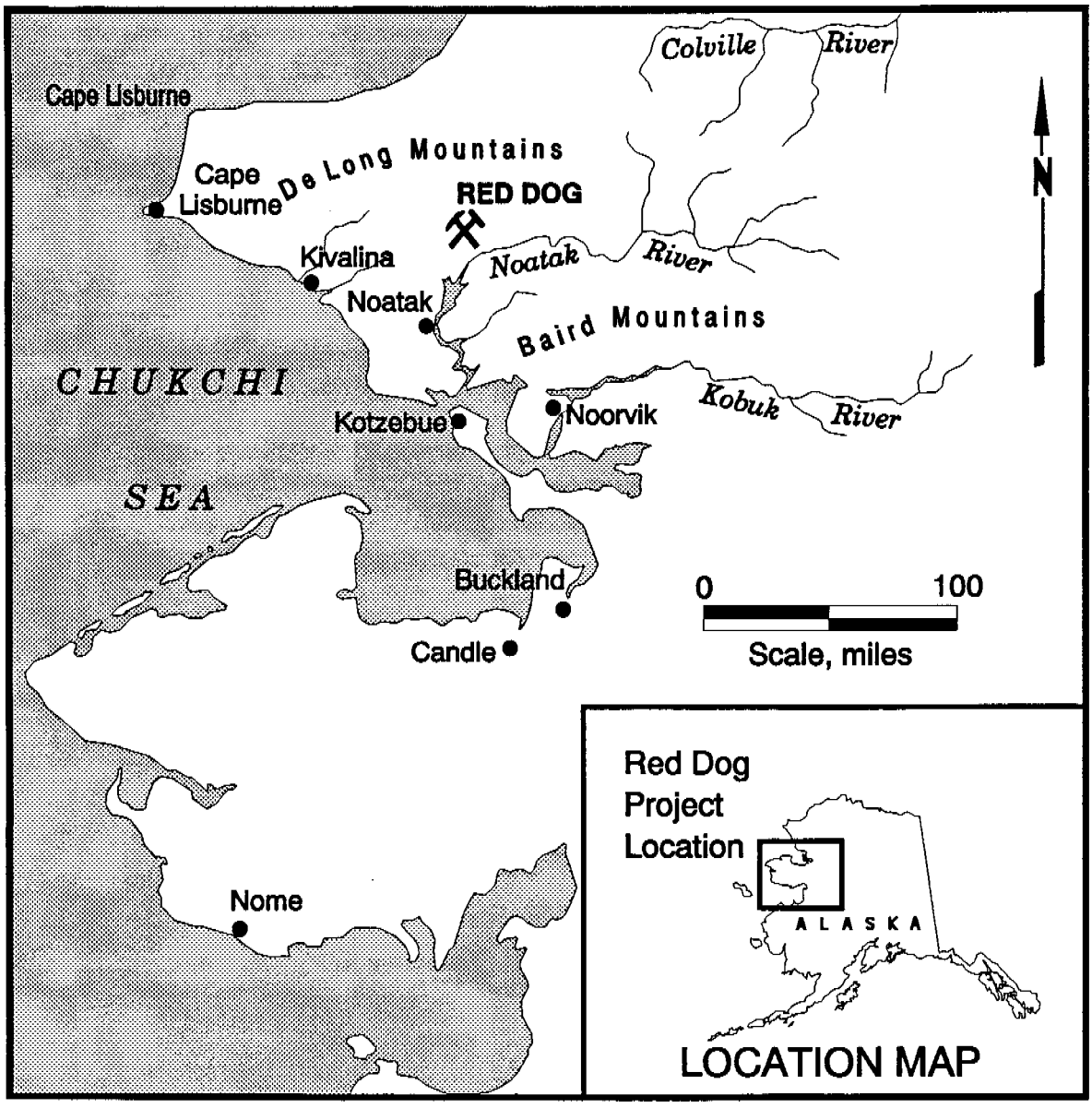
REGULATORY PROCESSES ASSOCIATED WITH METAL-MINE DEVELOPMENT IN ALASKA:

-A Case Study of the Red Dog Mine-



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REGULATORY PROCESSES ASSOCIATED WITH METAL-MINE DEVELOPMENT IN ALASKA: A CASE STUDY OF THE RED DOG MINE

Final Report

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REGULATORY PROCESSES ASSOCIATED WITH METAL-MINE DEVELOPMENT IN ALASKA: A CASE STUDY OF THE RED DOG MINE

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ABSTRACT

Regulatory processes associated with development of a world class lead-zinc mine, Red Dog Mine, in northwestern Alaska were reviewed and evaluated. Informal interviews with key project personnel, consultants, and agency field and permitting specialists provided perspective on the regulatory successes and failures of the project. Due to potential impacts to air quality, water quality, wetlands, and National Park lands, an Environmental Impact Statement was required. By developing a comprehensive baseline of information on the existing environment to aid in minimizing impacts during project siting/design and through regular coordination of evolving project plans with regulatory agencies, the mine developers were able to acquire necessary permits in a timely and cost effective manner. The only major exceptions occurred when inadequate information was collected on dispersal of airborne particulates, rates of surface water run-off, and groundwater quality. These deficiencies resulted in the need for design changes, unscheduled construction, additional environmental monitoring costs, and delays in issuance of the NPDES permit.

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1.0 INTRODUCTION

1.1 SCOPE OF PROJECT

The United States has well developed regulatory statutes for evaluating and permitting mine development projects. Mine development permitting can be implemented at the local state, or federal level. Which level of government has jurisdiction over a particular regulatory area is dependent on the ownership of lands affected, what agreements have been made between government levels, and whether a mine will discharge water or air contaminants.

According to some industry observers, Federal and State of Alaska regulatory structures concerning resource development continue to evolve at an accelerating rate with agency jurisdictional boundaries becoming obscure as the domain and focus of regulatory agencies continue to increase. Overlapping and inconsistent regulations are reported to be increasingly common resulting in delays in regulatory determinations and ever increasing demands by agencies for more and more information appear to be characteristic of the situation. Mine permitting and environmental monitoring requirements are becoming more stringent in Alaska and permitting processes that duplicate State or Federal efforts are beginning to appear at the local level. These industry perceptions create high levels of uncertainty with regard to successful permitting within the budgetary constraints of a mine development project which could affect Alaska's competitive position for exploration and mine development funds.

The purpose of this study is to review the metal-mine permitting process in Alaska and conduct a case study of the permitting process for development of Cominco Alaska, Inc.'s (the Company) Red Dog Mine Project.

Red Dog Mine development is located in northwestern Alaska approximately 82 miles (131 km) north of Kotzebue and 47 miles (75 km) inland from the coast of the Chukchi Sea (Figure 1). The mine site is located on Red Dog Creek in the De Long Mountains of the western Brooks Range. The Red Dog Mine Project is in a remote area with no prior development and no previously published environmental data, i.e., water quality, air quality, meteorological, geologic, soils, etc. The project consists of an open pit lead/zinc mine and concentrator at the inland mine location, with an interconnecting road corridor and port facility at the coast. The mine, mill, tailings pond, housing, water treatment facilities, and port facility are all located on private lands owned by the NANA Regional Corporation, Inc. (the Landowner).

Subsequently, in this document, no reference will be made to specific owner or operating companies or to individual personnel who worked for the Companies or agencies involved with the project. Personnel will be referred to by title or function. The mine operator and managing company will be referred to as "the Company" and the landowner will be referred to as "the Landowner". The purpose of this philosophy is to allow concentration on the process and the details of the process rather than the personalities or the corporate images involved.

2.0 REGULATORY OVERVIEW

The regulatory process governing metal-mine development projects in Alaska, such as Red Dog Mine, is two-fold. First, there is the environmental impact statement (EIS) process under the National Environmental Policy Act (NEPA) of 1969 which declares a national environmental policy and promotes consideration of environmental concerns by federal agencies. Second, there is the actual permitting process for specific project activities including exploration, construction and operation of the facility.

2.1 NEPA PROCESS

NEPA requires that an EIS be "included in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment." Federal actions include a federal agency's decision on whether to grant its required permission for activities of others, such as private businesses or state or local governments. Due to the scope of the proposed Red Dog Mine development and the federal permits required, EPA determined that an EIS would be required for the project and served as the lead agency for the EIS.

