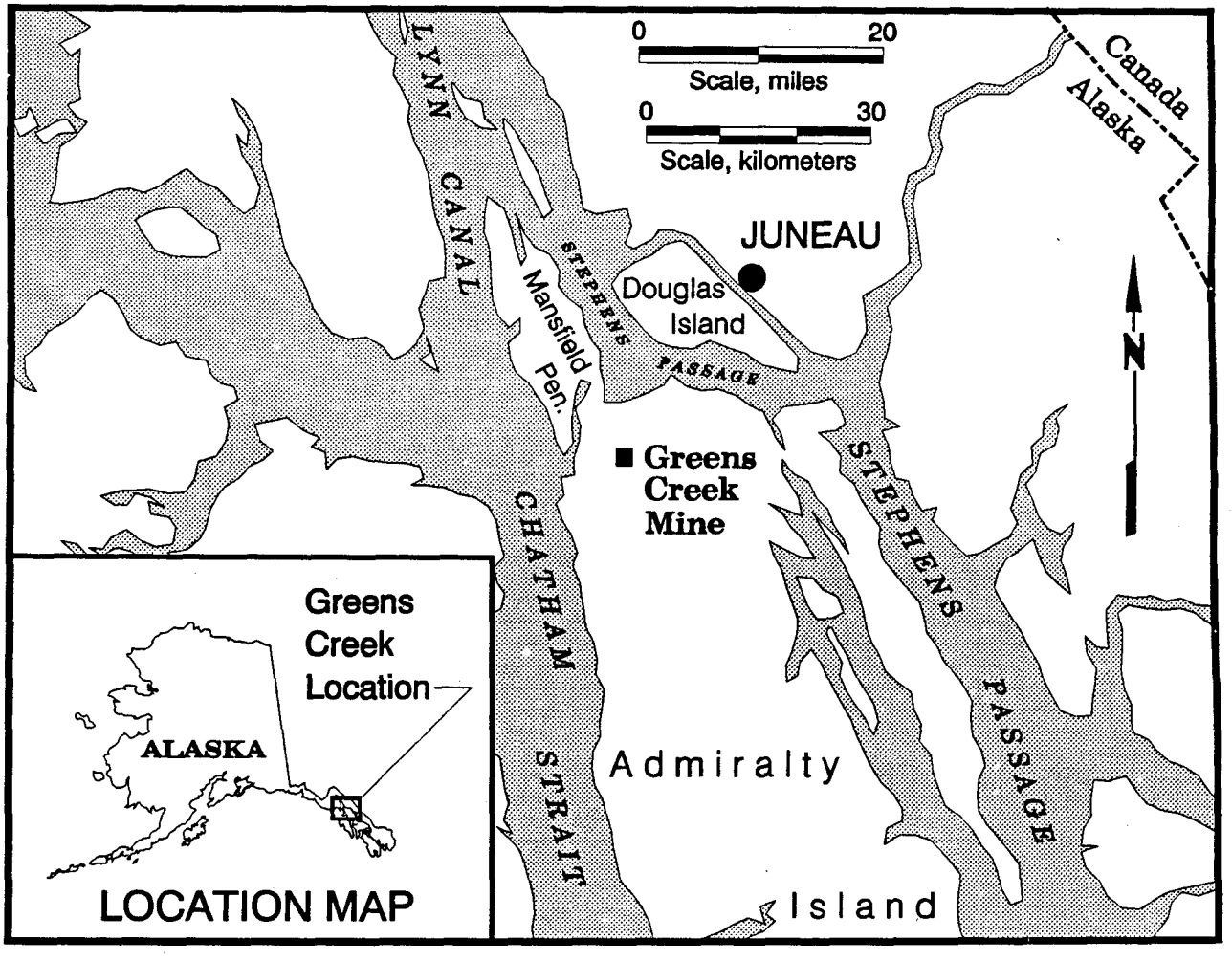
REGULATORY PROCESSES ASSOCIATED WITH METAL-MINE DEVELOPMENT IN ALASKA:

-A Case Study of the Greens Creek Mine-



U. S. DEPARTMENT of the INTERIOR
Bruce Babbitt., Secretary

BUREAU of MINES
Hermann Enzer, Acting Director

OFR 83-93

REGULATORY PROCESSES ASSOCIATED WITH METAL-MINE DEVELOPMENT IN ALASKA
A CASE STUDY OF THE GREENS CREEK MINE

Final Report

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REGULATORY PROCESSES ASSOCIATED WITH METAL-MINE DEVELOPMENT IN ALASKA
A CASE STUDY OF THE GREENS CREEK MINE

By G. Andrews[1]

ABSTRACT

This case study details the process that was used for project planning and permitting for the Greens Creek Mine, located near Juneau Alaska, as seen through the eyes of one of the primary environmental consultants. This case shows how a Company could involve the public and the agencies in the early 1980's and develop a project sensitive to concerns expressed with a high level of environmental protection. Comparisons are made to the current environmental permitting situation.

Initial baseline studies performed during the exploration phase provided helpful information for more detailed environmental work in 1980-1981 as planning and permitting formally got underway. Since the mine was in a National Monument and abuts up to a designated wilderness, the Monument Manager administered the project for the lead agency, the USDA Forest Service. Planning and permitting progressed smoothly to a Final Environmental Impact Statement (FEIS) in 1983. Metal prices were depressed when the FEIS was completed and the project permitting proceeded slowly. Ownership changed several times in the mid-1980's. New owners re-evaluated the project and suggested five changes that required a supplemental EA prior to development. The project was fully permitted and started construction in 1988. Operation began in 1989. Today the environmental process in southeast Alaska is now much more complex, detailed, expensive, and time consuming than in the early 1980's. Significant issues discussed that may impede development and operation include overlapping agency jurisdictions, personal agendas of agency staff, conflicts between agencies that impede project progress, changing regulations, and a well organized environmental opposition.

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GLOSSARY AND TERMS

Specific terms that may not be commonly understood, standard agency designations.

ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADNR (DNR)	Alaska Department of Natural Resources
ADF&G	Alaska Department of Fish and Game
ANILCA	Alaska National Interest Lands Conservation Act of 1980
CBJ	City and Borough of Juneau
CEQ	U.S. Council of Environmental Quality
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
Company	The mining company; Noranda in the early project stages, Amselco and Kennecott in the later stages
CWA	U.S. Clean Water Act
CZM	Coastal Zone Management
DEIS	Draft Environmental Impact Statement
DGC	Alaska Division of Governmental Coordination
DNR	Department of Natural Resources
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FONSI	Finding Of No Significant Impact
USDA,FS/USFS	U.S. Department of Agriculture, Forest Service (Including the Tongass National Forest and the Admiralty Island National Monument)
GPM	Gallons per minute
IDT	Interdisciplinary Team
KGCMC	Kennecott - Greens Creek Mining Company
LUD	Land Use Designation
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
NSPS	New Source Performing Standards
PDEIS	Preliminary Draft Environmental Impact Statement (defined for this project, not a standard term)
PSD	Federal Major Source Air Permit
ROD	Record of Decision
SEACC	Southeast Alaska Conservation Council
SHPO	State Historical Preservation Office
TLMP	Tongass Land Management Plan
USF&W	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

ENGLISH TO METRIC CONVERSION TABLE

FROM	TO	MULTIPLY BY
acres	hectares (ha)	0.045
cubic feet (ft^3)	cubic meters (m^3)	0.0283
cubic yards (yd^3)	cubic meters (m^3)	0.765
dollars per pound ($/lb)	dollars per kilogram ($/kg)	2.204
feet (ft)	meters (m)	0.305
gallon (g)	liters (1)	3.785
gallons per minute (gpm)	cubic meters per second (m^3/s)	0.0631
inches (in)	meters (m)	0.024
miles (mi)	kilometers (km)	1.609
pounds (lb)	kilograms (kg)	0.454
pounds per cubic feet (lb/ft^3)	kilograms per cubic meter (kg/m^3)	16.018
short tons (st)	metric tons (mt)	0.907

As of January 1, 1993, the Bureau of Mines converted completely to the metric system. This report was contracted and largely completed during 1992. Therefore most units of measurement use the English system. The above table can be used to convert English units into metric.

A. INTRODUCTION

A.1 Purpose and Scope

The Greens Creek Mine is one of only two major operating hard rock mines in the state of Alaska. It is situated in a National Monument (Admiralty Island), in a National Forest (Tongass), abuts designated wilderness, and located in one of the most sensitive wildlife habitat areas in the country. The project was the first major mining project to be permitted under the National Environmental Policy Act (NEPA) of 1969 in the state. These and many other factors make the Greens Creek Project an interesting and benchmark setting project. The project has been operating for more than 4 years after an 8-year exploration and permitting process. Valuable information can be learned by reviewing the historical aspects of this project and reflecting on the environmental and permitting processes that is in action today in Alaska.

The U.S. Bureau of Mines has decided to study the environmental and permitting processes for several of the recent major Alaskan metal-mining projects, as well as surrounding relevant Canadian mining projects, to catalog and compare the processes used and the incentives or disincentives to metal-mining in the state and region. Case studies are being prepared on several such projects.

This case study of the Greens Creek Mine will provide general background information on the project, the laws and regulations that affected the project, and on monitoring of performance of the project. The study will stress the actual environmental and permitting processes and the effect of these processes on project timing, study requirements, design details, costs, and overall project performance.

The key incentives or disincentives to development of the project will be identified and the implications described if possible. Socio-economic, regulatory, and institutional factors will be discussed. Positive and negative aspects of the environmental and permitting process and the approach used by the mine operator will be discussed where possible. Areas of possible improvement will be listed. Finally, key current procedures will be compared with the procedures used on the Greens Creek process where significant different current practices would result in project or environmental impact differences.

Much of the study will be based upon information gained by interviewing key agency, consultant, and company participants in the project. The author's experiences working as a consultant on the environmental and design aspects of the project for over 10 years provided additional insight from a perspective other than the agency or owners.

The objectives of the discussion as specifically stated by the Bureau of Mines are:

- Delineate the environmental and permitting regulatory structure and process as they relate to the Greens Creek Mine in Alaska.

- Conduct a case study of the environmental and permitting process associated with the Greens Creek Mine, both from the developer's and regulator's view point.

- Describe the advantages and disadvantages of the specific approach used by the mine developer to acquire permits.

- Identify major incentives and disincentives to metal-mine development in Alaska demonstrated in this case study.

A.2 Project Description

Figure A-1 illustrates the basic project location and facilities for the Greens Creek Mine. The Environmental and Permitting process resulted in evaluation of numerous alternatives for most facility components. The Preferred Alternative components from the Final Environmental Impact Statement (FEIS) and subsequent Environmental Assessment (EA) are included in **Figure A-2,** although the slurry line described in the EIS was not built. In it's place an effluent line was installed and dewatered tailings were hauled to the tailings disposal area.

The project is located on Admiralty Island approximately 18 miles west of Juneau, Alaska. The land is under U.S.D.A. Forest Service (Forest Service) jurisdiction. The project consists of an 800 to 1100 ton per day underground hard rock lead-zinc mine with gold and silver produced along with the base metal concentrates. The Greens Creek ore body is a small richly mineralized deposit in marine sediments. The deposit contains a complex association of base metals, precious metals, and iron sulfides. The average ore body identified was 16 feet thick at the time of the EIS.

The ore body is mined using the cut and fill method where up to 60 percent of the mill tailings are returned back to the mine to create a working floor for mining activities. Ore is milled and processed using the froth-flotation process to produce lead and zinc concentrates. The mill is located at the mine mouth approximately 7 miles up the Greens Creek valley from Hawk Inlet. Tailings from the mill are dewatered and used primarily for mine backfill with the remainder deposited in a dry tailings containment area near Hawk Inlet.

Barges carrying material for the project and concentrate ships dock at the Cannery Port Facility on Hawk Inlet. Mine workers live in Juneau and commute 15 miles by boat each shift to a port site on the island approximately 14 miles from the mine. Emergency housing facilities are provided at the Cannery port site for up to 100 workers. The mine employs approximately 250 workers.

Excess water from the process, mine drainage, and plant site runoff is treated by settling and then discharged in an outfall at the mouth of Hawk Inlet. Some additional treatment is accomplished by residual coagulation chemicals in the mill. A side-stream treatment for trace cyanide removal has been initiated. The cyanide is used as a flotation suppressant at low concentration levels, not for extraction of precious metal values. A water treatment plant for contingency removal of suspended solids from effluent was placed on line in late 1992.

Waste rock from mine development is deposited in several areas along the mine access road. Site runoff from areas potentially contaminated with ore or concentrate are diverted to the process outfall where possible. Runoff from other disturbed sites is routed through sediment ponds before discharge to Greens Creek or tributaries.

