A COMPARISON OF REGULATORY PROCESSES ASSOCIATED WITH METAL-MINE DEVELOPMENT IN ALASKA AND BRITISH COLUMBIA

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ABSTRACT

Regulatory processes associated with development of major mining operations in Alaska and British columbia were evaluated using specific case studies. Included were one hard rock mine in Alaska (Red Dog Mine), one hard rock mine in British Columbia (Snip Mine), and one offshore gold dredging project in Alaska (WestGold BIMA). Based on a comparison of the three case studies, it became clear that the primary incentives for cost effective permitting are: 1) early and continuing coordination of proposed project plans, designs and schedules with key regulatory agencies and local area residents and 2) development of a sufficient level of baseline information on air quality, water quality, wetlands, endangered species, fish and wildlife, and socio-cultural conditions to support the required permit application. The U.S. permitting process worked in much the same way as the Canadian permitting process. Disincentives of mine permitting include high initial costs for baseline data gathering. However, a relatively high early investment resulted in more efficient permit acquisition and reduced long-term monitoring requirements. A common problem identified was the inadequate supply of trained agency personnel with the requisite technical and permitting experience. This sometimes resulted in poor decisions and unnecessary changes in project plans and schedules.

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UNIT OF MEASURE ABBREVIATIONS

ha	hectares
km	kilometer
l	liter
mt	metric tons

1.0 INTRODUCTION

The United States has well developed regulations for evaluating and permitting mine development projects. Such permitting can be implemented at the local, state, or federal level. Which level of government has jurisdiction over a particular regulatory area is dependent on the ownership of lands affected, what agreements have been made between the government levels, and whether a mine will discharge water or air particulates. The permitting process in Alaska is organized around coordinating numerous agency reviews at all levels of government, each with jurisdiction over specific resources.

Similarly, Canada has a well developed regulatory review and permitting process, with similarities and differences existing between the two systems. Generally, the federal government has environmental assessment and review authority for all proposals within the federal jurisdiction while provincial governments have primary authority for environmental regulation. The provinces have the power to regulate local works, undertakings, and any matter of local or private concern with additional powers to regulate mineral exploration and development, including conservation and management of non-renewable natural resources. British Columbia has a well defined mine development review process organized around assessment of overall environmental impacts associated with a mine development project as a whole rather than individual environmental values. For example, impacts to air, water, and land resources are considered collectively rather than individual agencies having jurisdiction over these individual resources.

Case studies investigating regulatory processes associated with metal-mine development have been developed for the Cominco Red Dog Mine and the Western Gold Exploration and Mining Company, Limited Partnership (WestGold) Nome Offshore Placer Project (BIMA) in Alaska and the Cominco Snip Mine in British Columbia (Figure 1). The objectives of the case studies were to review metal-mine permitting processes in Alaska and British Columbia as described in the above case studies and to identify industry and regulatory strengths and weaknesses based on project permitting histories. It should be noted that major metal mines that have been permitted to date in Alaska, including Red Dog Mine and WestGold BIMA, have been located in the Alaska Coastal Zone. The purpose of this study is to summarize the comparative incentives and disincentives of metal-mine permitting in Alaska and British Columbia.

2.0 ENVIRONMENTAL PERMITTING AND REGULATORY STRUCTURE

The environmental permitting and regulatory structures for mine development vary between Alaska and Canada. This section provides a brief overview of the two permitting structures as a background to the case study evaluations and conclusions.

2.1 ALASKA

The environmental permitting process for mines in Alaska includes federal, state, and local requirements and involves three main components:

- The environmental planning and pre-issuance decision-making process established by the National Environmental Policy Act (NEPA)

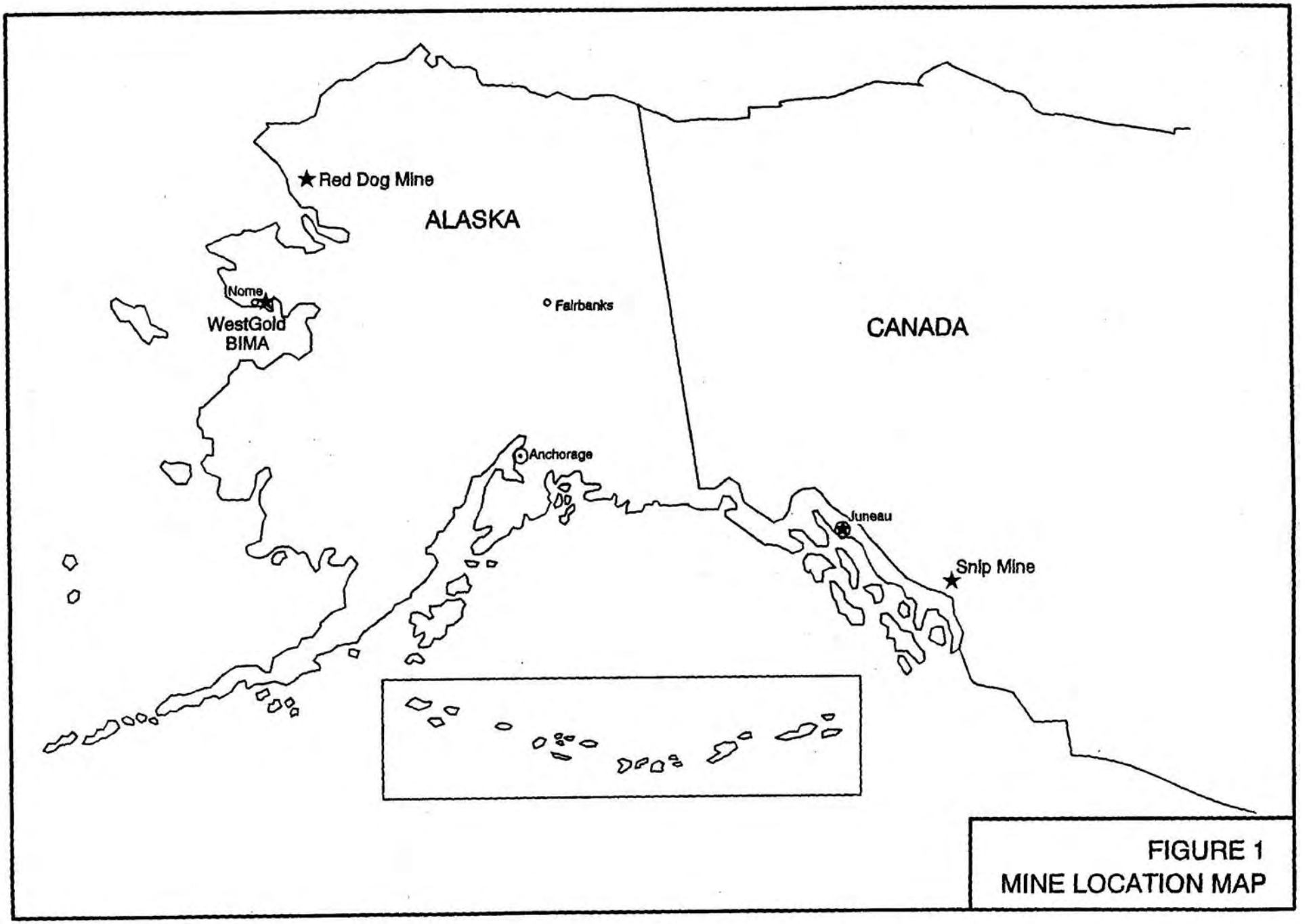


FIGURE 1
MINE LOCATION MAP

- The permit review and approval process associated with metal-mine exploration, development, and operation

- Environmental monitoring and post-mining requirements resulting from the permit review and approval process.