The EIS review process is designed to assure that all viable project alternatives have been considered in order to minimize the possibility of damage to the environment. As such, EPA uses a multiple-disciplinary review system for each of the impact statements submitted to the regional office for review. Impact statements are examined by specialists with expertise in air quality, water quality, engineering, biology, land use management, noise abatement, solid waste disposal, toxic substances, economics, and radiation health. Each person with an interest in the proposal has an opportunity to comment. An EIS must contain the following:

1. A description of primary and secondary impacts on the environment including impacts on aesthetics, and aquatic and terrestrial ecosystems.

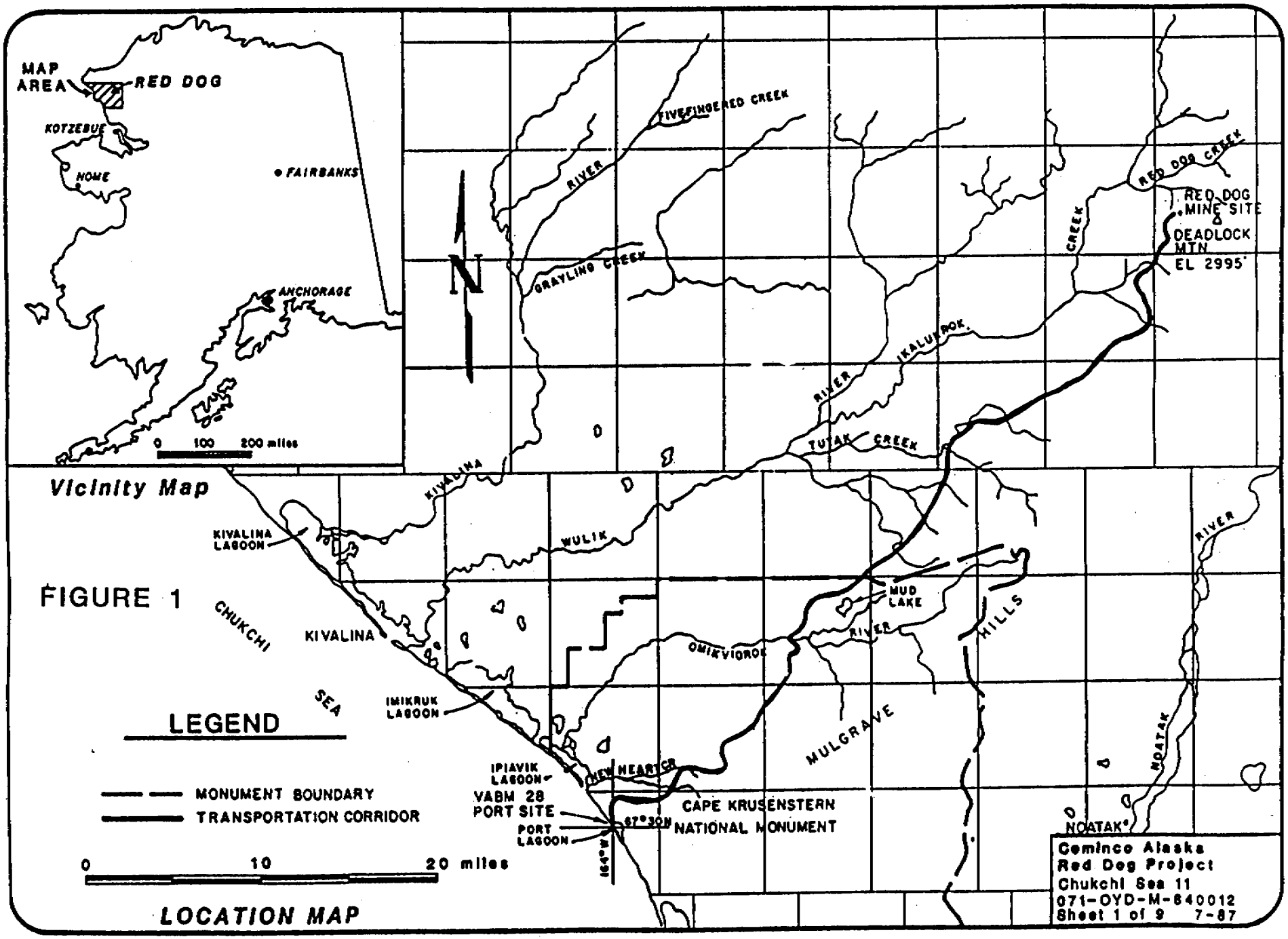
2. A description of any probable impact on the environment, including impact on ecological systems such as wildlife, fish, and marine life. The individual proposing the action must consider and report <u>all</u> alterations to existing conditions whether or not they are deemed beneficial or detrimental.

3. An evaluation of appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.

4. An assessment of the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term environmental productivity.

5. A description of any irreversible and unretrievable commitment of resources.

6. A discussion of problems and objections raised by local entities in the review process, where appropriate.


MAP AREA
RED DOG
KOTZEBUE
NOME
FAIRBANKS
ANCHORAGE
0 100 200 miles
Vicinity Map
N
FIVEFINGERED CREEK
RIVER
GRAYLING CREEK
RED DOG CREEK
CREEK
RED DOG MINE SITE
DEADLOCK MTN
EL 2995'
IKALUKROK
RIVER
TUTAK CREEK
KIVALINA
WULIK
KIVALINA LAGOON
FIGURE 1
CHUKCHI
KIVALINA
SEA
IMIKRUK LAGOON
MUD LAKE
RIVER
OMIKVIOROK
HILLS
RIVER
MULGRAVE
NOATAK
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TRANSPORTATION CORRIDOR
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LOCATION MAP
Cominco Alaska
Red Dog Project
Chukchi Sea 11
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For a reviewer to assess the effects of a project on the environment, the EIS should include detailed information of the existing environmental conditions of the potentially affected area. Prior to or during the EIS process, environmental baseline data is collected to assess existing environmental conditions prior to any developmental impacts.

In the case of the Red Dog Mine project, no published data was available for most of the project area being that it was located in a remote area with no prior development. As such, a baseline data collection program was established to characterize existing environmental conditions of the area. Baseline data collection needs included wetlands, water quality, air quality, biological, sociocultural, and habitat data. For the Red Dog Mine project area, even some of the most fundamental baseline data was unavailable, i.e. meteorological data, bathymetry data for the port site, and hydrogeologic data.

The baseline data for the Red Dog Mine project was collected over a three-year period and served three purposes:

1. to provide background information for project siting, design, and engineering,

2. to provide information from which to adequately assess proposed project impacts to the environment, and

3. to provide an environmental baseline for use in preparation of permit applications by the Company and for the regulatory agencies to determine permit stipulations and monitoring requirements for the construction and operation phases of the project in an effort to minimize negative impacts to the environment.

2.2 PERMITTING PROCESS

Title 6 of the Alaska Administrative Code, Chapters 50 and 80 (6 AAC 50 and 6 AAC 80) provide the regulatory basis for administration of the Alaska Coastal Management Program (ACMP) authorized under the Coastal Zone Management Act (CZMA) of 1972. These regulations establish the Division of Governmental Coordination (DGC) of the Office of Management and Budget (OMB) as the lead agency for the Alaska Coastal Management Program. Under these regulations, DGC is authorized to coordinate a consistency review and render a response concurring in or objecting to a federal consistency certification or determination. With regard to state permit consistency determinations, DGC coordinates the review and renders a determination for a project which requires the permits of two or more state agencies or a federal permit. In a case where project actions require only the permits of a single state agency and no federal permits, the resource agency issuing the permits shall coordinate the consistency review and render a conclusive consistency determination.

For a project requiring a federal permit or the permits of two or more state agencies, such as Red Dog Mine, the applicant submits a packet including all necessary state permit applications, copies of all necessary federal permit applications, and the Coastal Zone Project Questionnaire (CZPQ) to DGC. One exception to submission of a complete permit packet

is exclusion of the NPDES permit. Due to the long lead time for the U.S. Environmental Protection Agency (EPA) to review and approve National Pollutant Discharge Elimination System (NPDES) permits, DGC has a special provision for separating this permit from the initial permit packet. The NPDES permit is then reviewed under a separate consistency determination following the same process described herein. For a project requiring only the permits of a single state agency, the packet and CZPQ are submitted to the agency with jurisdiction over the permits.