Regional Location Map

GREENS CREEK PROJECT EIS

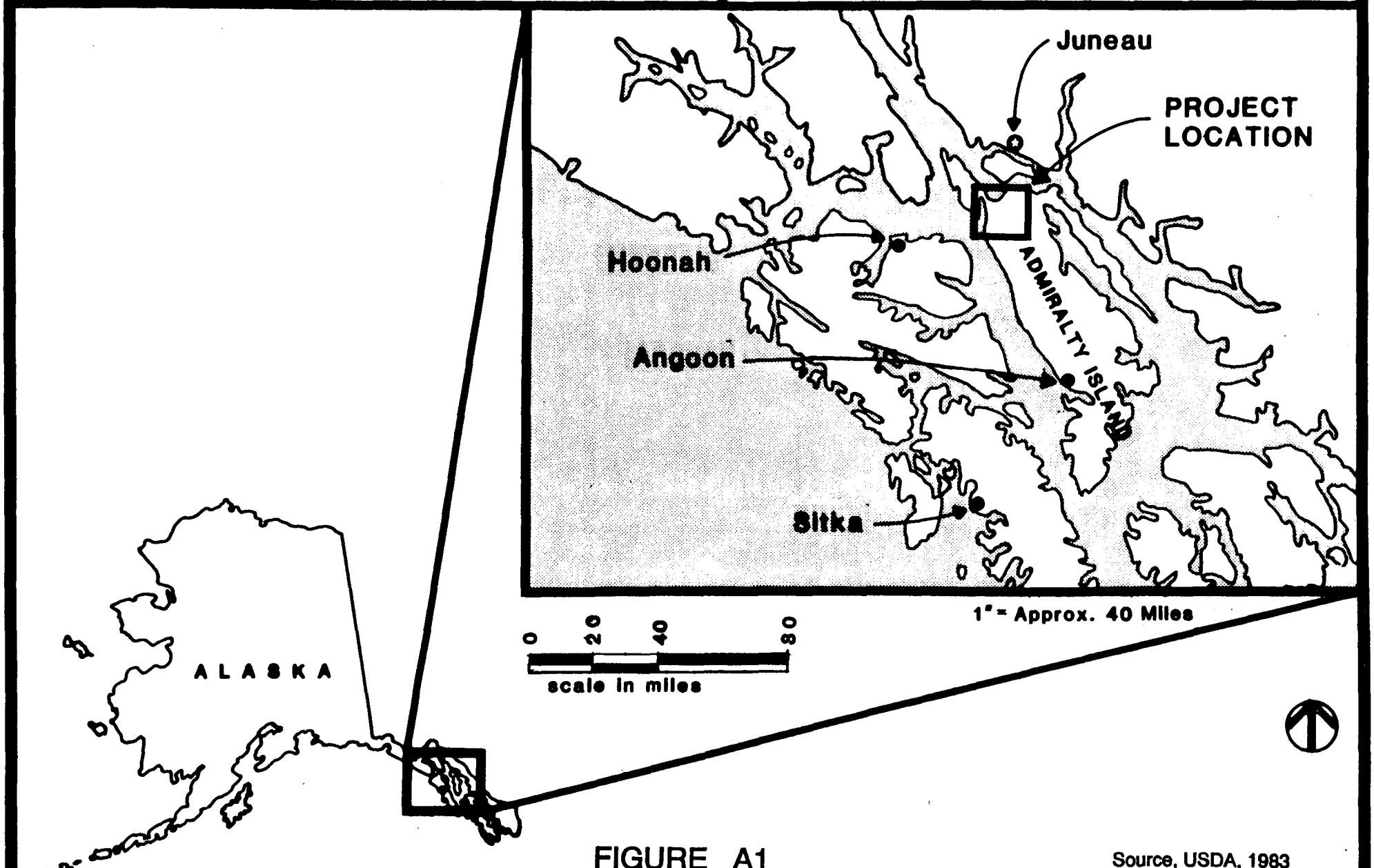
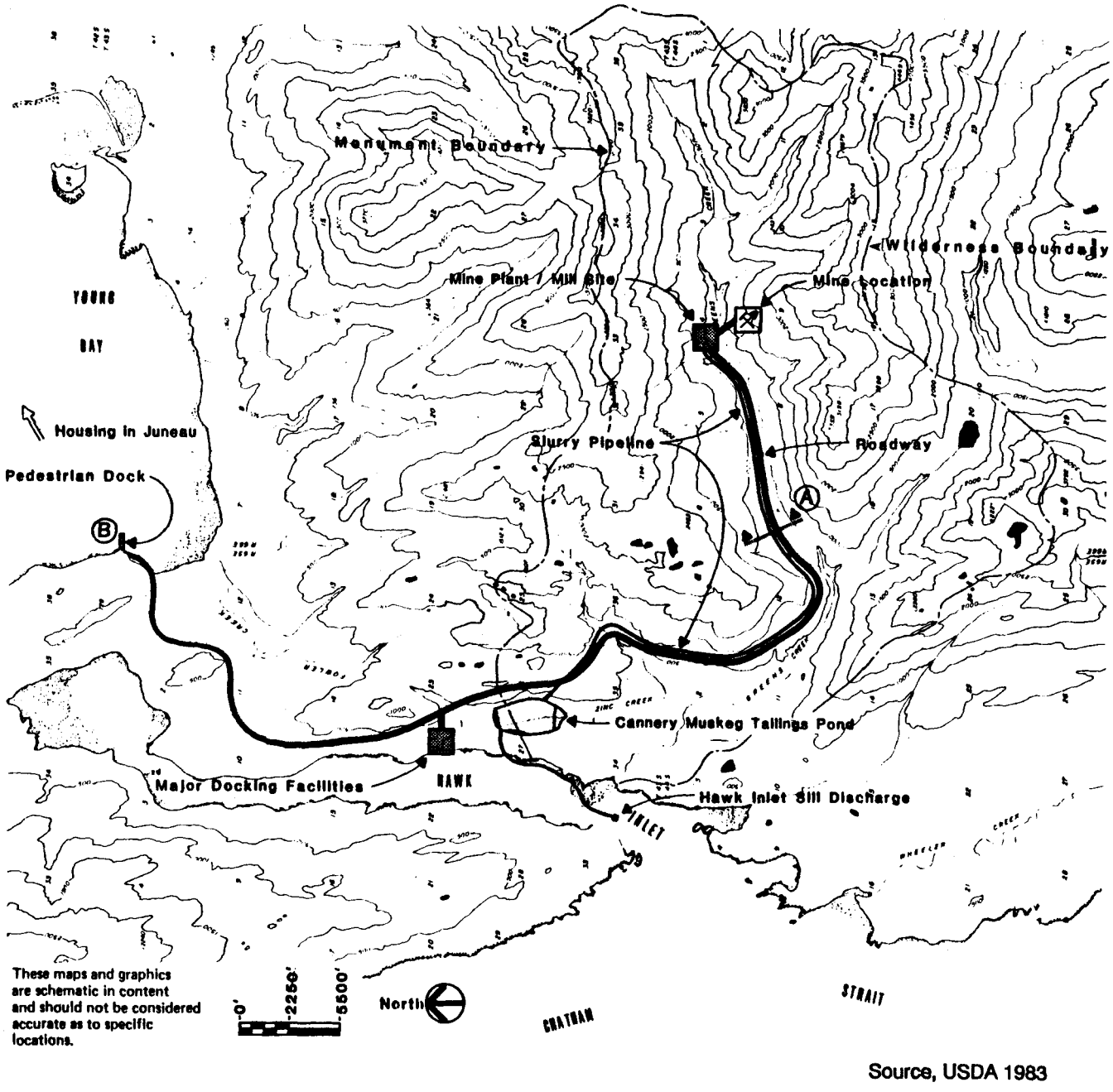


FIGURE A1

Source, USDA, 1983

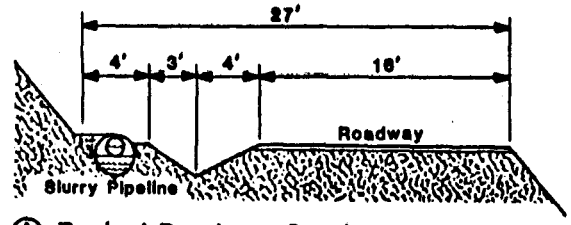


Source, USDA 1983

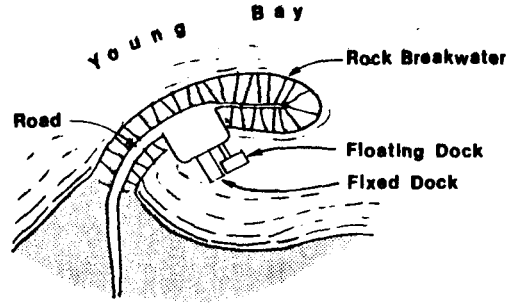
GREENS CREEK PROJECT EIS

Representational Graphics

- Noranda Conceptualization



Ⓐ Typical Roadway Section
Not To Scale



Ⓑ Pedestrian Dock
No Scale

▲—▲ Cross Section - Location and Direction

FIGURE A2

A.3 Planning/Permitting Background

In early 1973, the Pan Sound Joint Venture was formed to conduct a base metal exploration program in Southeast Alaska. The companies originally involved were Marietta Resources International, Exalas Resources Corporation (Mitsubishi), Texas Gas Exploration, and Noranda Exploration. From 1974 through 1976, geological studies concentrated on areas where stream sediment sampling indicated high base metal anomalies on Admiralty Island. Claims were staked, and detailed exploration, including surface drilling, began in the Greens Creek area. Lode claims (approximately 20 acres each) were staked in two large blocks: The Tom claims (122 claims) and the Big Sore claims (318 claims). Of these claims, seventeen have been determined to be valid at this time. In addition, a total of 138 mill site claims of 5 acres each were filed in 1978 on possible mine-related surface activity sites.

In 1976, Noranda Exploration, Inc. assumed responsibility as operator for the field operations phase of the project and managed all initial work at Greens Creek. In early 1978, the Greens Creek claims were put into a development category and the Pan Sound Joint Venture was dissolved. Its legal successor, the Greens Creek Joint Venture, which included the four original companies plus Bristol Bay Resources, Inc., was formed to develop the property.

In November, 1978, President Carter established the National Monument. ANILCA, passed in December, 1980 provided for the exploration and development of the mining claims.

From 1978 to 1980, extensive underground diamond drilling and environmental baseline studies were begun. The initial entirely helicopter-supported exploration program completed a 4,224-foot adit, which provided the means for delineating the ore body. A 600-foot cross-cut from the initial adit into the ore zone provided additional access.

The initial exploration and environmental work was performed in accordance with a Plan of Operation filed with the Forest Service. A review of the initial project information indicated the need for an EIS.

On November 16, 1979, the Forest Service filed a Notice of Intent to prepare an EIS of the proposed Greens Creek Project. Public meetings were held in Juneau and Angoon to determine issues and concerns associated with the project. In February 1980, the agency released a scoping document that described the issues identified at those meetings. The February document was characterized as draft and the comment period was left open to encourage public input.

In January 1981, Noranda Mining, Inc., assumed control as operator of the Greens Creek Project and as manager and representative for the Greens Creek Joint Venture.

Additional environmental baseline studies were conducted for several years, leading to preparation of a Draft Environmental Impact Statement (DEIS) in 1982, and a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD), which were approved by the U.S. Forest Service in January of 1983. In June of 1983 Noranda began preparation of a General Plan of Operations for development of the project as required by Forest Service regulations (36 CFR 228, Subpart D). The General Plan of Operations (Plan of Operations) defines how the mining operation will be constructed to minimize surface disturbances and

meet the terms of the ROD, other regulations, leases, permits, and contracts. The Plan of Operations was completed and approved by the Forest Service early in 1984.

The Plan of Operations describes mining of a mineral deposit containing 3.5 million tons of recoverable ore containing significant quantities of silver, gold, zinc, and lesser amounts of lead. Underground mining techniques are used to extract ore, which is then crushed and concentrated in a mill near the mine site. Ore concentrates are carried by truck approximately nine miles to the port site, on Hawk Inlet, and shipped to smelters outside of Alaska for processing and refining.

Largely due to low metals prices on the world market in the early 1980's, the actual project development was not begun until prices began to raise in 1986.

In 1982 Marietta Resources' interest was acquired by Anaconda Minerals Company who subsequently sold their interest in 1985 to Amselco Minerals Inc. Noranda's share was also acquired by Amselco in May 1986, and Amselco, having a majority interest, assumed control of project operations.

Amselco began a review of existing information, and development of a detailed mining plan and design studies. These studies resulted in the submittal of the 1987 Annual Work Plan for initiation of final project construction, with the intention of beginning full mine operations in the Fall of 1988. The 1987 Annual Work Plan proposed changes in the original Plan of Operations to include:

(1) Tailings handling, transport, and disposal

(2) Wastewater transport in a single pipeline from the mill to the tailings impoundment

(3) Increased water withdrawal from Greens Creek

The Forest Service notified Amselco that approval of certain operations was being deferred until an Environmental Assessment (EA) could be completed to determine the impact of the proposed changes.

An EA was prepared by a consultant to Amselco and submitted to the Forest Service. The changes described and evaluated in the EA were found to comply with the general intent of the FEIS and approval of the Plan of Operations to develop the project was given in 1988.

Concurrent with the consideration of the EA, permitting proceeded. Applications for many of the permits were submitted well before the EA. Permits to construct many of the facilities not affected by the EA were obtained and construction commenced before final action on the EA. Project aspects dealing with changes described and evaluated in the EA were also introduced into the permitting schedule, but no final determinations could be made until the project description and impacts were fully evaluated.

Road, port, mill, underground, and support facilities were constructed or being constructed concurrently with the EA consideration. Construction was effectively completed in late 1988 and project operation started in early 1989.

During the construction phase Amselco, a subsidiary of British Petroleum (BP) and Kennecott, a subsidiary of Standard of Ohio (SOHIO), merged as the result of BP acquiring SOHIO. Kennecott assumed control of the project and remained as project operator and manager. The project was officially renamed the Kennecott Greens Creek Mine (KGCM).

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." 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.

A.4 Environmental Regulatory Structure and Process

A.4.1 Federal

Under the General Mining Law of 1872, as amended, prospectors may search for mineral deposits on the 140 million acres of National Forest set up by proclamation from the public domain. A prospector upon discovering a valuable mineral deposit may locate a mining claim. After meeting specific requirements of the law, including confirmation of the discovery of a valuable mineral deposit, a claimant may obtain legal title (patent) to the surface and mineral rights on the claim. The Company is currently pursuing patent on their 17 valid mining claims.

The USDA Forest Service, Tongass National Forest, Chatham Area, is the agency responsible for the administration and management of Admiralty Island. The Greens Creek Project falls within two separate management entities: Admiralty Island National Monument (Management Area C22), and the Juneau Ranger District (Management Area C21).

A Presidential Proclamation established the Admiralty Island National Monument in 1978. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) designated most of the monument as Wilderness. A portion of the proposed project areas, including the mine site, is within the monument, but is not in the Wilderness Area.

The legal authority for mining in Admiralty Island National Monument is found in Section 503 (f)(2)(A) of ANILCA. Any holder of a valid mining claim in the Monument is permitted to carry out mining activities, as long as those activities are compatible, to the maximum extent feasible, with the purposes for which the monument was established. Regulations implementing the provisions of Section 503(f)(2)(A) are found in 36 CFR 228, Subpart D.

ANILCA's emphasis on environmental protection underscores the importance of a systematic review of all significant direct and indirect environmental impacts associated with development of the proposed mine.

ANILCA, in Section 503(c), provides that the Monument "shall be managed by the Secretary of Agriculture as units of the National Forest System to protect objects of ecological, cultural, geological, historical, prehistorical, and scientific interest."

A 10-year management plan for Admiralty Island National Monument Wilderness has been completed. The plan includes a compilation of resource data, a discussion of issues and opportunities, management philosophy, and the goals and objectives of management.

The Tongass Land Management Plan (TLMP) assigns the proposed project area between Young Bay and the cannery on Hawk Inlet (C21), a Land Use Designation (LUD III). The area is to be managed to provide a combination of both amenity and commodity values; the goal of LUD III management is to achieve compatibility among competing resource uses.

In 1969 the Federal Government passed the National Environmental Policy Act (NEPA) which requires federal agencies to assess the environmental impact of projects under their jurisdiction before implementation. This assessment must begin as early in the planning stages as possible and before the actual undertaking of the program. The main purposes of the legislation, as set forth in the act, are:

> To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality (CEQ).

If potential environmental concerns are identified, the Federal Government will issue an Environmental Assessment (EA) of the proposed project. If, upon investigation, significant environmental impacts are detected, the agency is required to prepare an Environmental Impact Statement (EIS). If, however, the EA does not find any significant environmental impacts, the agency or project proponent is issued a FONSI (Finding Of No Significant Impact), at which point agencies are allowed to begin acting on permits.

Once it has been determined that an EIS will be necessary, the lead agency must develop a draft EIS (DEIS). This must include:

- Cover Sheet - no more than one page
- Summary - to include any notable material, including areas of controversy, issues to be resolved, and conclusions - no more than 15 pages
- Table of Contents
- Purpose of and Need for Action
- Alternatives (including proposed action) - CEQ considers this the heart of the EIS
- Affected Environment
- Environmental Consequences - direct and indirect
- List of Preparers - no more than 2 pages
- Agencies, Organizations, and Persons to whom copies sent
- Appendix
- Index

The date that appears on the DEIS is the date around which the time-line of the study revolves. No decision on the proposed project may be made until ninety (90) days after this date. In reality, much more time is usually required.

In accordance with 40 CFR 1500-1508, various agencies and committees including Federal Agencies, EPA, state and local reviewers, and public interest groups review the DEIS.

Throughout this process, public involvement is also required. The public must be given access to all project-related information, as well as the decision process. In addition, information is exchanged through advertisements, announcements, mailings, briefings, hearings and presentations. Input from the public should result in a course of action consistent with the desires and needs of fellow community members. However, the decisions of the lead agency may differ from the majority of public comments since the decisions are based on facts as well as opinion.