2.1.1 The National Environmental Policy Act (NEPA)

NEPA (Public Law 91-190), enacted in 1970, requires federal agencies to consider the environmental consequences of and address environmental concerns associated with their activities. Federal actions include a federal agency's decision on whether to grant its required permission for activities of others, such as private business or state or local governments. The Council on Environmental Quality (CEQ), created by NEPA, has established regulations directing the NEPA process. The CEQ Guidelines ensure that all Federal agencies operate under uniform standards when conducting environmental reviews (Rona, 1988).

Any activities that an agency has determined do not require an Environmental Assessment (EA) or Environmental Impact Statement (EIS) can be categorically excluded from further NEPA review (Figure 2). Projects which cannot be categorically excluded, may require an EA to determine whether an EIS is required. The EA process generally requires 3 to 6 months to complete. If an EA is completed and the activity is found to have no significant impact on the environment, a Finding of No Significant Impact (FONSI) is issued and an EIS is not required. Conversely, activities which clearly represent a significant federal action require an EIS. A public scoping process is used to identify issues and concerns to be addressed in the EIS. The federal agency responsible for the proposed action generally serves as lead agency for the EIS. The EIS process can take anywhere from 18 months to 3 years to complete depending on many factors including issues of concern, location, regional information, amount of available baseline data, and public perceptions.

The EIS review process is designed to assure that reasonable project alternatives have been considered in order to assess potential damage to the environment and to ensure that environmental values receive equal consideration in the decision making process. As such, this process consists of a multi-disciplinary review system for each of the impact statements submitted for review. Impact statements are examined by specialists with expertise in air quality, water quality, engineering, biology, land use management, noise abatement, solid waste disposal, toxic substances, economics, cultural resources, and radiation health. Each person with an interest in the proposal has an opportunity to comment.

2.1.2 The Permit Review and Approval Process

As all major metal mines permitted in Alaska to date have been located in the Alaska Coastal Zone, the overall permit review and approval process is coordinated by the State as described below. Title 6 of the Alaska Administrative Code, Chapters 50 and 80 (6 AAC 50 and 6 AAC 80), provides the regulatory basis for administration of the Alaska Coastal Management Program (ACMP) authorized under the Coastal Zone Management Act (CZMA) of 1972. These regulations establish the Division of Governmental Coordination (DGC) of the Office of Management and Budget (OMB) as the lead agency for the ACMP. Under these regulations,

GENERALIZED ALASKAN LICENSING PROCESS

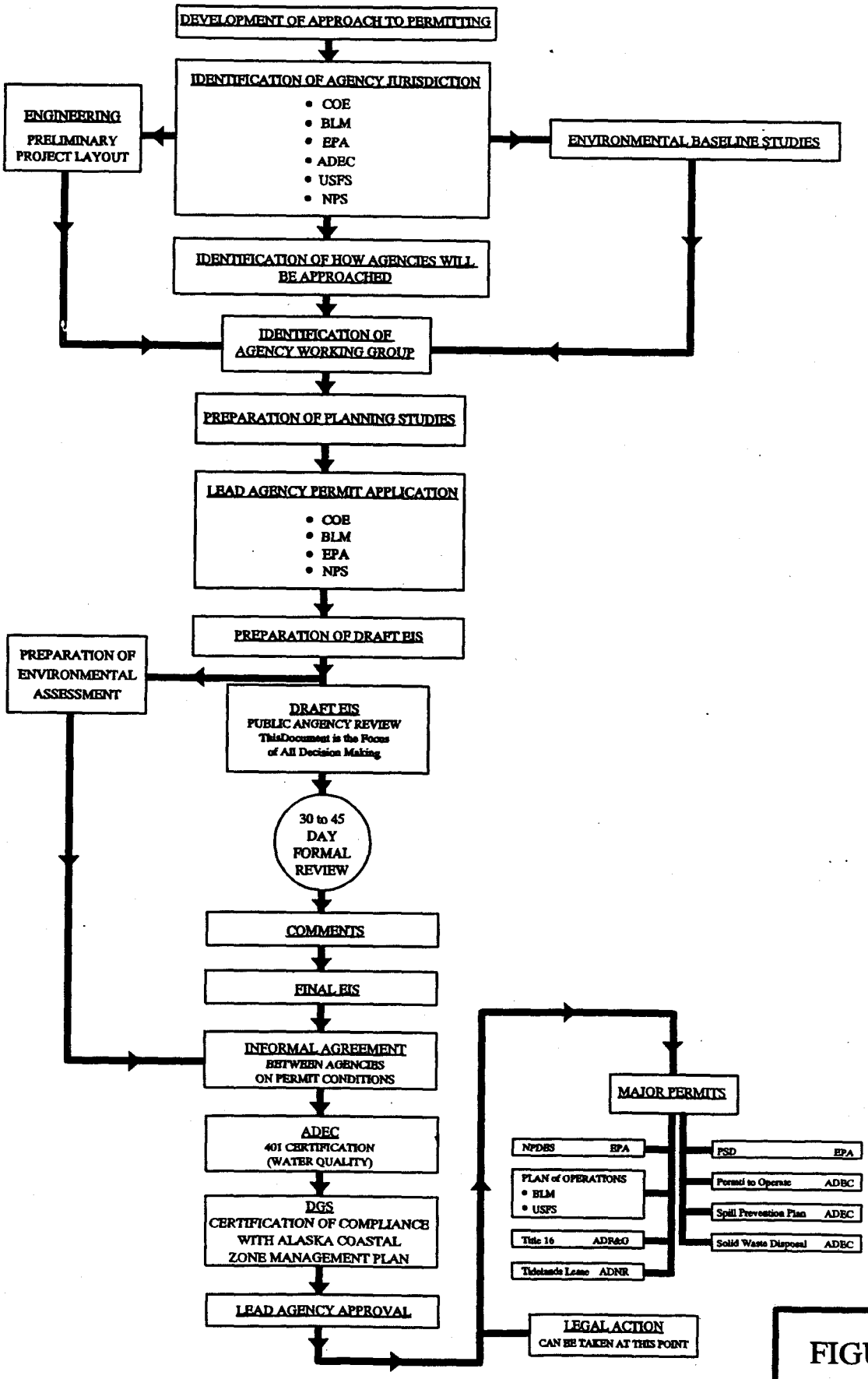


FIGURE 2

DGC is authorized to coordinate a consistency review and render a response concurring with or objecting to a federal consistency certification or determination. With regard to state permit consistency determinations, DGC coordinates the review and renders a determination for a project which requires the permits of two or more state agencies or a federal permit. In a case where project actions require only the permits of a single state agency and no federal permits, the resource agency issuing the permits will coordinate the consistency review and render a conclusive consistency determination.