The permit packet is reviewed for completeness and, if complete, the project is assigned a number and Day 1 of the review process commences. It should be noted that acceptance of the permit packet does not preclude an agency from requesting additional information or applications from the applicant as necessary for its consistency review or its own statutory responsibilities. On or before Day 2 of the review process, the coordinating agency (whether it be DGC or a state agency), distributes copies of the permit packet to all resource agencies, other state agencies on request, all affected coastal resource districts, and other interested parties. Under a single agency review, DGC participates in the consistency review process in the same manner as the other resource agencies. Under the DGC review process where no additional information is requested by the reviewing agencies, a consistency determination is made by DGC within 50 days of the start of the review process. Should additional information be requested, DGC can stop the clock until the additional information is received and then resume the review. Hence, this process could take considerably longer than 50 days.

Through this process, all resource agencies and interested parties are apprised of project activities from the exploration phase through development and operation, and have the opportunity to affect activities in such a way as to ensure minimization of environmental impacts. As the permits and consistency determination are issued, they may contain operating stipulations and monitoring requirements which, if not complied with, dictate the continued approval of a given permit. All permit stipulations and monitoring requirements are listed as part of the consistency determination. Appendix A provides a list of environmental permits and approvals identified for the Red Dog Mine Project. In addition to permits listed in Appendix A for Red Dog Mine, the Alaska Department of Natural Resources (ADNR) Division of Mining currently requires a reclamation plan under 11 AAC 97.

3.0 CASE STUDY APPROACH

3.1 OBJECTIVE

As noted previously, the purpose of this study is two-fold. The first is to review the permitting process for metal-mine development in Alaska. The second objective is to conduct a case study of the Red Dog Mine to provide a chronology of the permitting process and associated activities from both the mine developer's and the regulator's perspective highlighting efficiencies and inefficiencies in the process. The emphasis on this study is not

so much to detail the specifics of each permitting activity, but to provide a synopsis of the overall environmental permitting approach to mine development.

The case study approach primarily involved interviewing Company and agency personnel associated with the various phases of Red Dog Mine development. The case study consisted of delineating mine development stages, developing a general interview format, and conducting interviews of relevant personnel.

3.2 MINE DEVELOPMENT STAGE DELINEATION

The Company's approach to environmental strategies and permitting associated with Red Dog Mine evolved in accordance with four general stages of mine development:

- Exploration
- Development
- Construction
- Operation

The following is a brief description of each phase of mine development.

Exploration — While specific mine permitting strategies are not major a consideration at this stage in mine development, the manner in which a developer conducts exploration activities can indirectly affect the permitting process during later stages of mine development. Exploration activities can establish the mine developer as an environmentally responsible party or render the developer suspect in future permitting negotiations.

Development — At this stage of a project, project design alternatives are developed, baseline data is collected and it is determined whether or not an EIS will be required. If an EIS is required baseline data is collected and the EIS is prepared. Upon completion of the EIS and subsequent agency review, the critical path and permitting strategy are developed. Throughout this segment of the project, agency communications and contacts are established to facilitate specific permitting requirements prior to commencement of construction activities.

Construction — Construction permits are in place with associated permit stipulations and requirements. Operating permits may still be under review and compliance monitoring is being conducted by regulatory agencies.

Operation — The developer is working with agencies to meet operating permit requirements which may include monitoring, reporting, and operational modifications.

3.3 INTERVIEW STRATEGY

3.3.1 Interview Format

A general interview outline was developed to ensure as much consistency as possible among the interviews. The three primary components of the interview were identification of environmental issues and permit requirements, corporate performance relative to the permitting process, and agency performance associated with the permitting process. The first task of the interview was to establish the interviewees' involvement in the project relative to environmental and permitting strategies and the stages of mine development. Then, the remaining applicable sections of the interview outline were addressed.

3.3.2 Information Sources

Personnel were interviewed from all stages of project development on both the regulatory as well as the Company's side of the project. Table 1 presents a list of personnel interviewed and their association with the project. The individual interview summaries are contained in the accompanying document. Upon completion of each interview, the summary of the interview was provided to the interviewee for review and corrections as necessary.

4.0 RED DOG MINE CASE STUDY

4.1 MINE HISTORY

4.1.1 Site Characteristics

The Red Dog Mine Site area is characterized by mountain slopes, broad stream valleys and coastal lowland lagoon systems. The entire area is underlain by permafrost. Vegetation ranges from dry tussock tundra and wet sedge meadow to lowland sedge-grass marsh. Waterfowl and shorebirds frequent the coast during spring and fall migrations. Portions of the project area provide good habitat for cliff nesting raptors. Six large terrestrial mammal species are found in the vicinity: caribou, muskoxen, moose, Dall sheep, wolf and brown bear. Portions of the largest Arctic caribou herd in North America, range through the area during seasonal migration.

As shown in Figure 2, Red Dog Creek runs through the mine deposit emptying into Ikalukrok Creek which then drains into the Wulik River. Below the mine deposit, both the North and South Fork of Red Dog Creek drain into Red Dog Creek. Prior to mine development, Red Dog Creek above the mineral deposit and the north and south forks of Red Dog Creek exhibited high water quality as did Ikalukrok Creek downstream from the mixing zone of its confluence with Red Dog Creek. However, the mainstream of Red Dog Creek from the mineral deposit downstream to its confluence with Ikalukrok Creek exhibited extremely low water quality due to high concentrations of heavy metals compounded by

TABLE 1
CASE STUDY INTERVIEWS

TITLE	AFFILIATION	PROJECT INVOLVEMENT
Project Coordinator	Cominco, British Columbia	Early Planning, Technical Assistance on Permits
Manager of Exploration	Cominco Alaska Inc.	Early Development Team, Operational Coordinator
Permitting Coordinator, 1982-1985	Consultant	Early Development Team
Permit Coordinator, 1984-1991	Cominco Alaska Inc.	Spanning construction and early mine operations
Permit Coordinator, 1991-Present	Cominco Alaska Inc.	Current operations
Vice President	NANA Regional Corporation, Inc.	NANA in Partnership with Cominco for Red Dog Project
Environmental Consultant	Dames & Moore	Early Scoping and Strategies, Conducted Baseline Studies
Alaska Coastal Management Program Coordinator	DGC, Fairbanks	1986 - Present
Agency Contact	EPA, Region X, Seattle	Lead person on the Red Dog Mine EIS
Agency Contact, Early to Mid-1980's	ADEC, Fairbanks	Project design
Agency Contact, 1987-1991	ADF&G, Fairbanks	Construction and early operations

highly acidic springs which also entered the creek in this area. This naturally contaminated portion of Red Dog Creek was toxic to fish and other aquatic organisms.

Major archaeological sites lie adjacent to the project area within Cape Krusenstern National Monument. The Monument was created to preserve archaeological values on beach ridges south of the project area.

Subsistence is vital to the economic well being and nutrition of most of the area's residents. Approximately 55% of local households depend on subsistence hunting, fishing, and gathering for at least half of their food supply.

4.1.2 Project Conception

The Red Dog deposit was identified as a mineral resource by the U.S. Bureau of Mines in the 1970's. The Company began considering the viability of the project in 1980. Exploration activities of the Red Dog deposit were conducted from 1980-81. At the same time, the Company began negotiating with the Landowner. During the exploration phase, the Company conducted their exploration activities in a such a way as to minimize disturbance to the surrounding environment. For example, all transportation and mobilization of equipment to and from the exploration sites were conducted by helicopter.

A major turning point in the realization of the mine project came during 1981-82, when an agreement was developed with the Landowner to make the mine project a joint endeavor with the Company. With the Company having established itself as an environmentally responsible developer in the exploration phase of Red Dog Mine, initial opposition to mining was reduced and the Landowner was more receptive to considering a mining venture provided the operation would not impact subsistence. By the fall of 1981 the Landowner had warmed up to the project based on the employment opportunities for local people and the willingness of the Company to work on environmental planning for the project. After establishing its right to the Red Dog deposit, the Landowner entered into a partnership with the Company for the development of the mine. A letter of agreement was signed in the spring of 1982. The Company would lease the property from the Landowner and act as operator of the project. The Company's responsibilities would include permit acquisition, design, construction, financing, and operation of the mine. In return, the Landowner would be paid an annual royalty and after recovery of capital eventually receive 50% of the net profits.

The partnership between the Landowner and the Company represents a melding of environmental, social, cultural and economic interests. The intent of the agreement was to allow development in a manner that provided for a long-term economic base for the Landowner's region, jobs for the Landowner's shareholders and other Alaskans, an economic return for the Company, and minimal impacts on the region's subsistence lifestyle.

