Revenues, either price or sales with no decrease in associated costs, could decrease by up to 5 percent, and the company would still have funds to repay the debt, at a 1.0 coverage. Similarly, operating expenses could increase by up to 6 percent, and the company could still meet the payment requirement.

Reduced Sales Sensitivity Analysis

A reduced sales sensitivity was performed to identify the impact of reduced sales. For this analysis sales to the

following six villages were deleted: Ambler, Kobuk, Shungnak, Selawik, Deering, and Buckland. The reason these villages were chosen was their proximity to Kotzebue for barge delivery or proximity to Prospect for air carrier service. The results of the sensitivity analysis are that the net operating income remains high enough to pay for both interest and principal in the year 2000, although the 1.25 debt service coverage ratio indicates that there is very limited margin for error if the projections of revenue and expenses are not realized.

CONCLUSIONS

Projections indicate sufficient cash flow to support repayment of debt to AIDEA in years 2000, 2005, 2010, and 2015. Conclusions regarding feasibility and project implementation are as follows:

1. For the foreseeable future, the region's prospects are for modest economic growth.
2. The port facility can accommodate the additional barge traffic necessary to meet regional fuel needs. Fuel-oil transshipment to the region via DMTS would require no modifications to the existing port facility.
3. The existing fuel tank farm near the port cannot accommodate additional fuel storage to meet regional fuel needs. Additional tankage would have to be installed.
    A. Fuel-oil transshipment to the region via DMTS would require construction of a new airport with a 4,000-ft-long runway.
    B. Fuel-oil transshipment to the region via DMTS would require construction of a small, 6-in.-diameter pipeline from the existing tank farm to a new 20,000-gal storage tank at the new airport.
4. A project risk analysis identified no fatal flaws.
5. A public involvement program and permitting process must parallel future project development activities.
6. Construction activities are estimated to begin and end in the first construction season following completion of the detailed design.
7. Fuel could be available to NAB villages in the fifth season after the start of the project.
8. Shared use of DMTS facilities is expected to result in minimal conflict between users.
9. Feasibility indicators such as operating margin, working ratio, and debt service coverage calculations indicate project feasibility but show little room for error in revenue and expense projections.