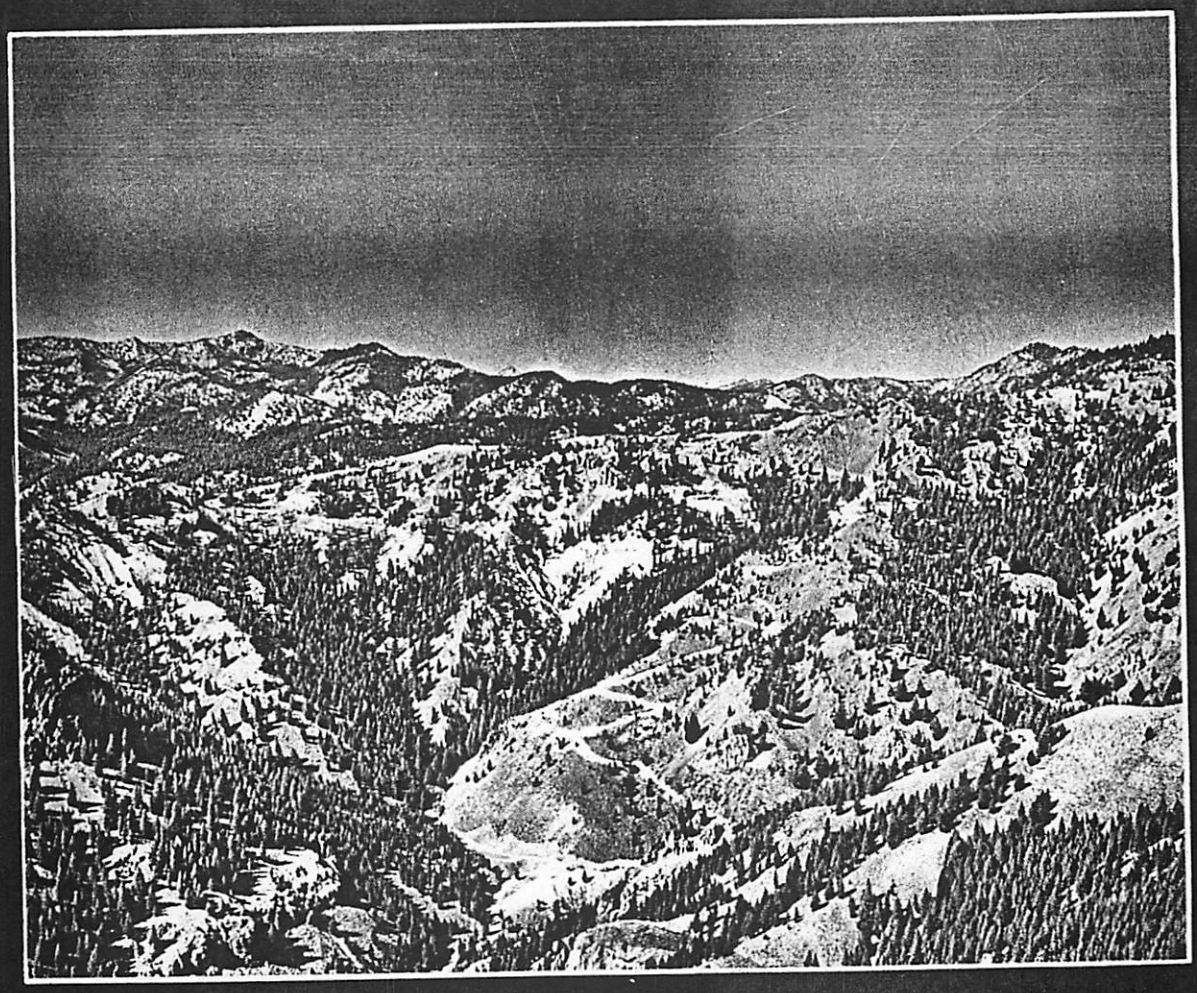
FINAL
ENVIRONMENTAL IMPACT STATEMENT



THOMPSON CREEK MOLYBDENUM PROJECT
CUSTER COUNTY, IDAHO
CYPRUS MINES CORPORATION

CHALLIS
NATIONAL
FOREST

USDA Forest Service

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RECORD OF DECISION

Final Environmental Impact Statement
Thompson Creek Molybdenum Project
Custer County, Idaho
USDA-Forest Service
Challis National Forest
OCT 31 1980

Based on the analysis and evaluation of the Final Environmental Impact Statement for Cyprus Mines' Thompson Creek Molybdenum Project, it is my decision to adopt Alternative No. 1.

The range of alternatives considered was limited by efforts to confine the project facilities to the Buckskin, Pat Hughes and Bruno Creek areas so that potential environmental impacts would be minimized. Four alternatives were evaluated, including the No Action alternative which would not allow development of the project. The three project alternatives differ from each other in the locations of the tailings impoundment and/or other physical facilities.

Alternative No. 1 is the environmentally preferred alternative of the three project alternatives. Implementation of the No Action alternative is not within the authority of the Forest Service or the Bureau of Land Management.

The selected alternative is consistent with the Multiple Use Plan for the Challis National Forest, Yankee Fork Ranger District, and the Bureau of Land Management, Challis Management Framework Plan.

The project's Operating Plan for National Forest lands, the Final Environmental Impact Statement, and other required permits and approvals will guide the development and operation of the project, and will provide for reasonable and specific mitigation and monitoring requirements.

This decision is subject to administrative review (appeal) pursuant to 36 CFR 211.19. A Notice of Appeal must be filed with the Forest Supervisor within 45 days from the date of this Record of Decision. No action to implement this project on National Forest lands will be taken prior to the end of the 45-day period.

Jack E. Bills

JACK E. BILLS
Forest Supervisor
Challis National Forest
Challis, Idaho 83226

FINAL ENVIRONMENTAL IMPACT STATEMENT
THOMPSON CREEK MOLYBDENUM PROJECT
CUSTER COUNTY, IDAHO

Lead Federal Agency	USDA, Forest Service Challis National Forest Challis, Idaho 83226
Cooperating Agency	USDI, Bureau of Land Management Salmon District P.O. Box 430 Salmon, Idaho 83467
Responsible Official	Jack E. Bills Forest Supervisor Challis National Forest
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Abstract

This Environmental Impact Statement is in response to an Operating Plan filed with the Challis National Forest by Cyprus Mines Corporation to mine and process molybdenum disulfide at their Thompson Creek Project. The project will include an open pit mine, waste dumps, concentrator facilities, tailings impoundment and associated transportation, pipeline and utility corridors. The project is located in central Idaho on a 15 square mile claim block straddling the boundary between the Challis National Forest to the north and lands administered by the Salmon District, BLM to the south.

SUMMARY

FINAL ENVIRONMENTAL IMPACT STATEMENT
THOMPSON CREEK MOLYBDENUM PROJECT
CUSTER COUNTY, IDAHO

Description

In May 1979, Cyprus Mines Corporation submitted an Operating Plan to the Challis National Forest to mine and process molybdenum disulfide at its Thompson Creek Project in Custer County, Idaho. Upon review of the Operating Plan and consultation with other interested agencies and Cyprus Mines, the Forest Supervisor advised that an Environmental Impact Statement (EIS) would be required to support Federal action on the Operating Plan. This decision was made pursuant to the National Environmental Policy Act of 1969 (NEPA) and the Council of Environmental Quality regulations for NEPA.

This Final EIS was prepared by the U.S. Department of Agriculture, Forest Service, Challis National Forest in a cooperative effort with the U.S. Department of the Interior, Bureau of Land Management (BLM), Salmon District. The proposed project will include an open pit mine, waste dumps, concentrator facilities and tailings impoundment. These components will be connected by transportation, pipeline and/or utility corridors. The major project facilities will be located within a 15 square mile claim block straddling the boundary between the Challis National Forest to the north and lands administered by the Salmon District, BLM to the south.

A number of issues and concerns have been raised by private and public individuals, agencies and organizations. In addition, positive opportunities which could arise from the proposed project have been identified. The major issues and concerns raised by the public and governmental agencies include:

- Effects of the project on population, housing, economics, community services and taxes.
- Effects of the project on water quality, fisheries and wildlife.
- Effects on endangered and threatened species and their habitat.
- Effects on cultural and paleontological resources.
- Technical feasibility of the project components and the project as a whole.

Mitigation measures and monitoring programs were designed to reduce or eliminate environmental impacts; these programs will be implemented by Cyprus Mines. Major efforts are being concentrated in the areas of community planning; prepayment of taxes and other financing for expansion of community facilities and services; and protection of water quality, fisheries, terrestrial vegetation and wildlife, and cultural and paleontological resources.

Alternatives Considered

No Action Alternative

For purposes of this environmental evaluation, the No Action Alternative is defined as no development of the project.

Alternative 1

Under this alternative, the waste dumps are located around the mine pit and the tailings impoundment is located in the upper Bruno Creek watershed. The other major project facilities are generally between the pit and the impoundment. The proposed access road from State Highway 75 generally parallels existing unimproved roads along Squaw Creek and Bruno Creek. This is the alternative proposed by Cyprus Mines.

Alternative 2

This alternative is basically the same as Alternative 1 except that the concentrator is located at a different site, thereby altering the required access road and/or utility corridors to some degree. This alternative is essentially the same as the proposed development addressed in the 1975 Environmental Impact Assessment.

Alternative 3

This alternative is similar to Alternative 1 except that there are tailings impoundments located in both the upper and lower portions of Bruno Creek. As a result, the access road must be routed further north along Squaw Creek, then generally westward along the drainage across from the Redbird Mine.

Summary of Environmental Effects

No Action Alternative

Under this alternative, the present environmental conditions generally will remain the same. There may be changes in some environmental elements with time, depending on the degree of growth in the project

area. Possible cultural and paleontological resources located near project facilities might not be discovered. Without the project, the opportunity to institute a land use plan for development of the City of Challis may be foreclosed for a period of time. Existing socioeconomic trends in Custer County and the City of Challis would continue. These include population growth at a rate below the state average and limited annual growth in economic base, employment and income. Growth in housing, utilities, community services and government services would not be required if population growth does not occur. In addition, the No Action Alternative could create adverse attitudes within the community since extensive community planning efforts and some investment commitments have occurred in anticipation of the project. The annual production of 15-20 million pounds of molybdenum, which represents approximately 7% of the projected 1985 Western World production, would not be realized.

Alternatives 1, 2 and 3

The environmental effects of implementing the three project alternatives are discussed below by discipline. The variations in environmental effects among the alternatives are identified where appropriate.

Air Quality: The major air pollutants associated with construction of the project are fugitive dust, and vehicular particulate and gaseous emissions. Fugitive dust will result from blasting, overburden removal and disposal, and truck traffic. Air quality during operation of the project will be affected primarily by particulate emissions from ore processing operations; fugitive emissions, primarily from mining operations; and emissions from concentrate dryers. The air quality emissions will be essentially the same for all project alternatives and are not expected to exceed applicable Federal and state air quality standards.

Noise: Project-generated noise should not impact nearby residents with the exception of occasional blasting. Construction and operation noise will drive wildlife away from the immediate location of the noise source. Some animals, however, may become accustomed to the noise generated and return to the area. These impacts essentially will be similar for all project alternatives.

Geology and Soils: The project alternatives will result in disturbance of about 2,460 acres for construction of the mine pit, waste dumps, concentrator, tailings impoundment, pipelines, conveyor, access road, service roads, and ancillary project facilities. The majority of the disturbed areas will not be returned to their present condition following mining activities, although measures will be employed by Cyprus Mines to reclaim the land as closely as possible to present conditions. All alternatives have mapped landslides in the general area of some project components, which is a concern with respect to slope stability.

Surface and Ground Water Hydrology: The project alternatives will have relatively the same effects on hydrology. The effects will be a modification of the amount and direction of surface and ground water flow within the claim area. The project will affect the hydrologic regime of several small drainages by construction of the mine pit, waste dumps, settling ponds, tailings impoundment and seepage control pond. The project will significantly affect the hydrology of Bruno Creek. Construction of the tailings impoundment will result in greater periods of time, than at present, when there will be a decrease or no flow in certain reaches of lower Bruno Creek, particularly during late summer and winter. Alternative 3 may cause a slightly greater hydrologic impact because the tailings impoundments will intercept a larger upstream drainage area. The project will not create a significant effect on the existing surface and ground water flows of Thompson Creek, Squaw Creek or the Salmon River.

Surface and Ground Water Quality: The three project alternatives are expected to have a moderate effect on the quality of surface and ground waters. Infiltration from the tailings impoundment over the life of the project will result in increased concentrations of iron, manganese and zinc in the local ground water and potentially in Bruno Creek. The concentrations of these elements also may increase in Squaw Creek; however, because of dilution, the concentrations will be below the EPA criteria for the protection of freshwater aquatic life. Concentrations of "general" water quality parameters also may increase in local ground water and in Bruno and Squaw Creeks. The concentrations in the creeks would gradually decrease to background levels due to dilution and biological activity. Some sedimentation in streams will occur as a result of construction of project facilities. Although this effect is expected to be short-term and localized, it may be significant depending on the area affected and the time of year. There is a slightly greater potential for sedimentation in Squaw Creek under Alternative 3 because of the greater area that would be disturbed for the access road, the steep grade, and the direct drainage to Squaw Creek. The construction camp along Squaw Creek will create potential for sedimentation and some degradation of local water quality due to runoff from the camp. The mine pit, waste dumps and settling ponds would only cause minor changes in the quality of the local ground water system and Thompson Creek. No water quality effects are expected from drainage of ore storage areas or from potential spills or pipeline leaks, if design and mitigation measures are effective. Significant increases in stream temperatures are not expected. No effects on the water quality of the Salmon River are anticipated as a result of project activities.

Aquatic Ecology: Salmonid fisheries may be affected to varying degrees by the project as a result of changes in hydrology and water quality, direct habitat loss, and increased human activities. A significant change in hydrology will occur in Bruno Creek as a result of construction of the tailings impoundment. This will result in the loss of the creek's aquatic habitat and cutthroat trout fishery. Although this is a significant local impact, the loss is considered minor on a regional

basis. The other direct habitat loss will be due to the waste dumps in Buckskin, Pat Hughes and Unnamed Creeks. This loss is considered minor because of the limited biotic resources in these creeks. Changes in the chemical water quality of project-area streams are not expected to significantly affect fisheries. The effects of sedimentation generally are considered minor, however they could become significant if large amounts of sediment are allowed to enter streams when salmonids are spawning or rearing. As noted above, there is a slightly greater potential for sedimentation in Squaw Creek under Alternative 3, and similarly, a greater potential for adverse effects on aquatic resources. A major impact on salmonid fisheries is expected as a result of the increase in the human population. This would occur from increased fishing pressure, poaching and habitat degradation from human activities near water bodies. The proposed construction camp near the mouth of Squaw Creek will create potential for local fisheries impacts. Indirect habitat loss from human usage of streamside areas and potential sedimentation and water quality degradation from camp runoff could adversely interfere with salmonid spawning and rearing in lower Squaw Creek.

Terrestrial Ecology: During the life of the project, the configuration of facilities in all three project alternatives is expected to result in a similar impact on big game movement. Animal passageways will be incorporated into the design of the overland conveyor and above-ground pipelines to minimize this impact. The temporary construction camp along lower Squaw Creek is expected to affect a large number of deer and could have a moderate to major short-term impact on migration. Alternative 3 is anticipated to have a somewhat greater adverse impact on wildlife movement due to the use of the Redbird access road in the Squaw Creek drainage. The degree of direct and indirect wildlife habitat loss in the project area is similar and considered minor for all project alternatives. Alternative 3, however, would have somewhat greater potential for adverse effect due to use of the Redbird access road. The increased human population resulting from the project is expected to have major adverse effects on wildlife in the area as a result of increased urbanization, hunting, poaching, ORV use, and human activity. The degree of this impact would be the same for all project alternatives.

Endangered, Threatened, Rare and Sensitive Species: The indirect impact of the project on endangered, threatened, rare or otherwise sensitive plant and animal species is expected to be minor. Local populations of potential endangered, threatened, rare or otherwise sensitive plant species were not found in areas to be disturbed by project facilities.

Land Use: Land use effects will be the same for all project alternatives. Land use impacts within the claim area will be limited and will be minor. The major land use impact will occur in the vicinity of Challis. Development of housing and associated commercial activities in response to new employment and population would create major changes in land uses in the vicinity of Challis.

Socioeconomics: The effects on socioeconomic factors will be the same for all alternatives. These effects will be major and will result from the influx of the work force required for the project. In addition to the primary or direct work force required for the project, major employment and population effects will result from secondary or indirect employment. The non-local primary and secondary work force and their families are expected to increase the population of Custer County by 1,475 in 1983.* It is expected that most of the new population will locate near Challis.

The primary and secondary work force will create a major impact for new housing in the local area. Approximately 517 dwelling units will be necessary to support the work force entering the area. Extensive community planning efforts have been undertaken to provide for this anticipated growth.

In addition to housing demand, major effects will occur to community services and utilities. The total incoming population is expected to add 412 new students to the local school district. Planning and examination of various methods of financing to provide for expansion of existing facilities have been undertaken in anticipation of the increased number of students. Utility services will be provided by the cooperatives or businesses servicing the local area. Major effects on other governmental services also will occur. Plans to accommodate the projected growth in services requirements have been undertaken. The addition of property to the local tax base also will provide revenue to offset the cost of required services.

Transportation: Effects on traffic will be similar for the project alternatives. Minor effects are expected to occur to the highway network serving the claim area. The major traffic impact will occur near Challis as a result of new housing and related development. No impacts are anticipated on bus or air service.

Aesthetics: The influx of people will alter the aesthetic character of the Challis area. It is likely that this will be negatively perceived by some current residents. Visual effects due to project facilities will be confined to the claim area. The local and regional topography and mountains will interrupt or block lines of sight from areas of high use in the region.

Cultural and Paleontological Resources: Twenty-five cultural resource sites have been identified which could be affected by project facilities. Mitigation measures will be implemented as appropriate to avoid, protect or recover these resources. The project will not result in adverse impacts to paleontological resources.

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* The 1983 population of Custer County without the project is projected to be 3,912.

Synopsis of Effects of Project Alternatives: Alternative 1 will result in major effects on salmonid fisheries and wildlife due to increased human population. Major effects also are expected on land uses, socioeconomic factors and traffic in the vicinity of Challis. Moderate impacts are expected on water quality in the claim area. Minor effects are expected: on salmonid fisheries due to changes in hydrology and water quality and direct habitat loss; on wildlife due to interference with migration and direct habitat loss; on endangered and threatened species; on surface and ground water hydrology; on air quality; on noise; and on cultural resources. Capital costs* for the components of Alternative 1 are estimated to be $97.8 million, while annual operating costs* are estimated to be $18.96 million.

Environmental effects of Alternative 2 will be the same as Alternative 1. Capital costs for Alternative 2 are estimated to be $99.7 million, with annual operating costs at approximately $19.12 million.

Impacts associated with Alternative 3 will be similar to those for Alternatives 1 and 2. However, slightly greater impacts are expected on surface water quality and salmonid fisheries, wildlife migration and habitat, and surface and ground water hydrology. These effects will result from the larger tailings impoundment area and use of the Redbird access road. Capital costs for the components of Alternative 3 are estimated to be $113.8 million; annual operating costs are estimated at $19.68 million.

Consultation with Others

Consultation with government agencies, public groups and individuals occurred throughout the preparation of this EIS. A scoping process involving public meetings/workshops and consultation with Federal and state agencies identified the major issues, concerns and opportunities to be addressed in the EIS. The Scoping Document which resulted from this process was issued on November 9, 1979 and provided the basis for the content and scope of this EIS. Throughout the preparation of the EIS, community meetings, workshops, letters and other contacts with private groups and individuals provided public input.

The review and comment period for the Draft EIS began with the release of the document on July 8, 1980 and ended on September 6, 1980. Approximately 500 copies of the Draft EIS were distributed during this period. The availability of the document was announced in local and regional newspapers, on radio and television, and by telephone. Two public meetings were held in early August to discuss the project and receive formal public comments on the Draft EIS. Thirty-four letters

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* The costs presented herein do not include mining and other costs common to all alternatives. These costs are estimated to be $267.2 million.

of comment on the Draft EIS, including respondents from the Federal government, the State of Idaho, local and regional government, private organizations and individuals, were received during the comment period. The comments expessed in both the public testimony and comment letters were similar and included concerns regarding the stability of the tailings embankment and other structures, long-term effects from the project, socioeconomic effects, additional alternatives, and the extent of fish and wildlife resources and impact. Responses to both oral and written comments are included in this Final EIS.

Identification of Forest Service Selected Alternative

Based on the environmental evaluation presented in this EIS, Alternative 1 has been identified as the selected alternative.

Date of Transmission of this EIS to EPA and the Public

Draft EIS	July 8, 1980
Final EIS	OCT 31 1980

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   Re: Threatened and Endangered Species

2. Memorandum Re: Survey of Sensitive Plant Species

3. Idaho State Archaeologist, State Historic Preservation Officer

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CHAPTER 1.0

INTRODUCTION

1.1 The Proposed Federal Action

This Final Environmental Impact Statement (EIS) was prepared by the U.S. Department of Agriculture, Forest Service, Challis National Forest in a cooperative effort with the U.S. Department of the Interior, Bureau of Land Management (BLM), Salmon District. The Forest Service and BLM jointly determined that an EIS was required in response to an application by Cyprus Mines Corporation to mine and process molybdenum disulfide at their Thompson Creek Project in Custer County, Idaho. The Federal action considered in the EIS is the approval by the Forest Supervisor, Challis National Forest, of an Operating Plan for the proposed project and the imposing of reasonable environmental constraints. The Supervisor's response may be to approve the Operating Plan as proposed or to require modification of the Plan.