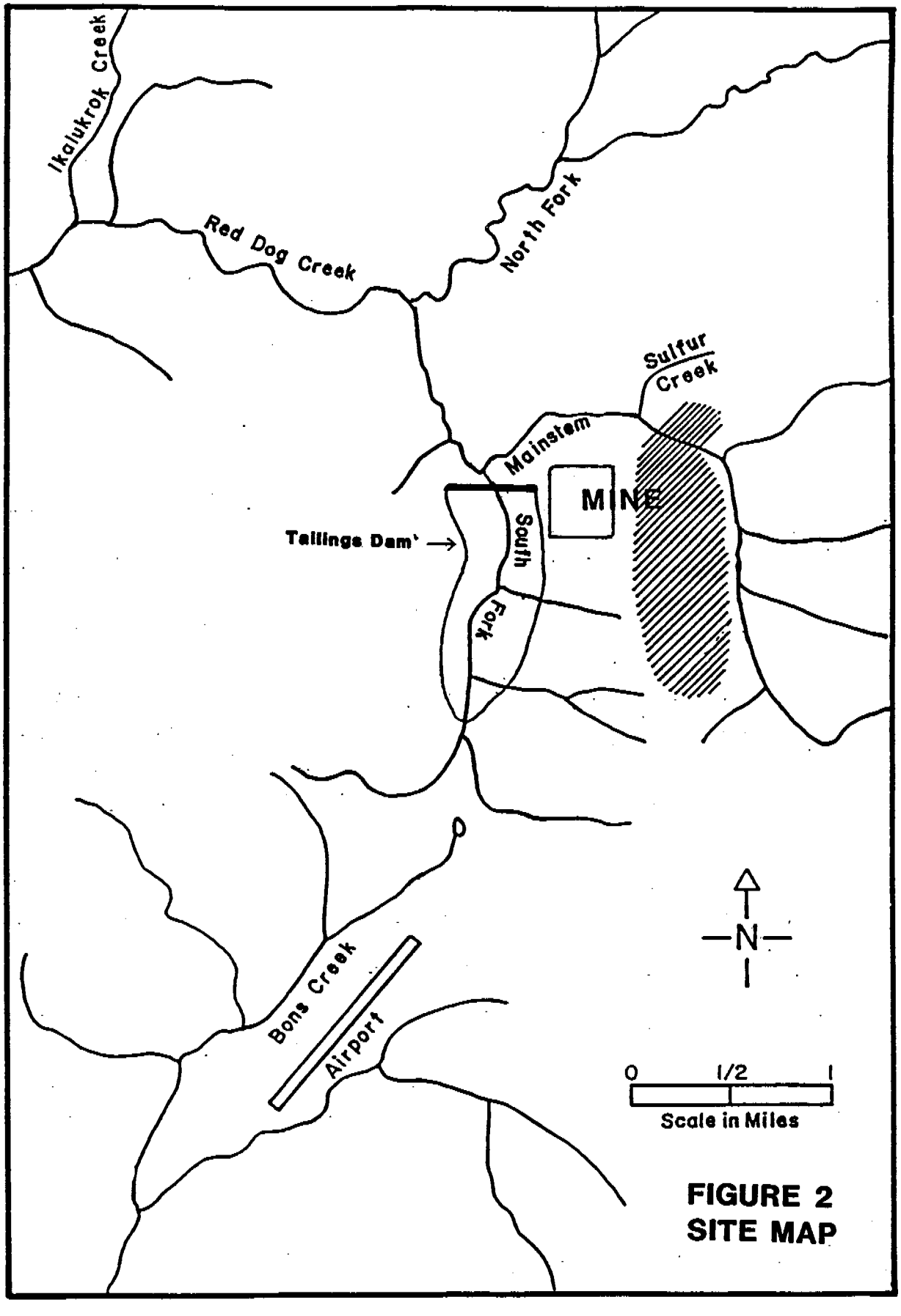


FIGURE 2
SITE MAP

4.1.3 Project Development

The Red Dog Mine Project consists of an open pit lead/zinc mine and concentrator at the inland mine location with an interconnecting road corridor and port facility at the coast. The mine, mill, tailings pond, housing, water treatment facilities, and port facility are all located on private lands owned by the Landowner while the road corridor passes through a portion of Cape Krusenstern National Monument.

Due to the nature of the project, both state and federal jurisdictional boundaries were crossed requiring permits from a number of different agencies. Because of the federal permit requirements, EPA determined that an EIS would be required for the project. The EIS process -- baseline data collection, agency meetings, document preparation, agency review, and final finding of fact -- began in 1981 and was completed in 1984.

Toward the later stages of the EIS process, site plans and environmental baseline data were used to develop the required project permits for submittal under the ACMP process. Section 4.1.4 provides the project timeline relative to the EIS and permitting. Section 4.2.1 provides a detailed discussion of key EIS and permitting issues which drove the permitting process and final realization of the project.

4.1.4 Permitting Timeline

A project timeline of milestone events in the mine's history are shown in Figure 3. The development phase of the mine consisted of project siting, baseline studies, project design and the NEPA process (Environmental Impact Statement). These processes lasted from 1981 to 1984. The permitting process ensued after the EIS was approved in September, 1984. The permit packet was submitted to DGC for consistency review under ACMP on May 25, 1984. The final consistency determination was made on August 6, 1984 and included two U.S. Army Corps of Engineers (COE) permits, the NPDES permit, and an Alaska Department of Environmental Conservation (ADEC) 401 Certification. Since the time of the final consistency determination, numerous permit modifications have been requested due to changes in operations or design over time. Construction began first at the port site (1986), then proceeded to the road (1987-1988), and finally to the mine facilities themselves. Mine facilities were transported in modules over the new road from the coast (1988-89).

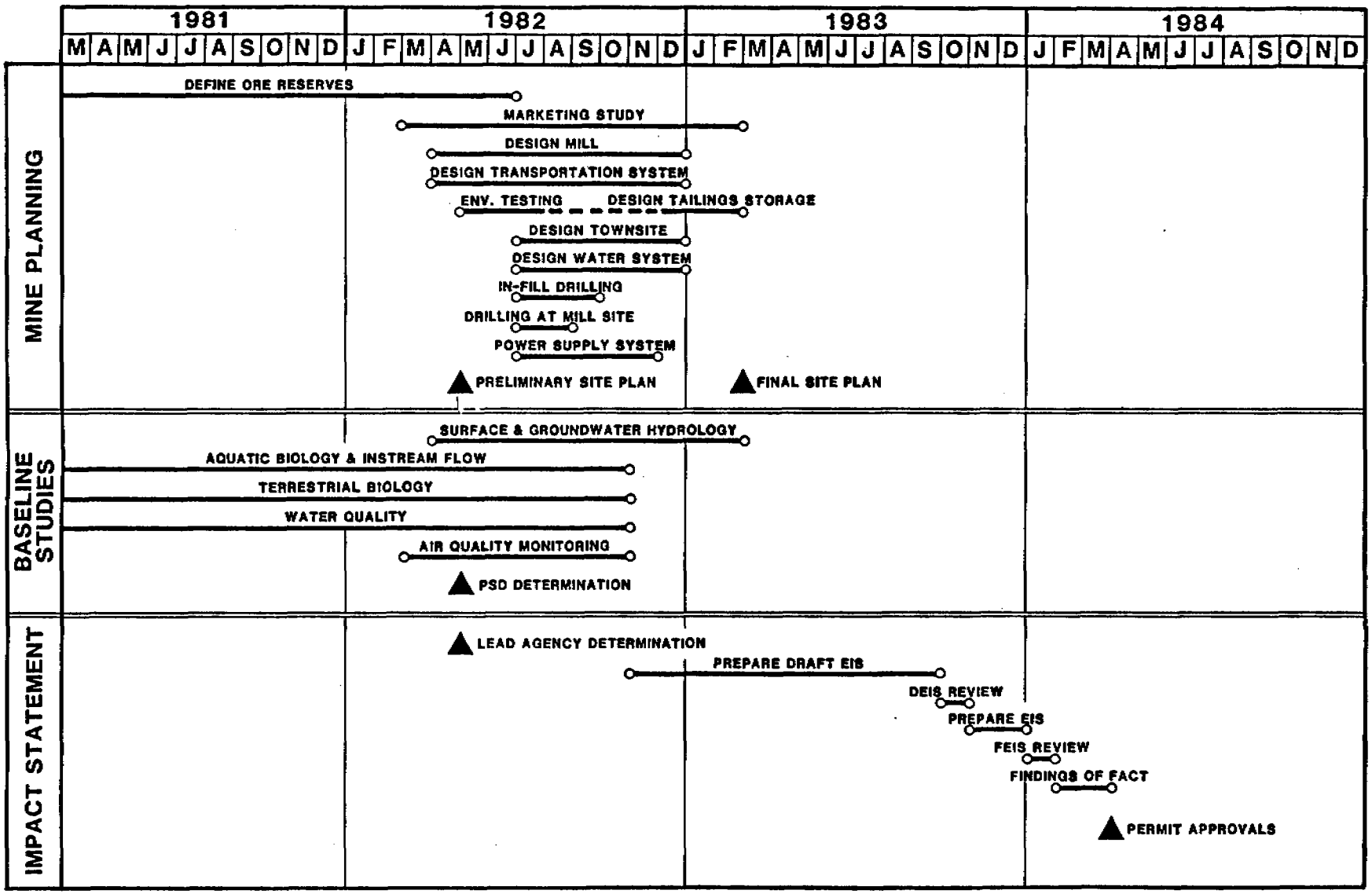
For construction activities, the following permits were required:

•Section 404 permit from the Army Corps of Engineers for construction of the road, transportation facility and material sites, with an accompanying 401 Water Quality Certificate from the ADEC.

•Permits from the ADNR for temporary pads and material sites.

•A Coastal Consistency Determination, from the State of Alaska, administered by the DGC.

FIGURE 3
PROJECT TIMELINE



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- Title 16 Permits from the Alaska Department of Fish and Game (ADF&G) for nine anadromous fish stream crossings for the road.

- Solid Waste Permit (From ADEC)--for both construction and operations activities.

For mine operations, the following permits were also needed:

- NPDES water permits for both the port and mine, and the attendant 401 Water Quality Certificate from ADEC.

- Prevention of Significant Deterioration (PSD) permit, for air quality, from ADEC.

4.2 PERMITTING AND ENVIRONMENTAL STRATEGIES

4.2.1 Identification of Key EIS and Permitting Issues

Three key issues which drove the Red Dog Mine EIS and permitting processes and subsequent realization of the project included:

- Mine Access
- Water Quality/Hydrology
- Air Quality/Meteorology

Mine Access

The location of the port facility was clearly determined by the coastal configuration. However, three alternative road alignments from the port to the mine were considered, one of which crossed through Cape Krusenstern National Monument. An environmental impact assessment of the three road alignment alternatives was conducted with potential environmental impacts being the only consideration. The results of this assessment indicated that the proposed alignment least damaging to the environment was the route which passed through the northern part of Cape Krusenstern with the other two options having higher potential impacts on waterfowl, fishery, and wetland resources.

Selection of the road alignment through Cape Krusenstern proved to be difficult. Sierra Club raised the objection that, politically, they did not want to set any precedence for development of lands through federally preserved lands for any reason. On the other hand, National Audubon Society took the stance that the alternative with the least impact to the environment should be chosen regardless of political boundaries. In the resulting decision, the lowest impacts to the environment won out.

The logistics of gaining rights to use the property to develop the road became the next critical issue. First, the Company pursued authorization via "Title XI" of the Alaska

National Interest Lands Conservation Act (ANILCA), which would allow access across a federal conservation unit. This request was elevated to the Secretary of the Interior for a decision. Concurrently, the Landowner was involved in land exchanges with the federal government, of which the property which would be used for the road corridor was part. The Company and the Landowner were successful in negotiating a land exchange causing the northwest boundary of the Monument to be altered to exclude Monument lands surrounding the preferred transportation corridor. This made a Title XI permit unnecessary. The staff of the National Park Service (NPS) were very cautious in negotiations because of concern about the potential precedents being set for access across federal lands in Alaska. The ability of Title XI to ever function is questionable in cases such as this, i.e., access has never yet been granted under Title XI.

A long series of negotiations culminated in 1986 with an agreement between the National Park Service, the Landowner, and the Company, for the conveyance of a transportation corridor to the Landowner. This easement agreement, signed by the Secretary of the Interior, required an amendment to the Alaska Native Claims Settlement Act (ANCSA). NPS included a set of "Terms and Conditions" on the right-of-way, to ensure continued low impacts during its use. Several cooperating entities (the Landowner, NPS, the Company, ADF&G ADEC, etc.) were required to create a Plan of Operations for the road corridor which would establish both construction parameters and long-term environmental monitoring provisions. The Plan of Operations is periodically updated, not only designating the location and types of activities allowed, but provides a mechanism for change if any of the cooperators deem it necessary at a later date.

Water Quality/Hydrology

As noted in Section 3.1, Red Dog Creek presents a contrast in water quality. It was anticipated that once mining began, overburden materials would have a high potential for leaching of soluble metal oxides and that the wastewater stream from processing of lead and zinc ore would also contain toxic material. As a result a surface impoundment was designed to accommodate mine tailings and anticipated surface water runoff from stockpiled overburden, the active mine surface, and process wastewater. The mine tailings impoundment was to be developed in stages commensurate with mine development over the course of the project.

As it turned out, design of the mine tailings impoundment did not include a number of critical design issues due to a lack of adequate hydrologic, geologic, and climatologic baseline information, e.g., ground water monitoring wells were not included in the baseline data program. As a result, mining activities along Red Dog Creek intercepted an unexpected ground water aquifer at the mine zone containing toxic levels of heavy metals which, once intercepted, discharged directly into Red Dog Creek. This resulted in unscheduled construction of a bypass to carry unpolluted waters of upper Red Dog Creek around the mining operation to a point downstream of the mine. Additionally, the Company constructed a system to route all surface water runoff and intercepted ground water to the tailings

impoundment. It is also clear that site-specific precipitation data and runoff considerations associated with mine development in arctic conditions was not adequately addressed. Precipitation was greater than expected and infiltration of precipitation into the ground was much less than expected due to permafrost conditions. This, combined with additional surface and ground water being routed to the tailings impoundment, resulted in surface and ground water discharges into the tailings impoundment being much greater than anticipated. As a result the mine tailings impoundment filled with water runoff at a much faster rate than expected, thus necessitating the acceleration of impoundment development and engineering design changes.

As noted in Section 3.1, pre-project water quality and biologic data showed that the mainstream of Red Dog Creek from the mineral deposit downstream to its confluence with Ikalukrok Creek exhibited extremely poor water quality. Surface water contamination attributable to interception of the ground water aquifer and greater surface runoff discharges into Red Dog Creek than originally anticipated resulted in lowering the water quality of the Ikalukrok and Wulik Rivers downstream of mainstream Red Dog Creek for approximately six months. According to Company personnel, the water quality problem was corrected by the Company through construction of a clear water bypass system and water treatment process.

Air Quality/Meteorology

At the time that baseline studies and early permitting activities were being conducted, the Company felt that air quality regulations were relatively new and the requirements for Prevention of Significant Deterioration (PSD) determination were not very well defined. As such, the Company decided to collect only air quality data which they felt was necessary for the PSD permit application. As a result only limited ambient air quality data was collected. Particulate matter (PM-10) data was not collected at all, resulting in little information on naturally occurring particulates and the effect of wind on the distribution of mineral oxides which were common on the undisturbed surface of the mineral deposit prior to mining.

As with the Company's other mine development projects, they attempted to keep the layout of the mine facilities compact, both for logistical reasons and to minimize landscape disturbance. No special provisions were made in siting or designing mine facilities to minimize air health risks to mine personnel as these potential risks were not known at the time due to limited baseline data. This compact mine camp design resulted in employee housing facilities being located downwind from the coarse ore storage pile. As a result of air quality monitoring during the early operational phase of the mine, it was discovered that unacceptable levels of airborne particulates were present near the housing facility and noncompliance orders were issued by ADEC. According to Company personnel, the company has since completed several construction projects which have effectively improved air quality, bringing them into compliance with ambient air quality standards.

4.2.2 Corporate Performance

Many of the key people involved in exploration and early development activities associated with the project were Canadians unfamiliar with the U.S. permitting system.