For a project requiring a federal permit or the permits of two or more state agencies, such as Red Dog Mine and BIMA, the applicant submits a packet including all necessary state permit applications, copies of all necessary federal permit applications, and the Coastal Zone Project Questionnaire (CZPQ) to DGC. One exception to submission of a complete permit packet is exclusion of the National Pollutant Discharge Elimination System (NPDES) permit. Due to the long lead time needed for the U.S. Environmental Protection Agency (EPA) to review and approve NPDES permits, DGC has a joint agreement with EPA defining procedures for reviewing NPDES permits. As a result of this agreement, NPDES permits are sometimes reviewed under a separate consistency determination following the same process described herein. For a project requiring only the permits of a single state agency, the packet and CZPQ are submitted to the agency with jurisdiction over the permits.

The permit packet is reviewed for completeness and, if complete, the project is assigned a number and Day 1 of the review process commences. It should be noted that acceptance of the permit packet does not preclude an agency from requesting additional information or applications from the applicant as necessary for its consistency review or its own statutory responsibilities. On or before Day 2 of the review process, the coordinating agency (whether it be DGC or a state agency), distributes copies of the permit packet to all resource agencies, other state agencies on request, all affected coastal resource districts, and other interested parties. Under a single agency review, DGC participates in the consistency review process in the same manner as the other resource agencies. Under the DGC review process where no additional information is requested by the reviewing agencies, a consistency determination is made by DGC within 50 days of the start of the review process if a public notice is required and 30 days if one is not required. Should additional information be requested, DGC can stop the clock until the additional information is received and then resume the review. Hence, this process could take considerably longer than 50 days. State agencies must issue permits within 5 days of conclusive consistency determination unless additional review is required by their own statutes or regulations.

Through this process, all resource agencies and interested parties are apprised of project activities from the exploration phase through development and operation, and have the opportunity to affect activities in such a way as to ensure minimization of environmental impacts. The total permitting process time generally ranges from 1 to 5 years depending on whether or not an EIS is required and the amount of existing baseline data that is available.

Appendix A provides a list of environmental permits and approvals identified for BIMA and Red Dog Mine. As indicated in Appendix A, significantly more permits were required for the Red Dog Mine Project (29 permits/approvals for Red Dog Mine vs. 10 permits/approvals for BIMA) due to its location and activities associated with project construction and development. Required

permits for a given mine project can vary greatly from project to project depending on the activities involved.

2.1.3 Environmental Monitoring and Post-Mining Requirements

As the permits and consistency determination are issued, they may contain operating stipulations and monitoring requirements which dictate the continued approval of a given permit. All permit stipulations and monitoring requirements are listed as part of the consistency determination. In addition to permits listed in Appendix A, the Alaska Department of Natural Resources (ADNR) Division of Mining currently requires a reclamation plan under 11 AAC 97.

2.2 BRITISH COLUMBIA

The environmental permitting process in Canada involves three main components:

- The Environmental Assessment and Review Process (EARP) established by the federal government
- The Mine Development Assessment Process (MDAP) established by the provincial government
- Environmental monitoring and post-mining requirements.

2.2.1 The Environmental Assessment and Review Process (EARP)

The purpose of the EARP, established in 1973, is to ensure that the environmental consequences of all proposals within federal jurisdiction are assessed for potential impacts during the project planning process. The objectives of EARP are to identify all impacts during the project planning stage and to include mitigation of impacts by use of Best Practicable Technology and, where applicable, compensation. Proposals within federal jurisdiction include those that are initiated by a federal department, those that impact an area of federal responsibility, and those which have received a financial commitment from the federal government (Brownlow, 1992).

The Federal Environmental Assessment Review Office (FEARO) is responsible for the administration of the EARP. An Environmental Assessment Panel, including from 3 to 7 participants, is appointed by the Minister of Environment for each development proposal. Panel members are chosen for their objectivity, credibility, and knowledge of the project (Brownlow, 1992).

The development of policy based on the theme of sustainable development has resulted in increased interaction of the Environmental Impact Assessment (EIA) process with other decision making processes. In British Columbia, Manitoba, and the northern territories, an EIA is addressed mainly within the context of resource planning. In Alberta, EIAs are intimately tied to the review process of the Energy Resource Conservation Board. To avoid duplication of hearings and to assure more integrated decisions, Ontario passed the Consolidated Hearings Act (1981). This Act permits the creation of a joint board from members of the Environmental

Assessment Board and the Ontario Municipal Board to hold hearings that could be required under 12 different statutes which pertain to environmental and land use questions (FEARO 1988).

The Canadian experience has grown from the experience gained in the United States after the implementation of NEPA and from other jurisdictions undertaking EIAs in the 1970s. The central elements in the decision paths of an environmental assessment are therefore, not surprisingly, similar. There are essentially four levels of assessment:

- Initial screening indicates the project has no environmental dimension and is considered environmentally benign
- Screening indicates the need for a more systematic study of environmental impact potential
- Project involves important environmental consequences, specific environmental studies must be done, and is subject to technical review with specialist expertise and public input
- Public hearings are required as determined by a review body decision, by Cabinet, or by Minister depending on the recommendations of the review body.

There are a number of acts which will trigger an environmental assessment of a development project. A regulatory process case study conducted for Snip Mine in 1992 (Brownlow, 1992) provides a list of more than one hundred and fifty authorities from eighty Acts and regulations administered by seventeen federal departments and agencies. Standardization of the EIA process has been enhanced by frequent cooperation and interaction on proposals when more than one jurisdiction (agency) has an interest (Brownlow, 1992).

2.2.2 Mine Development Assessment Process (MDAP)

The provincial governments in Canada have primary authority for environmental regulation under Section 92 of the Constitution (Europa 1990). The provinces have the power to regulate works, undertakings, and any matter of local or private concern with additional powers to regulate exploration, development, conservation, and management of non-renewable natural resources and forestry resources (Brownlow, 1992).

The province of British Columbia, where Snip Mine is located, has several review processes that have been developed for specific purposes including: The Mine Development Assessment Process (MDAP); the Major Project Review Process; The Cowichan Estuary Review Process; Order in Council 908 regarding the Fraser River Estuary; and the Energy Project Review Certification Procedures. These review processes are either established around specific industry activities or address largely prescribed regional processes that are not typical of the other review processes (Brownlow, 1992).