The Forest Service, under the 1897 Organic Act, the Multiple Use Mining Act of 1955, and the Multiple Use Sustained Yield Act of 1960, is responsible for managing the surface resources of the National Forest system, including administration of mining claims located on National Forest land under the General Mining Law of 1872 as amended. All aspects of the proposed operations, as they affect National Forest surface resources, are subject to Operating Plan (36 CFR 252) or special use permit (36 CFR 251) approval by the Forest Service.

Where the land surface is under BLM management responsibility, BLM approves the rights-of-way or requests for surface use. BLM formulates stipulations to be included in permits and licenses for the protection of surface and non-mineral resources, and for reclamation of same according to the Federal Land Policy and Management Act of 1976.

A joint agreement was made among representatives of the Forest Service and BLM that the Forest Service would act as the lead agency in supervising the preparation of the EIS and in conducting the environmental analysis required by the National Environmental Policy Act (NEPA) relative to the Federal action. BLM agreed to become a cooperating agency in this process and supplied input to this EIS with regard to matters of BLM jurisdictional interest or responsibility.

This EIS is issued by the Forest Service in compliance with NEPA. In order to ensure that planning and decisions reflect environmental values, and to avoid potential conflicts, the new regulations specifically include the following requirements:

- EIS should be analytic and concise, instead of encylopedic.
- Impacts should be presented in proportion to their significance.

- EIS should include the full range of alternatives to be considered by the responsible agency line officer.

1.2 Background of Company and Project

Cyprus Mines Corporation, a wholly-owned subsidiary of Standard Oil Company (Indiana), is proposing to develop a large open pit molybdenum mine and to construct a concentrator near Thompson Creek in central Idaho. The project is scheduled to commence operation in 1983 with an annual production rate of 15-20 million pounds of molybdenum contained in molybdenum disulfide (MoS_2) concentrates.

Cyprus Mines Corporation staked its first mineral claims at Thompson Creek in 1967. Since that time, Cyprus Mines has drilled over 160,000 feet of exploration holes from surface and underground locations and has outlined an important molybdenum deposit containing at least 200 million tons of ore averaging 0.18% MoS_2.

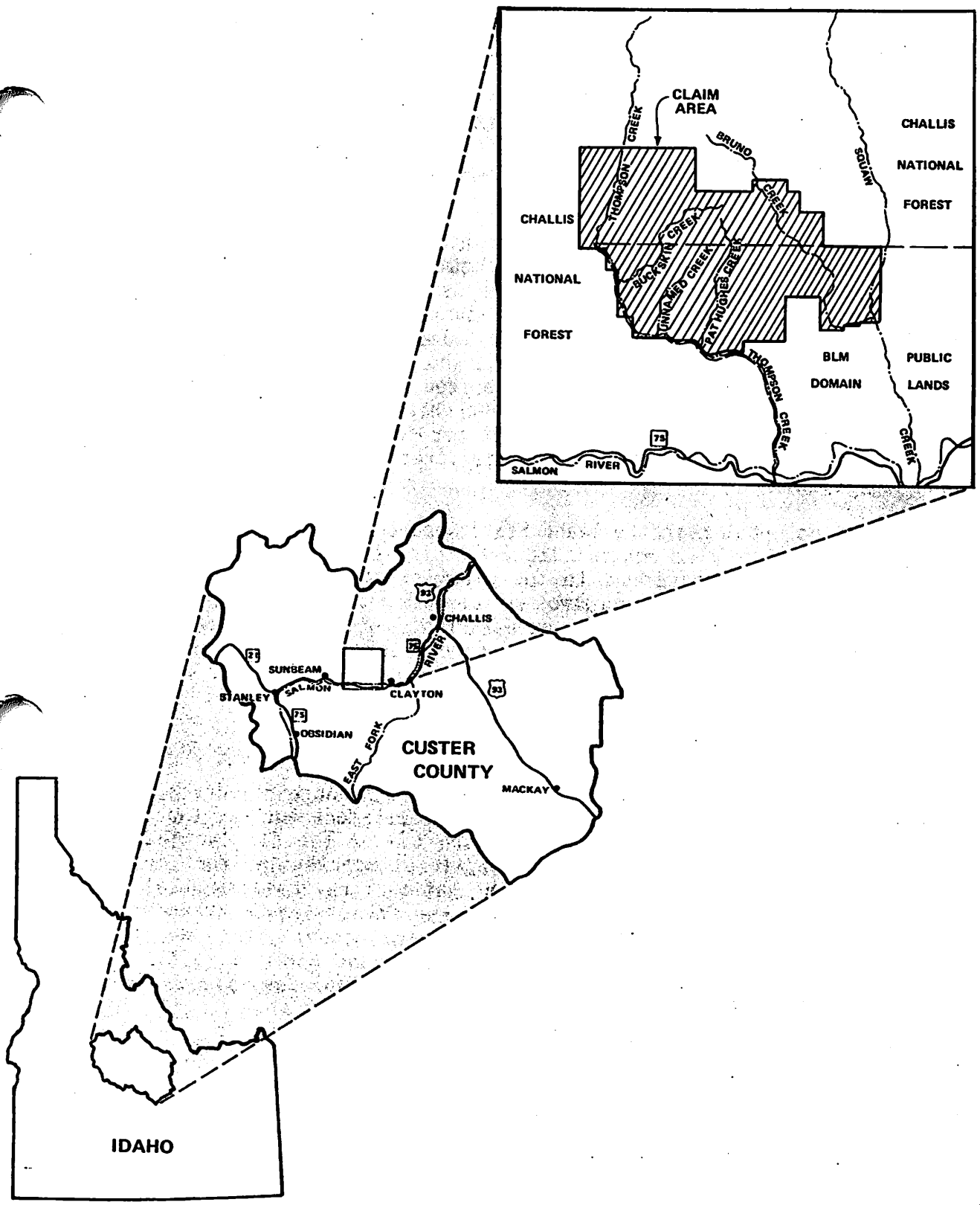
During the 1974/75 time period, a preliminary feasibility study of a large open pit mine and concentrator was completed by Kaiser Engineers and a detailed Environmental Impact Assessment was prepared by VTN Corporation. On the basis of this work, Cyprus Mines decided to perform additional technical studies to more closely define the proposed project. Since September 1979, preliminary engineering has been coordinated by a joint venture of Wright Engineers Limited of Vancouver, Canada and Morrison-Knudsen Company, Inc. of Boise, Idaho.

On May 25, 1979, Cyprus Mines submitted its Notice of Intent to Operate and Initial Plan of Operations to the Challis National Forest. After review of the Operating Plan and consultation between the Forest Service, Cyprus Mines and other interested agencies, the Forest Supervisor advised that an EIS would be required to support Federal action on the Operating Plan.

On September 25, 1979, the Challis National Forest and Cyprus Mines entered into a Memorandum of Understanding (MOU) specifying the responsibilities for the preparation of the EIS. The Forest Service subsequently selected VTN Corporation to prepare the EIS. The Forest Service directed the consultant on all phases of the EIS and, as the lead agency, has the final responsibility for the scope and content of the EIS. Cyprus Mines assumed the financial responsibility for the preparation of the EIS. The names and qualifications of the Forest Service, BLM and VTN technical staff who prepared this EIS are included in Appendix A.

1.3 General Description of Project Area

The proposed Thompson Creek Molybdenum Project is located in Custer County, Idaho approximately five miles north of the Salmon River and 30 miles southwest of the county seat of Challis. The project location is shown in Figure 1-1.



LOCATION OF THOMPSON CREEK MOLYBDENUM PROJECT

CUSTER COUNTY, IDAHO

FIGURE 1-1

Mineral claims are located within a 15 square mile claim block straddling the boundary between the Challis National Forest to the north and lands administered by the Salmon District, Bureau of Land Management to the south (see Figure 1-1). Most of the claims are held in the name of Tuscarora Mining Corporation, a wholly-owned subsidiary of Cyprus Mines.

The project is located within the Northern Rocky Mountain physiographic province in central Idaho. Streams have cut deep canyons through these mountains, creating slopes which are very steep and rocky. The Salmon River Mountains are the predominant mountain range in the region. Elevations range from 5,500 feet at the Salmon River to peaks of 9,487 feet near the claim area. In general, precipitation increases with elevation. The project area is characterized by a wet season in winter (mostly snow), from November through March, and by a dry season in summer, from July to September. Except for the valley flora and some south-facing slopes, most of the basin is forested with Douglas fir and Lodgepole pine.

The project is located in the Idaho State Department of Fish and Game's Management Unit 36-B in central Idaho. This region has a relatively diverse wildlife resource due to the wide variety of habitats available. The Salmon River and two streams, Thompson Creek and Squaw Creek, have been identified as potentially important spawning and/or rearing areas for either steelhead or chinook salmon. Idaho and other states of the Columbia Basin and the Federal natural resource management agencies work together to manage fisheries in the region.

1.4 Major Concerns, Issues and Opportunities

On August 17, 1979, the Forest Service, as lead agency, filed a Notice of Intent to Prepare an Environmental Impact Statement for the Thompson Creek Molybdenum Project. The preparation of the EIS is governed by (1) the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR Parts 1500-1508, and (2) the Forest Service NEPA Process, Final Implementation Procedures, Forest Service Manual (FSM), Chapter 1950. Sections 1501.7 of the CEQ Regulations and FSM 1951.2 direct that a "scoping" process be used to identify the major issues, concerns and opportunities that will be addressed in the EIS.

As the first step in this process, a preliminary scoping document, which identified environmental concerns, was developed by the Challis National Forest with input from the Bureau of Land Management, U.S. Fish and Wildlife Service, interested State of Idaho agencies and local government entities. Two meetings were held to provide for public involvement and to solicit public comment. The first was a workshop, held on August 13, 1979, with local government officials, selected community leaders and representatives of interested organizations. The second was an open public meeting held on August 27, 1979. In addition, written comments were received from Federal and state agencies and many

private individuals. Based on the results of the various meetings and the written comments, a Scoping Document was prepared and issued on November 19, 1979. The Scoping Document outlines the significant issues and concerns to be addressed in the EIS. It also identifies and eliminates from detailed study the issues which are not significant.

The major issues and concerns which have been raised by private and public individuals, agencies, and organizations, as well as the identification of positive opportunities which could arise from the proposed Thompson Creek Molybdenum Project are outlined below.

Public Issues

- What effect will the project have on the human resources and economic base of Custer County?
- How will the incoming population be assimilated into the present Challis area social structure?
- Can the housing demand be met satisfactorily?
- Will the Custer County and Challis City life-support systems (community services and utilities) adequately adapt to the population increase caused by the project?
- What effect will there be on local governments and their abilities to provide services?
- Will taxes be increased to pay for the expanded public facilities and services required as a result of the project?
- What is the potential for long-term public indebtedness from expansion of public facilities and services required as a result of the project?
- Will the project affect the resident and/or visitor perception of the aesthetic quality of Custer County?

Agency Management Concerns

- How will air quality at the project site and in the surrounding areas be affected by release of airborne particulates?
- Will increased vehicular emissions cause a decrease in air quality?
- How will noise levels be affected by construction and operation of the proposed project?
- What is the potential change in flow regimes due to interception of ground and/or surface water flow?

- What will the degree of change be in the hydrology of the project area due to topographic modifications?
- Is there a potential for trace metal/toxic substances leaching into surface or subsurface waters?
- What are the potential water quality changes in surface and ground waters due to spillage of diesel or other substances used in project operation?
- What are the potential long-term water quality changes due to leakage, seepage, and erosion?
- How will water temperature and chemistry change due to the project?
- Will the modification of stream habitat characteristics adversely affect the fisheries resource?
- What will be the potential effects of increased fishing pressure on the fisheries resource?
- Will there be interference with deer and elk migrations through the project area by the project facilities?
- To what extent will the loss of wildlife habitat from project facilities affect wildlife populations in the area?
- What will be the potential effects of increased hunting on the wildlife resource?
- Will project construction or operation affect any threatened or endangered plant or animal species?
- Does the project and project-related activities affect and/or deviate from existing or planned land uses within or near the project site?
- Are there cultural resources which will be impacted by the project and can they be protected?
- Will the design of impoundments or facilities be adequate for long-term stability considering the storm potential and earthquake hazard?
- How will human waste be handled?

Opportunities Resulting From the Project

- Broaden the economic base of the City of Challis and Custer County. The Thompson Creek Project will require approximately 550 employees at full production. It is expected that these employees

will locate in Custer County with a major portion residing in the City of Challis. It is estimated that the annual salary requirements will be near $9.8 million for the operation work force.

- A substantial increase in tax revenues of approximately $5.5 million annually during operation.

- The project and project-related activities may provide about $120,000 annually to the State of Idaho from sale tax revenues.

- Assist in the balance of payments deficit for the United States. Exports of molybdenum from the USA have an annual value approaching $1 billion. A balanced marketing program for Thompson Creek molybdenum, including sale in both domestic and foreign markets, is planned.

1.5 Other Permits, Licenses, and Approvals

To bring this project into production, various permits and approvals must be obtained by Cyprus Mines Corporation in addition to approval of their Operating Plan by the Forest Service. Listed below are the major permits and approvals necessary for the Thompson Creek Project. Additional permits may be required during the life of the project.

- Exploration notice and reclamation approval from the Idaho Department of Lands, Bureau of Minerals (IDL-BM).

- Reclamation plan approval from, and a performance bond with, the IDL-BM for any surface mining disturbance.

- A special use permit for facilities and operations proposed outside the claim area on lands administered by the Forest Service.

- Corridor right-of-way or temporary use permit for facilities and operations proposed outside the claim area on lands administered by the BLM.

- High hazard dam review by the Forest Service.

- Stream channel alteration permit and dam/impoundment plan approval from the Idaho Department of Water Resources (IDWR).

- A permit to construct for any source which may constitute significant airborne emissions from the Idaho Department of Health and Welfare, Bureau of Air Quality (IDHW-BAQ).

- Approval of the spill prevention control and countermeasures plan by the U.S. Environmental Protection Agency (EPA) within six months of beginning operation.

- National Pollutant Discharge Elimination System (NPDES) permit from the EPA. IDHW-Bureau of Water Quality (BWQ) will assist EPA in determining effluent limitations.

- Approval of plans and specifications for new waste-water collection, treatment, and disposal facilities by IDHW-BWQ.

- A permit for new appropriation and use of surface and ground waters from IDWR.

- Approval of plans and specifications for the construction of new public water supply systems by IDHW-BWQ.

- Approval of plans, maps, specifications and a report on operational procedure for solid waste land disposal sites by the IDHW, Bureau of Solid Waste.

- Consultation with the United States Fish and Wildlife Service and the Idaho Department of Fish and Game (IDFG) concerning threatened, endangered, and protected species as required by the Endangered Species Act.

- Approval of the cultural resources investigations and mitigation measures by the Forest Service and BLM in consultation with the Idaho State Historic Preservation Officer (and the President's Advisory Council on Historic Preservation if National Register of Historic Places eligible sites are adversely impacted) all in accordance with the National Hisotric Preservation Act of 1966, as amended and Executive Order 11593, Protection and Enhancement of the Cultural Environment.

- Review and approval of the paleontological resources survey by the BLM in accordance with BLM's 1979 memoranda 79-111 and 79-267.

- Permit for transportation, storage and use of explosives from U.S. Department of Treasury, U.S. Department of Labor and Idaho State Mine Inspector.

CHAPTER 2.0

AFFECTED ENVIRONMENT

2.1 Introduction

Project-related information and environmental data* have been compiled by the Forest Service and its environmental consultant, VTN. Major sources of this information and data include:

- Investigations, explorations, analyses and preliminary conceptual design studies performed by Cyprus Mines and its team of consultants.
- Reports and unpublished data on file with the U.S. Forest Service, the U.S. Bureau of Land Management and State of Idaho agencies.
- The 1975 Environmental Impact Assessment (EIA) for the project prepared by VTN.
- Additional environmental data collection programs conducted in 1979 and 1980 by VTN.

Information and data from these and other sources were assembled and analyzed to define existing environmental conditions. The results of this effort were published in seventeen Technical Memoranda which are on file with the U.S. Forest Service in Challis and the U.S. Bureau of Land Management in Salmon.

In the following sections of this chapter, the significant features of the environment which might be affected by the Thompson Creek Molybdenum Project are briefly presented. Detailed descriptions of each environmental discipline are contained in the respective Technical Memorandum. The disciplines which are described in this chapter are:

Air Resources	Terrestrial Ecology
Noise	Land Use
Geology and Soils	Socioeconomics
Ground Water Hydrology	Transportation
Surface Water Hydrology	Aesthetics
Water Quality	Cultural Resources
Aquatic Ecology	

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*The References Cited and Bibliography Section lists the reports and information compiled for this EIS.

2.2 Air Resources

2.2.1 General Climatology

The Thompson Creek Project is located in a fairly rugged mountain region of central Idaho. This region is west of the Continental Divide and approximately 525 miles east of the Pacific Ocean. The air flow controlling the region is predominantly westerly. In the project region, summer weather is characterized by clear conditions with cumulus clouds common in the late afternoon and evening. Relative humidity is low, usually 25% or less, and fog conditions rarely occur. Winter days are usually clear or partly cloudy. Storms are generally infrequent and of short duration.

The prevailing synoptic air flow over the local area near the project is from the west; however, local topographic features considerably influence surface wind velocity and direction. The canyons and ridges probably cause some channeling and lee eddies. Winds are more intense during the winter months and during summer storms. Velocity of night-time winds is usually higher, especially just prior to dawn. Velocity of winds also increases in the narrower canyons when flow is channeled through the constricted portion of a valley or canyon.

The maximum wind velocity recorded by an on-site weather station operated since 1972 was 15 mph. Wind gusts were not measured; however, strong gusts estimated to be in the range of 40-60 mph have occurred. On-site wind direction was variable about 50% of the time and trended north-south the other half of the time. Generally an up-slope wind pattern was observed during the day, with down-slope and down-valley flow prevailing during the night. The down-slope flow occurred more frequently. These conditions occurred when the general wind was light and the skies clear. They are a result of differences in the rates of cooling and heating along the sides and floor of the canyons which produce slight density and pressure differences.

The average annual precipitation at the project site is estimated to be 10 to 20 inches or more, depending upon altitude. Maximum and minimum recorded temperatures were 93°F and -24°F, respectively.

2.2.2 Air Quality

The Thompson Creek project is located in an undeveloped area on Federal lands in Custer County, Idaho. The quality of the air in the project area is excellent because of the remoteness of the area and the absence of man-made pollutant sources.

There are no ambient air quality monitoring stations in the vicinity of the project. However, the baseline air quality is expected to be typical of a remote area, and an indication of the existing ambient concentrations may be obtained from the following:

- The Prevention of Significant Deterioration (PSD) ambient monitoring guidelines (EPA 1978) suggest that in the remote locations the following air quality levels can be assumed:

Total Suspended Particulates	30-40 ug/m^3
Sulfur Dioxide (SO_2)	20 ug/m^3

No value has been assigned for hydrocarbons (HC)

- Particulate data collected at the Craters of the Moon National Monument in Idaho showed an annual geometric mean concentration of 10-15 ug/m^3. This location is approximately 70 miles from the project site, at about the same elevation and with similar amounts of precipitation and, therefore, the ambient particulate concentrations in the two areas should be comparable. No other pollutant has been monitored at the Craters of the Moon National Monument.

- Since the area is remote, background concentrations of carbon monoxide (CO) and nitrogen oxides (NO_x) generated by vehicular traffic are assumed to be low.

2.3 Noise

The project site is located in an undeveloped area relatively undisturbed by man's activities. There are no ambient noise level data currently available for the project area. Noise levels can be expected to be similar to those measured at other rural areas with the exception of core drilling activity. Noise levels for rural areas are typically 30-50 A-weighted decibels (Cunniff 1977), with an L_{50} value of 37.*

The main noise sources now present in the project area are related to human activities (e.g. exploratory drilling and low-volume vehicular traffic) and natural sources (e.g. winds, snowslides and animals such as coyotes and birds).

2.4 Geology and Soils

2.4.1 General Geology

The bedrock geology of the region is a sequence of Paleozoic sedimentary rocks intruded by Cretaceous igneous rocks known as the Idaho batholith. A large portion of the area is overlain by a series of Tertiary volcanic rocks called the Challis volcanics.

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*The weighting of noise levels is done to simulate levels perceived by the human ear. The L_{50} value is the noise level that is exceeded 50% of the time.