After the DEIS has been submitted, reviewed and commented upon, work begins on a final EIS. This is now submitted to several committees, including EPA and the CEQ, and no decisions can be made until thirty (30) days after submission. The final EIS must consider all comments received on the DEIS. If the agency wishing to implement its project feels it is necessary to carry out an action which will have significant environmental impacts, it should also introduce a counter action that will minimize ill effects, a process called mitigation. This must be applied when significant impacts cannot be avoided. Other significant impacts must be minimized, if not avoided altogether.

The process is complete when the designated responsible party for the lead agency issues a record of decision (ROD). The ROD outlines the allowable project, specific restrictions and requirements, and states acceptable mitigation and monitoring requirements. If this is positive, the agency may then move on to the next phase of the program. If not, they may choose to cancel the program or begin the process again. The process is actually normally driven by appeals by the proponent or environmental groups at this point.

Today, it is generally common practice for the lead agency to contract with a consultant to prepare a "third-party" environmental document. The project proponent pays for the third-party effort, but the lead agency directs the third-party consultant directly. In many cases, the project proponent is kept from having much direct contact with the consultant. The theory is that the project proponent should not have undue influence on the environmental analysis. In practice, keeping the proponent away from the document preparation results in considerably more reworking of the document and misinterpretations by the EIS preparation team and the agency team members. Several current projects in the Juneau area are experiencing such problems. It is optimistic to believe that a third party working under a set time frame and budget will develop the degree of understanding of project details so that errors, misinterpretations, or incorrect conclusions will not appear in the EIS documents. Even small misinterpretations could be caught during reviews by the project proponent since their staff is intimately familiar with the proposed project.

The Monument Manager for the U.S. Forest Service interpreted the NEPA requirements differently and allowed the project proponent and their consultants to prepare a document that the project proponent felt was a preliminary Draft Environmental Impact Statement (PDEIS). They analyzed the alternatives and issues developed by the Forest Service's Scoping and Interdisciplinary Team (IDT) processes in detail. The report was submitted to the Monument Manager and the IDT for review, editing and revision to ultimately become the DEIS. This process allowed the project proponent to analyze the proposed project

environmentally and to make project modifications to eliminate or mitigate environmental impacts during the planning stage instead of after the EIS process is completed. Considerable discussion, cost, time, and negotiation effort were saved using this process. In addition, unworkable concepts and environmentally unacceptable features were not presented to the IDT or the public.

The U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (EPA) represent the other key federal agencies involved with the project as cooperating agencies as defined in 40 CFR 1510.6 because of their administration of federal permit programs (i.e. NPDES, PSD, CWA, Dredge and Fill). However, their involvement in the Greens Creek project was generally limited to review and mitigation input and preparation of draft permits for inclusion in the DEIS.

A.4.2 State

The many state agencies involved with the project were primarily in a review and comment position during the environmental process. Most have considerable permitting responsibility which will be discussed later. The NEPA process does not require that state agencies be intimately involved in all aspects of the process. However, the key state agencies were represented at most of the IDT meetings and project discussions that will be detailed later. This involvement was based upon the foresight of the Monument Manager and at the request of the Company. Continued coordinated involvement proved invaluable to the Company for a smooth environmental and permitting process with few surprises.

A.4.3 Interest Groups

Generally, the special interest groups in southeast Alaska worked through the Southeast Alaska Conservation Council (SEACC). While many individuals and several other interest groups commented on the proposed project, SEACC was involved throughout the planning and environmental process and contributed to the analyses of the project evaluations. Involvement was viewed by the project proponent as positive and constructive.

A.4.4 Operating Company(s)

The ownership and operation of the mine development company has varied throughout the project as illustrated in the A.2, Planning/Permitting Background section. The development of strong leadership, openness, and good working relationships developed by the operating company during the initial environmental and permitting processes had great impact on the project progress. The effects of that project "personality" linger today and are illustrated in later sections.

A.5 Permitting/Planning Schedules

Federal, state, and local permits were required for the Greens Creek Project. The actual permits will be itemized in a later section. One of the purposes for environmental documentation (i.e., preparation of an EIS) as stated in the NEPA authorization is to provide information to aid permitting decisions.

The complete permitting and planning schedule envisioned for the project is presented on **Figure A-3**. The Case Study discussions will describe schedule changes and associated impacts to the project. **Figure A-4** illustrates the actual project schedule. The differences in the two schedules will be discussed in the Case Study section.

A.5.1 Federal

Federal permits are the responsibility of each individual agency. A Memorandum of Understanding (MOU) was prepared to help coordinate the three key federal agencies (Forest Service, EPA, and the COE). The MOU covered the agency reviews and participation in the environmental process and to some extent permit coordination.

EPA is responsible for permits under provisions of the Clean Water Act (Public Law 95-217). The mine was determined to be an existing source under Section 306 of the CWA and therefore is not subject to the New Source Performance Standards. However, the CWA does require a discharge permit under the National Pollution Discharge Elimination System (NPDES) for each project water discharge. In addition, the NPDES regulations [40 CFR 122.29(c)(2)] require that an EIS include a recommendation on whether an NPDES Permit should be issued, denied, or issued with conditions.

As a cooperating agency for the EIS, the COE under authority of Section 10 of the River and Harbor Act of 1899 and Section 404 of the CWA evaluate proposed activities and structures of fill in waters of the United States and in wetlands in the vicinity of the project.

A.5.2 State

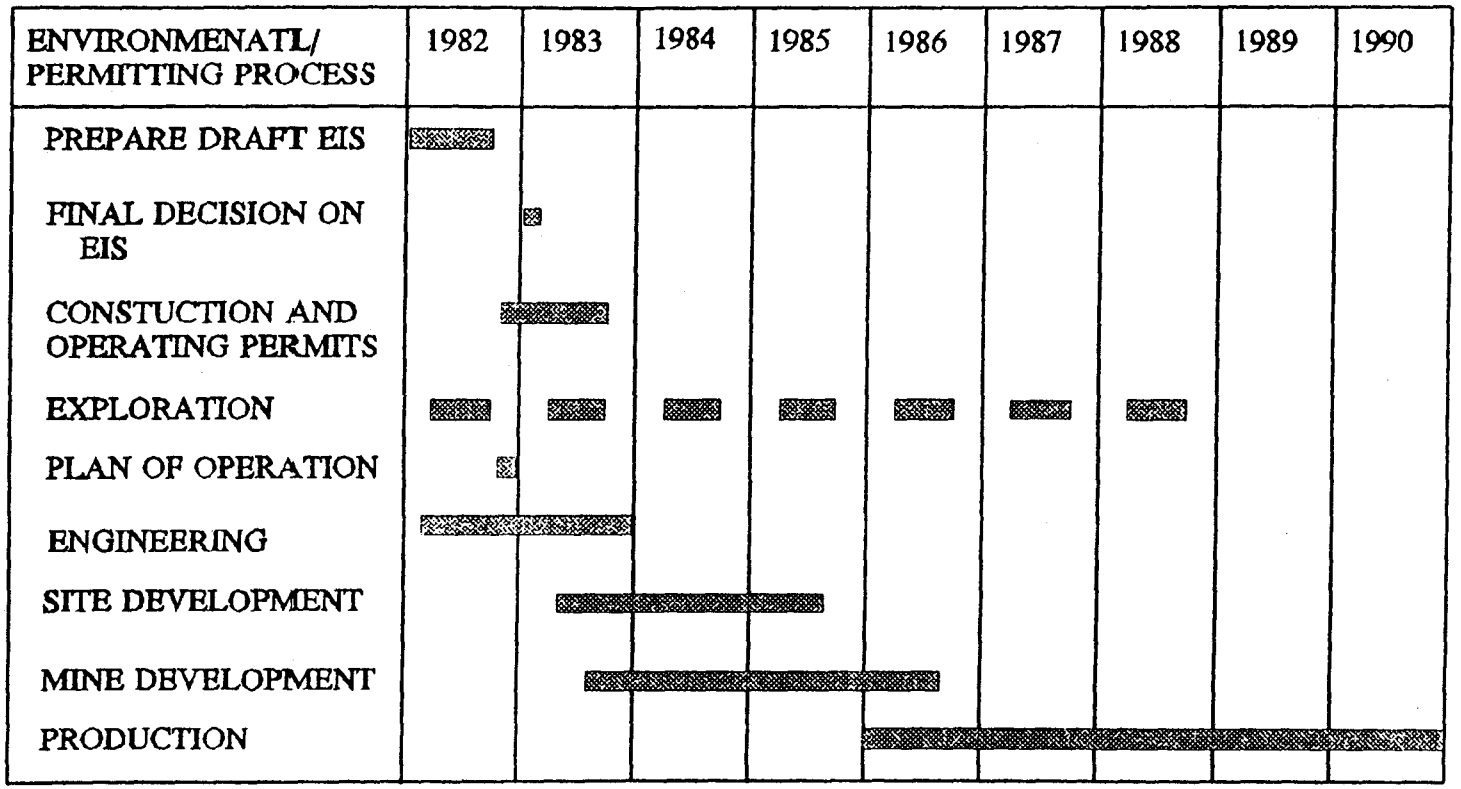
State permitting authority is based upon the coordinating requirements of the Coastal Zone Management (CZM) Consistency Determination Concurrence. The coastal zone application and process assists in determining need for additional state permits. The Division of Governmental Coordination, Governor's Office of Management and Budget which administers the coastal zone process is charged with coordinating the state permitting process. In practice, the individual state departments generally administer their individual permits under department authority.

The key state agencies include the Department of Environmental Conservation (DEC), the Department of Fish and Game (ADF&G), the Department of Natural Resources (DNR), and the State Historic Preservation Office (SHPO).

A Certification of Consistency with the Alaska Coastal Management Program was needed from the company along with all project permitting applications during initial Greens Creek permitting. A new CZM form now outlines the time schedule of permitting activities. The review of state permits is dependent upon NEPA decisions, coordination with federal permits, and upon submission of all state applications and request data.

Public notification, scheduled permitting review, and permit writing then theoretically follows the schedule in the permit application (i.e. 25 days for agencies to request additional information and 60 to 80 days for consistency determination).

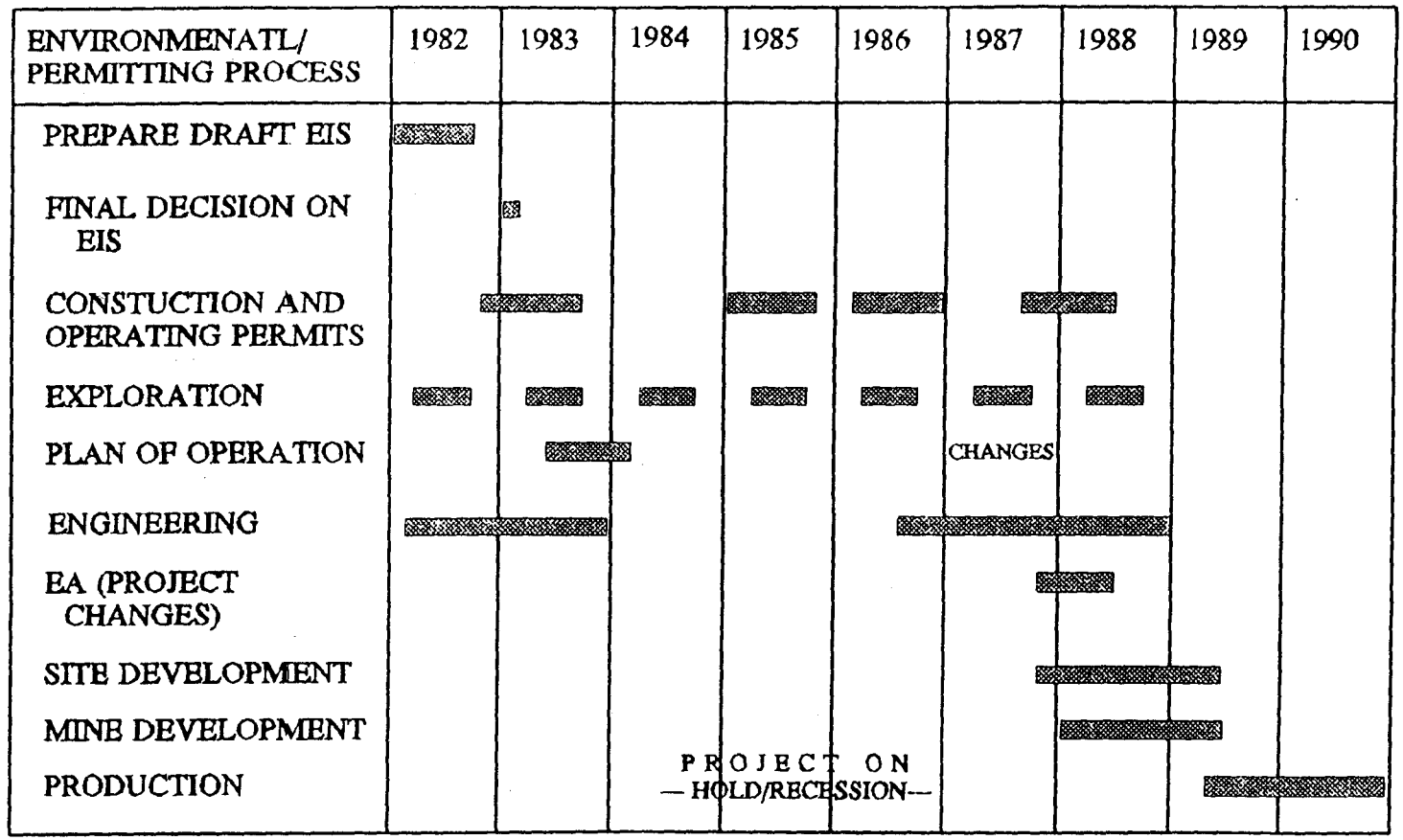
GREENS CREEK PROJECT EIS
ORIGINAL ANTICIPATED DEVELOPMENT SCHEDULE



NOTE: TIME STARTA AT START OF EIS PREPARATION

FIGURE A-3

GREENS CREEK PROJECT EIS
ACTUAL DEVELOPMENT SCHEDULE



NOTE: TIME STARTS AT START OF EIS PRAPARATION

FIGURE A-4

A.5.3 Local Permitting

For the Greens Creek Project, the local permitting authorities (CBJ, Angoon, and other city governments) were initially limited to comment on the environmental documentation and to a special use permit for the Juneau based commuter port development. The CBJ had opportunity to review all environmental and permitting actions and to provide appropriate comments.

In 1990, a request by the mine initiated consideration of annexation to the CBJ. Such action would invoke the CBJ Major Mine Ordinance, CBJ 49.65.130, Large Mine Permits. An entire additional level of permitting is created when the project is covered by this ordinance. The major permit review criteria would stress socio-economic factors, but the ordinance provides for full redundant regulation including water, air, land use and other factors. No additional details of the CBJ permitting under the Major Mine criteria is included since the project has been annexed, but exempted from permitting requirements until 1994.

A.6 Reclamation

In the early 1980's, the reclamation requirements were loosely included in the Forest Service administrative responsibilities. As such, the Forest Service requested a preliminary Reclamation Plan early in the EIS preparation process as part of the initial reports of baseline data and engineering project reports. The draft Reclamation Plan was used in preparation of the environmental documents.

The ROD in the FEIS contained specific reclamation requirements including:

- General statements requiring reclamation within the monument to "as near a natural condition as possible."
- Reclamation of non-monument portions of the project on National Forest land will be determined at closure of the mine.
- Private lands are outside the jurisdiction of the Forest Service.

These rather broad statements left total control and flexibility to the Forest Service on Forest and Monument land. The ROD could not and did not set guidelines for reclamation outside Forest administered land.