The MDAP (originally the Mine Development Review Process), was initiated in 1976 to deal specifically with coal projects and was expanded to include hardrock mining in 1978. The components of the MDAP in British Columbia include 1) project design, 2) social impact assessment and mitigation, 3) environmental impact assessment and mitigation, and 4) economic analysis. The goal of project design is to work toward a technically sound and economically realistic mine design with respect to employee safety, resource recovery, and environmental

protection. Social impact assessment examines the proposal in light of impacts on local residents, manpower and training requirements, service requirements, and infrastructure development (roads, rail, port, transportation, housing, etc.). The Environmental Impact Assessment examines the potential effects on water, air, fish, mammals, vegetation, competing uses such as recreation, etc. Part of this assessment is the development of mitigation plans to minimize anticipated impacts and manage any residual impacts. The goal of economic analysis is to determine whether project economics justify public sector funding support and whether project benefits to the public outweigh social and environmental impacts (Brownlow, 1992).

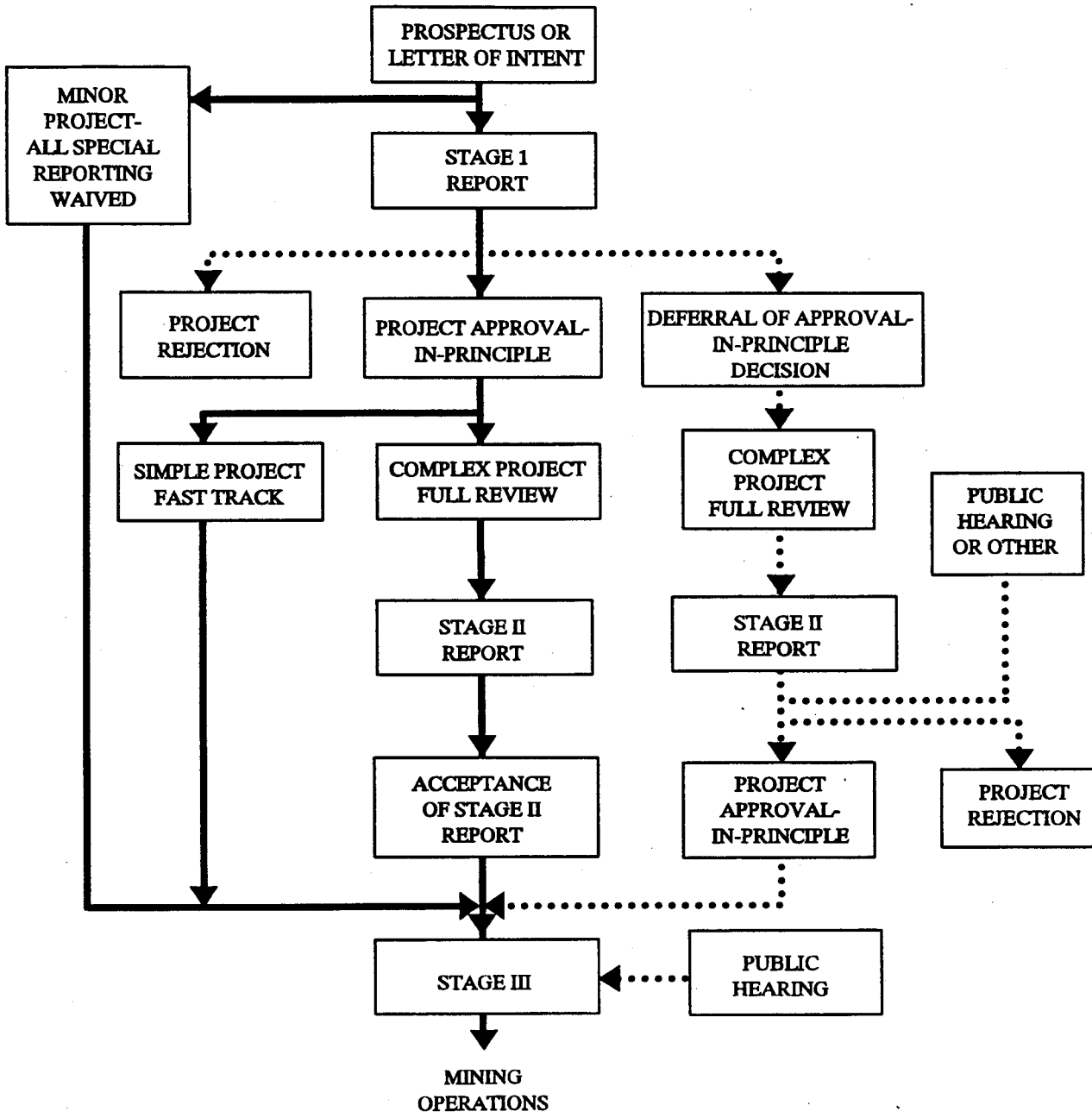
There are four overall objectives of the Mine Development Assessment Process:

- To provide proponents with "one window" on government for the purposes of project review and approval, embracing all levels of government (federal, provincial, municipal)
- To organize expeditious project reviews based on effective coordination and custom-tailored government requests for project details and impact assessments
- To focus these requests so that they are set at a level of detail consistent with the company's own progress with project planning
- To ensure the consistent application of government policies and regulations to project reviews and approvals.

The MDAP process, shown in Figure 3, is initiated by submittal of a prospectus or letter of intent by the project proponent to the Mine Development Steering Committee (MDSC). Based on the project prospectus, if the MDSC determines that the proposed activities constitute a minor project with minimal environmental impacts, either all special reporting is waived, allowing the proponent to move to Stage III and to commence mine operations, or a Stage I Report is required to address social and/or environmental impact concerns. Based on the Stage I Report, the MDSC either issues a project rejection, project approval-in-principle, or defers the approval-in-principle decision requiring more detailed project information and/or allowing time for public hearings. If project approval-in-principle is awarded after review of the Stage I Report, the project is either determined to be a simple project which is fast tracked onto Stage III, or a more complex full project review is conducted requiring a Stage II Report and approval prior to moving onto Stage III. Time frames for the overall Mine Development Review Process are very similar to the U.S. permitting process timeline, being dependent on the amount of existing baseline data available at the beginning of a proposed project. However, the B.C. process is somewhat more flexible in allowing discrete project development tasks to begin prior to approval-in-principle as negotiated on a case by case basis.

The MDAP lead agency in British Columbia is the Ministry of Energy, Mines and Petroleum Resources (MEMPR) while other provinces in Canada have ministries of environment as the lead agency (Brownlow, 1992). Appendix B provides a list of permit requirements for Snip Mine.

BRITISH COLUMBIA
MINE DEVELOPMENT REVIEW PROCESS



Source: U.S. Bureau of Mines. Regulatory Processes Associated with Metal Mine Development in British Columbia: A Case Study of the Snip Mine, April 1992.

FIGURE 3

2.2.3 Environmental Monitoring and Post-Mining Requirements

While environmental monitoring requirements were not discussed in the Snip Mine case study, the development of mitigation plans to minimize impacts and manage any residual impacts is part of the MDAP as noted in Section 2.2.2.

3.0 CASE STUDY REVIEW

Case studies investigating regulatory processes associated with metal-mine development have been developed for Red Dog Mine and the Nome Offshore Placer Project (WestGold BIMA) in Alaska and Snip Mine in British Columbia. The objectives of the case studies were to review metal-mine permitting processes in Alaska and British Columbia and to identify industry and regulatory strengths and weaknesses based on project permitting histories.