The Paleozoic sedimentary rocks range in age from the Cambrian to Pennsylvanian geologic periods, and vary in sequences of argillite, quartzite, limestone, dolomite and shale, some several thousand feet thick. The primary sedimentary rocks from oldest to youngest are the Saturday Mountain, Copper Basin (formerly called Milligen) and Wood River formations. These sedimentary rocks have been intruded by a biotite granodiorite-quartz monzonite stock known as the Idaho batholith. In some areas of intrusion, contact metamorphism has occurred, creating silicification and hornfelsing of the argillite. The youngest rocks are a complex series of volcanic flows and ash deposits of Tertiary age called the Challis volcanics. They are found on most ridge tops and are present in some valley bottoms that were topographic lows during the time of deposition. These volcanics are the youngest of the bedrock units and overlie others unconformably. The most common volcanic rock in this area is andesite and smaller portions of tuff and breccia. Intrusive rocks are exposed on the ground surface at the mine site but are overlain with volcanics in most areas within the claim boundary. The major rock types and structures in the claim area have been mapped by Cyprus Exploration (1980).

2.4.2 Structural Geology

Complex folding and faulting exists in the Paleozoic sedimentary units of the claim area. A thrust fault is thought to exist near the stratigraphic boundary between the Copper Basin and Saturday Mountain formations near Bruno Creek in Sections 7 and 8, T11N/R17E. The thrust plane is at a low angle and the effect has been to thrust younger Mississippian rocks on top of the older Ordivician sequence at this location. The trace of this thrust fault has been distorted by differences in erosion and effects of local transverse faulting. Other structural evidence suggests that the Saturday Mountain formation lies at relatively shallow depths beneath the Copper Basin formation in the valley of Bruno Creek.

A variety of other faults including bedding plane slippage have been noted in the Bruno Creek area; structural data based upon scattered exposures indicate that faulting and folding of the Paleozoic units was complex and presently known only in broad detail.

A geology map prepared by Cyprus Exploration (1980), locates known faults within the claim area. The alignment of segments of Bruno and Buckskin Creeks may be the result of structural control on surface drainage.

The age of folding and faulting in the claim area remains uncertain. The deformation clearly took place before the extrusion of the Challis volcanics (38-49 million years) and may have been completed by stresses related to the intrusion of the nearby plutonic rocks during mid-Cretaceous time (85-100 million years). There is no known evidence to indicate that faults in this area have been recently active (Gerath 1979).

2.4.3 Seismicity

Data on earthquake epicenter locations within a 93-mile radial distance from the town of Clayton were obtained from the Earthquake Data File of NOAA (U.S. Department of Commerce 1980). An earthquake which could affect the stability of project structures would most likely occur within this study area. For the study area, there were a total of 56 earthquakes over the period of record (about 45 years) with Richter magnitudes of 4.0 or greater. These earthquakes can be subdivided based on their magnitude:

Richter Magnitude	Number of Earthquakes
4.0 to <5.0	51
5.0 to <6.0	3
6.0 to <7.0	2

The largest earthquakes occurred about 55 miles to the northwest during 1944 and 1945 and had magnitudes of 6.1 and 6.0. The next largest earthquake had a magnitude of 5.9 and occurred in 1963; its epicenter was located about 20 miles to the west. All other earthquakes on record for the study area had magnitudes of 5.1 or less.

The majority of earthquake epicenters in the study area are located in the vicinity of the town of Sunbeam, about 12 miles west of the claim area. This region of seismic activity is referred to as the Sunbeam District. Earthquake swarms have been recorded in this district, and Richter magnitudes have ranged from 3.0 to 4.9.

Three earthquake epicenters are located within the claim area near Bruno Creek (Section 7, T11N/R17E). The largest associated earthquake had a magnitude of 4.0 and occurred in 1968. Four earthquake epicenters are located about one mile southwest of the confluence of Thompson Creek with Buckskin Creek (Section 8, T11N/R16E). The largest associated earthquake had a magnitude of 4.7 and occurred in 1964.

The lack of larger recorded historical earthquakes does not preclude the possibility of such events occurring in the vicinity of the project. The largest event which has been recorded within 300 miles of the claim area is the Hebgen Lake earthquake which occurred in 1959 at Hebgen Lake, Montana, about 160 miles to the east. This earthquake had a Richter magnitude of 7.6, and is associated with the Intermountain Seismic Belt, which contains major fault structures.

The maximum earthquake which may be expected in an area is related to the size and length of active geologic faults. There are no known major faults within 12 miles of the claim area. Therefore, it is very unlikely that a fault structure exists in the project vicinity which could produce an earthquake event exceeding the 7.6 magnitude of the

Hebgen Lake earthquake. More detailed structural mapping of the area could result in a lower magnitude maximum credible earthquake event (RPI 1980).

2.4.4 Landslides

Landslides within the tuffaceous members of the Challis volcanics occur throughout northern Idaho. Large areas of the site are underlain by these tuffaceous members.

There are several mapped landslides within the claim area. The largest of these is located along upper Bruno Creek (Sections 5 and 6, T11N/R17E). This slide is probably a block of Tertiary gray andesite that slid on the west-dropping beds of the Copper Basin formation. Two small slides are located along the perimeters of the proposed locations of waste dumps No. 4 and 6. A portion of a landslide which extends outside of the claim boundary is located in the NW 1/4 of Section 5, T11N/R17E. These relatively small slides are located on volcanic flows and tuffs. The slide at waste dump No. 6 is estimated to have an age of between 30 and 50 years; the age of the other three slides is not known.

2.4.5 Soils

Regional soils are predominantly medium, moderately-coarse textured and dark colored with steep to moderately steep slopes (U.S. Department of Agriculture 1973). The soils within the claim area are formed on terrain that is nearly level on stream bottoms (0% to 6% grade) and sloping to steep on hillsides (2% to greater than 70%). The soil profiles are shallow to deep and well-drained, except for stream bottoms. Most of the soils of the claim area are skeletal soil (35% or more stones) and loam (dry loam, sandy loam or silty-clay loam) formed from wind-deposited silt and/or material weathered from sedimentary rocks. The pH is slightly acidic to mildly alkaline. The cation exchange capacity, the total amount of exchangeable cations, is uniformly high in the soils of the area and indicative of high fertility. A soil map of the claim area is included in the 1975 EIA (VTN 1975).

Additional soils information was collected by Cyprus Mines in the summer of 1980 to determine the soil characteristics in areas that would be disturbed, and to determine where there is sufficient soil that could be stockpiled for reclamation. The physical characteristics of the soils are generally as follows: gravelly to very gravelly loams; well drained; 40 to 60 inches deep; of low to moderate water-holding capacities; of moderate permeability; and rapid runoff potential. Chemically the soils are slightly acid, with low electrical conductivity and low sodium adsorption ratios (SAR).

The areas to be disturbed contain limited amounts of topsoil suitable for use in reclamation. Generally the main restrictive characteristics for topsoil salvage are the shallow depth, coarse fragments, and steep

slope gradient. Portions of the concentrator and tailings areas have the best potential for topsoil salvage because of their relatively moderate slope gradients and deeper soil depths. The north- and east-facing slopes of the pit area also may be potential topsoil salvage areas.

2.5 Ground Water Hydrology

The occurrence and distribution of ground water within the claim area is determined by the complex geology of the region. The area is mountainous with steep slopes along drainages. The primary sources of ground water include: 1) infiltration of runoff into surface soils and decomposed bedrock; 2) stream channel underflow within alluvial deposits; and 3) water in fracture and fault zones of bedrock formations.

Relatively small quantities of ground water are contained within the surface soils and decomposed bedrock comprising the soil mantle. Alluvial deposits occur in stream channel bottoms; ground water in the alluvium is in direct connection with surface water within the stream courses. The major stream channels in the claim area are Squaw and Thompson Creeks which are tributary to the Salmon River. The major tributaries to these streams are Bruno Creek (to Squaw Creek, on the east side of the claim area) and Buckskin and Pat Hughes Creeks (to Thompson Creek, on the west side of the claim area). The direction of surface water flow is generally to the south. The claim area is characterized by narrow, steep-sided and V-shaped valleys cut by these drainages. Based on existing information, alluvial deposits are probably less than 100 feet in thickness and 300 feet in width along the stream courses.

Ground water was encountered in fracture and fault zones in volcanics and intrusive rocks penetrated by the mine adit and exploration boreholes, however large sustained volumes of flow were not derived from them (Golder Associates 1980). The location and extent of water-containing fractures in this unit are highly variable.

Argillaceous sediments of the Copper Basin and Saturday Mountain formations are the primary sedimentary bedrock aquifers in the claim area. The lithology of these units is largely argillite, bedded limestones and dolomite. The well consolidated, and in some locations, metamorphosed nature of these rocks creates low porosity preventing the production of significant amounts of ground water from pore spaces. However, these sediments are extremely folded and at some locations they are nearly vertical. Ground water in relatively large quantities and of good quality has been encountered in wells penetrating fractures and faults. The wells are located near Bruno Creek in Section 8, T11N/R17E.

In general, there is a continous supply of baseflow to the streams throughout the year from the alluvial and bedrock aquifers. Larger

quantities of baseflow occur during periods of high precipitation and snowmelt (spring and early summer), however this contributes a smaller pecentage to total surface water runoff. Baseflow may constitute 90% or more of the total stream flow during dry periods of the year (winter months); this is especially true for smaller drainages.

Geohydrologic tests conducted within the claim area include those performed at: 1) the tailings impoundment area for determination of seepage rates into the underlying bedrock; 2) at proposed concentrator water supply wells to determine production capability; and 3) at the mine area to determine permeability of the bedrock and requirements for mine dewatering.

Testing completed to date in the tailings impoundment area has demonstrated average permeabilities ranging from 10^{-5} to 10^{-6} cm/sec for the Copper Basin Formation (argillites) and 10^{-5} cm/sec for volcanic rocks. The permeability of both rock types could be greater locally where jointing, fracturing or faulting has not healed or filled with subsequently weathered materials. Additional testing is planned in this area (RPI 1980). Mine area tests indicated an average permeability for quartz monzonite and volcanic tuffs of 10^{-5} cm/sec (Hydro-Triad 1979). Tests on two water supply wells completed in the Saturday Mountain limestone indicate that each are capable of producing 4,000 gallons per minute (gpm) or more and have a permeability of about 1 cm/sec (WEN 1980d,e).

In general, results of geohydrologic tests indicate that permeability varies considerably with rock type, location and the amount of fracturing.

Water level measurements were made in wells and boreholes completed to various bedrock units. Ground water levels ranged from flowing artesian in wells near Bruno Creek (Section 18, T11N/R17E), to greater than 1200 feet below ground surface in the mine area. Elevations for water levels ranged from about 8,200 to 5,800 feet above sea level. Wide variations in water levels, especially in the mine area, indicate the probability of penetrating bedrock of varying permeabilities (Golder Associates 1980). The rate of regional ground water movement is relatively slow throughout the claim area due to the overall low permeability of the bedrock. Within the claim area there are localized areas which may have interconnected fracture and fault zones, thereby having permeabilities and rates of ground water movement several magnitudes greater than the regional values. The regional direction of ground water flow in this area is to the south.

In a review of water rights by Anderson & Kelly (January, 1980), there are no ground water rights on record within or adjacent to the Thompson Creek and Squaw Creek drainages. Two applications for permits to construct wells for the purposes of diverting a total of 11.14 cfs for domestic, mining, and commercial processing purposes are on file, with a priority date of July 2, 1979. Once these wells are successfully

completed, an application for permit to use the water must be filed to establish a priority date for a right. The applications are by Cyprus Mines Corporation for the SW 1/4 NE 1/4 Section 8, T11N/R17E on Bruno Creek, and for the NE 1/4 SE 1/4 Section 34, T12N/R16E BM near Buckskin Creek.

2.6 Surface Water Hydrology

2.6.1 Streamflow Characteristics

Streamflow on the Salmon River and its tributaries exhibits the typical pattern of mountain streams. Highest flows occur in the spring as the winter snowpack melts; thereafter, flows decrease until a fairly regular baseflow condition is established during the fall and winter months. Runoff during spring may be as much as 20 times as great as the flow rate during dry periods when baseflows are the predominant source of runoff. Flows vary from day to day and diurnally as atmospheric conditions change.

Available USGS flow records for project-area streams are shown in Table 2.6-1. The data indicate that average annual runoff is 8.21 inches for Thompson Creek, 5.88 inches for Squaw Creek, and 3.62 inches for Bruno Creek (USGS 1979). Buckskin Creek and Pat Hughes Creeks have estimated average annual runoff values of about 8 inches (Hydro-Triad 1980). The project-area streams have similar monthly distributions and also follow similar yearly variations in streamflow. Variations of average annual streamflow are shown in Figure 2.6-1. On the average, Thompson and Squaw Creeks annually contribute 51.8 cfs to the Salmon River. This is about 5% of the Salmon River flow in this reach.

The streamflow characteristics of Bruno Creek during the low flow period are somewhat unique compared to the other streams in the project area. During the late summer months, there is usually a constant source of ground water discharge (baseflow) in the upper reaches of Bruno Creek. This surface water flow decreases gradually in the downstream direction until there is no surface flow approximately at the point where the creek has a right angle bend to the east. About 500 to 800 feet downstream from this bend, a spring discharges water into the Bruno Creek channel. The USGS gauging station near the mouth of Bruno Creek is downstream from this point. The station records indicate that Bruno Creek has not totally dried up at the station during the period of record.

2.6.2 Surface and Ground Water Interaction

The streams of the project area have a continuous source of flow from ground water (baseflow). Existing ground water sources can be categorized into three major areas: 1) shallow ground water found in surface soils and decomposed bedrock; 2) underflow within alluvium along stream channels; and 3) water in fracture and fault zones of bedrock formations.

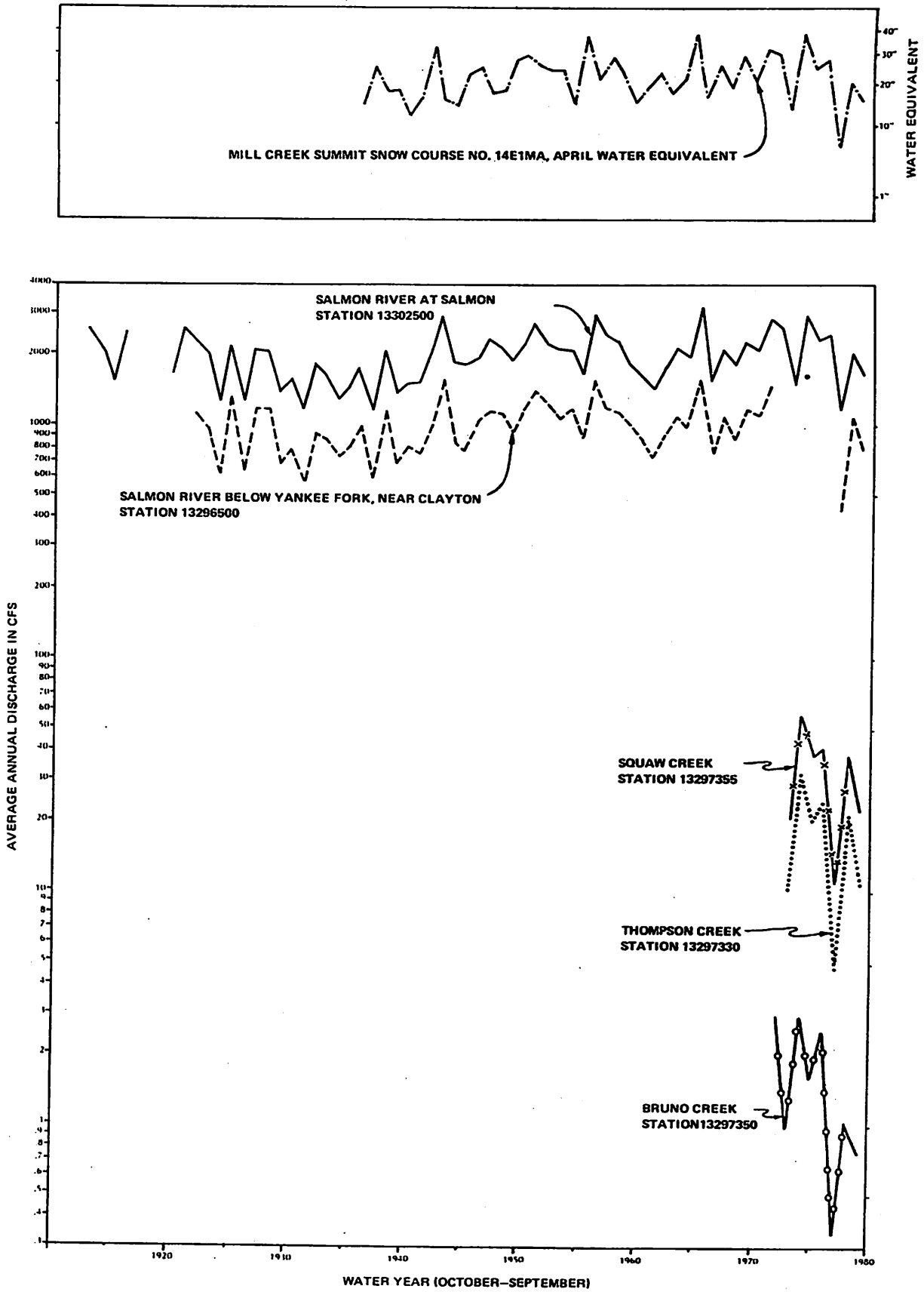
TABLE 2.6-1

SUMMARY OF USGS FLOW RECORDS
FOR STREAMS IN THE PROJECT VICINITY

	Salmon River below Yankee Fork near Clayton (Sta 13296500)	Thompson Creek near Clayton (Sta. 13297330)	Bruno Creek near Clayton (Sta. 13297350)	Squaw Creek near Clayton (Sta. 13297355)	Salmon River near Challis (Sta. 13298500)	Salmon River at Salmon (Sta. 13302500)
Period of Record:	Oct. 1921 to present[a]	Nov. 1972 to present	April 1971 to present	Oct. 1972 to present	Oct. 1928-Dec. 1971, Apr. 1972-Sept. 1972	Apr. 1912-Sept. 1916, July 1919 to Present
Drainage Area (mi^2)	802	29.1	6.29	79.0	1,800	3,760
Average Annual Flow (cfs)	998	17.6	1.68	34.2	1,488	1,966
Minimum Flow for Period of Record (cfs)	160	1.1	0.03	3.3	160	242
Maximum Inst. Flow for Period of Record (cfs)	10,400	332	42	694	15,400	17,700

(a) Operated during high flow period only for water years 1972, 1973, 1975, and 1976.

Source: USGS Water Resources Data for Idaho (through 1979).



LONG-TERM STREAMFLOW CHARACTERISTICS OF
THE CLAIM AREA WATERSHEDS AND VICINITY

FIGURE 2.6-1

Based on the collected data, Thompson Creek, Squaw Creek and their tributaries can contribute underflow or receive inflow at the same time at different portions of each stream. Surface water runoff is greatest at the headwaters due to proximity to snowmelt. Surface water flow diminishes or disappears at times from Buckskin, Pat Hughes and Bruno Creeks near their mouths during the dry months of the year. The decreases in surface water flow of these three creeks are caused by the infiltration of water into the alluvium. Loss of flow in Bruno Creek may also be due to interconnection with fracture and fault zones.

Baseflow estimations for Thompson, Bruno and Squaw Creeks were derived from inspection of the USGS streamflow records at the respective gauging stations through the 1979 water year. The estimated baseflow is 4 to 5 cfs for Thompson Creek, 0.4 to 0.5 cfs for Bruno Creek, and 9 to 10 cfs for Squaw Creek. Estimations for Buckskin Creek and Pat Hughes Creek are more difficult to make because the available records are very limited. The data suggest that the baseflow of Buckskin Creek near its mouth is approximately 0.15 to 0.25 cfs, and the baseflow of Pat Hughes Creek near its mouth is 0 to 0.2 cfs.

2.6.3 Low Flow Analysis

The minimum values of mean monthly streamflow for the USGS gauging stations on Thompson Creek and Squaw Creek based on seven years of record (water years 1973-1979) are 2.14 cfs and 5.38 cfs, respectively. The minimum value of mean monthly streamflow for the USGS gauging station on Bruno Creek based on 8-plus years of record (water years 1971-1979) is 0.090 cfs. Minimum mean daily streamflow during the periods of record at the USGS gauging stations on Thompson, Squaw, and Bruno Creeks were 1.5 cfs, 4.0 cfs, and 0.06 cfs, respectively.

There are no continuous records of streamflow available for Buckskin Creek and Pat Hughes Creek. However, the limited data that are available indicate that minimum values of mean monthly flow are probably about 0.1 to 0.2 cfs for Buckskin Creek near its mouth, and 0 cfs for Pat Hughes Creek near its mouth.

The low flows usually occur during August, September or October of a year with abnormally low snowfall and rainfall, but also may happen during the winter months of a dry year.

2.6.4 Flood Analysis

The types of floods in the Salmon River watershed are 1) snowmelt, 2) rain-on-snow or snowmelt-followed-by-rain, and 3) to a minor degree, cloudburst. By far the largest number of annual flood peaks in the basin are caused by snowmelt or by rain-on-snow (Thomas, et al. 1963).