Early on in the project development phase, the Company made the decision to utilize people with Alaska regulatory experience. While the Company had taken a dominating approach to permitting in Canada, it was found that a more cooperative and involving approach to permitting in the U.S. would be more conducive to permit approval. Environmental consultants were instrumental in steering this course for the development team.

As mentioned previously, the Company had already developed a joint venture with the Landowner prior to project development. Based on early input from consultants, the Company proceeded to garner support for their project by "working from the bottom up" rather than from the top down. The small development team at the Company held many preliminary meetings with residents of the region and with pertinent agency personnel in order to explain the scope of the project. The Landowner assisted in organizing meetings in local villages. Discussions were also held with state and federal legislators and government agency staff. The Company invited all interested parties to tour the mine site area. This allowed members of the general public to see the area first hand, speak candidly, and to get direct answers to their questions. Few formal meetings were held in offices. These tours were offered throughout the preconstruction phase of the project.

While the EIS was being prepared, a number of project designs were still evolving. Whenever the Company was unsure about which design alternative to use, they usually chose the worst case scenario with regard to environmental impacts to include in the EIS. As such, subsequent changes in project design generally resulted in lower impacts to the environment. Since the changes made actually reduced potential impacts, agencies usually approved the changes rather than require the Company to re-do their EIS. As such, continued open communications enhanced regulatory and public trust in the Company's operations and facilitated permit approvals despite numerous changes in project design throughout the development phase of the project. Many agencies no longer interpret this authority in this manner and supplemental environmental analyses may be necessary for almost any changes.

4.2.3 Agency Performance

In general, the Company found agency personnel cooperative in working through EIS and permitting issues and visa versa. The only areas where agency interaction in the permitting process broke down appeared to occur when there was conflicting agency input or lack of communication between the various parties.

Conflicting Agency Input

During the road construction phase of mine development, there were several instances where National Park Service (NPS) and ADF&G had different opinions. For example, ADF&G favored the creation of pools in material sites, while NPS had a policy against any new waterbodies in the National Monument. Likewise, NPS was originally against the use of calcium chloride to stabilize dust on the road, while ADF&G thought it was less destructive than the dust. ADF&G was pleased to find that the cliff face of a quarry site had become a favored nesting site for ravens and rough-legged hawks, while NPS still wanted the

site to be reshaped which would have destroyed the new nesting habitat. NPS was reluctant to endorse "unnatural" nesting sites.

Also during the road construction phase of the project, problems arose between NPS and ADF&G over the construction permits. The original ADF&G Title 16 permits were written with the understanding that construction would take place in winter. Unknown to ADF&G, NPS later signed off on summer construction on streams inside the Cape Krusenstern National Monument. Because construction changed to summer, the construction contractor could no longer use snow/ice bridges to move equipment over the streams during road construction. The summertime solution was to construct temporary gravel bypasses containing culverts (called "shoo-flies"). These bypasses were permitted by ADF&G with the stipulation that they be removed by "break-up" of spring, 1988. On April 28, 1988, runoff from a spring rainfall caused the streams to breach 9 of 11 temporary bypasses. Some cross-drainage culverts washed out as well. As a result, ADF&G issued 9 Notices of Violation to the Alaska Industrial Development and Export Authority (AIDEA) for these disruptions in anadromous fish streams. AIDEA then stepped in at the construction site and directed the construction contractor to rehabilitate the crossings. However, the construction contractor's rehabilitation crew sometimes got ahead of ADF&G recommendations, and some mistakes were made. This was caused by an awkward chain of command among the construction managers. The Landowner showed concern about potential stream damage and asked for restoration of the impacted areas.

During mine operations, the Company got caught in the middle of a dispute between the U.S. Department of Interior Minerals Management Service (MMS) and the State of Alaska on jurisdiction over offshore structures. The structure was already in place but because of erosion, the Company needed to place some fill on the dock structure at the port. The Company applied to the COE for fill authorization. MMS found out about it and put a stop to it based on their jurisdiction over offshore drilling. Though this constituted the ninth modification of the permit, it was the first time MMS had spoken up since the process started. MMS wanted the State to agree that the State of Alaska's jurisdiction ended at the beach and not at the end of the offshore structure. The State did not agree with MMS's contention. In the Company's opinion, the erosion had to be dealt with immediately so the Company told the COE that they were going to place the fill anyway without the permit in order to minimize the damage to the dock. The Company didn't get fined, but they did get a letter from the COE saying that they were in violation. It took about a year to get the permit modification.

Also during mine operations, when the water quality problems arose, it was frustrating for ADF&G staff because they could not apply their own permit process. ADF&G had been instructed not to involve themselves in reaches of the stream that had not been designated as anadromous. In this case, the reach of Red Dog Creek being polluted fed into valuable anadromous fish habitat with high Dolly Varden populations, but was not designated as an anadromous fish stream. Thus ADF&G had to rely on ADEC to deal with the problem. However, ADF&G had more motivation to quickly resolve the issue because of the value of the fish resources at stake. Another drawback with this arrangement was that ADEC people were not necessarily biologically-oriented.

To evaluate the damage, ADF&G set up a fish monitoring program and found that fish densities were much higher in stream reaches that were unaffected by the contamination. Tests revealed elevated levels of heavy metals in Dolly Varden specimens downstream that were above the baseline levels. In winter (Feb-Mar 1991), the Company proceeded to construct a bypass of Red Dog Creek around the mine operations. At that time, ADF&G was given approval to regulate permits on Red Dog Creek for this project. Diverted clean water was reintroduced to the bed of Red Dog Creek below the mine, while dirty water was pumped to the tailings pond. This bypass resulted in much better water quality downstream--the red color was gone, aquatic insects returned, algae began to grow, and bird use was observed. Somewhat elevated levels of heavy metals were still detected in certain fish tissues (e.g., gills, kidney and liver), but were not deemed to be a hazard to the fish or consumers. ADF&G is now receiving funds from the Company to monitor the clean-up/recovery of the stream. According to the Company, 1992 monitoring indicates an overall improvement of water quality since the construction of the bypass system.

Lack of Communications

During the road construction phase of the project, a number of obstacles arose due to lack of communication between the Company and their contractors and with agency personnel. There was no support (e.g., transportation) planned for on-site visits by regulators (although AIDEA did become generous in sharing their vehicles). It would have been more cost-effective for the contractors to either have their own environmental consultant on-site, or to have provided support to the state agency people (since the road was a state project) than to fund remediation of construction errors. Money could have been transferred from AIDEA to ADF&G at a lower overall cost. AIDEA did provide some support to ADF&G after the road crossings washed out. ADF&G perceived that one field monitor (e.g., from ADF&G, or NPS) could have been able to scout out the concerns of both state and federal agencies during construction, though each agency would have conducted its own permitting and enforcement.

There was confusion about leadership on the construction site. AIDEA, the owner of the road, sub-contracted construction management to the Company, who subcontracted work to Ralph M. Parsons Co., a world-wide construction management company. Parsons watched over construction company responsible for building the road. Two AIDEA representatives worked on-site. The staff from Parsons had little Alaskan construction experience. Initially, the Parsons manager was not cooperative with ADF&G. They refused to provide living accommodations and said they (Parsons) had been delegated state authority from AIDEA. But the on-site AIDEA representative eventually found space for ADF&G and other agencies. Whenever problems developed, AIDEA field staff had to contact their supervisor in Anchorage. If the Anchorage supervisor agreed, Parsons was issued a decision. Sending ADF&G input via Anchorage and back to the crew would take several days, during which time irreversible actions may have occurred.

Additionally, while the on-site labor force received a general orientation, most were not informed of the specific environmental controls and permit stipulations, so they never understood the potential impacts of construction in fish streams. If they had understood the state stipulations, they probably would have been happy to comply. As it was, the ADF&G

representative was seen as outside of the chain of command, and was told not to speak directly with crews.

4.3 ENVIRONMENTAL PERMITTING COSTS

Table 2 provides a summary of costs associated with environmental permitting of the Red Dog Mine Project.

TABLE 2 - RED DOG MINE
ENVIRONMENTAL PERMITTING COSTS

Environmental Baseline Data Collection (Consultant)	$1.2 Million
EIS Preparation (Consultant)	$300K
Environmental Permitting Coordinator	
During Baseline and EIS (Consultant)	$156K/yr.
Construction	
1 Company Employee (Salary)	$40K/yr.
Other Costs	$110K/yr.
Operations	
1 Company Supervisor and 2 Environmental Technicians	$1 Million/yr.