The reclamation of non-forest administered public lands used by the project were left to the permitting process. Permits for the Young Bay dock, the Auke Bay dock and the Hawk Inlet dock are covered by COE, DNR, and/or CBJ permits as applicable.

The Hawk Inlet Cannery site work is on private land and was considered outside the jurisdiction of the various agencies, although Cannery site activities were reviewed in the FEIS as connected actions. This would not be considered the case in 1992. The project would now be reviewed in the environmental process as a whole. When actual reclamation was being enforced, only certain reclamation requirements such as wetlands and water quality implications could be enforced on the private land. In practice, these same requirements will

apply to the Greens Creek Project.

In 1991, the state Department of Natural Resources (DNR), Division of Mining issued draft reclamation regulations. These new regulations could provide a second level of regulation and reclamation bonding or financial guarantee. Many of the requirements of the DNR regulation are similar to those requested by the Forest Service. Because the Greens Creek Project is not on private land, a series of regulations laid down by both agencies must be met. The City and Borough of Juneau Major Mine Ordinance also has specific reclamation regulations. Such overlapping of regulations often result in considerable discussion simply deciding the details of administration. Each agency's criteria must be met. The importance of project proponents facilitating inter-agency cooperative agreement or memoranda of understanding to limit the regulatory overlap cannot be over-emphasized.

B. ENVIRONMENTAL CASE STUDY DISCUSSION FOR THE GREENS CREEK MINE PROJECT

B.1 General Introduction

The Greens Creek Project is complex and interesting environmentally for at least the following reasons:

- There are over 12 years of project history.
- The project operated for several years until April 1993 and has many more years of production.
- The project was initially a joint venture of 4 to 5 entities.
- Environmental assessment procedures for large projects were new to all agencies and from the author's perspective, there was a long learning-curve.
- The project started initial baseline work early before the project was well defined and before the baseline needs were well understood.
- ANILCA and the National Monument designation occurred early in the project.
- The project is partially in a National Monument, a National Forest, private land, and within a parcel of non-wilderness land nearly surrounded by wilderness.
- A second baseline effort was needed to fill in the database after the project was better defined.
- The project is on a remote island.
- The project was not considered a new source, but was permitted when the New Source Performance Standards (NSPS) were promulgated.
- The document that became the Preliminary DEIS was largely prepared by consultants working for the proponent instead of the Forest Service as a third-party.
- The EIS was approved during an economic recession and development was delayed 3 years due to low metal prices.
- Ownership and management of the project changed 3 times after the EIS was approved.
- Changes in the project were requested after the 3 year delay and ownership changes.
- Proposed changes necessitated a Supplemental EA prior to development.
- Construction issues were not specifically considered in the EIS nor by the regulating agencies until construction was underway.

- Several unexpected environmental issues developed during initial operation.
- More waste rock than projected was being produced, thereby necessitating another EA to investigate expansion of existing waste rock sites or creation of new sites.
- Procedures change periodically at agencies and the learning curve is continuous.
- The environmental process has changed during the project history.
- Another proposal involving an expansion of the daily production rate is in the formulation stage. This may necessitate another EA or EIS.

These and other factors will provide the basis for the discussion of the Greens Creek Mine Project Environmental Processes. The discussion will proceed chronologically as much as possible. Interrelated factors will be introduced out of chronological order when appropriate to illustrate a point.

B.2 Pre-project Mining Company Activities

B.2.1 Exploration and Concept Development

Claims were filed on the Greens Creek project ore body in the early 1970's after the deposit was tentatively located by geochemical and stream sediment tracing. Detailed surface drilling began in 1976. Underground drilling began in 1978 along with initial environmental studies. Work at the mine site was supported entirely by helicopter.

An initial Plan of Operation describing the planned project activity was submitted by Noranda Exploration in 1979. Very early in the development of the project, several public meetings were held to identify issues and concerns associated with the project. The Forest Service contacted several local organizations and nationally affiliated local environmental groups to act in an informal advisory capacity. A briefing paper was prepared by the Company in cooperation with the Forest Service to illustrate the project plans. This briefing paper was actually an initial project description (many projects now compile and distribute Project Descriptions) and included some preliminary environmental information. After reviews and a semi-formal group meeting in mid-1979, the Forest Service filed a Notice of Intent to prepare an EIS in late 1979.

Based upon the decisions and discussions at the mid-1979 review meeting, a revised issue paper was developed and issued in late-1979. In December of 1979, a public workshop was held in Juneau to review scoping issues and obtain public comment on the proposed project and issues. Public comments were incorporated into the issue paper and distributed in final form in early 1980. The issue paper formed the basis for the updated scoping effort. In early 1980, the Forest Service published a draft scoping document. Concurrently, the Forest Service initiated a site specific validity examination, which determined that seven (7) of the Big Sore mining claims were valid.

The initial baseline environmental studies done on the project in the late 1970's were possibly premature in some cases for three reasons. First, the agencies were not adequately familiar with the environmental procedures necessary for a major mine project. The NEPA requirements were not well integrated into state or federal agency procedures and had not been used on significant non-forest projects in Southeast Alaska. The Forest Service had not developed procedures that could be used for a large project that was different from a timber

harvest or a logging road project.

Secondly, the mining company had not fully defined the most feasible project and was not familiar with the agencies or the necessary procedures. Consequently, many of the initial actions were not always coordinated with later identified needs. The initial baseline work had to be augmented. The project schedule had to be lengthened several times when new data needs or procedures were identified.

Finally, the initial project activity was driven by exploration needs instead of production needs. As a result, the yearly Plans of Operation to the Forest Service initially stressed work for exploration and did not identify or fully describe the project. Therefore, an EA could not be done to determine the extent of the environmental impacts.

Considerable early environmental work was done before detailed coordination with the agencies and before the most feasible project was defined. As it turned out, the initial work was invaluable in helping to define the project and identifying potential impacts. In fact, the initial work allowed the ultimate environmental process to be very specifically defined. However, little progress was made initially toward completing the environmental process. What was accomplished was needed for project definition and included the following:

- Ore Body Identification and Partial Reserve Estimation
- Project Concept Development
- Feasibility Analyses
- Initial Plans of Operation
- Initial Baseline Information

The initial baseline effort included the following studies:

- Soil Reconnaissance Survey of the Proposed Access Road Corridor
- Fresh Water Baseline
- Fresh Water Biology
- Meteorology/Air Quality
- Hydrographics of Hawk Inlet
- Socio-Economics
- Recreation
- Visual
- Archaeology/Historic
- Surface Water Hydrology
- Vegetation
- Wildlife

The initial baseline studies were general and in many cases did not measure site specific information simply because the project sites and facilities had not been fully defined.

In early 1981, management of the project shifted from exploration managers to mine development/operations managers. The project direction changed. Management reviewed the situation and hired additional environmental consultants to assist in planning the approach to environmental permitting. The new team concluded the following:

- Additional baseline work would be necessary and must be coordinated with the agencies.

- The agencies had little if any experience with large scale mining projects. The management team determined that a great deal of effort would be necessary to increase all levels of understanding before further progress could be made.

- The U.S. Army Corps of Engineers or the Forest Service could be the lead agencies. The Forest Service administered the most land and would likely be the lead agency with the Corps a cooperating agency.

- The project must be defined and agreed upon within the Company before formal environmental impact assessment and permitting processes could proceed.

To define the project, the team interviewed all Company personnel. A summary of the known project components and a list of needed component decisions was prepared for internal Company review. The internal document was labeled Planning Overview and included some discussion of how agencies might view specific project components and the impacts of the components. Guidelines were provided to help Company staff better define the project. The Planning Overview was an initial attempt to define the process and explain it internally. It covered who the key agencies would be and the key personnel in each agency. It outlined the logic of the environmental decision-making process at the time. Estimates were outlined of project duties and requirements for data, presentations, studies, and basic budgets. The Overview was the initial internal project management tool and a place for everyone to begin.

B.2.2 Baseline and Engineering Studies

The project could not be totally defined on the first attempt. Adequate data were not available in all cases to allow the Company personnel to define the best project. In some cases, the available data were deficient. A second edition of the Planning Overview was prepared. The new edition outlined the environmental process in more detail and summarized the existing data in a section titled "General Review of Baseline Studies--Contents/Limitations." Additional studies were needed in the following topics:

- Access road corridor potential alignment and soil survey
  - Define erosion and siltation potential.
  - Develop erosion and siltation control measures.
  - Determine soil chemistry and evaluate contamination potential.
  - Address potential impacts.
  - Investigate slope stability and bedrock depths.
  - Determine potential quarry locations.

- Additional fresh water baseline data
  - Techniques used on initial data may have given high metal readings.
  - Additional parameters needed.
  - Lower detection limits needed for several metals, including mercury and cadmium.
  - Shipping delays limited coliform data on initial tests.
  - Additional streams must be monitored.

- Stream flow must be taken concurrently with sampling.

- Fresh water biological studies
  - Need more complete spawning data.
  - Need benthic invertebrate, periphyton, and fish composition and abundance data.
  - Sediment toxics and size data needed.

- Meteorology/Air Quality studies
  - Need wind rose at mine site.
  - Need particulate data at mine and port sites.
  - Analysis needed to determine frequency and duration of severe weather conditions
    that could interfere with transportation.

- Hydrographic Study of Hawk Inlet
  - For mixing projections.

- Socio-economic Baseline Study
  - Housing impacts in Juneau.
  - Impact of project on the labor market.
  - Service industry changes in Juneau.
  - Impacts on Skagway, Gustavis, and Haines.

- Recreation Baseline
  - Review of Tongass Forest land management plan.
  - Recreation use statistics for the project area.
  - Review of Admiralty Island management plan.
  - Subsistence use analysis.

- Visual Assessment
  - Need graphic materials to use in meetings and the environmental documents.
  - Identify impacts of development and illustrate.

- Groundwater Baseline
  - Permeability testing at tailings dam site(s).
  - Groundwater monitoring needed at tailing dam site(s).
  - Groundwater hydrology needed.
  - Water quality and permeability needed in the ore zone.

- Surface Water Hydrology Baseline
  - Record long term flow patterns of Greens and Zinc Creeks.
  - Measure monthly stream flows at each water quality monitoring station.
  - Adjust existing Forest Service regression equations to allow prediction of flows.
  - Use flows and water quality data to project mass transport.

- Vegetation Baseline
  - Identification of wetlands.
  - Identification of rare and endangered plant species.

- Additional site specific information needed at proposed component sites.
- Reclamation plan needed.

- Wildlife Baseline
  - Identify critical bear habitat.
  - Identify critical deer winter range.
  - Identify active eagle nests.
  - Review pertinent literature.

In addition to the additional baseline work that was needed, several engineering studies were needed before final Company decisions could be made on the project description. Additional studies included:

- Draft Reclamation Plan

- Wastewater Analysis
  - Identify waste streams.
  - Develop conceptual wastewater plans.
  - Interact with agency personnel.

Many of the studies carried on for several years or were the basis for a long term monitoring program.

B.3 Project Environmental Monitoring

Environmental monitoring consists of four stages. The first, the baseline phase, monitors, among other things, air, water quality, and plant and wildlife characteristics. Information gathered during the baseline phase is used to prepare the EIS for the project. After the EIS decisions are formulated, the permitting and pre-development phase begins. During this phase monitoring continues to extend the baseline database. Monitoring continues during the operational phase, when the project is actually in production. The closure phase covers monitoring after the project reclamation.

The significance of environmental monitoring is important and warrants a separate section for its discussion. A thorough long-term monitoring record is needed to compare conditions before the project with conditions during operation and after reclamation. The monitoring process should ideally be coordinated with the environmental process. Such coordination is difficult because of the following factors:

- Requires knowledge of a complete project concept early in the planning

- Requires involvement and commitment by agency representatives

- Requires agency coordination with other agencies and with the Company to meet all needs

- Requires review and discussion by agencies that may ultimately use or require additional monitoring as the baseline monitoring proceeds

Typically the commitment of time and staff is not possible, especially early in a proposed project. Agency personnel do not typically provide input or an indication of their goals concerning a project until the process becomes more official. Coordination with agencies was an ongoing effort, but it was quickly identified that the agencies had no criteria for evaluation or development of baseline or subsequent monitoring programs. Instead of coordinating the development of monitoring criteria, agencies waited for the Company to develop monitoring proposals. The Company sometimes received agency responses or opinions. Due to the lack of set guidelines, some agency personnel that responded accepted the proposals, others required additional monitoring sites and parameters, while still others questioned the need for the proposed monitoring at all. In general, without some type of coordination mechanism, agency conclusions were inconsistent and, in most cases, fell short of formal approval of the monitoring program. Therefore, the initial monitoring programs for baseline data are prone to be of limited use or at best of questionable long range value to the project proponent or the regulatory agency. It is therefore critical to continue the baseline monitoring even after the FEIS to expand the database.

The baseline data must provide significant data with which to compare project impacts. Such data would be to the benefit of the project proponent and the agency. Data collection is expensive. Often, the data bases are not quality controlled to the satisfaction of agencies or do not contain the specific parameters or parameter form desired by agencies. Monitoring requirements are not standardized in any way, criteria statements do not exist, and requirements are interpreted differently by almost everyone involved. This is an area of the environmental process that could be dramatically improved. Improvement would require:

- General standardization of monitoring requirements and coordination between agencies
- Commitment of time by agencies and a willingness to determine the needs of each agency
- Coordination with the agencies and the project proponent

B.3.1 Baseline and Pre-Project Monitoring

The necessity for baseline information is obvious. Through direct experience, administrative interpretations by numerous agencies reviewing projects in the Juneau area have set a guideline of a minimum of one year of baseline data. However, this guideline is flexible since some subtopics such as vegetation or historic features do not allow or require a set length of the period of study. Water quality or wildlife studies are more amenable to the minimum time period of study, although in specific cases more or less data may be appropriate (i.e., historical and endangered plant baseline are normally one time efforts).

To establish baseline requires a study of the environmental setting or location and conditions under which the proposed action is to take place. This may include the assembling of previously collected or secondary data, and when necessary, the acquisition of first-hand or project site-specific data. The baseline studies must incorporate existing conditions, geographical features, and the temporal characteristics in such a manner that the baseline information serves as a filtering mechanism, allowing the screening of impacts unrelated to the specific project and aiding in estimation of impacts where the severity of impact would

vary. In this way it becomes possible to utilize the baseline database to determine changes related to the project.

Conditions prior to activity on the site are critical because measurement and analysis of environmental impact cannot take place without basic data. Area geographical characteristics are significant since environmental impacts may be very different for a given activity in an even slightly different area.

Baseline studies for Greens Creek covered the following broad categories:

- Atmosphere
- Water
- Land and land use
- Biological environment
- Human aspects
- Economic aspects

These categories were divided into more specific subcategories. For example:

- Water
  - Marine water quality
  - Fresh water quality
  - Hydrology
  - Meteorology

Studies were performed for each of the categories. Obviously, the initial studies formed the basis for the environmental analysis. Considerable care and planning were necessary in developing the scope of the studies to meet all needs. The study scopes were coordinated with agencies involved where possible. It was not always possible to obtain approval or commitment of agencies regarding study scopes, and therefore the Company proceeded at risk of future requests for additional data.

B.3.2 Project Monitoring (Construction and Operation)

Project monitoring requirements are specifically outlined in the Record of Decision from the lead agency and as conditions to individual permits. In addition, it is normally good practice and possibly useful in future potential compliance litigation for the project proponent to continue most of the baseline monitoring efforts during preconstruction, construction, and for at least the first 1 to 2 years of project operation. This suggestion is based on litigation at Greens Creek and other projects where a strong, long-term baseline database helped prove that impacts were well within the natural variation.