Snowmelt floods occur during the April-June period in the project area. Rain-on-snow floods generally occur during the December-March period. Snow can absorb a considerable volume of rainfall before

runoff occurs. When melted, the snow contributes to the volume of water released, and this increase in volume often causes severe floods. Occasionally, rain on frozen ground causes floods because most of the rainfall appears directly as runoff. No large thunderstorm-type floods have been recorded in Bruno, Squaw, and Thompson Creek at the USGS gauging stations. The flood frequency curves for Thompson, Squaw, and Bruno Creeks are shown in Figure 2.6-2. (The curves were determined by analyzing the annual peak discharges at the gauging stations with the Log Pearson Type III distribution. The regional skew coefficient of -0.3 was used since the periods of record are short. The dashed portions of the curves indicate values which may not be reliable due to the short periods of record from which the curves were derived.)

2.6.5 Water Rights and Uses

The Anderson and Kelly (1980) report indicates that only one decreed right exists for either Thompson Creek or Squaw Creek and their tributaries. The 1977 right decrees the full flow (820 Miner's inches or 16.4 cfs) of Squaw Creek and its tributaries to the named persons and parties. Priority dates for the named parties range from April 1, 1882 to April 1, 1902. The decreed right is divided between ranch and property owners on Squaw Creek and is used for irrigation.

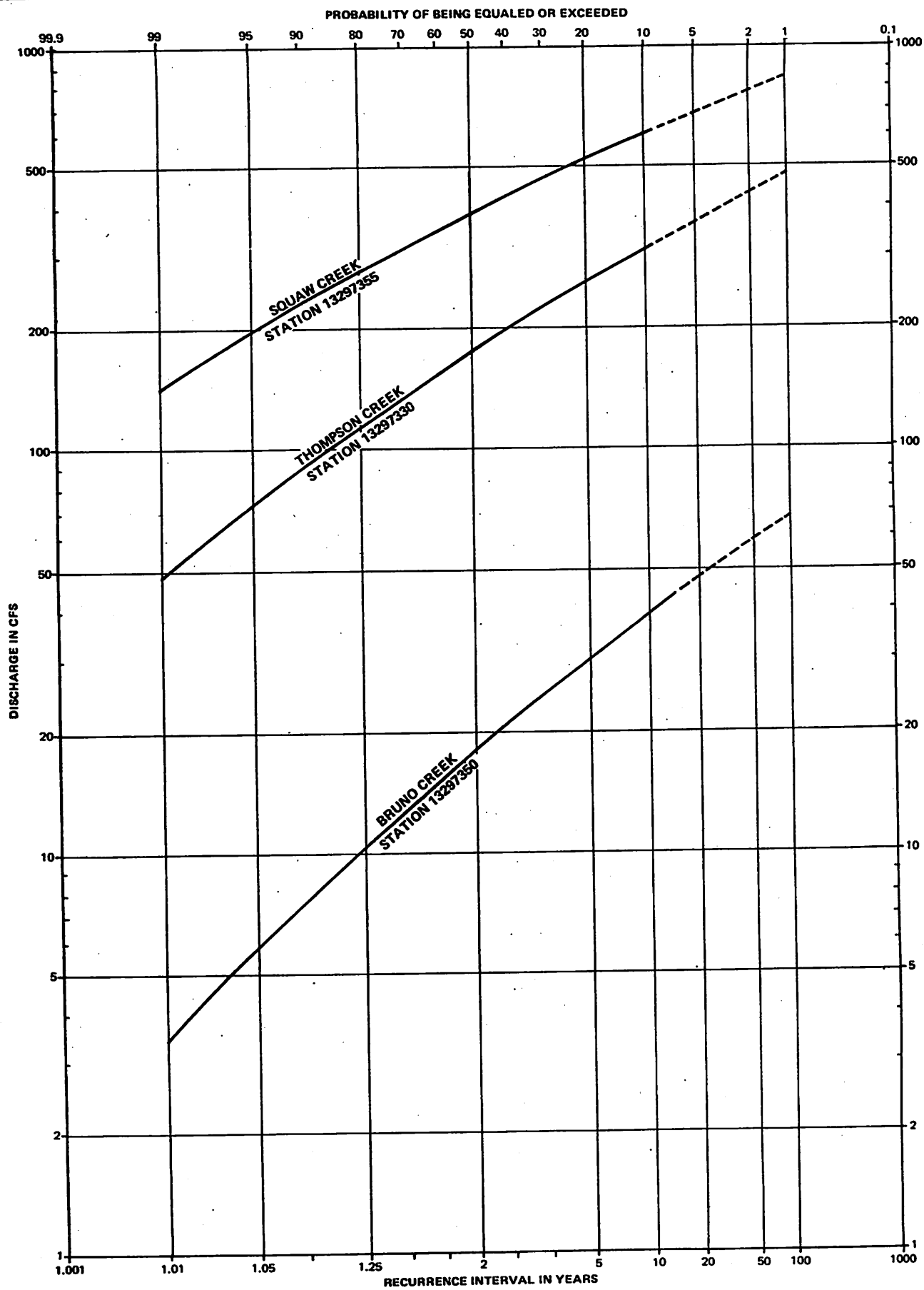
As a result of constructing the tailings embankment across the upper Bruno Creek drainage, the surface flow of upper Bruno Creek will be impounded for use in the concentrating process. In order to use this flow (calculated at 1.92 cfs), Cyprus Mines needs to have a legal right to the impounded water. Cyprus Mines has purchased or optioned a majority of the land (and water rights) located on Squaw Creek, and therefore, has the legal right to the needed amount of water. Cyprus Mines proposes to transfer some of the original point(s) of diversion on Squaw Creek to the tailings impoundment on upper Bruno Creek. This transfer will be accomplished by applying for a "Change in Point of Diversion" from the Idaho Department of Water Resources.

There is one claimed use right for Thompson Creek. The amount is 1.0 cfs and the use is for ore milling purposes. The priority date is October 10, 1966.

There is one licensed right for Redbird Creek, a tributary of Squaw Creek. The right is for 2.0 cfs for industrial use (milling of ore), and the priorty date is December 15, 1924.

There are ten filings for use of springs or surface diversions in the vicinity of the project. However, the water uses are not located in the Thompson Creek or Squaw Creek drainages.

On April 7, 1980, Cyprus Mines filed an application with the Idaho Department of Water Resources for the appropriation of 10 cfs from the waters in Thompson Creek. The application was approved on May 23, 1980. The use of the water is described in the application as



FLOOD FREQUENCY CURVES
LOG PEARSON TYPE III DISTRIBUTION
BRUNO, THOMPSON AND SQUAW CREEKS

FIGURE 2.6-2

industrial. The purpose of the filing is to: (1) provide a legal source of water for the Thompson Creek Project and (2) protect the vested interests of the project from potential claims or injury (water loss).

It must be emphasized that the preferred alternative for a fresh water source for the project remains a deep (non-tributary) well system located on the claim area. At the present time work is continuing on the drilling of the initial production well. Upon successful completion of the drilling and casing, the well will be pump-tested for sustained yield. Water rights for the well(s) have been applied for and an appropriation date has been established. In addition, the necessary permit(s) to drill and construct a water well have been obtained. The Thompson Creek Project Water Management Plan continues to utilize well water in the circuit as fresh water makeup and domestic supply.

Surface water from Thompson Creek would only be diverted for project use should all other options (additional well locations, etc.) be proven unfeasible. In the unlikely event that surface water from Thompson Creek had to be diverted, arrangements with appropriate regulatory agencies would be made to protect reasonable minimum flow requirements necessary for fisheries.

It remains the stated and firm commitment of Cyprus Mines to utilize well water as the primary source of fresh water for the project. The appropriation of surface waters from Thompson Creek is intended as a backup contingency should other options become infeasible.

2.7 Water Quality

2.7.1 Introduction

A considerable amount of data on the surface water quality of the project area creeks has been gathered by various government agencies and private companies since 1971. These data indicate that the surface water quality has remained about the same over the period 1971 to 1980. In light of this, the most recent data are presented below except where long-term summaries of certain water quality constituents are more appropriate.* Water quality sampling locations corresponding to the data presented below are shown in Figure 2.7-1. Data on ground water quality in the project area were collected during 1979 and 1980.

2.7.2 Water Quality Standards

The Idaho State Water Quality Standards (IDHW 1980) classify waters in terms of existing or potential water uses to be protected. Specific physical, chemical and biological standards are assigned to the various use classifications. In addition, there are general water quality standards applicable to all the state's waters.

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*Refer to VTN (1980 WQ) for a complete discussion of water quality.

There are no specific use classifications assigned to the creeks which drain the project site and which would receive project-related discharges. These creeks are "unspecified waters" and are designated as "secondary contact recreation waters." The present uses of the creeks which should be considered in evaluating project-related discharges are:

- Agricultural water supply (Thompson and Squaw Creeks)
- Cold water biota (Thompson, Bruno and Squaw Creeks)
- Salmonid spawning (Thompson, Bruno and Squaw Creeks)

In addition, the Salmon River south of the project site is designated as a Special Resource Water, whose ambient water quality must be protected. Any discharges from the project also must meet the state regulations governing point source waste water discharges.

2.7.3 Surface Water Quality

Temperature

The maximum water temperatures for the streams occur during the summer (late June through August); minimum temperatures occur during the winter (November through March). The annual variation of water temperature for project area stream ranges from 17°C to 0°C.

pH

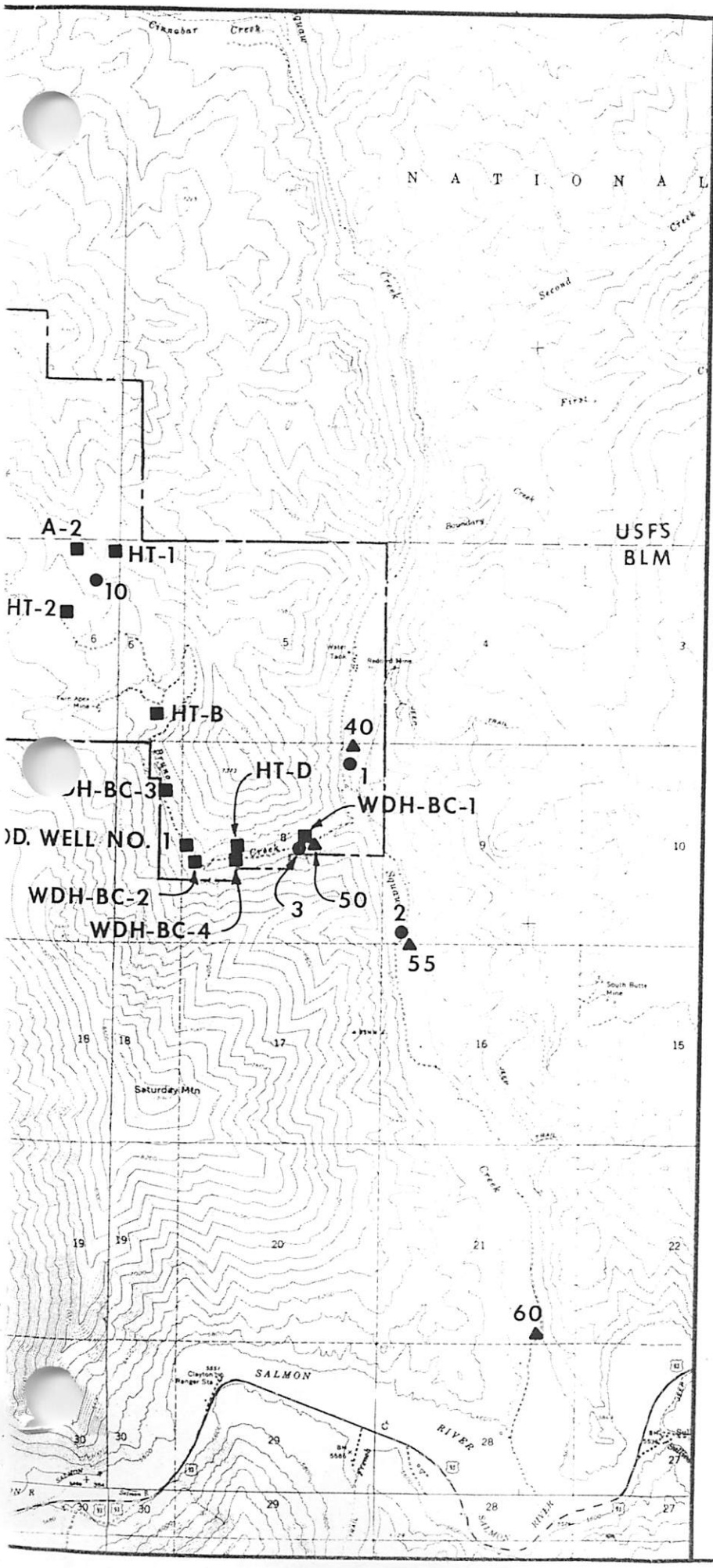
The ranges of pH values vary slightly depending on the drainage, but all of the variations are from near neutral to slightly alkaline. The ranges of pH values for the various streams are:

Stream	Range of pH
Thompson Creek	6.8 to 8.0
Buckskin Creek and Pat Hughes Creek	7.4 to 8.2
Bruno Creek (near mouth)	7.5 to 8.4
Squaw Creek	7.0 to 8.5

The lower values of pH generally occur during high streamflow from snowmelt or storm runoff, and the higher values generally occur during low streamflow.

Total Dissolved Solids (TDS)

The values of TDS generally vary indirectly with streamflow; i.e., the lower values occur during high streamflow from snowmelt or storm runoff and the higher values occur during low streamflow (baseflow). This



LEGEND

CLAIM AREA BOUNDARY

SURFACE WATER SAMPLING STATIONS

▲ USGS (a)

● VTN

GROUND WATER SAMPLING STATIONS

■ HYDRO-TRIAD/W.E. NORK INC.

(a) Only the last two digits of USGS Station number shown.

0 1 2 MILES

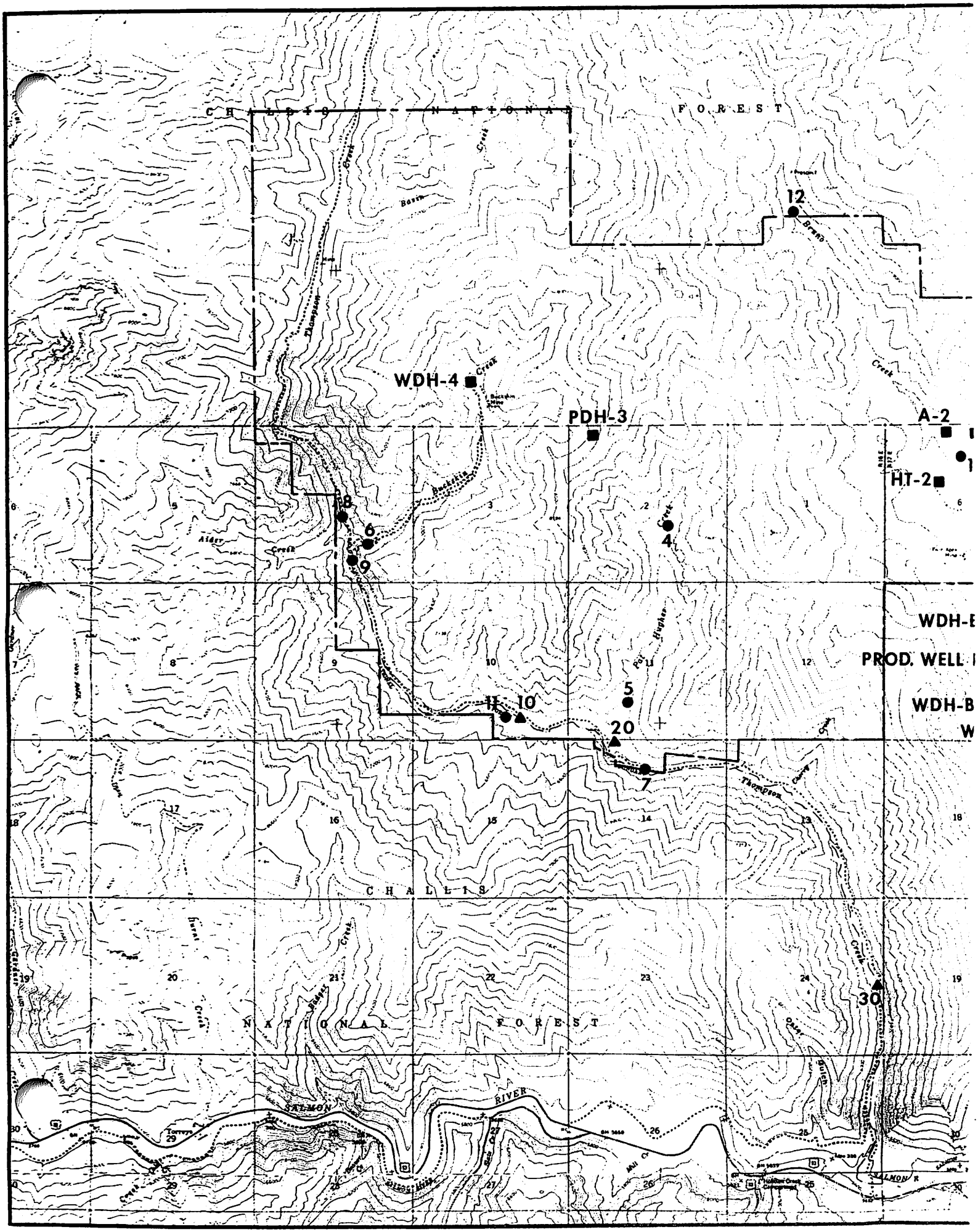
SCALE

CYPRUS MINES CORPORATION

THOMPSON CREEK PROJECT

SURFACE AND GROUND WATER QUALITY SAMPLING STATIONS

FIGURE 2.7-1


CHALLIS NATIONAL FOREST
FOREST
CHALLIS
NATIONAL FOREST
SALMON RIVER
WDH-4
PDH-3
A-2
HT-2
WDH-E
PROD. WELL
WDH-B
12
8
6
9
4
5
10
20
7
30
Thompson Creek
Alder Creek
Buckskin Creek
Bear Hughes
Bruno Creek
Basin Creek
Gilson Creek
Mill Cr
Olsen Gulch

relationship results from the dilution by runoff of the ground water inflow which makes up the baseflow of the streams. During high streamflow the TDS concentrations of Thompson and Squaw Creeks have reached values as low as 48 mg/l. The TDS concentrations of Buckskin, Pat Hughes, and Bruno Creeks during high streamflow periods have usually been slightly higher than the values for Thompson and Squaw Creeks. However, during low streamflow the TDS concentrations vary considerably depending on the stream involved and also depending on the location on a particular stream.

The approximate ranges of TDS concentration during low streamflow periods at the various stream locations are:

Stream Location	Range of TDS (mg/l)
Thompson Creek above Pat Hughes Creek	80 to 130
Thompson Creek below Pat Hughes Creek	90 to 150
Buckskin Creek near mouth	170 to 200
Pat Hughes Creek near mouth	170 to 200
Upper Bruno Creek	90 to 120
Bruno Creek near mouth	220 to 290
Squaw Creek above Bruno Creek	110 to 160
Squaw Creek below Bruno Creek	100 to 160

These data indicate that during low streamflow periods Bruno Creek near its mouth has the highest TDS concentration, and Thompson Creek, upper Bruno Creek and Squaw Creek have the lowest TDS concentration. Both Thompson Creek and Squaw Creek show a slight increase in TDS concentration in the downstream direction over a distance of several miles. These increases are due partially to the flow contributions of tributaries (such as Buckskin Creek, Pat Hughes Creek and Bruno Creek) which have higher TDS concentrations than Thompson Creek and Squaw Creek. However, the largest portion of the increases are probably due to the influence of ground water inflow along Thompson Creek and Squaw Creek. Bruno Creek exhibits a large difference in TDS concentration between its upper and lower reaches during low streamflow periods. The concentration of TDS for water near the mouth of Bruno Creek during the low flow period is influenced by ground water discharge in the lower reaches of the drainage.

Suspended Sediment (SS)

The SS concentrations of the streams in the project vicinity vary directly with streamflow; i.e., the concentrations are greatest during high streamflow from snowmelt or storm runoff and lowest during the baseflow period. The USGS collected SS samples from stations on Thompson Creek, Pat Hughes Creek, Bruno Creek and Squaw Creek during water years 1971 through 1974. The SS concentrations for all of the streams were generally very low during baseflow. The maximum and minimum concentrations of SS at the USGS stations for the period of record are shown in Table 2.7-1. It is likely that the SS concentrations in these streams are occasionally somewhat higher at present as a result of recent construction of roads and drill pads and year-round activity on the claim area. The streams would also reach higher SS concentrations during peak flows with a large recurrence interval (for example, greater than 20 years).

Major Ions

The surface waters of the streams in the project vicinity are a mixed-bicarbonate type. The water of Pat Hughes Creek is a calcium-sodium-bicarbonate type; the rest of the streams have water which is a calcium-magnesium-bicarbonate type. The concentrations of the major cations and anions follow variations with streamflow which are similar to the variation of TDS. The trends of alkalinity and hardness values at the various stream locations correspond to the general trends for TDS.