3.1 RED DOG MINE, ALASKA

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

Due to the nature of the project, both state and federal jurisdictional boundaries were crossed requiring permits from a number of different agencies. Because of the federal permit requirements, EPA determined that an EIS would be required for the project. The EIS process -- baseline data collection, agency meetings, document preparation, agency review, and final finding of fact – began in 1981 and was completed in 1984 (Cocklan-Vendl, 1992).

Due to the project location within the coastal zone of Alaska and the varying state and federal permits required for the project (Appendix A), permitting for the project was coordinated through the DGC of the OMB as the lead agency for the ACMP. With the exception of the NPDES permit from EPA, DGC coordinated the consistency review and rendered a response that the Red Dog Mine project was consistent with the ACMP and permits with corresponding stipulations were issued (Cocklan-Vendl, 1992). The EIS process lasted from 1981 to 1984 with final permits being issued in August, 1984. Due to the long lead time needed for the EPA to review and approve NPDES permits, DGC developed special provisions to separate this permit from other permit actions. The NPDES permit was reviewed under an independent consistency determination.

In 1982, the RDM Developer entered into a joint venture agreement with NANA for development of the mine. With the RDM Developer having established itself as an environmentally responsible developer in the exploration phase of the project, initial opposition

to mining was reduced and NANA became receptive to considering a mining venture provided the operation would not impact subsistence resources of the area. Based on early input from consultants, the RDM Developer proceeded to garner support for their project by "working from the bottom up" rather than "from the top down", i.e. establishing a rapport with the local people to gain their support of the project. The small RDM Developer project team held many preliminary meetings with residents of the region and with pertinent agency personnel in order to explain the scope of the project. NANA assisted in organizing meetings in local villages. Discussions were also held with state and federal legislators and government agency staff. The RDM Developer invited all interested parties to tour the mine site area. This allowed members of the general public to see the area first hand, speak candidly, and to get direct answers to their questions. Few formal meetings were held in offices. Tours were offered repeatedly to agency personnel and interested parties throughout the preconstruction phase of the project (Cocklan-Vendl, 1992).

Three key issues of the project which drove the Red Dog Mine EIS, permitting process, and subsequent realization of the project included mine access, water quality/hydrology, and air quality/meteorology. With regard to mine access, the issue centered around three alternative road alignments from the port to the mine, one of which crossed through Cape Krusenstern National Monument (approximately 97 km (60 miles) of road). The results of an environmental impact assessment to evaluate the three alternatives with respect to potential environmental impacts indicated that the least damaging alignment to the environment was a route which passed through the northern part of Cape Krusenstern National Monument. The water and air quality issues centered around project operations resulting in unanticipated water and air quality problems stemming from insufficient baseline data collection in the initial stages of the project (Cocklan-Vendl, 1992). Had sufficient baseline data been collected early in the project, different project design alternatives may have reduced or eliminated the problems which arose.

Environmental permitting costs totalled approximately 2.5 million dollars, environmental costs associated with construction activities averaged approximately 150 thousand dollars per year, and environmental costs associated with mine operation average approximately 1 million dollars per year.

3.2 NOME OFFSHORE PLACER PROJECT (BIMA), ALASKA

BIMA was located offshore of Nome, Alaska on submerged State lands covering approximately 8802 ha (21,750 acres). The lease area extended from approximately 1.6 km (1 mile) east to 16 km (10 miles) west of the City of Nome, and offshore for a distance of approximately 4 km (2.5 miles). The project involved the dredging of sediments from the seafloor. Those sediments were processed onboard the BIMA (which was at the time the largest bucketline mining vessel in the world) using a physical process employing trommels and jigs to recover gold. No chemicals were added in the process. The sediment-water slurry of tailings was then discharged back into the dredged area. The project activities under regulatory scrutiny included the dredging of sediments, the discharge of process water, and the discharge of dredged material back onto the seabed, approximately along the dredged path and to the rear of the advancing dredge (Gardner, 1992).

BIMA, as an offshore mining project, was unique for the United States and, therefore, presented many opportunities for creating new protocols in regulations. As noted in the BIMA

case study, the closest analogue was harbor dredging. However, BIMA had significant differences from harbor dredging which did not fit into the usual regulatory mold. Many rules and regulations applied, but specific requirements were formulated to fit the situation of the BIMA. Because the project was unique and because many different agencies had regulatory jurisdiction, the process of formulating the requirements for BIMA took time and coordination. There were also special habitat protection requirements in the Bering Straits Coastal Plan. As a result of the project being located within State waters and the Federally mandated coastal zone, other approvals were required at the state and local levels. Appendix A provides a summary of permits required for the this project as well as Red Dog Mine.

Under NEPA, the U.S. Army Corps of Engineers (COE) and EPA were required to prepare an Environmental Assessment (EA) for the project to determine whether the marine environment would be irreparably harmed by the project. As a result of the EA, a FONSI was issued and no EIS was required (Gardner, 1992). As with Red Dog Mine, DGC coordinated the consistency review for BIMA and rendered a response that the project was consistent with the ACMP and permits with corresponding stipulations were issued (Gardner, 1992). The BIMA project issued a request for an expedited schedule and expressed a willingness to fund an extensive marine monitoring program concurrent with project operations. Through the DGC coordinated review process, the BIMA developer and the regulatory agencies adopted a unique, shared risk approach to the permitting of the project. Since little information existed on potential impacts from a large scale offshore mining operation, agencies thought that more could be gained by monitoring actual operational performance against criteria based on the their best professional judgement. By evaluating the mining operation on an ongoing basis against performance criteria, a foundation for permitting future offshore mining operations could be established. From this project, realistic "best management practices" could be developed and relevant environmental parameters identified. Additionally, the quantification of direct dredging impacts and recolonization rates of marine life would provide the basis for development of reduced long-term monitoring strategies. The monitoring strategies would reflect expected impacts rather than potential ones (Rusanowski, 1991). Because of this unique approach, the permitting process continued throughout the life of the project (1985-1991).

The project was authorized on a tiered basis where risks were shared by industry and the regulatory agencies in manageable and discrete units (i.e. relative risks were kept proportioned; open-ended authorizations were not approved). Regulation was set up in phases, with each having well-defined activities. Monitoring information obtained was immediately disclosed and then used to formulate and define the next phase of regulation. Through this iterative process, environmental issues were addressed and, in many instances, resolved. From the public hearing testimony, and numerous scoping meetings involving the applicant and technical staff from ADEC and ADF&G, a series of 11 environmental issues were identified. From the 11 specific issues and concerns identified, a long-term monitoring program was developed that focussed on five general areas: physical changes to the seafloor; king crab distribution and abundance; king crab feeding dynamics; biological characteristics of seafloor habitats and recolonization of those habitats after mining; and the potentials of trace metals accumulation in the food chain.