The entire monitoring program should be reviewed at least annually to determine if monitoring is meeting the data needs of the interested parties or if the monitoring programs should be adjusted. Monthly reporting is typically required for compliance determinations. However, some monitoring such as wildlife may be more suitable for annual reporting.

Annual monitoring reviews should also provide for reduction of the programs if data

continually shows no impact, if specific parameters or programs are no longer needed, or if the program should be reconfigured to stress the key parameters and most critical features. Such annual review was promised by agencies during the environmental process. However, agencies are reluctant to consider changes and the extensive monitoring continues.

Annual review and program modification is not a legal requirement, but is recommended as a tool to achieve the necessary information in the most efficient manner. Clauses requiring or allowing annual reviews can be placed in individual permits. The author's experience suggests that the common lack of review and modification of monitoring programs costs projects significant sums and may lead to ineffective programs that do not focus on the key potential issues.

The Greens Creek monitoring program that began with baseline studies was expanded when the consultants were contracted by the Company to prepare the PDEIS. More than a full year's data was obtained for preparation of the EIS. Because the data were not exactly the same throughout the baseline monitoring periods, different agencies and consultants became involved, and the monitoring program evolved during that time.

After the FEIS was prepared, the monitoring program was continued by the Company. The purpose for continuing the program was twofold: it was necessary to develop a longer baseline for possible future environmental evaluations, and it also provided a degree of protection for the owner. A longer database would illustrate the variability that was inherent in the system. The additional monitoring was not required by the agencies but has proven a valuable asset to the Company.

Eight years into the project, the monitoring program is being reviewed. The following findings are being discussed with agencies:

- Most parameters do not need to be analyzed since only a few key parameters correlate to project activity. These include total suspended solids and the metals zinc, nickel, copper, lead, and possibly chromium (primarily zinc and nickel).

- Some of the monitoring programs initially required by agencies may be redundant and therefore unnecessary. For example, effluent impacts from the project are monitored in six ways: effluent toxicity, testing on organisms, effluent parameter concentration tests, receiving water quality tests, tests of sediment content in the receiving environment, and tests of body burden content of organisms in the receiving water and the receiving environment. Four years of operational data and comparisons with up to five years of pre-operational data would indicate that the effluent concentration tests, in conjunction with long term body burden testing in the receiving water environment would likely provide adequate data and early warning if problems are likely to appear.

- Criteria are needed for data analysis and presentation. Many of the agencies that request testing and data to be submitted do not possess an effective method for data review, analysis, storage, or retrieval. The data sets are simply too complicated and too extensive for visual inspection of data points. People interviewed for this study believe that data are often submitted and accumulate

without review, resulting in a cost without benefit to the project or the environment.

These findings are being discussed and negotiated with the appropriate agencies including the Forest Service, EPA, and the Alaska Department of Environmental Conservation at this time.

B.3.3 Post-Project Monitoring

Post project monitoring would be required by the newly proposed Alaska DNR Mining Reclamation regulation and possibly a proposed ADEC cyanide regulation. In fact, bonding would be required to help assure reclamation. The monitoring would determine the effectiveness of reclamation.

Currently, post-project monitoring requirements are included in the ROD by the lead agency and in individual permit conditions. Such requirements are critical to the workability of the environmental process. For example, it is common for agencies, the public, or interest groups to ask about post-project environmental responsibilities.

Normally, bonding, reclamation, maintenance trust agreements and post-project monitoring are the long-term controls used to address the question of post-project responsibility. These control techniques are used in conjunction with operation plans, reclamation plans, and contingency plans outlined during the EIS process and developed more fully before the project is reclaimed.

B.4 Environmental and Permitting Organization

The team philosophy was stated in the initial Planning Overview document as follows:

> The general approach to permitting is based on developing close working relationships with agency personnel, identifying potentially limiting factors and subsequent solutions to those problems and attempting to meet the legal requirements of existing environmental regulations.

The key factor needed to obtain progress was to identify the Company preferred alternative and to describe that alternative to the agencies. The Planning Overview document was the means to achieve the necessary internal Company discussions and decisions.

While the internal decisions were being made, the following stated approaches were used with the agencies:

- Close informal communication
- Key on major agencies (Forest Service, COE, USF&W, ADF&G, ADEC)
- Foster interagency relationships to minimize duplication
- Gear most of the effort to the Forest Service, the likely lead agency
- Use technical specialists for impact assessment and replies to agency and public questions and concerns
- Formulate an approach to environmental documentation and coordinate discussions with agencies

- Initiate public input informally by holding informational meetings
- Keep control of the planning of the project

The Company developed a team to address the project planning and environmental permitting composed of the following:

- Project Manager (Mining Co.)
- Project Engineer (Mining Co.)
- Corporate support (President and Environmental Manager)
- Environmental Manager (consultant)
- Wildlife (consultant)
- Vegetation (consultant)
- Economist (consultant)
- Air quality (Joint Venture partner)
- Aquatic/Marine Biology (Joint Venture partner)
- Water and Wastewater (consultant)

The consultants were both individual consultants and from larger companies. The key individuals from the consultant group in the previous listing were selected as the specialists to deal with the agency coordination under strict direction of the Environmental Manager. The Company Project Manager and Project Engineer were very active during agency discussions and helped develop the cooperative, professional image of the project team.

B.5 Environmental Process

B.5.1 Lead Agency Designation

In accordance with the NEPA requirements and by joint agreement among agencies, the U.S. Forest Service, Tongass National Forest, Chatham Area was determined to be the lead agency responsible for the administration and management of the environmental process. The Company had not initially been able to determine the lead agency and had worked under the assumption that either the Forest Service or the U.S. Army Corps of Engineers could be the lead. However, as the project progressed and the project description became better defined, the Forest Service became the logical lead agency because most of the project facilities fell under Forest Service jurisdiction.

With the designation of the Admiralty Island National Monument the Monument Manager became the manager of the environmental process. The Forest Supervisor maintained ultimate decision making authority. In the remainder of this document, the term Forest Service will be used to designate the lead agency.

B.5.2 Scoping Process/Issue Identification

The project had previously been "scoped" to identify issues and concerns. Previous scoping had been thorough including public meetings in communities near the mine site. However, considerable additional information had been and was collected after the original scoping. Therefore, additional scoping was considered, but delayed until Forest Service IDT project staff were selected (see next Section).

B.5.3 Interdisciplinary Team (IDT) Process

The Forest Service Interdisciplinary Team (IDT) and team leader were named by the Chatham Area Forest Supervisor in 1981. The IDT is responsible for following and recording the NEPA process, conducting and monitoring the environmental process, and preparing the EIS. The IDT consisted of the following representatives from the U.S. Forest Service:

- An engineering geologist
- A civil engineer
- A fisheries biologist
- An hydrologist
- A wildlife biologist

These core team members were supported by the following Forest Service support team members:

- Admiralty Island Monument Manager
- An archeologist
- A botanist
- An economist
- An editor
- A forester
- A second mining geologist
- A landscape architect
- A soil scientist
- A planning officer

In addition, members from key state agencies were invited to participate in IDT functions.

The IDT reviewed the original scoping results in light of the additional data being obtained and the changes or refinements in the project description and determined that the original scoping was adequate. Some additions and modifications were made to the original scoping, but a new scoping process was not needed. The issues developed during scoping are summarized in the following summary statements:

- Development in the Admiralty Island National Monument
- Decreasing recreation opportunities and increasing competition
- Maintaining existing quality and quantity of fishery habitat
- Maintaining the quality and quantity of wildlife habitat and minimizing impacts on wildlife
- Maintaining the quality and quantity of water
- Marine environment

- Technical feasibility
- Economic feasibility
- Impacts on Juneau

The NEPA process requires that impacts be evaluated for the project and surrounding areas. Decisions relating to project components outside the federal agency boundaries are not the direct responsibility of the federal agencies involved, but must be considered for cumulative impact analyses. However, the EIS can be used by appropriate agencies to fulfill environmental analysis needs and to provide information for later permitting.

The Forest Service's IDT met often during the planning and discussion phase of the permitting process to question the scope of studies, ask project questions, provide requests for additional information, discuss opinions, and generally keep active in the process. Meetings were held in Juneau and Sitka since IDT members were located in both communities. Some meetings were held with IDT members only in attendance. Company and Company consultant representatives were asked to attend when details of studies or project plans were on the agenda. The IDT meetings were held to review the progress of studies and project planning and to develop options, possible actions, mitigation measures, or treatments that may be initiated to address issues associated with the Greens Creek Project development.

Discussions were held early in the process to determine responsibilities. NEPA requirements were interpreted to allow the Company to develop the baseline studies, the engineering studies and a Preliminary Draft EIS to be submitted to the Forest Service for use in preparing the DEIS. The company proposed preparing the PDEIS to maintain control of costs. There was precedent for such control and responsibility in several other states. The Forest Service agreed to receive, review, and modify as necessary a PDEIS from the Company. The Company and contributing consultants participated in designated IDT review meetings and to submit draft sections of the PDEIS for IDT review as they became available. As previously stated, the IDT leader does not now agree that the PDEIS was a significant contribution and was "advisory only". The PDEIS process did save the Company significant time and money and is considered significant for project proponents.

B.5.4 Baseline and Engineering Studies

The IDT reviewed the initial and expanded baseline effort that the Company project proponent had undertaken before the formal environmental process and specifically the IDT review process was organized. The baseline effort was not yet complete. Therefore, there was opportunity to modify or adjust the effort.

The IDT review concluded that the baseline studies essentially covered the areas and topics needed to the extent necessary. The expanded baseline effort had been coordinated with the Forest Service. IDT input resulted in relatively minor additions made to the monitoring program. These included items such as gravel sampling, additional samples at stations near modified project components, added parameters to the test lists, and additional flow, sediment, and fish monitoring.

IDT reviews of the baseline and engineering studies were a continual process during preparation of the studies and the PDEIS. New concepts or additional data needs were constantly identified. Studies were modified. Most additional baseline data needs were not needed for the environmental evaluation, but were to assure that pre-project data would be available for comparison during project operation and reclamation. Therefore, the changes in the programs and studies did not unduly delay the process and did improve the database.

B.5.5 Agency/Public Involvement and Coordination

NEPA does not require direct involvement of other agencies in the environmental process unless the agency is a cooperating agency due to some specific project impact or jurisdiction. However, NEPA strongly suggests agency coordination, requires public notice, and requires public involvement. Since the early 1980's, the interpretation of agency and public involvement has broadened as will be discussed later.

The Forest Service, in its capacity of lead agency, conducted public and interagency consultation and coordination meetings throughout the development of the environmental documents. The COE and EPA participated as cooperating agencies.

To meet the commitment of involvement, informational meetings were held in Juneau and Angoon during development of the PDEIS. Angoon is the nearest village to the mine site and residents had expressed interest. The meetings in Juneau were more numerous (estimated at 3 to 5 before submittal of the total PDEIS to the IDT).

Agencies and the public were invited to attend the informational meetings. Meetings were also held with each agency and the proposed mine developer to discuss the proposed project and specific agency issues, relevant regulations, or permitting implications that could affect the project description. Changes were made in the project as additional information and requirements were identified.

Public input at the informational meetings was informal. The presentations at each informational meeting were organized basically as follows:

- Introductions of project developers and Forest Service representatives
- Outline of the environmental process and proposed time schedule
- Overview of the project as envisioned (including visual aids)
- Specific topic discussion. Meetings were set up to stress specific topics such as:
  - Transportation and housing
  - Wastewater
  - Wildlife
  - Recreation
- Questions and answers

The questions were noted and new issues raised were incorporated by discussion in the

PDEIS or in some cases by modification of the project concept. Considerable agency and public input were therefore incorporated into the PDEIS before any formal public or agency permitting involvement.

The complete listing of agency and information meetings held after initial project activity and scoping is summarized in **Table B-1**. This table does not include the numerous IDT meetings.

B.5.6 Environmental Process Schedule

The process was officially begun in November of 1979 when a notice of intent to prepare an EIS was filed by the U.S. Forest Service. A number of public meetings were held to scope the process. In an early 1980 draft, scoping documents were prepared based upon the initial meetings. The project then remained somewhat inactive for about another year while the Forest Service determined the validity of the claims on the project and the mining company underwent a change in management from the exploration group to the operations group. In early 1981, the operations group worked with the Forest Service to develop the schedule for the process. At that time, the Interdisciplinary Team (IDT) was formed to head up the planning and organization process.

When the IDT was established and fully functional, a target project schedule was developed by the IDT and the Company. Tentative schedules had been discussed with the Forest Service District Ranger and the Monument Manager early in the process. These schedules were modified after the issues and estimated time frames to address data needs were better understood. According to discussions with individuals involved with the project, the initial schedules were maintained quite closely. Agency review time was the critical path and resulted in the only additions to the schedule (several months). Approximately 24 months were required to process the PDEIS and the FEIS (early 1981 to early 1983).

B.5.7 Document Preparation

- Outline of PDEIS

  The outline was jointly prepared by the Company consultants, Company representatives, and the IDT during periodic reviews. The initial IDT meetings dwelled on terminology discussions so that everyone understood the differences between Components, Options. and Alternatives. Components are essential elements of the mine. Options are developed from combinations of the different locations or methods by which each component can be accomplished. Alternatives are groupings of options including each of the Components into a functional system.

  When all involved understood how the project would be developed and analyzed, a draft outline was written and submitted for IDT review. The outline was basic and modified often during preparation of the PDEIS.

- PDEIS

TABLE B-1

Federal and State Involvement
Meetings Held and Number of People Attending

	Forest Service	EPA	USFWS	NMFS	COE	OG-DPDP	ADF&G	ADCED-OMD	ADNR	ADEC	City of Juneau	Angoon	Village of	Noranda Mining Inc.
Review of Options (08/19/81)	7			2	1		1			2				4
Review of Options (08/20/81)	9	1	1	1	1		1			1				4
Planning Criteria (08/27/81)	9		1							2				1
Range of Options (09/03/81)	6			1										3
On Site Review (09/15/81)	1	7												1
Dye Study Results (09/16/81)	4	1	1				1			4				4
Wetland Discussion (09/24/81)	1	1			2									1
Angoon Public Meeting (10/01/81)	3												25	2
Socioeconomic Discussion (11/04/81)	2										1			2
Marine Tailings Disposal (11/05/81)	4		1	3			2		1	5				
Environmental Effects (11/17/81)	8	1	1		1		1			1				7
Environmental Effects (11/18/81)	8	1	2		2		1			1				7
Environmental Effects (11/19/81)	8	1	1		1		1			1				7
Range of Alternatives (12/17/81)	6		1					1						3
Range of Alternatives (12/18/81)	6		1	1			1	1		1				3
Mitigation (01/07/82)	3		1	1			1							3
Effects Analysis (03/03/82)	11	1	2	1			7	2	1	2	1			6
Effects Analysis (03/04/82)	9		1	1			4	1		1				5

Source, USDA, 1983

The PDEIS was prepared by the Company consultants and coordinated by the consulting Environmental Manager. The PDEIS was primarily written in Juneau by the specialists during periodic 1 to 2 week sessions. All the consultant specialists traveled to Juneau and worked in the Company offices. Word processing was done by the Company secretary.

Each specialist lived in another city or state, from Anchorage to California to Colorado. All prepared for the writing session before coming to Juneau. Some had draft sections to coordinate into the PDEIS during the writing session. Working together in one location for short intensive periods helped control expense, facilitated coordination of document sections, and forced the time schedule to be maintained.