Nutrients and Biochemical Constituents

The streams in the project vicinity generally have low levels of nitrogen and phosphorus compounds. The concentrations of nitrate have been below 0.5 mg/l* and the concentrations of total phosphorus have been below 0.26 mg/l, based on USGS data from 1971 through 1974 and VTN data during September 1979 (see Table 2.7-2), February 1980 (see Table 2.7-3) and June 1980 (see Table 2.7-4). Also, in 1979 and 1980 the concentrations of total organic carbon (TOC) and oil and grease ranged from 1.2 mg/l to 3.8 mg/l and less than 0.1 mg/l to 4.0 mg/l, respectively. In February 1980, samples for petroleum hydrocarbon analyses were collected by VTN at the stations on Thompson Creek above Buckskin Creek (No. 8) and below Pat Hughes Creek (No. 7) and at the stations on Squaw Creek above Bruno Creek (No. 1) and below Bruno Creek (No. 2). The samples were analyzed for the following constituents:

- Phenanthrene
- Napthalene
- Methyl Napthalenes

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*Except for one value of nitrate plus nitrite at Thompson Creek (1.3 mg/l, June 4, 1973), and one value of nitrate plus nitrite in Bruno Creek (0.63 mg/l, May 3, 1973).

TABLE 2.7-1

SUMMARY OF SUSPENDED SEDIMENT CONCENTRATION FOR STREAMS IN THE VICINITY OF THE PROJECT SITE FROM USGS RECORDS
Water Years 1971-1974[a]

Station/Period of Record	Suspended Sediment Concentration (mg/l) Maximum	Minimum
Thompson Creek above Pat Hughes Creek, near Clayton Sta. No. 13297310 1971-1972	57 6/11/71	3 8/10/71
Pat Hughes Creek near Clayton Sta. No. 13297320 1971-1972	128 8/10/71	4 2/24/71
Thompson Creek near Clayton Sta. No. 13297330 1971-1974	103 6/22/71	1 9/2/71
Squaw Creek above Bruno Creek, near Clayton Sta. No. 13297340 1971-1972	388 6/3/72	3 7/24/71
Bruno Creek near Clayton Sta. No. 13297350 1971-1974	813 6/3/72	1 7/23/71 9/2/71 10/7/71 6/7/73
Squaw Creek below Bruno Creek, near Clayton Sta. No. 13297355 1973-1974	9 5/3/73	4 6/7/73
Squaw Creek near Clayton Sta. No. 13297360 1971-1972	605 6/3/72	1 9/2/71

(a) The USGS did not collect any suspended sediment samples at these stations during water years 1975-1980.

Source: USGS Water Resources Data for Idaho, Water Years 1971 through 1974.

TABLE 2.7-2

SUMMARY OF SURFACE WATER QUALITY
IN THE VICINITY OF THE PROJECT SITE
SEPTEMBER 18, 1979

Parameters	1 Squaw Creek above Bruno Creek	2 Squaw Creek below Bruno Creek	3 Bruno Creek near Mouth	4 Pat Hughes Creek above adit	5 Pat Hughes Creek near mouth	6 Buckskin Creek near Mouth	7 Thompson Creek below Pat Hughes Creek
Streamflow (cfs)	5.6	6.2	0.24	0.1 Est	0.02 Est	0.2 Est	2.4
Water Temperature (°C)	15.9	15.5	10.3	7.0	9.1	4.8	8.1
Air Temperature (°C)	27	27.5	28	7	20	15	21
Dissolved Oxygen (mg/l)	10.0	12.3	11.4	11.6	12.3	13.7	11.8
pH, field (units)	8.3	8.1	7.9	6.6	7.6	7.6	7.3
pH, lab (units)	8.5	8.3	8.1	7.7	7.8	7.9	7.9
Conductivity, field (umhos/cm at 25°C)	163	201	367	144	286	251	125
Conductivity, lab (umhos/cm at 25°C)	144	177	310	136	235	220	111
Turbidity, lab (JTU)	0.5	0.5	0.3	1.6	0.9	0.3	0.5
Color (units)	5	5	5	5	5	5	10
Suspended Solids (mg/l)	2	<2	3	2	9	4	<2
Total Solids (mg/l)	113	141	263	123	202	202	93
Total Volatile Solids (mg/l)	12	5	25	23	19	12	7
Total Dissolved Solids (mg/l)	111	141	260	121	193	198	93
Hardness as $CaCO_3$ (mg/l)	77	98	200	30	111	120	66
Acidity as $CaCO_3$ (mg/l)	<1	<1	1	3	3	2	2
Total Alkalinity as $CaCO_3$, lab (mg/l)	83	99	160	81	123	97	55
Sulfate as SO_4 (mg/l)*	4	10	21	3	12	14	6
Chloride (mg/l)*	<1	<1	<1	<1	<1	<1	<1
Fluoride (mg/l)*	0.1	0.1	0.2	0.1	0.2	0.1	0.1
Bromide (mg/l) *	<2	<2	<2	<2	<2	<2	<2
Silica as SiO_2 (mg/l)*	15	15	12	13	13	13	12
Cyanide (mg/l)*	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005

TABLE 2.7-2 (cont.)

Parameters	1 Squaw Creek above Bruno Creek	2 Squaw Creek below Bruno Creek	3 Bruno Creek near Mouth	4 Pat Hughes Creek above adit	5 Pat Hughes Creek near mouth	6 Buckskin Creek near Mouth	7 Thompson Creek below Pat Hughes Creek
Ortho-Phosphate as P (mg/l)*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Phosphate as P (mg/l)	0.04	0.04	0.03	0.02	0.26	0.04	0.02
Nitrate as N (mg/l)*	<0.05	<0.05	0.07	0.2	0.06	0.2	<0.05
Total Kjeldahl Nitrogen (mg/l)	0.4	<0.1	0.4	<0.1	<0.1	<0.1	<0.1
Total Organic Carbon (mg/l)	1.6	2.4	2.7	2.1	1.2	1.2	1.2
Oil and Grease (mg/l)	0.3	<0.1	<0.1	0.1	<0.1	0.4	<0.1
Chemical Oxygen Demand (mg/l)	<5	<5	<5	<5	<5	<5	<5
Sodium (mg/l)*	5.3	5.2	4.5	31.8	24.5	5.1	4.7
Potassium (mg/l)*	1.6	1.6	1.0	0.5	1.1	1.1	0.6
Calcium (mg/l)*	17.3	19.0	44.1	7.6	29.0	33.2	15.0
Magnesium (mg/l)*	8.2	8.2	15.3	1.2	6.0	5.5	3.1
Aluminum (mg/l)*	<0.05	<0.05	<0.05	0.05	0.05	<0.05	<0.05
Arsenic (mg/l)*	<0.005	<0.005	0.010	0.005	<0.005	<0.005	<0.005
Barium (mg/l)*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium (mg/l)*	<0.002	0.003	0.005	<0.002	<0.002	0.007	0.033(a)
Chromium (mg/l)*	<0.002	0.005	<0.002	0.003	0.005	<0.002	0.003
Copper (mg/l)*	0.009	0.010	0.010	0.007	0.007	0.013	0.010
Iron (mg/l)*	0.02	0.02	0.04	0.07	0.07	0.03	0.17
Lead (mg/l)*	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01
Manganese (mg/l)*	<0.002	0.005	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (mg/l)*	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Molybdenum (mg/l)*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel (mg/l)*	0.010	0.010	0.014	0.008	0.010	0.013	0.008
Silver (mg/l)*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Selenium (mg/l)*	0.008	<0.005	<0.005	0.008	0.015	0.008	<0.005
Zinc (mg/l)*	0.031	0.042	0.045	0.026	0.029	0.041	0.030

(a) Anomalous value.
*Dissolved phase of constituent.

Source: Samples were collected by VTN Consolidated, Inc. and analyzed by Laucks Testing Laboratory.
Note: <xx.xx means below lower detection limit.

TABLE 2.7-3

SUMMARY OF SURFACE WATER QUALITY
IN THE VICINITY OF THE PROJECT SITE
FEBRURARY 7, 1980

Parameters	1 Squaw Creek above Bruno Creek	2 Squaw Creek below Bruno Creek	3 Bruno Creek near Mouth	6 Buckskin Creek near Mouth	7 Thompson Creek below Pat Hughes Creek	8 Thompson Creek above Buckskin Creek	9 Thompson Creek below Buckskin Creek	10 Upper Bruno Creek
Streamflow (cfs)	5.73	6.92	0.12	0.11	2.60	1.5	2.28	0.43
Water Temperature (°C)	0.1	0.4	3.5	2.0	1.3	0.4	0.3	0.5
Air Temperature (°C)	1	-1	0	5	0	2	2	-1
Dissolved Oxygen (mg/l)	11.5	10.2	8.2	9.3	9.0	11.7	10.2	7.6
pH, field (units)	8.0	8.4	8.4	8.3	8.0	7.7	8.0	8.1
pH, lab (units)	7.9	8.0	8.2	8.1	7.6	7.6	7.7	7.7
Conductivity, lab (umhos/cm at 25°C)	126	155	305	203	108	77	88	104
Turbidity, lab (JTU)	1.0	1.0	0.7	2.0	0.7	0.5	0.7	0.9
Color (units)	5	5	5	5	5	5	5	5
Suspended Solids (mg/l)	<1	<1	1	8	<1	1	1	1
Total Solids (mg/l)	107	124	256	179	95	71	75	88
Total Volatile Solids (mg/l)	22	20	24	21	18	18	14	17
Total Dissolved Solids (mg/l)	107	124	255	171	95	70	74	87
Hardness as $CaCO_3$ (mg/l)	69	92	220	123	57	42	49	60
Acidity as $CaCO_3$ (mg/l)	7	6	<1	4	7	7	6	8
Total Alkalinity as $CaCO_3$, lab (mg/l)	79	96	185	98	55	43	47	66
Sulfate as SO_4 (mg/l)*	5	12	36	27	14	9	10	5
Chloride (mg/l)*	<1	<1	<1	<1	<1	<1	<1	<1
Fluoride (mg/l)*	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Bromide (mg/l)*	<1	<1	<1	<1	<1	<1	<1	<1
Silica as SiO_2 (mg/l)*	19	18	13	15	14	15	15	17
Cyanide (mg/l)*	0.022	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	0.005

TABLE 2.7-3 (cont.)

Parameters	1 Squaw Creek above Bruno Creek	2 Squaw Creek below Bruno Creek	3 Bruno Creek near Mouth	6 Buckskin Creek near Mouth	7 Thompson Creek below Pat Hughes Creek	8 Thompson Creek above Buckskin Creek	9 Thompson Creek below Buckskin Creek	10 Upper Bruno Creek
Ortho-Phosphate as P (mg/l)*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Phosphate as P (mg/l)	0.05	0.04	0.02	0.05	0.04	0.04	0.02	0.04
Nitrate as N (mg/l)*	0.2	0.09	0.4	0.3	0.07	0.2	0.1	0.2
Total Kjeldahl Nitrogen (mg/l)	0.2	0.4	0.1	0.3	0.4	0.3	0.3	0.1
Total Organic Carbon (mg/l)	1.5	1.6	1.9	1.4	1.5	1.2	1.9	2.4
Oil and Grease (mg/l)	0.1	<0.1	<0.1	0.2	<0.1	0.2	0.1	0.3
Chemical Oxygen Demand (mg/l)	6	9	3	6	9	27	12	6
Sodium (mg/l)*	7.1	6.5	4.6	6.8	5.8	5.0	5.0	6.2
Potassium (mg/l)*	1.5	1.5	1.2	1.4	0.7	0.7	0.7	0.6
Calcium (mg/l)*	15.8	19.5	52.0	36.0	17.3	13.2	15.2	18.2
Magnesium (mg/l)*	6.8	8.0	17.6	5.5	3.8	2.2	2.8	3.0
Aluminum (mg/l)*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (mg/l)*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium (mg/l)*	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02
Cadmium (mg/l)*	<0.002	<0.002	0.004	<0.002	0.004	<0.002	<0.002	<0.002
Chromium (mg/l)*	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Copper (mg/l)*	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron (mg/l)*	0.04	0.04	0.02	0.03	0.03	0.02	0.03	0.03
Lead (mg/l)*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese (mg/l)*	<0.002	<0.002	<0.002	<0.002	0.004	0.004	0.002	<0.002
Mercury (mg/l)*	<0.002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum (mg/l)*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel (mg/l)*	0.006	0.008	0.015	0.010	0.008	0.008	<0.005	<0.005
Silver (mg/l)*	<0.0001	0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Selenium (mg/l)*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (mg/l)*	0.011	0.024	0.018	0.015	0.009	0.014	0.010	0.012

*Dissolved phase of constituent.

Source: Samples were collected by VTN Consolidated, Inc. and analyzed by Laucks Testing Laboratory.
Note: <xx.xx means below lower detection limit.

TABLE 2.7-4

SUMMARY OF SURFACE WATER QUALITY
IN THE VICINITY OF THE PROJECT SITE
JUNE 8-9, 1980

Parameters	1 Squaw Creek above Bruno Creek	2 Squaw Creek below Bruno Creek	3 Bruno Creek near Mouth	5 Pat Hughes Creek near Mouth	6 Buckskin Creek near mouth	7 Thompson Creek below Pat Hughes Creek	8 Thompson Creek above Buckskin Creek
Streamflow (cfs)	79.6	76.7	5.07	2.36	2.78	43.9	33.5
Water Temperature (°C)	10.5	10.5	10.0	4.5	1.0	4.0	1.0
Air Temperature (°C)	28.0	21.0	25.0	12.0	4.0	23.0	5.0
Dissolved Oxygen (mg/l)	9.1	9.1	9.3	11.2	12.6	10.8	11.8
pH, field (units)	7.5	7.5	7.7	7.8	7.7	7.7	7.4
pH, lab (units)	7.35	7.25	7.5	7.05	7.15	6.95	6.75
Conductivity, lab (umhos/cm at 25°C)	84	94	145	120	137	77	58
Turbidity, lab (NTU)	2.4	2.4	1.6	1.0	0.68	0.90	1.3
Color (units)	10	10	5	5	5	5	5
Suspended Solids (mg/l)	6.5	10.5	7.0	<2.0	<2.0	4.0	<2.0
Total Solids (mg/l)	112	102	128	112	116	82	48
Total Volatile Solids (mg/l)	72	62	68	58	62	52	48
Total Dissolved Solids (mg/l)	76	100	133	111	127	81	59
Hardness as $CaCO_3$ (mg/l)	45.4	67.4	95.0	67.4	82.0	52.4	33.0
Acidity as $CaCO_3$ (mg/l)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total Alkalinity as $CaCO_3$, lab (mg/l)	49.4	52.7	75.5	60.8	65.6	40.4	31.4
Bicarbonate Alkalinity as $CaCO_3$ (mg/l)	49.4	52.7	75.5	60.8	65.6	40.4	31.4
Carbonate Alkalinity as $CaCO_3$ (mg/l)	0	0	0	0	0	0	0
Sulfate as SO_4 (mg/l)*	2.0	4.0	13	11	19	6.0	4.0
Chloride (mg/l)*	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Fluoride (mg/l)*	0.11	0.15	0.20	0.16	0.21	0.12	0.12
Bromide (mg/l)*	<0.1	<0.1	0.325	0.125	0.35	<0.1	0.185
Silica as SiO_2 (mg/l)*	23.0	22.5	19.5	19.4	19.4	17.8	17.9
Cyanide (mg/l)*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

TABLE 2.7-4 (cont.)

Parameters	1 Squaw Creek above Bruno Creek	2 Squaw Creek below Bruno Creek	3 Bruno Creek near Mouth	5 Pat Hughes Creek near mouth	6 Buckskin Creek near mouth	7 Thompson Creek below Pat Hughes Creek	8 Thompson Creek above Buckskin Creek
Ortho-Phosphate as P (mg/l)*	0.05	0.04	0.05	0.02	0.04	0.04	0.05
Total Phosphate as P (mg/l)	0.07	0.08	0.07	0.05	0.04	0.05	0.08
Nitrate as N (mg/l)*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen (mg/l)	0.13	0.42	0.20	0.16	0.14	0.21	<0.1
Total Organic Carbon (mg/l)	3.8	3.5	2.8	2.5	2.5	2.2	2.4
Oil and Grease (mg/l)	0.8	3.2	3.2	1.0	<0.2	<0.2	3.8
Chemical Oxygen Demand (mg/l)	9.7	11	10	6.8	9.4	5.6	2.8
Sodium (mg/l)*	4.3	4.7	4.1	12.7	4.9	4.1	3.3
Potassium (mg/l)*	1.3	1.2	0.7	0.6	1.0	0.5	0.5
Calcium (mg/l)*	10.2	11.4	22.2	14.4	24.1	11.5	7.89
Magnesium (mg/l)*	4.86	9.49	9.64	7.66	5.31	5.77	3.24
Aluminum (mg/l)*(a)	--	--	--	--	--	--	--
Arsenic (mg/l)*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium (mg/l)*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (mg/l)*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (mg/l)*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (mg/l)*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (mg/l)*	0.09	0.10	<0.05	<0.05	0.06	<0.05	<0.05
Lead (mg/l)*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Manganese (mg/l)*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury (mg/l)* (b)	--	--	--	--	--	--	--
Molybdenum (mg/l)*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (mg/l)*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Silver (mg/l)*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Selenium (mg/l)*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc (mg/l)*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

(a) Suspected contamination of sample bottles or systematic error in laboratory results.
(b) Suspected contamination of sample bottles.
* Dissolved phase of constituent.

Source: Samples were collected by VTN Consolidated, Inc. and analyzed by Century Laboratories
Note: <xx.xx means below lower detection limit.

TABLE 2.7-4 (cont.)

Parameters	9 Thompson Creek below Buckskin Creek	10 Bruno Creek at Proposed Seepage Control Pond	11 Thompson Creek above Pat Hughes Creek	12 Bruno Creek above Proposed Tailings Impoundment
Streamflow (cfs)	32.5	4.82	39.3	4.12
Water Temperature (°C)	1.0	6.8	2.5	2.5
Air Temperature (°C)	8.0	21.0	10.0	14.0
Dissolved Oxygen (mg/l)	11.9	9.8	11.8	11.8
pH, field (units)	7.6	7.5	7.6	7.5
pH, lab (units)	6.85	6.8	6.85	7.1
Conductivity, lab (umhos/cm at 25°C)	63	73	69	69
Turbidity, lab (NTU)	1.1	1.4	1.0	0.52
Color (units)	5	7	5	5
Suspended Solids (mg/l)	<2.0	<2.0	<2.0	<2.0
Total Solids (mg/l)	62	80	70	66
Total Volatile Solids (mg/l)	56	56	52	46
Total Dissolved Solids (mg/l)	72	71	78	62
Hardness as $CaCO_3$ (mg/l)	46.2	43.2	48	36.6
Acidity as $CaCO_3$ (mg/l)	<5.0	<5.0	<5.0	<5.0
Total Alkalinity as $CaCO_3$, lab (mg/l)	34.9	43.8	36.4	38.5
Bicarbonate Alkalinity as $CaCO_3$ (mg/l)	34.9	43.8	36.4	38.5
Carbonate Alkalinity as $CaCO_3$ (mg/l)	0	0	0	0
Sulfate as SO_4 (mg/l)*	4.0	2.5	5.0	2.5
Chloride (mg/l)*	<2.5	<2.5	<2.5	<2.5
Fluoride (mg/l)*	0.19	0.12	0.12	0.11
Bromide (mg/l)*	<0.1	<0.1	0.16	0.17
Silica as SiO_2 (mg/l)*	17.8	20.1	16.8	18.8
Cyanide (mg/l)*	<0.02	<0.02	<0.02	<0.02

TABLE 2.7-4 (cont.)

Parameters	9 Thompson Creek below Buckskin Creek	10 Bruno Creek at Proposed Seepage Control Pond	11 Thompson Creek above Pat Hughes Creek	12 Bruno Creek above Proposed Tailings Impoundment
Ortho-Phosphate as P (mg/l)*	0.03	0.04	0.03	0.04
Total Phosphate as P (mg/l)	0.05	0.04	0.03	0.05
Nitrate as N (mg/l)*	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen (mg/l)	0.20	<0.1	0.35	<0.1
Total Organic Carbon (mg/l)	2.1	2.9	2.3	2.7
Oil and Grease (mg/l)	<0.2	4.0	<0.2	2.4
Chemical Oxygen Demand (mg/l)	3.4	8.8	2.0	6.4
Sodium (mg/l)*	3.4	4.4	7.7	3.3
Potassium (mg/l)*	0.5	0.4	0.6	0.4
Calcium (mg/l)*	9.68	10.2	10.2	11.0
Magnesium (mg/l)*	5.37	4.32	5.49	2.22
Aluminum (mg/l)*(a)	--	--	--	--
Arsenic (mg/l)*	<0.005	<0.005	<0.005	<0.005
Barium (mg/l)*	<0.1	<0.1	<0.1	<0.1
Cadmium (mg/l)*	<0.001	<0.001	<0.001	<0.001
Chromium (mg/l)*	<0.001	<0.001	<0.001	<0.001
Copper (mg/l)*	<0.01	<0.01	<0.01	<0.01
Iron (mg/l)*	0.07	0.09	0.15	<0.05
Lead (mg/l)*	<0.005	<0.005	<0.005	<0.005
Manganese (mg/l)*	<0.01	<0.01	<0.01	<0.01
Mercury (mg/l)* (b)	--	--	--	--
Molybdenum (mg/l)*	<0.1	<0.1	<0.1	<0.1
Nickel (mg/l)*	<0.1	<0.1	<0.1	<0.1
Silver (mg/l)*	<0.005	<0.005	<0.005	<0.005
Selenium (mg/l)*	<0.005	<0.005	<0.005	<0.005
Zinc (mc/l)*	<0.05	<0.05	<0.05	<0.05

(a) Suspected contamination of sample bottles or systematic error in laboratory results.
(b) Suspected contamination of sample bottles.
* Dissolved phase of constituent.
Source: Samples were collected by VTN Consolidated, Inc. and analyzed by Century Laboratories.
Note: <xx.xx means below lower detection limit.