Monitoring requirements and stipulations associated with BIMA permits did not address all of the concerns and perceptions within the agencies and general public that could also ultimately affect the project. As a result, another mechanism was used to build community support on the project and to show that their concerns were being addressed (Rusanowski, 1991). At the next

phase a Project Review Committee (PRC), was established to monitor project activities and build community support by addressing issues and concerns. The PRC for BIMA consisted of State and Federal agencies, project staff and consultants, regional and local regulatory groups, regional native groups, and special interest groups identified during the permitting process. All interested groups were invited to attend. Private citizens participated through organized groups, but not as individuals. The PRC formed the primary mechanism for information transfer to all interested parties on a regular basis. The PRC provided an opportunity for groups and agencies to track the mining activity, comment on those activities, and to see the ongoing results of those efforts.

Environmental costs associated with the BIMA project ranged from approximately 200-700 thousand dollars per year with an average cost of 450 thousand dollars per year.

3.3 SNIP MINE, BRITISH COLUMBIA

The Snip Mine is a relatively remote operation on the Iskut River in northwestern British Columbia. It is operated by the Snip Mine developer under a 60/40 joint venture agreement with Prime Resources Ltd. Access to the site is by air or, in special circumstances, by hovercraft. The mine has been operating since January, 1991 at a rate of approximately 350 mt (318 short tons) per day. The mill produces approximately 12.5 mt (11.3 short tons) per day of gold concentrate which is transported to market by hovercraft down the Iskut River or by Bristol aircraft to Wrangell, Alaska (Brownlow, 1992).

Permitting for Snip Mine followed the Mine Development Review Process (now the Mine Development Assessment Process) described in Section 2.2.2. Upon submission and review of the project prospectus, the components of the proposed environmental monitoring program were outlined as part of the required Stage I Report.

The Stage I Report was submitted to the MDSC in August 1988 and provided a description of the proposed development plan and documentation of environmental conditions and potential impacts from the project, with the exception of hydrogeological studies which were submitted at a later date. The Stage I Report also included conceptual mill and mine designs. The report did not respond to all of the information requirements listed by the various agencies after the Prospectus review. Reasons for this approach included development schedule requirements, disagreements on the relevancy of the information requirements, and changes in the project design. During the agency review of the Stage I Report, exploration work at the site continued. Conceptual designs for components of the mine, mill, and accommodation complex continued as well as continuation of the baseline environmental monitoring program. The review of the Stage I Report by the MDSC in November 1988 indicated that several aspects of the project required further clarification and resolution prior to approval-in-principle. The key areas included: evaluation of effluent discharge impacts, definition of acid generation potential, control of tailings pond seepage, and contingency planning for excess mine water flows. About this time the proponent informed the MDSC of a change in mill location which meant that the MDSC review would have to be revisited in light of the proposed change.

In December 1988, the Ministry of Environment indicated to the MDSC that they had completed an interim review and could not support an approval-in-principle at that time. Major concerns of the ministry were: 1) Tailings pond seepage, 2) Tailings pond effluent quality, 3)

Contingency planning, 4) Impacts of effluent discharge, and 5) Acid mine drainage. A Stage I review status meeting was held to review the recent changes in planning and to confirm a date for completion of the extended Stage I review. The project schedule at that time called for production to be initiated during the last quarter of 1989.

A second Stage I review status meeting was held in February 1989 to review responses to agency comments and to identify, and resolve if possible, any outstanding environmental issues. A deadline of February 24, 1989 was established for review of information submitted by the proponent with the MDSC prioritizing the Snip Mine project in an effort to accommodate the project development schedule.

The MDSC indicated to the proponent that the key review agencies would complete their Stage I review by mid-March 1989. The MDSC also expressed concern that the mine development and construction at the site was progressing well beyond that which would typically be done prior to approval-in-principle being granted. Throughout the Stage I Report review process, the proponent received permits for clearing, development, and construction of mine infrastructure facilities associated with the air strip, personnel accommodations, and the tailings dam areas. The MDSC required the submittal of a Stage I Addendum Report to address the outstanding issues prior to further consideration of the approval-in-principle for further project development. The addendum report was submitted to the MDSC in May 1989. The joint venture formally received approval-in-principle in February 1990, resulting in a two year permit approval process. Throughout the process the proponent was insistent on maintaining the project schedule which took into account little consideration for agency review. No cost information is available for the Snip Mine development.

4.0 COMPARISON OF REGULATORY PROCESSES

The overall regulatory structures for metal-mine permitting in Alaska and British Columbia are remarkably similar while the individual permit review and approval processes are somewhat different. This section attempts to compare and contrast the regulatory processes at the federal and state/provincial levels.

4.1 FEDERAL REGULATORY PROCESS

Both the United States (U.S.) and Canada have federal laws and regulations requiring federal agencies to consider the environmental consequences and address environmental concerns associated with their activities whether they be federal agency activities or those activities approved by federal agencies. In the U.S., NEPA is the enabling legislation governing environmental protection while in Canada it is the EARP. Both processes have a range of requirements based on project activities from routine activities which can be generally excluded from the environmental assessment process, to those requiring minimal impact evaluation to make a decision with regard to consequences to the environment, to those projects requiring detailed evaluation of environmental impacts of various project alternatives. While the stages inherent in the U.S. and Canadian federal environmental assessment requirements have different names, the overall processes are similar.

4.2 STATE/PROVINCIAL REGULATORY PROCESSES

While there is considerable similarity between state and provincial permitting processes in Alaska and British Columbia, there are also very distinct differences. Both those areas of Alaska covered by DGC jurisdiction and all of British Columbia attempt to establish one coordinating body for overall project permitting in an effort to more efficiently conduct project permit review and approvals and to streamline the permitting process for individual developers by reducing overlapping agency jurisdiction and coordinating review comments and permit stipulations. This is essentially where the similarity ends.

For projects located within the Alaska Coastal Zone, the DGC coordinated review process attempts to bring all agencies (federal, state, and local) with a regulatory or vested interest in the proposed project together to make decisions regarding permit review and approval. This allows the developer seeking project approval to address all agency issues and concerns at one time and attempts to minimize multiple agency requests for the same information. All project design information and permit requests must be submitted to the DGC in one project submittal and no project permits are issued until the complete project package is reviewed, made available for public review and comment, and approved. To this end, it is to the developers advantage to become familiar with all project permitting requirements and to have a well established project design prior to submittal of the permit package to DGC. Because of the many regulatory requirements of even a small project, developers generally elect to hire an in-house environmental professional or environmental consultant to coordinate environmental permitting for a mine project. Once the permits are in hand, the need for an environmental coordinator remains for maintaining compliance with permit stipulations.

DGC conducts a conclusive consistency determination of a project to determine if the project meets the requirements of the ACMP and the approved district plan. Under the DGC permit review process, each agency with jurisdiction over the proposed project is represented by an individual from the agency. The individual agency representatives are responsible for coordinating their agency's review of the proposed project permits and providing individual agency input to the DGC process. These same representatives followup on monitoring and compliance during the operational phase of the project.