5.0 DISCUSSION

Three issues continually arose throughout the case study as important factors related to the permitting process for Red Dog Mine. These issues included the Company's approach to the permitting process in general, the Company's approach to working with agencies, and collection of baseline data.

Permit Process in General

We asked all the Company personnel whether they were satisfied with the permitting procedure in the case of the Red Dog Mine. All of them answered affirmatively, with the exception of specific situations as noted below.

A number of factors contributed to the Company's success in the permitting process. Previously noted were the establishment of open communication with regulators and interested parties early in the process, and the beneficial involvement of the Landowner. Other factors appear to include the good preparation that the Company permitting coordinators put into permit planning. The permitting coordinator developed a chart for tracking all the details (e.g., time schedules, supporting data needed, turnaround times). The total number of permit actions came to approximately 70 for the combined construction of the road, mine and port. With good preparation and realistic expectations, the Company was not really held up by permitting delays. The biggest delay encountered in construction was the road access issue.

The Company permit coordinator found that most of the problems encountered were the result of the Company changing their mind after the permitting process had begun and not collecting enough baseline data, e.g., the location of the concentrate building was changed four times. By early 1991, the Company had pursued over 12 modifications of the COE permit for the road, and 6 modifications of the mine permit. When a change was made and the permit process was started, the Company would find that the alternative was not feasible and there was insufficient baseline data to indicate that ahead of time. Thus the later permit coordinator would have spent a lot more time and money on the baseline studies. The inadequacy of the baseline information, specifically in the areas of water and air quality data, cost the project during construction and operation phases.

One of the early project participants felt the permitting process was not efficient because there was so much overlap in agency jurisdiction. Examples include NPS and ADF&G conflicts over the road construction and other construction permits, MMS and State of Alaska conflicts regarding jurisdiction over offshore structures, and ADF&G and ADEC conflicts over water quality issues.

During construction the company permitting coordinator would prepare draft permit applications and circulate them to key Company and AIDEA personnel for review and comment. Permit applications were completed following staff input. This method proved effective.

Also, during the construction phase of the project, the environmental coordinator position was moved from Anchorage to the mine site. This greatly improved environmental coordination because the Company representative became directly involved in weekly management meetings at the mine. Up to that point, there was no one at the upper mid-management level to bring attention to solving environmental problems. The environmental staff was also augmented, making it possible to keep up with all the reporting requirements of different agencies.

Working with Agency People

One successful approach that should serve as an example for other projects was the Company's continued communication with the agencies, holding meetings on a regular basis even after all the construction permits were obtained and operations began. This method of agency communication proved worthwhile to the Company, because the agencies were cooperative and able to respond quickly when a change or an emergency situation came up. In one case, when the construction crew ran out of potable water, they were able to obtain a drinking water permit to withdraw water from the coastal streams within 24 hours. The DGC facilitated quick response after one phone call from the Company. In other cases, the ADF&G representative would respond to permit modifications immediately in the field. The agencies were very responsive whenever small emergencies arose.

One of the early project managers suggested that agency people are more efficient at their job when they have adequate support from their own superiors as well as project proponents. This enables agency personnel to get onsite and collect information first-hand.

In general, the Company staff felt that, at times, the agency staff they dealt with in the beginning did not always have the expertise to recognize potential permitting problems with the project. Among agency and industry personnel, the most effective people were those that had the most varied experience with projects in northern Alaska. Those people had the broadest perspective of what and how project adjustments could be made.

In the end, the decisions made regarding baseline studies required a balance of the two approaches. The early project managers were motivated to pare down the issues to the bare minimum. On the other hand, problems related to airborne particulates or mine drainage behavior could have been avoided with a sharper focus on information needs. Taking these complications into account in before project design was completed would have averted expensive corrections at a later date.

Baseline Studies

The interviews revealed several conflicting opinions regarding the baseline studies for the project. The leaders in the preconstruction phase of the project voiced a different mind-set than the permit coordinators during the construction and operation phases. The initial group stated that their concern was to expend the least amount of effort on baseline data collection until they knew whether the project would actually proceed. The Company was not operating on a large budget in the early 1980's. The questions in their minds in the early stages were "What can be done to make this mine become a profitable project? What do we need to do to get the basic operating permits? What are the minimum expenditures to accomplish this goal?" The first priority was to secure an approved right-of-way. The Company was unwilling to fund extensive baseline studies until the issue of access was resolved. This did not happen until long after designs were completed. Another factor limiting the amount of baseline data collected was that the Company managers from Canada were not accustomed to funding the extensive baseline studies often required to complete the permitting process in the United States.

Most people interviewed conceded that more comprehensive baseline data would have been prudent for the Red Dog project. The Company could have avoided many operational permitting problems and major costs without much additional effort in their baseline research.

Hind site regarding baseline data collection indicates that additional water quality, air quality, meteorologic, hydrologic, and hydrogeologic data collected during the early stages of the project would have reduced costs associated with permit compliance in later stages of mine development and operation. Additionally, better communications between environmental and scientific specialists with project design engineers may also have alleviated some problems later on in the project.

6.0 CONCLUSIONS

The primary problem areas encountered during the permitting process for Red Dog Mine included:

- State and Federal water quality permits related to the zone of active mining, discharge from the tailings impoundment, and wastewater from housing facilities at the port

- State air quality permits covering air particulate matter control at the mine site

Minor problems were encountered related to permit compliance monitoring during road construction as a result of a complex chain-of-command involving supervisors from the Company, AIDEA, and various construction contractors.

Overall corporate performance was excellent based on a philosophy that emphasized regular public involvement and regulatory agency coordination and early planning in advance of detailed project engineering and permitting. However, early uncertainty about the viability of the project caused financial constraints that resulted in insufficient baseline data in several disciplines.

Closer coordination between air and water quality specialists and facilities designers may have reduced or eliminated many of the non-compliance issues identified during early operations of the mine.

Except for NPDES permitting, regulatory agencies were very responsive and the conclusion of essentially all mine personnel interviewed was that the permitting process did not delay the project. Permitting and compliance monitoring functioned particularly well when agencies were able to have personnel assigned to the project who could visit the project area on a regular basis and coordinate directly with mine personnel. In the case of the NPDES permit process, there was minimal on-site involvement of EPA staff and some permit applications are still pending at the time of this report.

The lessons learned from the Company/Landowner Red Dog Mine experience are:

- Set aside adequate time for project planning prior to initiating the permit process

- Develop a clear understanding of permitting requirements prior to completing a scope of work for baseline data gathering

- Work closely with regulatory agencies to minimize misunderstanding and compliance problems

- The cost of remedial action during mine operations is much greater than the cost of developing an adequate data base prior to construction

- Interdisciplinary specialists should be encouraged to communicate directly with design engineers to reduce the risk of permit non-compliance

- The Red Dog Mine Project went smoothly and on schedule because of a strong public/agency involvement program and comprehensive early planning

Some of these problems could have been avoided by having a stronger data base on air particulates, precipitation, surface runoff, permafrost conditions, and groundwater quality. Closer coordination between baseline data specialists and design engineers may have also reduced the potential for design change contingencies.

In retrospect, the Company should have taken more water quality data up front. Even though it was documented before the project that Red Dog Creek was already laden with heavy metals, they should have better documented the baseline water quality and periodic die-offs of aquatic organisms downstream attributed to heavy metals poisoning during natural flooding events. In that situation the Company would have had a record of natural variation to present when the water quality of Red Dog Creek deteriorated after mine operations began. In the early stages, however, the road right-of-way issue was much more controversial and took precedent over potential problems with water quality at the mine site.

Agency people later recounted that even with the baseline data available before construction the need for a bypass of Red Dog Creek around the mining zone should have been anticipated. This was discussed in the early 1980's, but the Company viewed the bypass as a future requirement during expansion of the mine. Unfortunately mining began without a stream diversion which ultimately resulted in severe heavy metal contamination of Red Dog Creek and fines from the EPA. As a result a stream diversion had to be constructed on an emergency basis which impacted mine operations.

The Company should also have measured total metals rather than dissolved metals during the first year of the baseline studies for water quality. Since they did not, they could not come up with any meaningful comparisons later on. Because of inconsistent techniques, the unsaturated groundwater issue was never fully understood, despite the amount of data previously collected. This could have been accomplished by following the State water quality standards more closely. The company should also have paid more attention to measurements of surface runoff and precipitation.