- o Dimethyl Napthalenes
- o Total of the above aromatics
- o Total Alkanes

All values were below 5 micrograms per liter (ug/l) at all four stations except for a total alkanes concentration of 12 ug/l at Squaw Creek above Bruno Creek (Station No. 1). Chemical Oxygen Demand (COD) varied from less than 5 mg/l to 27 mg/l for the samples collected during 1979 and 1980. Dissolved oxygen levels have been at or near saturation, except for some lower values in February 1980; these may have been caused by ice cover on streams during the winter.

Trace Metals

The levels of dissolved trace metals shown in Tables 2.7-2, 2.7-3, and 2.7-4 are comparable to the data collected by the USGS during 1971 through 1974, except for the values of dissolved iron and cadmium for Thompson Creek below Pat Hughes Creek in September 1979. These values are unusually high compared to other data collected at these sites. The cadmium value is considered to be anomalous, but it is not known whether the value was a true chemical anomaly in nature or if it was a spurious laboratory value. The major dissolved trace metals in the streams are generally iron, zinc, nickel and copper.

Comparison to Water Quality Standards

The streams in the project area meet the Idaho State Water Quality Standards for the existing water uses. No exceptions were noted during the water quality sampling of Bruno Creek, Squaw Creek, Buckskin Creek, Pat Hughes Creek and Thompson Creek.

2.7.4 Ground Water Quality

Introduction

The quality of ground waters in the project area has been the subject of a recent (and ongoing) investigation. The locations where ground water has been collected for analysis are shown in Figure 2.7-1. The results of the analyses are summarized below.

The applicable water quality standards are Idaho State's general water quality standards.

In general, the quality of ground water is determined by several factors, including the composition of the surficial units and the geologic units through which it flows; the amount of infiltration; the rate of movement; and the temperature, pressure and duration of contact with these units. Samples were collected from several different geologic units, as shown in Table 2.7-5. This table also relates the station designations used in Figure 2.7-1 to the station names used in this section.

TABLE 2.7-5

SUMMARY OF GROUND WATER QUALITY
STATION NAMES, STATION DESIGNATIONS,
AND SOURCES OF WATER

Station Name[a]	Station Designation	Primary Source of Water
Bruno Creek Well No. 1	WDH-BC-1	Copper Basin Fm.
Bruno Creek Well No. 2	WDH-BC-2	Saturday Mtn. Fm.
Bruno Creek Well No. 3	WDH-BC-3	Copper Basin & Saturday Mtn. Fm.
Bruno Creek Well No. 4	WDH-BC-4	Saturday Mtn. Fm.
Twin Apex Mine Adit Discharge	HT-B	Volcanics and Copper Basin Fm.
Spring in Lower Bruno Creek	HT-D	Alluvium & Saturday Mtn. Fm.
A-2 Peizometer	HT-H	Copper Basin Fm.
Monitoring Well on Left Abutment	HT-1	Volcanics & Copper Basin Fm.
Monitoring Well on Right Abutment	HT-2	Volanics
Production Well No. 1 (57 to 72 feet interval)	Production Well No. 1	Alluvium and Copper Basin Fm.
Well PDH-3	PDH-3	Volcanics and Quartz Monzonite
Buckskin Creek Well No. 1A	WDH-4	Copper Basin Fm. & Quartz Monzonite

(a) All stations are located in the Bruno Creek Drainage except for wells PDH-3 and WDH-4.

The relationships of ground water quality to the geologic units which were the primary source of the sampled water are not completely consistent. Therefore, the ground water quality monitoring stations have been grouped by drainage basin; rather than by geologic unit.

Ground Water in the Bruno Creek Drainage

The analyses of ground water quality in the Bruno Creek drainage are summarized in Table 2.7-6.

The data collected from wells which penetrate relatively deep ground water indicate a water temperature range from just below 10°C to about 12.5°C. The temperature of this deep ground water is seasonally constant with slight variations from location to location (WEN 1980). Water temperatures for ground water at or near the surface are controlled by air temperatures.

The values of pH ranged from neutral to slightly alkaline (7.05 to 8.4). The TDS concentrations ranged from 102 mg/l to 711 mg/l. The higher values occurred at Bruno Creek Well No. 1 (200 feet to 675 feet deep) and the lower values occurred at the relatively shallow monitoring wells HT-1 and HT-2. The water from all of the sampling locations in this group can be classified as a calcium-magnesium-bicarbonate type. Alkalinity and hardness values followed the same variations as the TDS values, and ranged from 67 mg/l to 410 mg/l and 64 mg/l to 640 mg/l, respectively. These maximum values represent water which is soft to very hard and has a low to high buffering capacity.

The values for the trace metals shown in Table 2.7-6 are generally considered low, except for the maximum values of cadmium, copper, iron, lead, manganese, selenium, and zinc. The maximum values of cadmium and zinc occurred in samples from the Twin Apex Mine adit discharge and may not be representative of the ground water in the Bruno Creek drainage. Values of cadmium and zinc at the other sampling locations were considerably lower than at this station. The maximum values of copper, iron, lead, manganese and selenium all occurred in samples from monitoring wells HT-H, HT-1 and HT-2. It is believed that these wells were not flushed adequately prior to sampling, and that these high values may be due to contamination from drilling fluid. The values of these parameters for the other sampling locations were considerably lower than the values from these three wells.

If the data for samples collected from the Twin Apex Mine adit discharge and wells HT-A, HT-1 and HT-2 are excluded from the summary given in Table 2.7-6, the maximum values of these parameters for the Bruno Creek drainage are:

2.7-6

SUUMARY OF GROUND WATER QUALITY
IN THE VICINITY OF THE PROJECT SITE
July 24, 1979 - February 14, 1980

Parameter	Bruno Creek Drainage			Buckskin Creek Drainage		
	Number of of Analyses	Maximum	Minimum	Number of of Analyses	Maximum	Minimum
Water Temperature (°C)	18	12.5	1.7	2	8.5	8.25
pH, lab (units)	31	8.4	7.05	3	8.9	8.5
Specific Conductance, lab (umhos/cm)	17	580[b]	153	3	293	238
Turbidity, lab (NTU)	17	70[c]	0.09	3	3.0	0.22
Total Suspended Solids (mg/l)	17	202	<1	3	5	<2
Total Volatile Solids (mg/l)	4	76[a]	66[a]	3	32[a]	<2
Total Dissolved Solids (mg/l)	31	711	102	3	235	215
Total Hardness as $CaCO_3$ (mg/l)	30	640	64	3	53	8.0
Total Alkalinity as $CaCO_3$ (mg/l)	31	410	67	3	139	117
Carbonate Alkalinity as $CaCO_3$ (mg/l)	21	10	0	0	-	-
Bicarbonate Alkalinity as $CaCO_3$ (mg/l)	21	410	67	0	-	-
Sodium (mg/l)	31	7.3	1.2	3	70.1	57.6
Potassium (mg/l)	22	7.2	0.7	3	0.8	0.5
Calcium (mg/l)	31	132	19	3	16.3	1.6
Magnesium (mg/l)	31	98	3.7	3	2.99	0.98
Sulfate (mg/l)	31	186	10	3	62	4
Chloride (mg/l)	31	16	<0.1	3	<2.5	<0.1
Fluoride (mg/l)	18	1.8	0.2	3	1.3	0.25
Bromine, residual (mg/l)	4	<0.1	<0.02	3	<0.1	<0.02
Total Kjeldahl Nitrogen (mg/l)	14	2.33	<0.01	3	0.9	<0.1
Nitrate as N (mg/l)	28	0.5	0.02	3	<0.1	0.03
Ortho Phosphorus (mg/l)	7	0.07	<0.01	3	0.02	<0.01
Total Phosphorus (mg/l)	23	0.15	<0.01	3	0.07	<0.01
Silica as SiO_2 (mg/l)	10	19.3	4.4	3	12.04	3.5
Oil and Grease (mg/l)	4	4.6[a]	0.2	3	3.6[a]	<0.2

TABLE 2.7-6 (cont.)

Parameter	Bruno Creek Drainage			Buckskin Creek Drainage		
	Number of of Analyses	Maximum	Minimum	Number of of Analyses	Maximum	Minimum
Total Organic Carbon (mg/l)	3	0.7	<0.05	0	-	-
Chemical Oxygen Demand (mg/l)	4	2.3	<1.0	1	3.7	3.7
Aluminum (mg/l)	4	<1	<0.5	3	<1	<0.5
Arsenic (mg/l)	29	0.01	<0.003	3	<0.005	-
Barium (mg/l)	15	<0.2	<0.1	3	<0.1	-
Cadmium (mg/l)	16	0.048[b]	<0.001	3	<0.001	-
Chromium (mg/l)	16	0.002	<0.001	3	<0.001	-
Cobalt (mg/l)	16	<0.1	<0.05	3	<0.1	-
Copper (mg/l)	16	0.06[c]	<0.01	3	<0.05	<0.01
Cyanide (mg/l)	14	<0.02	<0.001	3	<0.02	-
Iron (mg/l)	30	3.71[c]	0.01	3	0.12	<0.05
Lead (mg/l)	16	0.28[c]	<0.002	3	<0.005	-
Manganese (mg/l)	29	0.47[c]	<0.01	3	0.03	<0.01
Mercury (mg/l)	16	<0.0013	<0.0005	3	<0.0005	-
Molybdenum (mg/l)	16	<0.1	<0.05	3	<0.1	-
Nickel (mg/l)	16	<0.1	<0.03	3	<0.1	-
Selenium (mg/l)	16	0.027[c]	<0.005	3	<0.005	-
Silver (mg/l)	16	0.007	<0.00025	3	<0.005	-
Zinc (mg/l)	16	1.96[b]	<0.001	3	<0.05	-
Coliform, Total per 100 ml	2	0	0	0	-	-
Coliform, Fecal per 100 ml	5	4	0	0	-	-

(a) Values are questionable due to possible contamination from pump or drilling fluid.
(b) Values are from samples collected from Twin Apex Mine adit discharge and may not be representative of ground water in area.
(c) Values are from samples collected from HT-H, HT-1 and HT-2. Values are questionable due to possible contamination from drilling fluid.
Note: <xx.xx means below lower detection limit.

Parameter	Maximum
cadmium (mg/l)	<0.001
copper (mg/l)	<0.05
iron (mg/l)	1.7
lead (mg/l)	0.007
manganese (mg/l)	0.15
selenium (mg/l)	<0.005
zinc (mg/l)	0.47

Ground Water in the Buckskin Creek Drainage

The results of the water quality analyses for the two wells in the Buckskin Creek drainage are summarized in Table 2.7-6.

The pH values were slightly alkaline (8.25 to 8.5). The concentrations of TDS ranged from 215 mg/l to 235 mg/l. The ground water from these wells can be classified as sodium-bicarbonate type. This water is different from the ground water in the Bruno Creek drainage, which is a calcium-magnesium-bicarbonate type. Alkalinity values ranged from 117 mg/l to 139 mg/l, and hardness values ranged from 8.0 mg/l to 53 mg/l. This is representative of soft water with a moderate buffering capacity. Trace metals concentrations are considered to be low.

Comparison to Water Quality Standards

The ground water in the project area generally meets the Idaho State Water Quality Standards. No exceptions were noted during the water quality sampling.

2.8 Aquatic Ecology

2.8.1 Biological Components

The two major streams in the claim area, Thompson Creek and Squaw Creek, have been identified as potentially important spawning and/or rearing areas for either steelhead or chinook salmon (BLM 1979). Bruno Creek is the only tributary having significant fish habitat, supporting a population of cutthroat trout. Several surveys of the aquatic biological communities, and fish habitat of these streams have been conducted in recent years (VTN 1975; Rabe 1975; USFS 1976-78; BLM 1979; VTN 1980a). The following description of the aquatic environment is based largely on the findings of these surveys.

Rainbow trout, mountain whitefish and sculpins have been captured at most stations in Thompson and Squaw Creeks. Cutthroat trout, Dolly Varden, and chinook salmon also have been captured, but in smaller numbers and at fewer locations in each stream. Species composition on Thompson Creek varied by location: whitefish were found to be more common near the confluence with Pat Hughes Creek while cutthroat trout were more common near the confluence with Buckskin Creek (VTN 1975).

Cutthroat trout abundance in Thompson Creek increased and juvenile chinook abundance decreased with the distance from its mouth (VTN 1980a). Cutthroat trout were not captured at Squaw Creek stations during 1979 (VTN 1980a), but were present during earlier surveys (Rabe 1975; BLM 1979; VTN 1975).

Juvenile chinook salmon were found as far up as two miles in Thompson Creek in the 1977 BLM and 1979 VTN surveys. In the 1979 VTN survey, a large number of juvenile chinook (1,000-1,500) were found in Thompson and Squaw Creeks at their confluence with the Salmon River (VTN 1980a). Juvenile chinook were found as far upstream in Squaw Creek as 3.5 miles from the Salmon River. During the 1975 and 1979 VTN surveys the number of fish taken from Squaw Creek was considerably lower than the number taken from Thompson Creek. A number of catchable rainbow trout were present at the mouth of Squaw Creek when Rabe (1975) did his study.

Cutthroat and rainbow trout were the only species collected in Bruno Creek. A resident population of cutthroat appears to be present in Bruno Creek as indicated by the presence of both adults (VTN 1975; VTN 1980a; BLM 1979) and juveniles (VTN 1980a).

Runs of steelhead and chinook salmon in the mainstream of the Salmon River and other tributaries have been declining in recent years. The primary reason for declining Salmon River runs is downstream dams. Additional limiting factors contributing to the decline in salmonid production in Thompson Creek and Squaw Creek are water loss due to diversions for irrigation and the loss of fish through unscreened diversions (BLM 1979).

Very few, if any, chinook salmon spawn in Thompson Creek and Squaw Creek due to low stream flows at the mouths of both creeks due to dewatering. Also, there is a water diversion barrier on Squaw Creek at stream mile 0.7 that is impassable during the late summer/early fall spawning period (BLM n.d.(1)). Although steelhead are better able to spawn in Thompson and Squaw Creeks due to higher spring streamflows, the steelhead run is very small, due to loss of downstream migrants through unscreened diversions (BLM n.d.(1)).

At this time Thompson and Squaw Creeks contribute very little to the salmon and steelhead produced in the BLM Challis Planning Unit (BLM n.d.(1)). However, if habitat were improved, an estimated run of 172 and 467 salmon could be expected in Thompson and Squaw Creeks respectively (BLM n.d.(1)). If the steelhead runs were increased to their estimated potential, about 427 and 1,148 steelhead could be expected in Thompson and Squaw Creeks respectively. The steelhead runs to Idaho have averaged 48,237 (1962 - 1971) and the chinook runs 49,061 (1962 - 1974) (Mallet 1974). Thompson and Squaw Creeks could potentially produce 0.9% and 2.4% of the total steelhead run and 0.4% and 1.0% of the total chinook run, respectively.

The invertebrate fauna of Thompson, Squaw and Bruno Creeks is abundant and diverse. Species present indicate clean water conditions. The algal assemblages found in the streams also are typical of clean mountain streams.

Bruno Creek differed from Squaw and Thompson Creeks by supporting a population of green algae during the summer and a different blue-green alga, during the fall (VTN 1980a). These differences are possibly due to the higher hardness and alkalinity levels in Bruno Creek (VTN 1980a).

There are no endangered or threatened species of fish (Deacon, et al. 1979) or aquatic invertebrates known to be present in the streams of the project area. There is consideration being given to the possibility and desirability of classifying certain geographic races of chinook salmon and steelhead trout as rare or endangered, but they are not now so listed.

While not endangered or threatened, the cutthroat trout of the project area may be of special interest. They are the native cutthroat of Clearwater and Salmon River drainages, and, while not anadromous, do make extensive seasonal intra-stream migrations. Populations of individual streams, such as Bruno Creek, may well be discrete (Behnke 1980; Ball 1980).

2.8.2 Fisheries Management

Idaho with other states of the Columbia Basin and the Federal natural resource management agencies work together to plan and implement habitat and fishery protection, maintenance, and enhancement operations. Recent and current fisheries management in the project area consists of fish stocking, harvest regulation, and habitat protection where possible.

The Idaho Department of Fish and Game has been stocking trout in Thompson and Squaw Creeks for the last two and three years, respectively. The road in the Squaw Creek drainage allows easy access to most stream areas, particularly upstream of the private land near the Salmon River. However, sport catch and angler use is very light (Ball 1979; Mallet 1974). Access to Thompson Creek is more limited and the stream probably experiences little use for recreational fishing. Squaw Creek was first stocked in 1977 with 50,000 steelhead fry. Squaw and Thompson Creeks were each stocked with 48,140 steelhead fry in 1978. During 1979 two plantings of "catchable" sized rainbow trout (total number 458) and 100,000 steelhead fry were made in Squaw Creek. Another 60,000 steelhead fry were stocked in 1979 in Thompson Creek (Degulio 1980). No fish stocking activities have occurred in Bruno Creek and none are planned.

BLM recommendations are to increase annual Thompson Creek salmon and steelhead runs to 172 and 427, respectively by stocking 35,000 chinook

salmon fry and 85,000 steelhead fry over four consecutive years. Squaw Creek is considered a more important stream for anadromous fisheries because of its low stream gradient. The BLM recommendations are to increase present salmon runs to 467 by the stocking of 90,000 chinook fry for four consecutive years, and to increase the annual steelhead run from a few to 1,148 by stocking 230,000 steelhead fry, also for four consecutive years. The year 1993 has been set as a goal for the establishment of self-sustaining anadromous fish runs and the improvement of the lower 5.5 miles of aquatic habitat in Squaw Creek (BLM n.d.(1)).

Before salmon and steelhead stocking occur, BLM recommends the following:

- Establishment of minimum summer streamflow for the protection of anadromous fisheries.
- Installation of fish screens at all private water diversions.
- Removal of beaver dams, on a case by case basis, which restrict upstream migration.

2.9 Terrestrial Ecology

2.9.1 Vegetation

The major vegetation associations which occur in the area surrounding the project are Douglas-fir forest, Wyoming big sagebrush, mountain big sagebrush, riparian fringe and bottomland pasture in the Salmon River Valley (VTN 1975; USFS 1969; BLM n.d.(2); BLM 1979; VTN 1980b).

Vegetation within the claim boundaries includes three major communities: Douglas fir forest, big sagebrush-grass and riparian. In addition, areas of nearly barren rock occur on steep slopes, cliffs and rock outcrops. These vegetation types, with the exception of riparian areas, are common in the region and do not represent unusual or limited vegetation types. Riparian areas, while they are limited to creek edges and are therefore not present in large acreages, appear to be typical for the general area and are not unusual (VTN 1975; USFS 1969; BLM n.d.(2); BLM 1979; VTN 1980b).

Douglas-fir forest covers approximately 45% of the claim area. The forest is characterized by Douglas fir, snowberry, and pinegrass. Other trees which also occur include blue spruce and aspen in moderately moist areas; Engelmann spruce and subalpine fir at high elevations; limber pine and whitebark pine on exposed ridges; and lodgepole pine in areas disturbed by fire or logging. Understory shrubs which are typically associated with this community include mountain big sagebrush, bitterbrush and dwarf juniper. Typical grasses include Wheeler bluegrass, elk sedge, both beardless and bearded bluebunch wheatgrass, Idaho fescue and needlegrasses. Typical forbs include

heartleaf arnica, arrowleaf balsamroot, wayside gromwell, lupine, phlox, western yarrow, penstemon, ano groundsel (VTN 1975; Millick 1980; USFS n.d.; BLM 1979).

The big sagebrush community covers approximately 50% of the claim area. This community is characterized by open stands of big sagebrush and contains few trees. Two important types of big sagebrush community are found within the claim area. These are Wyoming big sagebrush and mountain big sagebrush. The mountain big sagebrush type generally occurs at elevations between 6,000 and 9,000 feet while the Wyoming big sagebrush type is generally restricted to drier sites at elevations below about 7,500 feet.

The Wyoming big sagebrush type is characterized by Wyoming big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, and generally contains phlox, Douglas rabbitbrush, penstemon, and needle-and-thread grass (VTN 1975; Millick 1980; USFS n.d.). Wyoming big sagebrush is an important winter browse species for mule deer in the project area (Ririe 1980; Bodie 1980) and the Wyoming big sagebrush type is an important wildlife habitat for deer.

The mountain big sagebrush type is characterized by mountain big sagebrush, bluebunch wheatgrass, and Idaho fescue. Species which are usually associated with this type include bitterbrush, rabbitbrush, western snowberry, phlox, locoweed, fleabane, bluegrass, needlegrass, western yarrow, and buckwheat (VTN 1975; Millick 1980; USFS n.d.).