The PDEIS was prepared in sections. The sections were internally proofed and edited, then reviewed with the IDT. IDT comments and suggestions were incorporated into the next draft of the PDEIS. There were several iterations of draft section preparation and review (possibly 3 to 4) before the entire PDEIS draft was compiled.

The final draft PDEIS was formally submitted to the IDT for a 2 month review period. The comments were received in early 1982 and a week long writing session was held to address comments and prepare a final PDEIS submittal to the Forest Service.

- DEIS

The IDT received the PDEIS from the Company and reviewed the document. Additional questions were asked, data were requested, and input from the consultant specialists and Company was needed to address IDT interpretations of the PDEIS.

The IDT worked on the modification of the PDEIS for more that 5 months before drafts of the DEIS began to take shape. Coordination with the Company during this time was minimal and generally limited to questions, interpretations of the project description, or additional data.

The DEIS was internally reviewed and released to the public in the late summer of 1982. The DEIS was presented to the agencies listed in **Table B-2**. In addition, over 300 copies of the DEIS were issued to private individuals, organizations, or companies for review and comment.

- FEIS/ROD

The FEIS was prepared after public hearings in September. Questions and comments from the public hearings were incorporated into the FEIS by the Forest Service with input from the Company as requested.

The Record of Decision (ROD) was prepared as the FEIS was completed by the

TABLE B-2

FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST

Presented below is a list of agencies to which the DEIS and FEIS were sent. A complete mailing list, including individuals, is available at the Admiralty Island National Monument office in Juneau.

Federal Agencies

Environmental Protection Agency
United States Department of Health and Welfare
United States Department of Housing and Urban Development
United States Department of Labor
United States Department of Energy
General Services Administration
Interstate Commerce Commission
United States Department of Transportation
United States Coast Guard
Water Resources Council
Federal Energy Regulatory Commission
Federal Highway Administration
Federal Aviation Administration
Pacific NW River Basins Commission
United States Department of Agriculture, Forest Service
United State Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
United States Department of Defense
Army Corps of Engineers, Alaska District
Advisory Council on Historic Preservation
United States Department of the Interior
- Bureau of Land Management
- Bureau of Mines
- Fish and Wildlife Service
- Geological Survey

Alaska State Agencies (through State Conservation System Unit Coordinator)

Department of Fish and Game
Department of Natural Resources
Department of Transportation and Public Facilities
Department of Environmental Conservation
Department of Administration
Department of Commerce and Economic Development
Department of Community and Regional Affairs
Department of Education
Department of Health and Social Services
Department of Labor
Department of Law
Department of Military Affairs
Department of Public Safety
Department of Revenue
Division of Fish and Wildlife Protection
Division of Policy Development and Planning
Office of History and Archeology
Alaska Power Authority

Source, USDA 1983

TABLE B-2, continued

Local Communities

Village of Angoon
City of Hoonah
City of Juneau
City of Sitka

Congressional Delegation

Honorable Ted Stevens - United States Senate
Honorable Frank H. Murkowski - United States Senate
Honorable Don Young - House of Representatives

Forest Supervisor with advice of staff and cooperating agencies.

The FEIS and ROD were issued to the public in late January, 1983. The same list of agencies (**Table B-2**) received the FEIS/ROD. Over 300 copies were also sent to private entities.

- PLAN OF OPERATION

  An annual Plan of Operation is required by the Forest Service for activities on Forest land. Most Plans had been for exploration activity. When the ROD was issued, a General Plan of Operation for the entire project was needed essentially as the Forest Service application for permit to operate.

  By mid-year, after the ROD (January 1983), a General Plan of Operation was submitted. It defined how the project would be constructed to minimize surface disturbance and meet the terms of the ROD, other regulations, leases, permits, and contracts. The Plan was reviewed and approved by the Forest Service in early 1984.

B.5.8 Public Hearings

After release of the DEIS to the public in August of 1982, public hearings were scheduled and noticed in the local newspapers and by direct notification to the Council in the village of Angoon. A 60 day review period was allowed for submission of written testimony (although the comments were accepted up to 90 days after DEIS issuance). Hearings were held in September in Juneau and Angoon. The hearings were formatted to provide a project plan and impact summary and answer questions about the project, as well as to accept testimony from the public. The Forest Service chaired the hearings and were supported by representatives from the cooperating agency (EPA).

Public comments were recorded at the hearings. In addition, another 30 days were allowed to submit written comment on the project and the DEIS.

Public hearings initiated 34 written comments. Ten comments were from out of state, 13 from Juneau, 8 from Anchorage, and 3 from Ketchikan. Only 4 comments were from individuals. Thirteen were from federal agencies, 5 from state agencies, 4 from environmental groups, 1 from city government, and 1 from a native corporation. Three of the comments simply stated that nothing in the EIS came under the authority of the commenting agency. The comments were considered by the Forest Service and questions forwarded to the Company as necessary. Key issues or items addressed in the comments included:

- 13 expressed preferences for alternatives
- 14 requested additional consideration of effluent and tailings disposal sites
- 7 expressed concern or questions on the Hawk Inlet to Young Bay road
- Additional less frequent comments regarded:

- Site access
- Air quality
- Concentrate handling methods
- Eagles and nest sites
- Effluent discharge and treatment
- Fish, fisheries and marine life
- Gender specific words
- Survey monuments
- Historic Register eligibility
- Housing
- Hunting and trapping
- Mill site location
- Mining in the Monument
- Mitigation/Monitoring/Reclamation
- No-action alternative
- Permits, licenses, approvals
- Pesticides and herbicides
- Power sources
- Recreation
- Socio-economic impacts
- Spills and spill prevention
- Structures required in Juneau
- Subsidence of the mine
- Visual quality objectives
- Water quality
- Wetlands
- Wildlife

Obviously, each written comment may have contained numerous issues and topics. The written comments and responses are included in the FEIS. Where responses are short and do not necessarily modify the EIS, responses are tabulated in Section VIII of the FEIS. Where the comments resulted in modifications to the document, the tabulation refers the reader to the appropriate FEIS section.

B.5.9 Record of Decision (ROD)

The Record of Decision was prepared by the Forest Supervisor in conjunction with Forest Service staff and cooperating agencies upon completion of the FEIS. The ROD concludes the following:

- Selects Alternative 6 from the EIS;
- Reminds about other permits that are required;
- Selects the Chatham Straits discharge site, but indicates that additional study and EPA/ADEC approval, the Hawk Inlet sill site could be used and that it has been fully discussed in the FEIS;

- Summarizes the extent of the alternatives studied;

- Indicates consistency with federal requirements of ANILCA for development in the Monument, TLMP for development on non-monument land, and the Alaska Coastal Management Program (ACMP) requirements;

- Outlines the need, scope and uses for the Project Operating Plan that will be prepared and submitted to the Forest Service describing the activities of project development;

- Listed project assumptions, mitigation requirements, monitoring requirements, and reclamation programs.

The ROD indicates that the decision, process, or findings are subject to administrative review (appeal) in accordance with 36 CFR 211.19 and states that project implementation will not begin sooner than 30 days from the date of the ROD. The time is allowed for filing appeals.

No appeals were filed. SEACC, the local nationally affiliated environmental group, had been included in the planning process and their comment letter indicated that while they could not support the project, it had been planned in such a manner that they would not appeal.

Since the ROD is an interesting and very significant document and provides a good summary of key project elements and requirements, a copy is included in this document for reference (see Appendix A).

B.6 Deviations from the Standard Environmental Process

The Greens Creek Project was affected by world metal price drops, the recession of the early 1980's, management and ownership changes, and an evolving environmental process and understanding by the agencies and the Company. The agency factor was one of experience. None of the federal or state agencies involved, except EPA and COE, had experience with projects of the magnitude of Greens Creek. The understanding of mining projects and mining processes and problems was very limited. Therefore, considerable effort and time was expended by the Company preparing and presenting training and familiarization information.

Most agencies did not maintain permanent staff assignments for the project although most of the IDT members served during the entire EIS process. At most Greens Creek Project planning meetings, several new agency people who had no prior knowledge of the project or of mining attended. The inconsistency of personnel and the typically large meetings held for this project resulted in many requests for re-explanation and re-training.

The meeting attendance is probably not that unusual for environmental reviews in Alaska. In fact, current practices by most state agencies would involve 3 to 10 staff members in most meetings. Also, meetings are long and numerous. One project similar to the Greens Creek Project that was being permitted in 1992 in southeast Alaska has had over 60 formal and official public meetings compared to the less than 10 held for the initial Greens Creek environmental process.

Other items that resulted in deviations of process or schedule are discussed in the following sections.

B.6.1 Time Delay Due to Economic Conditions

In 1980, many key metal prices were at all time high levels. Gold was at eight hundred dollars per ounce, 3 to 4 times higher than normal. Prices had fueled considerable interest in mining. During these times, the Greens Creek Project was progressing through the exploration, mine design and environmental process. As the EIS was nearing completion, the country was entering a recession period. Metal prices fell dramatically, especially gold.

The double surprise of recession and dropping metal prices affected the schedule of permitting and development for the Greens Creek project. Management determined that the environmental impact assessment process would be completed, but that additional permitting and development would be postponed. In early 1983, upon issuance of the ROD, the project was slowed to a holding pace.

Some exploration continued for the next 2 years. Pre-operational monitoring was continued. Several studies were undertaken to clarify options for water discharge location in Hawk Inlet or Chatham Strait as outlined in the ROD. Some design effort continued. Permit activity was limited to that necessary to support the exploration and study efforts and some of the major long-lead permits such as:

- EPA, NPDES water discharge permit
- State DNR, water rights
- Leases
- COE, 404

The key permit applications were submitted and the agencies proceeded with the permit process.

In 1985 or 1986, the recession had been replaced by a period of mergers and acquisitions. Both affected the project. The improving economy increased interest in development of the project. The exploration effort during the hold period had confirmed additional reserves which improved project viability. Some of the minority joint venture partners had been purchased by other mining companies. The Operating Company had experienced some environmental and economic difficulties at other operating projects. The project was ripe for acquisition.

Acquisition of the operating Company occurred in 1986 when one of the new minority shareholders acquired the majority Operating Company shares and assumed management of the project. The new operator was ready to proceed with development and the permitting and design efforts were restarted on a fast-track basis.

The delay and change in ownership resulted in a gap in the environmental and permitting process of over 2 years. Project permits which were not applied for after the ROD were thus delayed. The result of all these factors was a change in the project management's viewpoint of the project and a perceived need to modify the project before proceeding.

B.6.2 Project Modifications

A complete review of the project plans occurred upon restarting the project permitting and design under the new Operating Company. Four proposed project modifications were identified. The modifications were proposed for economic reasons or because of the new Operating company preference. The Plan of Operation that had been approved in 1984 was still in force, but was also subject to review. The four basic modifications and reasons for requesting the modifications are as follows:

- Change from conventional tailings pond tailings disposal to dry tailings disposal. The dry tailings would be transported to the tailings disposal site by truck instead of slurry pipeline.

  The dam and impoundment for the dry tailings concept were much smaller than for the conventional tailings pond concept. The original large dam foundation was in deep, unstable glacial clays and development of a stable foundation was estimated to cost from 30 to 80 million dollars. The smaller dam to control dry tailings pile runoff and mill water could be moved well up the drainage onto shallower and more stable material. In addition, less of Tributary Creek would be affected by the smaller dam.

- Increased mine production from 800 tons to 1050 tons per day.

  A review of project economics had identified the need for higher production rates to support the expense of remote project development.

- Transport of wastewater in a single pipeline from the mill to the tailings sediment pond instead of by double walled pipeline.

  The double pipeline was proposed as a mitigation measure to help prevent spill damage in the event of a slurry pipeline break or leak when conventional tailings disposal was the preferred option. The water routed from the mill to the tailings sediment pond would be much higher quality than the slurry and a double pipeline was not considered necessary.

- Increased water withdrawal from Greens Creek.

  Additional pilot milling studies and more comprehensive design work indicated that mill process water requirements would be higher than originally anticipated. The new findings required a variable water withdrawal of from 115 to 700 gpm. A water right of 250 gpm had been requested and issued based upon the original estimates.

B.6.3 Supplemental Environmental Documentation (EA)

The proposed changes were considered potentially significant by the Forest Service and an environmental process was started in accordance with NEPA requirements. The outcome of the process for the changes could result in the need to develop a supplemental EIS or the

issuance of a Finding of No Significant Impact (FONSI).

The Forest Service formally began a scoping process on the proposed changes in mid-1987. Environmental awareness had changed and the notification process was much more extensive. In all, notices were mailed to 430 individuals, groups, and agency staff members. Twenty-eight news releases were issued to Anchorage and all Southeast communities.

In the fall of 1987, the Forest Service held a public open house to receive comments and recommendations on the preparation of an EA for the proposed changes. The comments were used as input for the Forest Service in preparation of the following Issues, Concerns, and Opportunities to guide coverage in the EA:

Issues and Concerns

- Provision of adequate water over the full length of Greens Creek to maintain freshwater-dependent monument values and provide for efficient mill processing. NOTE: The term "Monument Values" became increasingly difficult to define for the project as interpretations multiplied.

- Provision of adequate water quality in the Greens Creek watershed to maintain monument values and provide efficient mill processing.

- Potential increased disturbance to wildlife due to changes in truck haul and mechanical placement of tailings.

- Changed impacts to recreation, visual, and wetland resources in the monument.

- Potential reduction of worst-case impact from failure of the slurry line and dam failure.

Potential Opportunities

- Improved mine economic efficiency and shortened overall mine life.

- A potential reduction of impacts on the Tributary Creek Valley and the overall anadromous fish habitat of the system from construction of a smaller tailings impoundment.

- Increased use of tailings as mine backfill (up to 60%).

- Reduced tailings basin construction costs.

- Increased mill processing efficiency due to increased access to mill water at key stages of the processing cycle.

The Supplemental EA progressed smoothly. The extent of the issues was focused and most of the issues had been discussed in some detail in the FEIS several years before. Detailed additional study was needed on the water withdrawal issue and the viability of the dry tailings

method of tailings disposal.

The Company had initiated studies early when it was determined that the original large tailings dam was not feasible in the deep unconsolidated sediments of the Tributary Creek watershed. Dry tailings studies emphasized dewaterability, workability and trafficability of the tailings. A method of placement of dewatered tailings underground as a working base in the mine also had to be worked out. The mine backfill was a key component of the concept since there is not adequate space at the tailings storage site for total above ground storage of tailings.

The issue of truck hauling and spill potential versus slurry pipeline transport of tailings in the original project proposal was a matter of increased numbers of trucks, not a totally new transportation concept. Much of the wildlife disturbance issue was also tied to the increased trucking and the use of equipment at the tailings site.

Water withdrawal discussions were lengthy. The agencies involved included the Forest Service and the state and federal fish and game agencies. The discussion concerning the potential impacts of water withdrawal keyed upon low flow winter withdrawal. Extensive winter field work was requested to characterize the habitat in Greens Creek and estimate the effect of increasing water withdrawal from 250 gpm up to 700 gpm.

Agencies asked the company consultants to survey some cross sections of the stream and calculate the relative changes in water levels at low flow. The effects projected were not significant. The agencies then asked that the consultants do winter surveys of low flow conditions. Photo and descriptive discussions were held. Several critical pool conditions were characterized and water level changes evaluated. No significant impacts were noted. Agencies then asked that each pool above the Greens Creek fish barrier be surveyed and characterized in winter conditions. The Company expressed concern for the risk to personnel working in the winter conditions in the remote gorge, the need for the work, and the high cost. An agreement that the increased withdrawal would not create significant problems was only reached after numerous and extensive meetings and discussions.