Under the DGC review process, the only portion of the permits which can be reviewed are those portions which deal with coastal consistency. Similarly, the only stipulations which can be placed on a project as a result of the consistency review are stipulations that are necessary to make the project consistent with ACMP. Permit review and stipulations not required for consistency with ACMP are conducted under the normal agency review process and authorities outside of the DGC review process.

The province of British Columbia has several review processes that have been developed for specific purposes, one of which is the Mine Development Assessment Process (MDAP) overseen by the Mine Development Steering Committee (MDSC). Generally, specific project permitting is conducted by engineers and scientists with previous exploration projects and operating mines in northwest British Columbia while environmental reviews are undertaken by biologists, hydrologists, and engineers in the Ministry of Environment, Environment Canada, and the Department of Fisheries and Oceans. Unlike Alaska, under this review process developers can obtain permits for developing portions of their projects without having full approval-in-

principle for the proposed project. This was the situation with Snip Mine, although there comes a point where the MDSC is hesitant to continue approving development permits without a decision with regard to approval-in-principle.

5.0 CASE STUDY CONCLUSIONS

In general, all three case studies, while different in scope from case to case, proved to be successful permitting efforts. In both of the Alaskan case studies, project developers made a concerted effort to open and maintain communications with agency personnel and the local communities regarding project plans and operation issues throughout the project. The DGC coordinated review system provides a mechanism for developers to efficiently maintain such communications throughout a project. As a result agency personnel were more responsive to development needs when project design or operational changes would arise.

The following problem areas were encountered during the permitting process for Red Dog Mine and BIMA. With regard to the mine developer, problem areas were generally associated with insufficient baseline data, changes in project design, and lack of communication between development personnel from one project stage to the next with regard to potential environmental issues. Agency shortcomings were generally associated with overlapping jurisdictions resulting in project delays, conflicting agency requirements, and the general perception that responsible agency personnel assigned to the project were underqualified in terms of familiarity with the mining process.

In Canada, the weaknesses and strengths of the permit review system were much the same. Under this process, there is little confusion as to which agency personnel and regulatory requirements pertain to mine development projects in British Columbia. The MDSC provides a consolidated interactive approach to overall mine permitting, taking under consideration the federal EARP process in conjunction with the MDAP.

However, as in Alaska, this approach is not a panacea. The MDAP is intended to be a staged approach to permitting based on the rate of project development. Thus, as mine development concepts change so do potential environmental impacts and critical information requirements to evaluate such impacts. Rather than being a cumulative process of providing project information to assess potential environmental impacts, the Snip Mine developer found the process to be more of an iterative one. As in Alaska, problem areas on the developer side are generally related to changes in project design throughout the project, inadequate transfer of information from one project stage to the next, and a lack of understanding on the Snip Mine developer's part of the specific importance of the permitting requirements and allowing adequate time for agency review. Agency shortcomings were generally related to inadequate staff availability and, in some cases, a perceived lack of qualifications of regulators with regard to mine projects.

6.0 RECOMMENDATIONS FOR FURTHER STUDY

The case studies conducted for Red Dog Mine Development, BIMA, and Snip Mine identified both strong and weak areas associated with the mine development permitting

processes of Alaska and British Columbia which translate to inherent incentives and disincentives to metal-mine development. Commonly identified problem areas associated with the permitting processes include:

- Coordination and timeliness
- Overlapping, duplicating, and conflicting regulations
- Qualifications of agency and industry personnel
- Personnel turnover
- Inappropriate or excessive permit stipulations.

The identification of these problem areas leads to recommendations for further studies in an effort to evaluate existing structures in further detail and recommend alternative permitting approaches for both industry and regulators which may streamline the permitting process. Such further studies include:

- Evaluation and comparison of mine permitting regulatory strategies of other states and countries

- Evaluation of alternative mine permitting approaches for use by industry

- Analysis of database requirements to meet initial permitting needs as well as provide a base for subsequent environmental studies throughout project construction, operation, and closure

- Expansion of case studies to include mine reclamation planning according to the new requirements of the ADNR Division of Mining

- Exploration of opportunities for reducing the time required to obtain NPDES permits from EPA.

REFERENCES

Brownlow, Harry E., April 1992. Regulatory Processes Associated with Metal-Mine Development in British Columbia: A Case Study, The Snip Mine. Open File Report No. 91-92, U.S. Bureau of Mines, Juneau, Alaska.

Cocklan-Vendl, Mary E. and James E. Hemming, September, 1992. Regulatory Process Associated with Metal-Mine Development in Alaska: A Case Study of the Red Dog Mine. Open File Report No. 93-92, U.S. Bureau of Mines, Juneau, Alaska.

Europa Publications Ltd., 1990. The Europa Year Book 1990 - Vol. II, London, England.

Federal Environmental Assessment Review Office, 1988. Environmental Assessment in Canada: 1988 Summary of Current Practice. Canadian Council of Resource and Environment Ministers.

Gardner, Lee Ann, July, 1992. Regulatory Processes Associated with Metal-Mine Development in Alaska: A Case Study of the WestGold BIMA. Open File Report 88-92, U.S. Bureau of Mines, Juneau, Alaska.

Rona, D.C. Environmental Permits: A Time Saving Guide. Chapter 6, "Preparation of Reports and Assessments." Van Nostrand Reinhold Company, New York, 1988, pp. 83-112.

Rusanowski, P.C., November, 1991. Nome Offshore Placer Project. A Model for Resource Extraction Projects in Alaska. Paper presented at the International Conference "Alluvial Mining", Institution of Mining and Metallurgy, London, U.K. 15 pp.

Rusanowski, P.C. and C.L. MacCay, March 1990. Nome Offshore Placer Project. 1989 Synthesis Report. Western Gold and Exploration and Mining company, Limited Partnership, Nome, Alaska, 48 pp. Available from ENSR Consulting and Engineering, Anchorage, Alaska.

APPENDIX A

ENVIRONMENTAL PERMITS AND APPROVALS FOR BIMA AND RED DOG MINE (RDM) PROJECTS

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ENVIRONMENTAL PERMITS AND APPROVALS FOR BIMA AND RED DOG MINE (RDM) PROJECTS

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
Federal Agencies		
Environmental Protection Agency	National Pollutant Discharge Elimination Permit (NPDES)	Permit required for discharge of wastewater from a point source into federal and state owned waters. The Permit is required for mine and sewage lagoon discharges and for stormwater runoff. (RDM and BIMA)
Environmental Protection Agency	Spill Prevention Control and Countermeasure Plans (SPCC)	Plans are required for oil storage facilities storing in excess of 2500 l (660 gallons) in a single container above ground; in excess of 5000 l (1,320 gallons) in aggregate in tanks above ground; or in excess of 159000 l (42,000 gallons) below ground. (RDM)
U.S. Fish & Wildlife Service	Section 7 Consultation	A Section 7 consultation is required to assure protection of endangered or threatened species and wildlife. The presence of the Peregrine falcons and bald eagles or golden eagles in the project vicinity triggers the need for the consultation. The National Marine Fisheries Service is also involved in the interest of marine mammals. (RDM and BIMA)
U.S. Coast Guard	Private Aids to Navigation	Private aids to navigation are usually required on man-made structures in or over navigable waters. (RDM and BIMA)
U.S. Coast Guard	Notification of Fuel Transfer Procedures	The U.S. Coast Guard requires notification outlining fuel transfer procedures from barges to the shore. They may make recommendations on the operating procedures. (RDM)