Wyoming big sagebrush is less common than mountain big sagebrush in the vicinity of the claim area. Within the claim boundaries there is no Wyoming big sagebrush on Forest Service land (Millick 1980) while on the BLM land, there are approximately 238 acres of Wyoming big sagebrush in comparison to about 2,170 acres of mountain big sagebrush (BLM n.d.(2)). Similarly, between Thompson Creek and Squaw Creek from the southern claim boundary to the Salmon River, there are approximately 1,430 acres of Wyoming big sagebrush compared to 3,495 acres of mountain big sagebrush (BLM n.d.(2)).

Riparian communities cover less than 5% of the claim area and are generally confined to areas adjacent to the lower portions of Thompson, Squaw and Bruno Creeks. They are highly variable in species composition depending upon elevation but are generally characterized by the presence of alder trees, cottonwood trees, willow thickets, wild rose and currant, and contain a variety of grasses, forbs and shrubs including Wheeler bluegrass, Sandberg bluegrass, sedges, big sagebrush and buckwheat (VTN 1975; Millick 1980; VTN 1980b).

2.9.2 Wildlife

The wildlife resources found in central Idaho are relatively diverse, due to the wide variety of habitats available. Nine big game species occur throughout this region. The Thompson Creek Project is located in

the Idaho State Department of Fish and Game's Management Unit 36-B. Seven of the nine big game species found in this region occur in moderate to high population levels in this unit. In addition to these major big game species, Unit 36-B supports a wide variety of furbearers, waterfowl, upland game and non-game birds and animals.

The claim area supports a variety of wildlife species. However, wildlife populations and habitat quality are typical of the surrounding areas and there appears to be no exceptional or unusual conditions which would attract wildlife in unusually high numbers to the claim area or its near vicinity (Bodie 1980; Bodie 1980a; Ralphs 1980; VTN 1980b).

The principal big game species inhabiting the project region are mule deer, elk, mountain lion, black bear, mountain goat, bighorn sheep and pronghorn antelope (see Figure 2.9-1, Wildlife Use Areas).

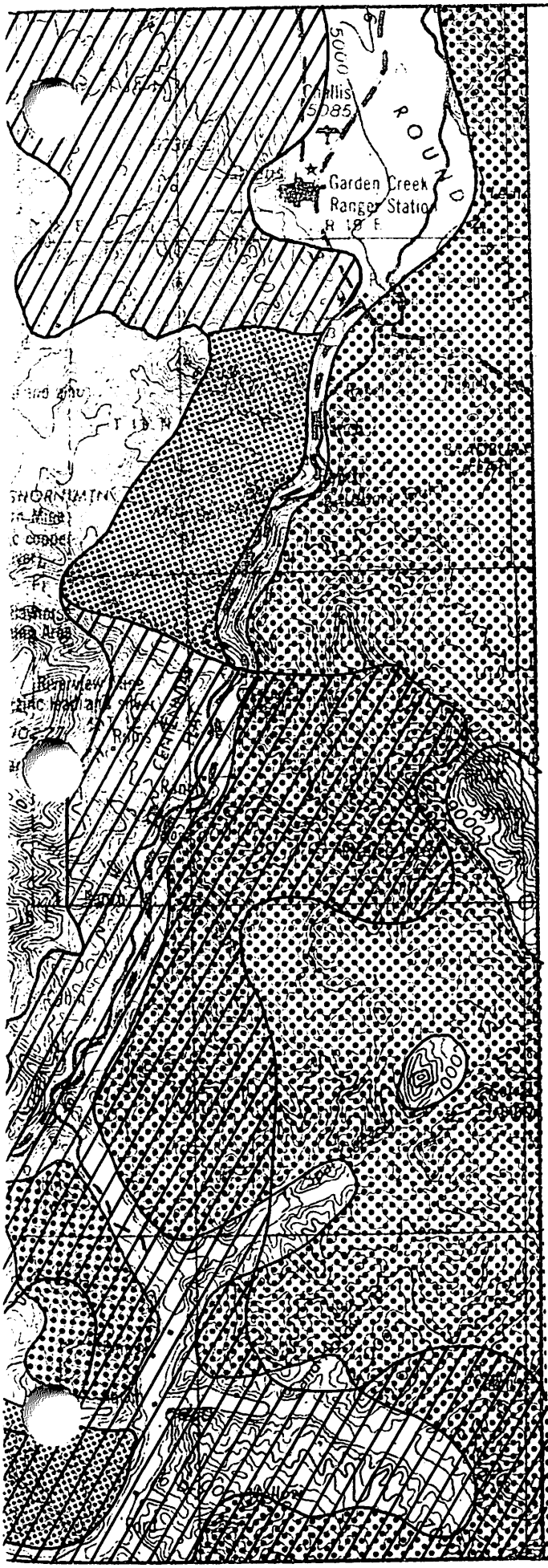
Mule deer are the most widely distributed big game animal in Idaho and the most frequently observed big game species in the project region. Nearly 700 mule deer were legally harvested in Management Unit 36-B in 1979 (IDFG 1979). Illegal harvests may exceed the number of legal kills in Management Unit 36-B (Welsh 1980) and poaching is the major known cause for adult deer mortality in the region (IDFG 1979).

The Bruno Creek and Thompson Creek BLM range allotments which include the lower portion of the claim area support an estimated winter population of 300 deer on approximately 4,350 acres of deer habitat (BLM 1979). The area along the Salmon River between Thompson Creek and Squaw Creek below 7,000 feet (approximately 450 acres) has been identified as critical deer winter range by the BLM (BLM 1979).

Mule deer utilize the claim area in relatively low numbers during the warmer months of the year. During the spring and fall, however, deer move through Bruno Creek, Pat Hughes Creek, Unnamed Creek and adjacent drainages and ridges to migrate to and from their winter and summer ranges (Power 1980). The number of deer moving through these areas is not known but is estimated to be up to 200 individuals. During the winter months large numbers of mule deer concentrate in the lower elevations below the claim area along the Salmon River Valley and its tributaries. During the summer, deer generally disperse throughout higher elevations above the claim area.

Elk are a favored hunting species in central Idaho. The estimated legal take in Management Unit 36-B during 1979 was 30 bull elk (IDFG 1979a). During 1975, an estimated 450 elk resided in Unit 36-B in scattered groups (IDFG 1979a). As with deer, poaching is an important factor affecting elk populations and is believed to be the major non-hunting cause of adult elk mortality (IDFG 1979a).

The combined Thompson Creek and Bruno Creek BLM range allotments support approximately 30 elk on 2,600 acres of elk habitat (BLM 1979).



LEGEND

- CRITICAL ELK SUMMER HABITAT
- ELK WINTER RANGE
- ELK CALVING AREA
- DEER WINTER HABITAT
- BIGHORN SHEEP & DEER WINTER HABITAT
- BIGHORN SHEEP SUMMER HABITAT
- BIGHORN SHEEP & MOUNTAIN GOAT SUMMER HABITAT
- MOUNTAIN GOAT SUMMER HABITAT
- PRONGHORN ANTELOPE HABITAT

Source: Challis National Forest Wildlife Habitat Use Map.
Environmental Statement on a Revised Range Management Program for the Challis National Forest

0 1 2 3 4 5 MILES

CYPRUS MINES CORPORATION

THOMPSON CREEK PROJECT

WILDLIFE USE AREAS

FIGURE 2.9-1

CLARKSCREW MOUNTAIN
MT ESTES
MT GREYLOCK
THOMPSON CREEK
BRUNO CR
CLAIM AREA
SALMON RIVER
NATIONAL FOREST
T 10 N

These elk may utilize the habitat within the claim boundary at some time during the year (Bodie 1980).

An important elk calving area is located in the Squaw Creek drainage above the confluence with Bruno Creek. The close proximity of this locally important calving area as well as other evidence suggests that some elk also may calve along Bruno Creek and the south facing slopes above the Salmon River (Power 1980). Areas of important elk winter range also occur along Squaw Creek near the claim area. The south facing slopes along Bruno Creek, which are covered with mountain mahogany (an important browse species for elk) also are frequently used by elk for winter forage. The area below Pat Hughes Creek along the Thompson Creek drainage is occasionally used by elk during the winter (Bodie 1980, 1980a).

Mountain lions are found throughout Management Unit 36-B in densities which are dependent on their major prey species, mule deer. Lions utilize the area throughout the year; utilization is expected to be higher during the fall and winter due to greater prey availability.

Black bear are fairly numerous in sections of Management Unit 36-B and are expected to be found on and near the claim area.

Mountain goats are found in the higher, more inaccessible portions of Management Unit 36-B. Mountain goats are not normally found on the claim area. However, populations located to the west appear to be expanding (Bodie 1980). No hunting of mountain goat is allowed within the unit to provide for herd growth (Bodie 1980).

Bighorn sheep are found in several herds within the region. Most herds in the vicinity of the claim area have had difficulty maintaining population levels, principally due to poor range conditions and other external stresses (Thiessen 1980; Oldenburg 1980).

The bighorn herd closest to the claim area winters along the Salmon River near Bayhorse Creek. The herd's estimated population count is 40-60 animals (Welsh 1980). While only rare, wandering, individual sheep are expected to occur within the claim boundary (Ralphs 1980), locations near the claim area have been proposed as transplant sites by the IDFG (Bodie 1980) and the claim area could support sheep if local herds increase their range (Thiessen 1980).

Pronghorn antelope are found scattered throughout the semi-arid areas of Idaho but are seldom found near the claim area (Thiessen 1980). The claim area is not considered pronghorn antelope habitat. Most pronghorn herds in adjacent Management Units have exhibited greatly reduced fawn to doe ratios in recent years (IDFG 1978).

Several species of upland game birds can be found in Management Unit 36-B. Blue, spruce, sage and ruffed grouse, chukar, Hungarian partridge, ringnecked pheasant, and mourning dove are found in various

population levels throughout the unit. Blue grouse occur at relatively high densities throughout the claim area. Thompson Creek and Squaw Creek, as well as Pat Hughes, Bruno and Buckskin Creeks, have been identified by the BLM as important nesting, brooding and overwintering areas for blue grouse.

The Salmon River adjacent to the project area supports a very limited amount of year-round waterfowl use. Populations fluctuate due to migration, forage availability, and winter freeze-over.

Raptor diversity in Unit 36-B is relatively high due to the diversity in topography and in habitat. The claim area is expected to support raptor population levels typical of habitats and topography found in the area.

Numerous species of non-game birds, small carnivors, lagomorphs and rodents occur within the diverse habitats found on or near the claim area. Population levels are expected to be typical for those habitats in the Challis National Forest. The claim area is expected to support populations of montane reptiles and amphibians.

2.9.3 Endangered, Threatened, Rare and Sensitive Species

2.9.3.1 Plant Species

Threatened, endangered, rare or otherwise sensitive species that require special consideration include those designated or proposed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS); species which are candidates to be nominated for threatened or endangered status by the USFWS; species proposed as uncommon, rare, endangered or requiring further study by the Technical Committee on Rare and Endangered Plants of the Idaho Natural Areas Council (INAC); and any additional species of concern to the Forest Service or BLM.

A site-specific survey of the project area for sensitive plant species was conducted during the summer of 1980 under the direction of Dr. D.M. Henderson, Professor of Systematic Botany, Director of Herbarium, University of Idaho. The results of this survey and other information on distribution and habitat requirements indicate that no sensitive plant species are present or are likely to occur on the areas to be affected by the proposed project (Brunsfeld 1980; Ririe 1980).

2.9.3.2 Wildlife Species

Species which are considered endangered by the USFWS or State of Idaho that may occur near the claim area are the bald eagle and the peregrine falcon (Bodie 1980; Ralphs 1980). Bald eagles concentrate along the Salmon River during the winter months, but it is very unlikely that they use the claim area. Peregrine falcons are known to have nested in Management Unit 36-B (Bodie 1980). However, there is no suitable

falcon nesting habitat in the claim area (Bodie 1980; Ralphs 1980), and falcons probably do not use the area to any extent (Bodie 1980; Thiessen 1980).

Several additional species of wildlife which are considered sensitive and are of special concern to the IDFG or the BLM may occasionally be found in the claim area. Bobcat may be present in numbers dependent on their prey species (Bodie 1980). Canadian lynx may occur at somewhat lower numbers than bobcat (Bodie 1980). River otter have been observed near the mouth of Thompson Creek (VTN 1980b) and may be expected to occasionally forage up both Thompson and Squaw Creeks at least to the claim boundary. Wolverine also may occur within the general area. Osprey forage along the Salmon River during the warmer seasons and occasionally may be found at various impounded water bodies in the region (Bodie 1980). Merlin are extremely rare in Custer County but could occur in the area.

2.10 Land Use

Land in the vicinity of the claim area is currently forested and used for multiple purposes, including grazing and a limited amount of recreation. Two BLM grazing allotments, Thompson and Bruno Creeks, extend into the southern portion of the claim area. The Squaw Creek allotment lies generally to the east of the creek, and is not within the claim area.

The nearest ranch to the claim area occurs near the mouth of Squaw Creek. Land in this area, which is three miles south of the claim boundary, is relatively flat. Ranching operations include cattle raising and alfalfa growing.

Primary land uses in Custer County are forest and agriculture. Total land area in the county is 3,162,000 acres, with 1,630,000 acres (51.6%) in forest land, 1,216,000 acres (38.5%) in pasture and range land, and 84,000 acres (2.7%) utilized for crop raising.

The City of Challis currently encompasses approximately 190 acres, with about 18.4 acres in commercial/retail use, 21.8 acres in government/institution and the remainder in residential or open space (City of Challis 1975). Commercial and retail uses are located on Main Street and on U.S. Highway 93 north and south of the junction with Main Street.

Land in the claim area is under multiple ownership or jurisdiction. The northern portion of the claim area is under the jurisdiction of the Forest Service, and contains approximately 4,800 acres. The southern portion is under the jurisdiction of the BLM, and contains about 4,700 acres. Private land ownership is confined to 200 acres of patented mining claims owned by Cyprus Mines, located primarily in the proposed mine area.

Land in Custer County is almost all publicly owned. Federal ownership constitutes 2,956,000 acres, 93.5% of the total land in the county; and state ownership is 53,000 acres, 1.7% of total. Private lands account for 4.7% of the land in the county.

Land in the City of Challis is primarily privately owned. Public ownership is approximately 21.8 acres, 11.5% of the total. Federal land, principally Forest Service land, accounts for 11.6 acres, (6.1%), and county property, mainly school facilities, 4.9 acres, (2.6%) (City of Challis 1975).

Land use plans for the claim area are set forth by the Forest Service and BLM. The portion of the claim area in the Challis National Forest is designated for multiple use, including recreation activities and timber and mineral operations. Land use plans for the BLM portion of the claim area are set forth in the Challis Planning Unit Management Framework Plan (MFP). Harvesting of timber products from the claim area is specifically set forth in the MFP. The objective, as stated in the MFP, is to obtain all useable timber products from the claim area prior to mining operations. In addition, the MFP specifies mining operations by Cyprus Mines in the claim area.

Custer County currently does not have a general or comprehensive plan to guide overall development in the county, or to control land uses. The County also does not have a planning department to plan for growth and development. A zoning and planning commission has been established to review subdivision plans prior to final approval by the County Commissioners. The County does not have an adopted zoning and subdivision ordinance; however, a draft ordinance has been prepared and is under review. A final schedule for adoption of this ordinance is not established.

The City of Challis does not have a general plan establishing land uses or policies to control land uses within the city. However, a zoning and subdivision ordinance was adopted by the city in late 1979. The ordinance sets forth permitted uses of land within the context of residential, commercial, agricultural and other areas, conditional uses of land and structures, variances, inspection and enforcement conditions.

The city adopted a comprehensive plan in 1975 which set forth overall development goals and objectives. The document was intended to provide local officials with guideline statements for use in decision making. The plan did not set forth land use plans for the city.

2.11 Socioeconomics

This socioeconomic analysis primarily examines the existing conditions within the City of Challis and surrounding Custer County area. These areas would be subject to the greatest impacts from the proposed project. Challis is the largest community in proximity to the project,

and the only one with both the land area and infrastructure necessary to accommodate the anticipated growth.

2.11.1 Population

Custer County is a sparsely populated area, with a 1970 census population of 2,967 persons. The latest population estimates developed by the Idaho Bureau of Vital Statistics, indicate a July 1, 1978 population for the County of 3,400 persons, a gain of 14.6% over the 1970 figure.

Population in the cities of Challis and Mackay have grown at a faster rate than Custer County. Population in the City of Challis increased from 784 persons in 1970 to an estimated 1,009 in July 1, 1978, a gain of 28.7%. Mackay, the other population center in Custer County, had a July 1, 1978 estimate of 670 persons, an increase of 24.3% over the 1970 census population of 539.

The claim area does not have a permanent population. The closest permanent residents are located along State Highway 75 near the mouths of Thompson and Squaw Creeks. Clayton, located approximately four miles east and four miles south of the claim area, had a population of 36 persons in 1970, the latest year data are available.

The State of Idaho has developed population projections to the year 2,000 for Custer County. Those projections are based upon the Idaho Population and Employment Forecast model, which was developed by the Idaho Department of Water Resources and Boise State University Center for Research, Grants and Contracts.

Using this model, the Custer County population is expected to increase to 4,025 in 1985; 4,296 in 1990; 4,420 in 1995; and 4,581 in 2,000. This projected growth would represent an increase of 1,181 persons in the year 2,000 over the 1978 figure, or a gain of 34.7%. Population projections for the cities of Challis and Mackay are not available.

2.11.2 Housing

There are no dwelling units within the Cyprus Mines claim area. There are a few scattered houses along the Squaw Creek and Thompson Creek Roads which provide access to the claim area. These dwellings are within one mile of the intersections of these roads with State Highway 75, and are three to four miles directly south of the claim area. The Redbird mine, directly east of the claim area, includes some dwelling units.

The existing housing stock in Challis is composed of about 303 dwelling units located primarily on 10,000 square-foot lots. Most dwellings are moderately sized, single-family structures of 1,000 to 1,500 square feet. About 10% are mobile homes, and one is a four-unit, low-income apartment structure. There are very few vacant houses within the

city, and normal housing turns are about eight per year. Most land within the city has been developed, and there are currently fewer than 20 vacant lots on which new housing structures could be built. Of the existing housing, almost all is owner-occupied. Housing prices currently range from about $35,000 to $75,000, with little or no rental housing available. According to a local realtor, housing prices have tripled in the past eight years and are continuing to rise.

2.11.3 Utilities

Electric power is provided to the Challis area by the Salmon River Electric Cooperative which purchases power from the Bonneville Power Administration. Power is transmitted over a 69 kv line from Moore to Challis.

The electric cooperative currently serves approximately 1,600 customers: 1,148 residential, 155 irrigation, 263 commercial/industrial and 34 other users. Normal peak periods are the months of July and August, due to irrigation requirements, while low usage occurs in April and October (Hurless 1980).

The claim area does not contain any electrical facilities.

Current plans are to augument the existing 69 kv line by constructing a new 230 kv line from the same end-point at Moore, to a new substation approximately 7 miles south of Challis. There will be some significant variations in the routing. Also proposed is a 230 kv transmission line spur that will go west through Spar Canyon to Squaw Creek. These plans would accommodate increased electrical demands posed by the project and related housing.*

Telephone service is provided by the Custer Telephone Cooperative, Inc., which serves most of Custer County and portions of Lemhi County. The cooperative is currently at capacity and is planning a "total upgrade" of the current system to about 1,400 single party connections, with about 1,000 to be in Challis. The upgrade includes additional personnel, equipment, and underground cable and is anticipated to be finished in early 1981, at a cost of about $2 million, to be financed through a Rural Electrification Administration (REA) loan. It is anticipated that this upgrade will result in "some increase in the cost of service," with rates to be set by REA (Leuzinger 1980).

The claim area does not contain any telephone facilities.

Water within the City of Challis is supplied through a municipally owned and maintained system. The existing system is operating at 60% to 70% capacity due to leakage of an estimated 250 gallons per minute.

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*An environmental assessment for this power line and related facilities was prepared by the BLM, Salmon District (BLM 1980).

Current plans are to upgrade the municipal water system by correcting the leaks, replacing undersized water lines, installing water meters, developing a new water source, and building new storage facilties. To accomplish these improvements, the City of Challis has applied for assistance to the U.S. Department of Housing and Urban Development (HUD) through the Community Development Block Grant Program, to the U.S. Department of Agriculture, Farmers Home Administration, through the Rural Water and Sewerage Program, and to the Economic Development Administration. Construction is contemplated in the fall of 1980.

The claim area does not contain any drinking water supply and distribution facilities.

Residential units in the county area utilize individual septic tanks or sewers and conventional facilities for treatment of waste water. Service to Challis is provided by a municipal sewer system. Currently, the system exceeds capacity due to infiltration into the sewers from Garden Creek and water leaking from the water supply system. This condition has created overloading of one of the two lagoons which comprise the sewage treatment facility. At present, this overload cannot be accommodated by the second lagoon, which is itself under repair for leaks. Based on a study by Hamilton & Voeller, Inc. (1975), sufficient capacity for the system could be provided by proper maintenance and elimination of the excess infiltration.

The claim area does not contain any waste water collection or treatment facilities.

The propane utilized for heating and cooking in the Custer County area is provided primarily by Vangas, Inc., of Challis which currently supplies and services about 750 customers. Vangas estimates it has the capability to accommodate any amount of new business (Paliughi 1980). Currently, Vangas is servicing tanks at the project site and anticipates providing service as project activites continue (Cook 1980).