Water quality at the tailings pond discharge was also a difficult issue. The issue was addressed using a two-phase contingency plan that satisfied the requirements for the environmental discussion, but was later to result in problems of interpretation during operation. The big water quality difference between dry and conventional tailings disposal results from the differences in tailings pond sizes. Though the conventional tailings pond was much bigger than the dry tailings pond, each would receive the same amount of water, resulting in a marked difference in settling times. Significant differences in settling time could equate to higher sediment and associated total metals in discharge water. Pilot milling and water quality studies done for the FEIS were interpreted to develop an approach. Studies indicated that settling occurred rapidly initially, then water quality improved additionally over several days. Based on the pilot work, chances were good that water quality would meet criteria during most conditions. As a contingency, the following measures were discussed in the EA:

- Add chemical flocculation and baffles in the tailings sediment pond if necessary to meet water quality criteria.

- Install additional treatment if necessary.

The mitigation measures were to be accomplished on a step-wise basis if water quality criteria were not met.

In actual practice, during start-up, the water quality standard was not always met and the Company installed additional baffles and flocculation to better meet criteria. Mill processes were also optimized and a treatment system was installed in the mill to destroy cyanide traces that resulted from higher than anticipated cyanide demand. A non-compliance fine by EPA resulted from the start-up water quality exceedences (copper) even though the mitigation procedures and schedules outlined in the EA were followed.

Recreation, visual, and wetlands issues along with increased traffic and equipment working at the tailing site all became part of the "Monument Values" issue. The Forest Service could not define what they meant by Monument Values in quantitative terms, but all sections of the EA and ultimately the decisions based on the EA were determined by their assessment of the impact of the project changes on Monument Values. Since the term was not well defined and could be applied to almost any aspect of the project, dealing with the ill-defined Monument Values became an impediment to the EA process.

The EA was written in draft form, reviewed internally, and rewritten at least two times. Most changes were not substantive. In fact, most changes were attempts to define Monument Values in comprehensive terms.

Ultimately, the EA was made public. Comments were received and incorporated into the document. The Forest Service determined that the proposed project modifications were not significant and would not create a significant environmental impact. A Finding of No Significant Impact (FONSI) was issued. An EA Decision Notice was issued in March 1988. Public notice for the State consistency decision ended in May 1988. No appeals were filed on the federal or state decisions and the project was able to proceed. The Plan of Operation was approved by the Forest Service in March 1988. Most permits had been either received or were being sought concurrently with the modification EA.

B.7 Permitting Process

B.7.1 Key Permits Required

The ROD's for the FEIS and the Decision Notice for the EA along with the State consistency determination were the key factors needed to start the final permitting of the project. Many permits were approved prior to the final EA decision. A complete permit listing and schedule follows:

PERMIT/FACILITY	AGENCY	PERMIT ACQUIRED
Plan of Operation	Forest Service	March 1984
Annual Work Plan	Forest Service	May 1988
Special Use Permit	Forest Service	August 1984
ROADS		
Section 404 (wetlands)	U.S. Army COE	April 1984

PERMIT/FACILITY	AGENCY	PERMIT ACQUIRED
Anadromous Stream Protection	ADF&G	August 1984
Timber Sale Contract	Forest Service	August 1984
Quarry Rock Contract	Forest Service	July 1986
MARINE TERMINAL		
Barge Dock	U.S. Army COE	January 1984
Section 10 (Marine construction)	U.S. Army COE	October 1987
CZM consistency (Log transfer)	Alaska DGC	March 1988
WASTEWATER		
Plan review (Cannery domestic)	ADEC	March 1986
Discharge (Cannery domestic)	ADEC	July 1987
Temporary 1350 Discharge	EPA/ADEC	April 1988, Expired 1990
Temporary 920 Discharge	EPA/ADEC	October 1986, Expired 1990
SOLID WASTE		
Sludge/Ash	ADEC	June 1988
Garbage	ADEC	July 1985
YOUNG BAY DOCK		
Section 404 (wetlands)	U.S. Army COE	May 1988
Section 10 (Marine construction)	U.S. Army COE	May 1988
Tidelands Lease	ADNR	September 1988 est.
MINE/MILL SERVICE AREA		
Water Rights (250 gpm)	ADNR	June 1984
Water Rights (700 gpm)	ADNR	Late 1988 est.
Water Rights (Slope drain wells)	ADNR	August 1988 est.
Air Quality (PSD)	ADEC	September 1988
Underground Tailings Backfill	EPA	No permit, notification needed
Mill Site Lease	Forest Service	August 1986
Water Intake (Greens Creek) (404/CZM/Anadromous Stream)	ADNR/U.S. Army COE	July, August 1988
TAILINGS AREA/PROCESS OUTFALL		
Section 404 (Wetlands)	U.S. Army COE	June 1988
Anadromous Stream Protection	ADF&G	July 1988
Tailings Dam Safety Review	ADNR	May 1988
Wastewater Discharge	EPA/ADEC certification	April 1987
Site Lease	Forest Service	August 1988 est.
GENERAL PERMITS/PLANS		
Effluent Pipe Right-of-Way	Forest Service	September 1988
Best Management Practices Plan	EPA/ADEC	Not yet approved, 4 years after submittal (no review comments from agencies)
SPCC Oil Spill Plan	ADEC/Coast Guard	Not known

The listed permits are the key environmental permits. There are numerous other more minor permits, such as permits to operate generators, compressors, food service, vehicles, and passenger ferry service.

B.7.2 Overlapping Jurisdictions

The permits and jurisdictions noted in the previous section illustrate the general overlap of permitting authority assumed or designated to the various agencies. Much of the overlap is

between state and federal agencies. The federal government typically requires the states to adopt standards that are as strict or more strict than the federal standards. The federal government typically delegates authority to the states when they have demonstrated that states have developed suitable regulations and are capable of implementing the regulations.

However, sometimes the delegation is not made and sometimes only a portion of the state regulations are sufficient and both agencies remain involved. It is apparent from several of the project consultant's perspective that an atmosphere of cooperation and trust generally does not exist between overlapping agencies. If not, the Company finds itself in a difficult permitting situation. It is difficult to obtain decisions. Lack of cooperation and disagreements regarding regulation interpretation especially affects the NPDES permit.

Being in the City and Borough of Juneau further complicates jurisdictional issues because of the city's Major Mine Ordinance. The ordinance prescribes duplicate jurisdictions for water, land, and other environmental issues. Greens Creek was annexed into the CBJ. The local permitting requirements were postponed until 1994 by mutual agreement with the CBJ. Current thinking would require a permit application at that time.

B.7.3 Permit Process and Associated Time Frames

The permit processes are much more defined than the overall environmental process. Each agency has its own process. The processes are generally defined by statute, but are subject to a wide latitude of interpretation by the agencies. Basically, after the EIS-ROD is formalized, the Coastal Zone Management (CZM) consistency process begins. The State Coastal Project Questionnaire and Certification statement form is used by the state and the Company to determine the major permits that are required. The form is split into sections by major state Department. By answering a series of questions for each Department, the major required permits can be identified.

Federal permit requirements are less numerous and the discussions with individual agencies are useful in determining the specific permits required.

The CZM process is intended to coordinate the state permits. The environmental process facilitated much of the federal permit coordination, but it is up to the Company to follow up on the federal process. The CZM process will begin only if the Alaska DGC believes the Company has submitted all permit applications and information. At that point, a 50-day time limit begins for consistency review.

Agencies in the state have a specified number of days (27) to let the Company know if additional information is needed. The public has 34 days during the initial CZM review to make comment. Public and agency information requests must be passed on to the Company within 34 days of the start of the CZM process. After additional information is provided, consistency must be determined within a total of 50 days. Permits must be issued within 5 days of consistency determination. Similar time frames are required for federal permitting. If the CZM process is elevated by appeal, there is a 15-day determination due from the DGC Director and if necessary another 15-day appeal to the DGC Commissioner (80 days total).

The time frames appear to apply some degree of urgency to issue permits. One way to look

at it is that the issues have been fully detailed and discussed in the environmental process and that the permit process is a formality where the details of the plans and operational procedures are cataloged. However, the process has evolved. Some consultants interviewed expressed frustration with how agencies appeared to use the information request-period to delay and postpone action.

The Greens Creek permitting process proceeded as scheduled and most necessary permits that had not been acquired before the Supplemental EA were obtained within four months of the ROD. Forest Service leases, ADF&G stream permit, and DNR lease and water permits were issued later in September (6 months).

The delays in permitting by some agencies did not necessarily hold up construction but required special scheduling to begin construction in fully permitted sites. It was the Company feeling that they could not afford to object too strenuously or to fight certain conditions in fear of long-term delays.

C. ADVANTAGES AND DISADVANTAGES OF THE APPROACHES USED BY THE MINE DEVELOPER

C.1 Environmental Approach

C.1.1 Process Understanding

The agencies and the Company were both unaware of many of the environmental procedures necessary during the early stages of the process. Large non-timber projects had not been permitted in southeast Alaska. The first few years of the project exploration allowed time for the Company to decide that the project was economically viable and therefore worth permitting while the Forest Service proceeded with initial environmental procedures. Permitting was started by submitting a preliminary project description, an initial plan of operation, and starting some baseline studies, but the project concept development was not complete enough to allow formulation of coordinated baseline studies or a workable scoping/permitting program.

After the first several years of exploration and permitting activity, the process was becoming more clear to both parties. The Company reorganized from an exploration role to a planning/permitting/operation role. The planning/permitting consultants worked with the Company to determine that the project must be specifically defined and not change dramatically before project permitting can proceed.

Agency and Company understanding of the environmental process evolved throughout the permitting effort and continues to evolve. In the initial stages the environmental process was driven by lack of experience and by development of interpretations of the NEPA and permitting process. As the author sees it, the environmental process has evolved; it is now driven largely by threat of legal action and by special preservationist interests both inside and outside the agencies. Environmental permitting has become a process where the opposing philosophies of resource utilization and preservation battle using the NEPA process as a battlefield.

C.1.2 Problem Areas and Potential Improvements

The environmental process for the Greens Creek project progressed relatively well after the project was defined. The following problem/solution discussions illustrate several areas where improvements could have been made.

PROBLEMS AND DISCUSSION

- Baseline Studies Coordination

  The initial baseline studies were performed before the project was well defined. Therefore, much of the work had to be augmented later. The initial work proved to be extremely valuable to the agencies and the Company in defining the project and determining the need and scope of future work. However, money and time could possibly have been saved if the agencies had been more experienced with large projects and the Company had defined the project earlier. In retrospect it may have been possible to wait on baseline studies until the project description was more defined. However, the early approach was of rapid development and all aspects of project development had to be compressed as much as possible. This was simply not possible in the atmosphere of the developing environmental process and is virtually impossible in view of the extensive evolution of the process today.

- Company Attitude

  During permitting, the Company developed a reputation of cooperation and openness with the agencies and the public. The results of cooperation can be to mutual benefit or be one-sided. In many cases, the consultants interviewed believe that the cooperative nature of the Company resulted in extra cost and in some specific cases agreement to unreasonable and unrealistic agency requests when reason dictated saying no. In most cases, the Company simply did not wish to take a stand that could have upset some of the agency personnel and jeopardized the permits.

  Several consultants interviewed believe that the Greens Creek fish ladder and numerous other studies, including the water removal exercise, were done simply because of inexperience of some agency staff members. Several consultants offered the Company sound reasons why the agency requests were considered frivolous.

  A cooperative attitude and performance can be extremely beneficial to all involved when it is mutually respected. Consultants interviewed believe a "guilty until the Company proves innocence or bends to agency requests" situation is common at all levels of the environmental process today.

- Ill-Defined State Water Quality Regulations

  Consultants pointed out during permitting that the state receiving water regulations were not well defined and were based upon a premise that the water quality at the

edge of the mixing zone should be 0.01 times the LC_{50} for the most sensitive Alaskan species in the receiving water (LC_{50} is the concentration where 50% of a test species die within 96-hours). Initially, the state attempted to use this approach in developing the receiving water standards. No data were available for Alaskan species and taking 0.01 times the LC_{50} for EPA Red Book organisms resulted in standards well below background sea water in some cases.

After considerable discussion, the ADEC Commissioner intervened during NPDES permit review and stated that most receiving water standards would be set based upon the EPA Red Book criteria.

However, the cyanide standard was set by ADEC based upon input from within the agency that supported measurements of free cyanide to levels below 0.0005 mg/l. The EPA-published detection level was then much higher. Further, in the very complex make-up of sea water, the very possibility of occurrence of free cyanide is arguable. Seawater has such a high level of dissolved solids that even total cyanide, the only EPA approved cyanide analytical test, cannot be measured to such levels. The arguments were stated, the standard remained and still remains. The laboratories cannot measure to such low levels even today. The cyanide standard is an example of a serious problem with the approach used to establish standards.

- Agency Leadership

During the initial stages of the Greens Creek Project, the strength of the U. S. Forest Service leadership (Monument Manager) helped tremendously to facilitate the decision making and overall progress of the project. However, supporting staff members on occasion put forth agency positions and attempt to dictate policy. At times the positions of staff members are not confirmed by agency managers.

According to those interviewed (consultants and agency personnel), the agency goals are apparently either not clear or ignored by some staff. Possibly a review of agency goals and communication of goals is warranted. It appears to the author that agencies need to more effectively communicate policy to staff and developers. Confusion could be reduced. Otherwise, numerous "defacto" policies are set by staff and, unless questioned, can impede project progress.

- Decision-Making Criteria

Recent proposed revisions to the ADEC Water Quality Standards and to EPA regulations are tending toward the narrative standard or the discretionary standard. The national trend is towards fewer specific criteria and more narrative criteria. Therefore, decision making will become even more difficult and the permitting process may be more prone to personal opinion and interpretation by agency staff. The use of "discretional" standards was a very time consuming issue for the Greens Creek NPDES Permit.

An alternative interpretation of the narrative standard is that it permits the regulator

flexibility to modify standards to the specifics of the site in question versus using the same standard at all sites regardless of the capacity of the environment to absorb the impacts of the project. The author's experience does not support this interpretation.

POTENTIAL IMPROVEMENTS

The following potential improvements are suggested based upon findings from this research and the author's experience with the environmental process in Alaska.

- Develop a productive working relationship between agencies, environmental groups, and project proponents. The relationships are generally adversarial.

- Develop strong leadership and high levels of experience in agencies.

- Develop mechanisms for making decisions using science and specific criteria instead of political consensus.

- Develop and communicate agency goals and objectives (i.e., national and regional mission statements) for use by staff, project proponents, and others to keep the agency policy clearly in perspective.

- Develop consistency. Interdisciplinary teams (IDT) and state agency representatives should be assigned to a project and generally remain throughout the project planning and permitting. On the Greens Creek Project, agency meetings were often attended by 20 to more than 30 agency representatives. In all cases, 25 to 50% of the agency attendees were new to the project. It was always necessary to begin at the beginning and bring the audience up to date. This was boring for regular agency attendees and frustrating and time consuming for the Company and their consultants. Decision consistency was difficult since decisions already made would be revisited by the new attendees.

  Approximately five Forest Service staff members carried through on the project from the start of permitting to implementation. Without their input, progress would have been even more difficult.