The Company did have hydrological information available on permafrost and surface water drainage, but the project design people didn't utilize. When the rains came, the site flooded. This illustrates a universal problem in project development. With every project, one of the key challenges is to enhance the internal communication between the technical people, the people with local experience, and the overall project promoters. In retrospect, better internal communications could just about always have improved the flow of the project and avoided some mistakes. This was the case for Red Dog as well.

Had the information been available for facility planners it may have been possible to locate the personnel accommodations, offices, etc., upwind of the coarse ore storage pile to reduce risk to mine personnel and to prevent violation of state air quality standards.

The mine camp design has resulted in continuing violations of air quality standards that may still require expensive design changes before it is resolved. At present, the Company conducts blood level surveys and monitors blood levels on all their employees.

The Company permit coordinators in later stages of mine development and early in the operations phase had to deal with many complications because of the inadequate baseline data. Even after the Company did know that the project would be constructed, they did not start adjusting the funding allocated to start-up studies. Spending a bit more in the early stages could have saved a bundle later on. For example, since they had no baseline data on air quality, they had to hire consultants at great expense to remedy the problem.

A contrasting opinion identified during interviews of project personnel that of the early-vs-later permit coordinators on the utility of the Division of Governmental Coordination (DGC, State of Alaska) in the permit process. Those involved early in the project felt that the Coastal Zone Consistency Determination came at an awkward time and delayed the project flow. However, people that later dealt with permits and permit modifications after the EIS found that the coordination through the DGC helped the Company to receive their permits in an expeditious manner. The DGC role of bringing all the parties together to discuss permits was quite useful, and the Company's staff were able to respond to small emergencies quickly.

Several of the Case Study participants lauded this approach. Taking agency people to the proposed site helps to make the permitting process run more smoothly as many questions were answered more completely early on, and a continuity of rapport was created.

According to one consultant, the key to successful project development is the company's approach and the personalities involved. However, if polarization should occur with the public or regulatory agencies, this "open communication" approach won't necessarily work. As such, it is prudent to keep agency personnel informed of project-related information.

APPENDIX A

ENVIRONMENTAL PERMITS AND APPROVALS

APPENDIX A

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE RED DOG MINE PROJECT

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
Federal Agencies		
Environmental Protection Agency	National Pollutant Discharge Elimination Permit NPDES	Permit required for discharge of wastewater from a point source into federal and state owned waters. The Permit is required for mine and sewage lagoon discharges and for stormwater runoff.
Environmental Protection Agency	Spill Prevention Control and Countermeasure Plans	Plans are required for oil storage facilities storing in excess of 660 gallons in a single container above ground; in excess of 1,320 gallons in aggregate in tanks above ground; or in excess of 42,000 gallons below ground.
U.S. Fish & Wildlife Service	Section 7 Consultation	A Section 7 consultation is required to assure protection of endangered or threatened species and wildlife. The presence of the Peregrine falcons and bald eagles or golden eagles in the project vicinity triggers the need for the consultation. The National Marine Fisheries Service is also involved in the interest of marine mammals.
U.S. Coast Guard	Private Aids to Navigation	Private aids to navigation are usually required on man-made structures in or over navigable waters.
U.S. Coast Guard	Notification of Fuel Transfer Procedures	The U.S. Coast Guard requires notification outlining fuel transfer procedures from barges to the shore. They may make recommendations on the operating procedures.
Federal Aviation Administration	Notice of Proposed Construction or Alteration	Applicant is to notify the FAA if any proposed structure is over 200 feet or is within 20,000 feet of a runway (100 to 1 horizontal slope).

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE RED DOG MINE PROJECT

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
Federal Agencies (Cont'd)		
Federal Aviation Administration	Notice of Landing Area Proposal	FAA notification is required if an existing airport runway is altered in any way. Upgrading and resurfacing of a runway is considered an alteration for purposes of this notification requirement.
Bureau of Land Management	Road Right-of-Way Approval	Required for that part of the road crossing federal public lands under BLM management (Red Dog Valley).
Bureau of Land Management	Material Sites	Required for sites on land managed by BLM.
National Parks Service	Road Corridor Agreement	A negotiated settlement for use of the road corridor crossing Cape Krusenstern National Monument.
U.S. Army Corps of Engineers	Section 404 Permit	A Section 404 permit is required when wetlands are affected by the discharge of dredge or fill material, or construction activities. For this project, permits were required for road construction, material sites, and mine facilities.
U.S. Army Corps of Engineers	Section 10 Permit	A Section 10 permit is required for the construction or placement of structures in navigable waters. Installation of a port and concentrate transfer facilities resulted in a requirement to obtain this permit.

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE RED DOG MINE PROJECT

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
Federal Agencies (Cont'd)		
Advisory Council on Historic Preservation	Review/Approval that proposed actions do not adversely impact National Register and eligible properties	The Council protects properties of historical, architectural, archaeological and cultural significance at the national, state and local level by reviewing and commenting on Federal actions affecting National Register and eligible properties.
State of Alaska		
Division of Governmental Coordination	Coastal Consistency Determination	Each state agency with permit review authority must find that proposed activities within the coastal zone of Alaska are consistent with applicable standards of the coastal management program. All federal permits must comply with all state agency statutes and regulations. The Division (DGC) coordinates all agency determinations and permit applications.
Department of Environmental Conservation	Solid Waste Disposal Permit	A permit is required for permanent site disposal of solid, semi-solid, or liquid waste. This project required several during construction.
Department of Environmental Conservation	Plan Review of Public Water Supply System	A plan review for all facilities providing water for human consumption to more than one single family residence.
Department of Environmental Conservation	Plan Review of Sewage Systems or Wastewater Treatment	DEC reviews all plans for facilities which collect or treat wastewater or sewage. Plans must be approved before construction commences.

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE RED DOG MINE PROJECT

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
State Agencies (Cont'd)		
Department of Environmental Conservation	Financial Responsibility Statement for all Facilities and Vessels Handling Crude Oil and Petroleum Products	A financial responsibility application form is required for the project. This requirement applies to tank vessels, barges and oil terminal facilities.
Department of Environmental Conservation	Food Service Permit	Permit is required when food service operations serve more than 11 persons per day.
Department of Environmental Conservation	Oil Discharge Contingency Plans for Facilities and Vessel Handling	Oil discharge contingency plans are required for fuel transfer operations in state water and fuel storage that may affect state waters.
Department of Environmental Conservation	Certificate of Reasonable Assurance (401 Certificate)	DEC must issue a 401 Certificate to accompany any federal permit issued under the Federal Clean Water Act. In this case the U.S. Army Corps of Engineers Section 404 and Section 10 permits, and federal NPDES permits, triggered the need for this state certificate.
Department of Environmental Conservation	Air Quality Permit (PSD)	Certain source types which emit more than 250 tons per year are subject to these permit requirements. Road dust, wind-blown contaminants and emissions from generators were regulated for this project.

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE RED DOG MINE PROJECT

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
State Agencies (Cont'd)		
Department of Fish & Game	Fish Habitat Permit	An anadromous fish stream permit (Title 16) is necessary if heavy equipment usage or construction activities disturb the natural flow or bed of a designated anadromous fish stream, river, or lake. These permits also stipulated how stream water withdrawals would be conducted.
Department of Natural Resources, Division of Land and Water Management	Water Rights Permit	This permit is required when waters owned by the State of Alaska are diverted or appropriated for private use, such as for permanent water rights at the mine site.
Department of Natural Resources, Division of Land and Water Management	Temporary Water Use Permit	This permit was required for water withdrawals along the road during construction. This permit lasts for the length of a temporary project.
Department of Natural Resources, Division of Land and Water Management	Land Use Permit	A land use permit was required for the installation of a mooring buoy in state waters and material sites along the road right-of-way.
Department of Natural Resources, Division of Land and Water Management	Tidelands Lease	A tideland lease is required to conduct any operations on state tidelands.
Department of Natural Resources, State Historic Preservation Office	Concurrence with the Advisory Council on Historic Preservation	In accordance with information provided by the Advisory Council on Historic Preservation, SHPO will provide a determination regarding project impacts on known cultural resources.

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE RED DOG MINE PROJECT

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
State Agencies (Cont'd)		
Department of Public Safety	Life and Fire Safety Plan Check for the Construction and Occupancy of Buildings	Required before construction to insure compliance with Fire Safety regulations that protect the public from personal injury and property loss.