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE BIMA AND RED DOG MINE (RDM) PROJECTS

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
Federal Aviation Administration	Notice of Proposed Construction or Alteration	Applicant is to notify the FAA if any proposed structure is over 61 m (200 feet) or is within 6100 m (20,000 feet) of a runway (100 to 1 horizontal slope). (RDM)
Federal Agencies (Cont'd)		
Federal Aviation Administration	Notice of Landing Area Proposal	FAA notification is required if an existing airport runway is altered in any way. Upgrading and resurfacing of a runway is considered an alteration for purposes of this notification requirement. (RDM)
Bureau of Land Management	Road Right-of-Way Approval	Required for that part of the road crossing federal public lands under BLM management (Red Dog Valley). (RDM)
Bureau of Land Management	Material Sites	Required for sites on land managed by BLM. (RDM)
National Parks Service	Road Corridor Agreement	A negotiated settlement for use of the road corridor crossing Cape Krusenstern National Monument. (RDM)
U.S. Army Corps of Engineers	Section 404 Permit	A Section 404 permit is required when wetlands are affected by the discharge of dredge or fill material, or construction activities. For this project, permits were required for road construction, material sites, and mine facilities. (RDM and BIMA)
U.S. Army Corps of Engineers	Section 10 Permit	A Section 10 permit is required for the construction or placement of structures in navigable waters. Installation of a port and concentrate transfer facilities resulted in a requirement to obtain this permit. (RDM and BIMA)

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE BIMA AND RED DOG MINE (RDM) PROJECTS

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

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE BIMA AND RED DOG MINE (RDM) PROJECTS

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
State Agencies (Cont'd)		
Department of Environmental Conservation	Financial Responsibility Statement for all Facilities and Vessels Handling Crude Oil and Petroleum Products	A financial responsibility application form is required for the project. This requirement applies to tank vessels, barges and oil terminal facilities. (RDM)
Department of Environmental Conservation	Food Service Permit	Permit is required when food service operations serve more than 11 persons per day. (RDM)
Department of Environmental Conservation	Oil Discharge Contingency Plans for Facilities and Vessel Handling	Oil discharge contingency plans are required for fuel transfer operations in state water and fuel storage that may affect state waters. (RDM)
Department of Environmental Conservation	Certificate of Reasonable Assurance (401 Certificate)	A 401 Certificate must accompany any federal permit issued under the Federal Clean Water Act. In this case the U.S. Army Corps of Engineers Section 404 and Section 10 permits, and federal NPDES permits, triggered the need for this state certificate. (RDM and BIMA)
Department of Environmental Conservation	Air Quality Permit (PSD)	Certain source types which emit more than 227 mt (250 short tons) per year are subject to these permit requirements. Road dust, wind-blown contaminants and emissions from generators were regulated for this project. (RDM)

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE BIMA AND RED DOG MINE (RDM) PROJECTS

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

APPENDIX A (Cont.)

ENVIRONMENTAL PERMITS AND APPROVALS FOR THE BIMA AND RED DOG MINE (RDM) PROJECTS

Name of Agency Granting Permit/Approval	Name of Permit/Approval	Reason for Permit/Approval
Department of Natural Resources, Division of Mining	Approved Plan of Operations	This permit authorizes mining activities and sets reclamation stipulations of operations on State mining leases. (BIMA)
State Agencies (Cont'd)		
Department of Natural Resources, Division of Mining	Miscellaneous Land Use Plans	This permit is required for mining, developing or exploring a mineral property on public domain land owned by the State of Alaska using equipment which might damage the surface. (BIMA)
Department of Public Safety	Life and Fire Safety Plan Check for the Construction and Occupancy of Buildings	Required before construction to insure compliance with Fire Safety regulations that protect the public from personal injury and property loss. (RDM)

APPENDIX B

SNIP MINE PERMIT REQUIREMENTS

APPENDIX B

SNIP MINE PERMIT REQUIREMENTS

Activity	Permit Requirements	Ministry
Camp Operation (Accommodation Complex)	Effluent Permit (revised for construction period)	MOE - Waste Management Branch
	Refuse Permit (revised for construction period)	MOE - Waste Management Branch
	Fire Commissioner's Approval	MMARC - Fire Commissioner
	Health Inspectors Approval	MCH - Public Health
Plant Site	Application for Permission to Construct - Mill (Site Survey Required)	MEMPR - Inspector of Mines
	Application for Permission to Construct - Shops/Warehouse/Office/Dry	MEMPR - Inspector of Mines
	Application for Permission to Construct - Assay Lab	MEMPR - Inspector of Mines
	Application for Permission to Construct - Power Generation Facility	MEMPR - Inspector of Mines
	Application for Permission to Construct - Explosives Magazine	MEMPR - Inspector of Mines
	Interim Reclamation Plan	MEMPR - Inspector of Mines
Mine and Mill Operations	Air Emissions - Mill - Power Plant - Incinerator	MOE - Regional Waste Manager
	Effluent - Tailings Pond - Mill - Mine - Settling Ponds - Accommodation	MOE - Regional Waste Manager
	Refuse (revised)	MOE - Regional Waste Manager

APPENDIX B (Cont.)

SNIP MINE PERMIT REQUIREMENTS

Activity	Permit Requirements	Ministry
Mine and Mill Operations (Continued)	Fuel and Reagent Storage	MMARC - Fire Commissioners Approval
General	Land Improvement Purposes License	MOE - Senior Hydraulic Engineer, Victoria
	Environmental Monitoring Program Approval	MOE - Regional Waste Manager
	Hours of Work	MEMPR - Inspector of Mines
	Emergency Preparedness Plans and Procedures for Injuries and Dangerous Spills	MEMPR - Inspector of Mines
	Mine Plan	MEMPR - Inspector of Mines
	Process Plan	MEMPR - Inspector of Mines
	Explosives Storage	MEMPR - Inspector of Mines
	Underground Diesel	MEMPR - Inspector of Mines
	Burning Permits	MOF - Resource Officer
	Waste Disposal	MOE - Regional Waste Manager
	Potable Water System	MOH - Public Health Officer
Tailings Impoundment	Section 6 Application Tailings Disposal Plan	MEMPR - Inspector of Mines
	Land Improvement License Water Storage	MOE - Senior Hydraulic Engineer, Victoria
	Application for Permission to Construct - Tailings Impoundment	MEMPR - Inspector of Mines
Site Access	Transportation of Dangerous or Hazardous Goods	Transport Canada
Reclamation	Reclamation Plan	MEMPR - Inspector of Mines