- Improve up-front planning and agreements. Extensive initial planning and agency interface may have saved time and money. Planning and negotiation of study scopes with the agencies could have reduced the baseline data augmentation that was necessary after the project was further defined. The agencies would have known more about the project and been better able to determine their questions and concerns. The key is development of a detailed project description and agreement within the company prior to starting agency coordination and extensive environmental baseline work.

- Develop a workable communication mechanism. It is becoming more difficult to identify information needs and obtain usable answers. The answer is not always the same depending on the level of personnel (i.e., staff, middle, or upper

management) in the agency or the Company dispensing the information. Such a trend is increasing.

- The Operating Plan in the EIS should remain as general as possible to avoid conflicts during permitting when literal interpretation is attempted by agencies.

C.1.3 Advantages of the Environmental Process Used

The one basic difference in the Greens Creek environmental process over others and over typical processes now used in the state was the manner in which the Preliminary DEIS was prepared. The Company hired consultants to prepare baseline studies and to write an initial environmental assessment. This study was submitted to the Forest Service for their review and additions, and ultimately to be modified into the Forest Service's DEIS. This process saved the Company time and money, while providing a quality document for the agency and the public.

This procedure was fairly common in the early days of NEPA. The initial document can typically be prepared in half or less time than if administered by the lead agency. Since time is cost, the procedure saves significant dollars.

The fear of liability and charges that the Company should not have control of the consultants preparing the initial document has led to the now common practice of a third party consultant preparing the DEIS under the administration of the lead agency with costs born by the Company.

C.2 Permitting Approach

The permitting process was much better understood by the Company as well as the agencies than was the environmental process. Permitting had been common for years and each agency had experience with similar permits. The permits are broken into small categories that permits for the components of such a large project were similar to the permits for small individual roads, docks, or buildings. Therefore, the permitting procedures did not result in any specific issues or problems that have not been already discussed.

In hind-sight, different company strategy and position on specific permits could have benefitted the company and in some cases the environment as explained in the following discussion.

In some cases, conditions and requirements issued in permits were unrealistic and simply not feasible. The permit conditions were issued before final design in many instances. Engineering review of some permit conditions indicated that as much or more mitigation could be achieved for less cost.

The Company typically would discuss the issue with the issuing agency. In some cases, additional studies were contracted and submitted to provide more specific information. Agencies were reluctant to modify requirements if they were discussed in the FEIS. Interviewed consultants provided examples of situations where this was true even when the options suggested after the FEIS were less costly and provided greater environmental benefit.

In this case, environmental benefits can be lost because the Company's approach was too well defined in the EIS, not allowing for later changes.

The Company reluctantly complied in lieu of appeals or additional negotiations. What could have occurred in an ideal process is summarized:

- The Company could have requested review of the issues by qualified specialists experienced in the specific area of question. The Company would have paid for such a review, but savings could have been worth the cost.

- The Company could have been less flexible when they perceived that the requirements were unreasonable.

- If better communication mechanisms existed, the Company could have anticipated the requirements, realistic alternatives could have been presented in the permit application and discussed early in the permit process before the agency formulated the requirements and submitted them for public review. Agencies are reticent to make changes, once a course of action has been submitted for public review.

- If these other approaches failed, then the Company could have appealed through state and federal appeals processes.

The author notes that agreements by the Company to less than perfect concepts in an EA or EIS may be necessary if the Company is on a fast track project schedule. An equally significant and related fact is that an EIS is designed as an environmental guideline, not an engineering document. Permitting is the regulatory process for developing the detailed engineering requirements for a project. The balance between EIS or EA decisions and permitting requirements is a continually confusing and controversial area.

From the project proponent's perspective, potential improvements to the permitting process include:

- Consolidation of overlapping jurisdictions (i.e., reclamation, water quality, land use, ...).

- Tie the permitting closer to the EIS review process to reduce redundancy. Now it is common for a single agency to get the same information two, three, or more times for the DEIS, FEIS, and for each of several permits. This is especially true for ADEC and DNR permits. Many permit applications are between 500 and 1000 pages of text and figures, and the extensive work is largely redundant.

- Agency management needs to assure that qualified planning, engineering, and environmental expertise is available to review applications. If expertise is unavailable, it should be contracted. Inexperienced agency personnel commonly take the most ultra-conservative approach resulting in little actual environmental improvement but significant increases in costs for the project. The DNR dam safety review office commonly contracts with outside experts to assist in the review.

D. MAJOR INCENTIVES OR DISINCENTIVES TO METAL-MINE DEVELOPMENT IN SOUTHEAST ALASKA

The following listing of incentives and disincentives to the metal-mine development in Southeast Alaska summarizes the findings of this study and the author's experience with the environmental process in Southeast Alaska.

The listings are not intended to relay any specific messages regarding preferred solutions to disincentives. Lists are simply what any potential mining developer should be aware of when considering mine development in Southeast Alaska. In essence, these are the points a consultant should discuss with the client before any decision is made to proceed with a project.

Most disincentives were not present or significant during the early stages of the Greens Creek Project but have developed recently.

D.1 Incentives/Disincentives

D.1.1 Socio-Economic Incentives

- The resources are located in Alaska.

D.1.2 Socio-Economic Disincentives

- Organized, vocal environmental opposition to development in some areas.
- Costs for permitting and construction from 1.5 to 2.5 times higher than in the lower states or some other countries.
- Agency funding and staffing is at a proportionally higher level than in many states.
- Considerably more detail required for EIS level work by some agencies than in other states or regions (based upon consultants interviewed).
- The state school funding formula (State Endowment Matching Fund) penalizes communities for growth and transfers school funding to the community as economic growth increases assessed valuations. This results in additional cost to projects that supply jobs.
- Costly and largely duplicative local permitting requirements in some communities.

D.1.3 Regulatory Incentives

- DGC is set up to assist with coordination of permits.

D.1.4 Regulatory Disincentives

- Many agencies have large numbers of inexperienced staff members. Consequently

project reviews result in significant delays.

- Personal environmental philosophies of some agency personnel are taking precedent over agency policies and missions.

- Overlap of perceived authority and multiple regulation by the various state and federal agencies. Commonly agencies don't appear to trust each other. Therefore, comments and requirements are repeated often. DGC coordination could help with state activities.

- DGC coordination does not work as well as it could since each state agency tries to administer their own process independently.

D.2 Current Procedures (1992) that Would Affect the Greens Creek Feasibility Differently

Evolution of the environmental process has continued since the Greens Creek EIS in 1983 and EA in 1988. Considerable additional detail is now requested by the Forest Service and other agencies. More time is taken discussing and studying issues. Decisions are developed very slowly. Concern regarding third party legal action appears to be a key factor affecting agency actions.

The awareness of all parties involved with environmental issues has been increased in the past several years by the following factors to name a few:

- Hazardous waste regulations and the voluminous regulatory process involved.

- Third party law suits where the agency and the Company are sometimes sued for process or compliance irregularities regardless of impact to the environment.

- The perceived change of agency approaches such as EPA from permitting and technical assistance toward compliance.

- Organization and sophistication of preservationist opposition. Attitude appears to be more aggressive and confrontational instead of productive. "Public Participation" in southeast Alaska has evolved into organized group politics.

In summary, environmental permitting in southeast Alaska may be a great deal more difficult than it was even 2 to 3 years ago. Attitudes of project opponents and agencies appear to have significantly changed. Resistance has translated into organized opposition. Agency awareness has been increased by the environmental movement and recent regulatory changes. The result is a much slower and more costly process that may not serve environmental goals any better.

Since the southeast Alaska environmental situation is in a period of evolution, it may be advisable to consider potential development very carefully while the environmental movement and agency goals are developed, communicated and mature.

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Interviews with 7 agency, Company, and consultant representatives involved with the project environmental work on the Greens Creek Mine Project. (People interviewed will remain anonymous).

APPENDIX A

USFS - RECORD OF DECISION

from: USDA, 1983

RECORD OF DECISION
GREENS CREEK MINING PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT
ADMIRALTY ISLAND NATIONAL MONUMENT
USDA - FOREST SERVICE
TONGASS NATIONAL FOREST - CHATHAM AREA

Based on the analysis and evaluation in the Final Environmental Impact Statement for the Greens Creek Mining Project it is my decision to adopt Alternative 6. This Alternative will be used in the development of a detailed operating plan for the project. The effluent discharge site, while identified in the Preferred Alternative, is located outside the jurisdiction of the Forest Service and requires a certification of compliance with Alaska Water Quality Standards (ADEC) and a National Pollution Discharge Elimination Permit (EPA). The Chatham Straits discharge site was selected based on a lack of definitive data regarding potential biological effects within Hawk Inlet and the absence of discharge standards from ADEC at the time of this decision. It is recognized that the Hawk Inlet sill discharge site is technically and economically preferred. If, at a future date, the permitting agencies are satisfied that potential biological effects have been identified and/or that no significant deterioration of the biological community will occur, the Forest Service will not oppose effluent discharge at the Hawk Inlet sill site displayed in this EIS. Discharge at any other sites would require additional analysis and review.

Nine alternatives were evaluated, including the No Action Alternative which would not allow development of the project. The range of alternatives addressed all major issues but was limited by the location of the mine and major shipping facility, both of which are at fixed locations. The eight action alternatives differ from each other in the type and location of various project components such as employee housing, on and off island transportation, milling facilities, tailings pond, and effluent discharge.

The selected alternative is consistent with direction provided by the Alaska National Interest Lands Conservation Act (ANILCA) for development within the Monument, and with the Tongass Land Management Plan (TLMP) for development on non-monument land on the Juneau Ranger District. This alternative is the environmentally preferred alternative and will provide the best combination of physical, biological, social and economic benefits. It also contains the most practical means to reduce or minimize environmental effects. Alternative 6 is consistent with the standards and criteria set forth in the State of Alaska Coastal Management Program (ACMP).

Alternative 6 was selected because it met all evaluation criteria at an acceptable or better level. Alternatives which best addressed an individual criteria also addressed other criteria at an unacceptable level. Alternatives 1, 3 and 8 minimize road construction and house mine employees at the cannery but result in moderate to very high impacts on wildlife, recreation, subsistence and monument values. In addition, Alternative 3 is highly complex and costly and poses a moderate threat to Greens Creek. Alternative 5 best addresses monument and fisheries criteria, but represents a moderate impact or threat to wildlife, recreation and the marine environment in Hawk Inlet. Alternative 4 best addresses wildlife, recreation and subsistence criteria but

meets monument criteria at the lowest level and poses a threat to the greatest area of Greens Creek fish habitat. Alternatives 2, 6 and 7 are similar with the exception of a single component. Alternative 2 results in effluent discharge within Hawk Inlet. Since discharge standards are not available and biologic effects of the discharge have not been verified this was considered the least desirable of the two discharge sites. Location of the milling facility at the tailings pond in Alternative 7 increased impacts to wildlife, recreation and subsistence.

The Final Environmental Impact Statement, the Project Operating Plan and other required permits and approvals will guide the development and operation of the project and will provide reasonable and specific mitigation, monitoring and reclamation requirements. The following is a partial summary of the major assumptions and mitigation, monitoring and reclamation measures identified in the FEIS. Specific details will be included in the Operating Plan.

ASSUMPTIONS

1. The projected mine life based on proven ore reserves is 11 years. This EIS anticipated additional reserves and utilized a mine life of 15-17 years. The tailings disposal site and other facilities are designed for a 15-17 year mine life.

2. Detailed plans and specifications for all engineered structures or facilities will be completed by a licensed engineer and submitted to the Forest Service for review and approval prior to any construction activity.

3. Noranda will develop detailed mitigation, monitoring and reclamation plans as part of the final Operating Plan. The reclamation plan will include all areas on National Forest land disturbed by the project.

4. A "Spill Prevention and Control Countermeasures Plan" which addresses storage of petroleum products and contingency provisions for coping with emergency spill situations will be prepared by Noranda and reviewed by EPA prior to utilization of the storage facilities.

5. Noranda will comply with all State and Federal requirements for safety, health and environmental protection.

6. No Noranda employees will be permanently housed on Admiralty Island following construction.

7. A special use permit will be issued for the Young Bay to the cannery road. The road will be permitted for exclusive use by Noranda vehicles on company business. No use of the road by private vehicles will be allowed. Any modification of this permit will require review and approval by the Forest Service.

MITIGATION

1. Fisheries habitat destroyed by construction of the cannery muskeg tailings pond will be mitigated by removal, by Noranda, of a fish barrier on Greens Creek at R.M. 3.5.

2. Construction of the tailings slurry line will consist of a 5-6 inch slurry pipe enclosed in a 24 inch corrugated metal pipe (CMP).

3. During construction, runoff from all disturbed areas will be routed through sedimentation ponds.

4. Solid waste will be incinerated. The area around the incinerator will be fenced.

5. The use of explosives and other construction activity will be adjusted to insure compliance with the Bald Eagle Protection Act.

6. Noranda will insure that all employees transported to Admiralty Island by the company will be returned to Juneau by the company at the end of their shift.

7. Noranda will not allow employees to transport guns, traps or fishing equipment to Admiralty Island on company transportation. Only security personnel will have access to firearms for emergency wildlife confrontations.

8. The Young Bay to Cannery road will only be used for transfer of Noranda employees on company business. Any other use of this road will require a formal revision of the special use permit.

MONITORING

Noranda will be responsible for all monitoring unless otherwise noted below.

1. A spawning gravel monitoring program will verify the predicted effects of sediment additions, the functionality of settling ponds and the recovery period for any short term, unavoidable fine sediment additions to Zinc Creek and Greens Creek. The program will continue for 2 full years following completion of construction.

2. Fisheries mitigation measures will be monitored for 3 years following installation to determine their effectiveness.

3. Bald Eagle monitoring will be conducted by the Fish and Wildlife Service, with assistance from Noranda to insure compliance with the Bald Eagle Protection Act. Monitoring will continue for 2 full years following completion of construction.

4. Brown bears in the project area will be monitored to insure that projected effects on bear densities, movements and habitat use patterns are verified. Monitoring will be conducted by Alaska Department of Fish and Game with assistance from Noranda and will continue for 2 full years following completion of construction.

5. A freshwater monitoring program will continue for the life of the mine and will include sample sites in Big Sore, Greens, and Zinc Creeks and other locations as necessary. Noranda will be responsible for the majority of this program with limited assistance from the Forest Service.

6. Groundwater monitoring wells will be drilled above and below the tailings ponds and will be monitored through the reclamation phase.

7. Analysis of metal concentrations in the tissue of freshwater fish will be made annually and will continue for a minimum of 3 years following construction.

8. Sediment samples will be taken in receiving streams to monitor the sediment removal efficiency of sedimentation ponds. This will continue through the first 2 years of operation.

9. A marine water quality program will be developed subject to the approval of EPA and ADEC to insure compliance with the terms of the NPDES permit.

10. Representative samples of marine indicator species will be taken annually to monitor shellfish tissue for metals and hydrocarbons.

RECLAMATION

1. Reclamation within the monument will be to as near a natural condition as practicable. This will include sealing mine openings, restoring original surface drainage, removal of all structures, recontouring where possible and revegetating all disturbed areas.

2. Reclamation requirements on the non-monument portion of the project area will be determined by the most current TLMP revision at the time of mine closure.

3. Reclamation of docking facilities at Young Bay and Hawk Inlet are outside the jurisdiction of the Forest Service.

This decision is subject to administrative review (appeal) pursuant to 36 CFR 211.19. Project implementation will occur no sooner than 30 days from the date of this Record of Decision.

WILLIAM P. GEE
Forest Supervisor

JAN 21 1983
DATE