2.11.4 Community Services

Law enforcement is provided to Custer County and the City of Challis by the Custer County Sheriff's Department, which consists of one sheriff, five deputies, (4 patrol, 1 administrative) three dispatchers, and six vehicles. Facilities are located at the County Courthouse in Challis.

Future plans involve doubling jail facilities with modifications to provide cells for juveniles and for women to separate them from the others by sight and by sound. Additional staff are planned at the rate of one deputy per year for the next four years. The additional capacity and personnel are being added in anticipation of population growth due to increased mining activities, principally the Thompson Creek Project.

Fire protection for residents of Challis and the surrounding area is provided by an 18-man volunteer fire fighting force. The city's fire truck, located at the Challis City Hall, is used for fires within the city limits, and the county's fire truck is used for fires outside the city.

Initial responsibility for fire protection within the Cyprus Mines claim area is with BLM. In addition, under the terms of a standard cooperative agreement, the Forest Service would provide fire fighting assistance as necessary. Fires have not been a problem, as the claim area is within a low incident fire area where most occurrences result from lightning strikes.

There are limited health services available in Challis; more comprehensive services are available 60 miles to the north, in Salmon. Services in Challis are provided by the North Custer Health Clinic, which has day care facilities for medical treatment, x-ray, minor emergency surgery and emergency obstetrical care. The clinic is staffed by one doctor, one nurse and a receptionist-bookkeeper.

The North Custer Health Clinic is large for the level of service at which it currently operates. There are six examining rooms, three offices, a reception area, emergency room, laboratory, and x-ray facility. The clinic is currently underutilized, (four of the examining rooms and one of the offices are not in use). With additional staff, the existing facility could accommodate a notable increase in the number of persons treated (Maxwell 1980).

The City of Challis has a library of about 8,000 hardbound and 580 paperback books, 200 record albumns, two sets of encyclopedias, and talking books and records for the visually handicapped. The building is adequate to serve current needs.

2.11.5 Schools

There are five schools in the School District #181, which has a current enrollment of 466 (down from 560 in 1977). The two largest schools are in Challis, and the other three are in outlying areas. The schools in Challis and the school in Clayton will be impacted by the project; the other two schools are outside the area of impact.

The high school building in Challis is currently utilized below capacity and could accommodate an additional 80 students. It is estimated that the facility, built in 1922, is usable at least through the 1984-85 school year, provided minor renovations are made. The elementary school in Challis is at capacity and overcrowded. The Clayton Elementary School is currently utilized below capacity and could accommodate an additional 20 students.

Future plans for the District center on facilities in Challis and are being made in anticipation of population growth due to increased mining activities, principally the Thompson Creek Project. These plans

involve the addition of about 28 certified staff, plus expansion of elementary school facilities to accommodate three times the current enrollment together with expanded programs, such as a library, music, and physical education, plus dining facilities. It is also planned that a new high school complex will be built when current facilities become overcrowded in the next four to five years.

2.11.6 Economics

Agriculture and related activities provide the major economic base for Custer County. Although the County contains timber resources, activities related to lumber production occur primarily in Lemhi County to the north. Specific agricultural activities in Custer County include ranching, cattle raising and irrigated crops, primarily alfalfa production related to cattle raising. Federal, state and local government activities are a major source of employment, providing a significant portion of the economic base for the County.

Mining activity, as reflected in employment data, has not been a major source of recent economic activity for the County. Historically mining for minerals, including gold, silver, cobalt and tungsten, provided an economic base for the area. However, due to changing market conditions and increasing costs, mining activities have decreased in importance to the County.

Employment in Custer County reflects its economic base characteristics. Employment data by sector for workers covered by Idaho State Unemployment Insurance indicate almost no employment in manufacturing activities. Agricultural employment in 1978 was 262 workers and accounted for 17.8% of the County's total employment of 1,492. Actual agricultural employment in the county may be higher since many of the workers are not covered by insurance provisions.

Government is the largest employment sector in the county. During 1978, government employment, including those employed in education, averaged 442 workers. Self-employed workers were the next largest category of employment, 380 workers during 1978, accounting for 25.5% of the total county employment. The unemployment rate in the county in 1978 averaged 5.5%, the lowest since the 1970 rate of 5.0%.

Total personal income in Custer County, as measured by the U.S. Department of Commerce, Bureau of Economic Analysis, reached $15.1 million in 1977, the latest year data are available. This represents a gain of 5.7% over the 1976 figure of $14.3 million. Per capita personal income increased from $4,321 in 1976 to $4,623 in 1977, a gain of 7.0%. The per capita personal income for the state was approximately 29.7% higher than Custer County for 1977 and 30.7% for 1976.

Total assessed valuation in Custer County for the tax year 1978-1979 was $11,022,300, a gain of 32.5% over the 1977-1978 figure of $8,321,400. The major source of this increase resulted from a gain of 37.0% in assessed valuation of land and improvements, from $6,929,100

in 1977-1978 to $9,490,300 in 1978-1979. Assessed valuation in the tax code area which includes the claim area was $219,317 in 1977-1978, and $278,768 in 1978-1979, a gain of 27.1%.

The State of Idaho recently approved a tax limitation initiative limiting the amount of property tax which can be collected to a maximum of 1.0% of the market value of land, improvements and personal property. As part of this initiative, the total revenues from property taxes which could be collected were frozen at the 1978 level. Notwithstanding passage of the tax limitation, legislation implementing the provisions of the initiative has not yet been enacted. The schedule for passage of the implementing legislation is not known.

2.11.7 Public Finance

The three major taxing units in Custer County are: Custer County, City of Challis and Challis School District #181.

In fiscal year 1978-1979, actual expenditures for County operations were $635,841, compared to $778,938 in fiscal year 1977-1978, a decrease of 18.4% (Custer County Auditor 1978, 1979). Based on the 1977-1978 expenditures, County expenses were $229 per capita, and $187 in 1978-1979.

The City of Challis total estimated budget for fiscal year 1979-1980 was approximately $374,000 or $371 per capita. In addition to a general fund category, additional revenue expenditures for the city are incurred from operation of the library, airport, park, and water and sewer department. Generally, these functions have their own source of revenue, such as property taxes, leases, fees for services or grants, and must finance current operations and capital outlays within the constraints of available funds.

The third major category of public revenue and expenditure in Custer County is Challis School District #181. Similar to other public functions, the school district receives revenue from real and personal property taxes, sales tax-inventory exemption, and apportionments from the County and State. Major categories of expenditures include expenses related to instruction, administration, transportation of pupils, and operation and maintenance of school facilities. Revenues and expenditures for the school district in fiscal year 1979-1980 are projected to be $785,921, a gain of 8.9% over the 1978-1979 budget of $721,779. Based on an average attendance of 466 pupils, total expenditures per student are estimated to be approximately $1,687 (Challis School District #181 1979).

2.11.8 Community Attitudes

The Social Impact Assessment Report (Gold 1979) presents data and conclusions from interviews with 200 people between September 4 and October 22, 1979.

The study stated that many of the values of the respondents are maintained through an extensive kinship network which supports a "tight" community, business cooperation in preference to competition, and a proportionately large elderly population.

The predominant values of those who were interviewed include the following: a sense of active membership and a secure place within the community; maintenance of the status quo; support for others within the community; informal social controls; and distrust of bureaucracies and bureaucrats.

During the 1980 VTN field reconnaissance, similar responses were received from Challis residents who were interviewed. The most frequent response involved a concern regarding changes in lifestyle (due to potential growth), need for economic diversification, and dismay that young people must leave the area due to lack of economic opportunity. In addition, there was recognition of a need for city planning to remedy the problems with local utilities and services, and to effectively plan to accommodate current rates of growth.

In general, the community favors independence and neighborliness within the existing rural setting. The extent to which the Thompson Creek Project would facilitate this independence by providing greater economic opportunity in terms of long-term employment opportunities for young people in the area is seen as a favorable aspect. The project's potential to foster rapid growth and initiate a "boom town" situation is viewed unfavorably, as the general public is broadly aware of potential consequences of such a situation, e.g. increased real estate and consumer prices, overcrowded schools, overextended utilities and community services, and the loss of a rural lifestyle. It is also noteworthy that community concerns were related to social issues and not specifically to physical-environmental changes.

2.11.9 Recreation

Recreation opportunities occur primarily in proximity to the City of Challis, along the Salmon River north to Salmon and south to Clayton, and on adjacent BLM and Forest Service lands. Additional opportunities occur primarily to the southwest, within the Stanley Zone of the Sawtooth National Recreation Area (SNRA) in the Sawtooth National Forest, and within the Sawtooth Wilderness area of the SNRA. The primary recreational activities, both locally and regionally, are hiking, sight-seeing, snow activities, camping, hunting, fishing and picnicking. The periods of greatest recreational activity are summer and autumn. Activities drop sharply during winter and spring, due to a relative lack of intensive winter sports activities.

Organized recreation and leisure pursuits within and near the City of Challis consist of a normal range of school activities associated with Challis High School, local churches, the movie theater, the bowling center, Girl Scout and Boy Scout troops, 4-H, swimming at Challis Hot

Springs, neighborhood and community activities, and local rodeos. During winter months a small ski area, Chipmunk Hill, located about six miles west of town, operates on weekends.

Outdoor pursuits in the vicinity of Challis are associated primarily with the Salmon River and adjacent lands within the Challis Planning Unit of the BLM. Primary recreational activities within the Challis Planning Unit are sightseeing, camping, hunting, and lake, river and stream fishing. Current problems in the Challis Planning Unit primarily involve the overuse of undeveloped and primitive sites, which could be alleviated by the installation of proper facilities.

Regional recreation opportunities abound in the SNRA, about 30 miles southwest of Challis in the Sawtooth National Forest. A wide range of recreational opportunities exists, including sightseeing, camping, hiking, hunting, fishing, backpacking, floatboating, kayaking, mountaineering, cross-country skiing, snowmobiling, trailbiking, horseback riding, rockhounding, and photography.

There was a 27% increase in visitor use days from 1975 to 1978 (898,900 to 1,137,700), then a 13% decline to 984,500 from 1978 to 1979. Notwithstanding this short-term decrease, the SNRA General Management Plan anticipates a 3% annual increase in use over the next 20 years. The plan includes the construction of 738 additional camping and picnicking units, with about 15 to be located in the Railroad Ridge and Salmon River headwaters areas. Land committed for these facilities will be increased from 700 to 950 acres over the 20-year planning period. Also, lands have been allocated for the possible development of a ski area at Butterfield Creek, in the Big Wood River Canyon management area.

2.12 Transportation

Two major highways provide access to Custer County and the Challis area. U.S. Highway 93 provides access from the southeast, connecting Challis with Mackay, Arco and, ultimately with the Pocatello, Blackfoot and Idaho Falls areas. U.S. Highway 93 continues north of Challis to Salmon, a distance of approximately 60 miles. State Scenic Highway 75 provides southern access to Custer County from the Blaine County area.

Average daily traffic* volumes on these highways have been developed by the Idaho Department of Transportation. The data indicate an increase in ADT in 1978 over 1977 levels of approximately 9.6% on State Highway 75 between Stanley and the junction with U.S. Highway 93; 6.2% on U.S. Highway 93 south of the junction to Mackay; and 5.4% north of the junction to Salmon.

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*Average daily traffic (ADT) is defined as two-way traffic flow of all types of vehicles over a 24-hour period.

Projected traffic volumes for 1980, 1985 and 1990 were developed for this area by the Idaho Department of Transportation. Based on this analysis, the ADT for State Highway 75 between Stanley and the junction with U.S. Highway 93 is projected to increase in 1980 by 7.1% over 1978 data; 13.3% between 1980 and 1985; and 12.9% between 1985 and 1990. Similarly, on U.S. Highway 93 south of its junction with State Highway 75, the projected increases in ADT are 2.3% in 1980, 11.4% between 1980 and 1985; and 8.2% between 1985 and 1990. North of its junction with U.S. Highway 75, the projected increases are 7.7% in 1980; 18.4% between 1980 and 1985; and 16.4% between 1985 and 1990.

Access to the claim area is from State Highway 75 along an unpaved county road which generally parallels Squaw Creek. The road currently crosses Squaw Creek, first west to east about 1.5 miles from its intersection with State Highway 75 and from east to west about 4 miles from the intersection. The road is primarily used for access to the two ranches and the Redbird Mine located along Squaw Creek and for recreation uses during the summer season.

Bus service to Challis is currently provided by Challis Transportation Company three days per week. So few passengers utilize this bus service that the bus is nearly empty about 85% of the time. There are no current plans to expand the existing level of bus service.

Rail service is currently not provided to the City of Challis. Union Pacific Railroad provides the nearest freight rail service at Mackay, approximately 60 miles southeast of Challis. Facilities at MacKay include a small loading dock area.

The City of Challis owns and operates an airport, which is located north of the city. Regularly scheduled commercial air carrier service is not available at the airport, however, charter service is available. At this time, there are no plans to expand services at the Challis Airport.

2.13 Aesthetics

The claim area lies within a region of spectacular mountain ranges, high mountain lakes and streams, lush valleys, and the Salmon River and its tributaries which meander through the lower elevations. Vistas from the higher elevations are extensive, as there are no major sources of air pollution to interfere with visibility. The aesthetic quality of the region, particularly south of the Salmon river within the Sawtooth National Forest, is such that a portion of the forest has been designated as wilderness.

The project region is within a complex geologic setting, characterized by steep, rugged mountain peaks and ridges with widely dispersed basins. The region exhibits great contrast in geologic structure and rock type and is characterized by uplifted granitic and volcanic formations. The region exhibits strong evidence of glaciation, with U-shaped valleys and oversteepened slopes, commonly 49%-75%.

The area in which the project is located is typical, although somewhat less spectacular than the region as a whole. The characteristic landscape is steep to very steep topography accented by protruding ridgelines and occasional rock outcroppings. Groundcover consists of Douglas fir forests, and sagebrush and mountain grasses. There is little variation of these characteristics with distance. Although there is some variety in form, line, color and texture, they tend to be common throughout the area. Also, water forms, which are an important element of visual quality, are limited within the claim area.

It is believed that most users would not travel to the claim area or its immediate vicinity to enjoy its scenic quality, since spectacular scenic areas are nearby.

2.14 Cultural and Paleontological Resources

Cultural resource investigations were conducted during 1974 and 1980 (Appendix VIII, VTN 1975; Weder 1980). The investigations were based on archival reviews (regional literature and historic and archaeological site records) and intensive on-the-ground surveys of areas to be disturbed by project facilities. No previously recorded sites are located in the claim area; however, a possible Shoshoni village was mentioned in the literature as being in the general vicinity. It was not located during either field investigation.

Thirty-five sites, nine historic, 22 prehistoric and four of unknown cultural origin were located during the field investigations. Eight of the historic sites consist of cabins and associated outbuildings and trash deposits. The remaining historic site consists of five mine portals. All are associated with early mining and recent Euro-American (summer cabins) activity. The prehistoric sites consist of a sweat lodge site, one rock shelter, six chert quarries and fourteen lithic chipping waste scatters. Of these, two were identified as late prehistoric Shoshonean (the sweat lodge and one lithic scatter), one early Archaic (7,000 to 4,000 years B.P.) lithic scatter and one late Archaic (4,000 to 2,000 years B.P.) lithic scatter. The cultural affiliations of four sites, two with surface depressions and two rock shelters, could not be determined based on surface evidence. Most of the newly discovered aboriginal sites appear to be light lithic scatters with little or no depth, probably representing infrequent seasonal use by small migrating groups of hunters/gatherers.

The latest issue of the National Register of Historic Places has been consulted and no sites which are listed and no sites which have been determined eligible by the Secretary of the Interior are located within the area of potential disturbance. Continuing field investigations by qualified cultural resource specialists will locate any sites which could be eligible for National Register listing.

Paleontological resources investigations of the claim area also were conducted in 1974 (Appendix VIII, VTN 1975) and 1980 (Britt 1980). The

investigations consisted of archival reviews and on-the-ground surveys. There is one known invertebrate fossil locality in the claim area. This also had been previously reported by Chirkin (1963). The fossils are from the class Graptolithino and consist of 30 species from the genera Orthograptus and Didymograptus. These fossils are of multi-celled faunal organisms which existed between 500 million and 250 million years ago. This site is the holotype locality for some of these species. In addition, brachiopods (Inarticulata) and trilobites (Trilobita) are found in association with the graptolites. These associations and the good condition of preservation are uncommon. Other fossil localities were located during the 1980 field investigation; however, these fossils are of little scientific value because they are poorly preserved (Britt 1980).

CHAPTER 3.0

EVALUATION CRITERIA

3.1 Introduction

The evaluation criteria developed for the analysis of the environmental impact of the proposed Thompson Creek Molybdenum Project were compiled from several sources including:

- Public and agency recommendations.
- Laws, executive orders, and regulations.
- Goals and objectives of Forest Service and BLM plans and policy statements.
- Test of legal, technical, economic, social, and political feasibility.

The main sources for the evaluation criteria are listed at the end of this chapter.

The initial step in developing evaluation critera was the identification of public issues, management concerns, and opportunities regarding implementation of the Thompson Creek Molybdenum Project (see Section 1.4). The results of these efforts were incorporated into the "Scoping Document for Cyprus Mines Corporation Proposed Thompson Creek Molybdenum Mine." Based on this document, criteria were developed to evaluate the relative effects of implementation of each project alternative. Certain issues or concerns were eliminated because their application as criteria did not allow evaluation of the project options and alternatives.

The evaluation criteria were designated as significant criteria or general criteria. The significant criteria, are those representing the most significant issues and concerns or those considered unique constraints on the project (i.e., endangered and threatened species and cultural resources). The remaining criteria were designated as general criteria and were applied to the alternatives in order to evaluate relative differences in beneficial and adverse effects of implementation. The general criteria were not weighted as heavily in the evaluation process as the significant criteria, but were important in the selection of the preferred alternative.

In general, the alternative which provides the least adverse effect to the criteria would be the alternative which can be considered environmentally preferred. In some cases (i.e., air quality) there are quantifiable legal standards which cannot be exceeded. The criteria have been selected so as not to preclude the consideration of any

reasonable project alternative. These criteria should eliminate from consideration the options and alternatives which are not desireable for implementation.

3.2 Criteria

Significant Criteria

Effect on surface and ground water quality
Effect on salmonid fisheries due to:
- changes in hydrology and water quality
- direct habitat loss from construction of project facilities
- increased human population

Effect on wildlife due to:
- migration interference
- direct habitat loss from construction of project facilities
- increased human population

Effect on endangered and threatened species and their habitat
Effect on cultural and paleontological resources
Effect of new population (social and physical)
Effect on employment
Effect of new housing demand
Effect on community life support systems (i.e., community services and utilities)
Effect on local government and services
Technical feasibility

General Criteria

Effect on surface and ground water hydrology
Effect on air quality
Effect on acoustical environment
Effect on land uses
Effect on traffic flow
Effect on visual resources
Capital and Operation Costs

3.3 Sources of Information

- Scoping Document for Cyprus Mines Corporation Proposed Thompson Creek Molybdenum Mine

- National Environmental Policy Act of 1969 (42 USC 4321-4327)

- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508)

- Forest Service NEPA Process, Final Implementation Procedures (FSM 1950)
- National Forest Management Act of 1976 (PL 94-588)
- Federal Land Policy and Management Act of 1976 (PL 94-579)
- Federal Water Pollution Control Act, as amended (86 Stat. 816)
- Multiple Use Sustained Yield Act of 1960
- Resources Planning Act of 1974
- Resource Conservation and Recovery Act of 1976
- Clean Air Act, as amended (42 USC 1857)
- The Endangered Species Act of 1973 (as amended)
- Executive Order 11514, March 5, 1970--Protection and Enhancement of Environmental Quality
- Antiquities Act of 1906 (34 Stat. 225)
- Executive Order 11593, dated May 14, 1971--Protection and Enhancement of Cultural Environment (also, 36 FR 8921, 16 U.S.C. Sec. 470, May 31, 1979).
- National Historic Preservation Act of 1966, as amended (15 USC 470)
- Archaeological Resources Protection Act of 1979 (PL 96-95)
- Fish and Wildlife Act of 1956 (16 USC 742a, et seq.)
- Fish and Wildlife Coordination Act (16 USC 661-666c)
- Protection of Fish (Section 36-902, Idaho Code)
- Executive Order 11988 (Floodplain Management)
- Executive Order 11990 (Protection of Wetlands)
- Clean Water Act of 1977
- Safe Drinking Water Act (PL 93-523)
- State of Idaho "Water Quality Standards and Wastewater Treatment Requirements" (1973 and draft revisions, January 1980)
- Department of Transportation Act (49 USC 1165[b][A])

- Noise Control Act of 1972 (PL 92-574)
- Forest Service Manual Regulations
- BLM Manual Regulations

CHAPTER 4.0

ALTERNATIVES

4.1 Introduction

An overview of Chapter 4.0 can best be presented by outlining the objectives which will be satisfied in the various sections of this chapter:

- Describe the applicant's proposed action.
- Document the planning process used to formulate component options and alternatives for the Thompson Creek Molybdenum Project.
- Document the reasons for eliminating some component options and alternatives because of major technical or economic constraints.
- Describe the proposed component options, including the Cyprus Mines preferred option for each project component.
- Select and display reasonable alternatives based on the viable component options.
- Based upon probable effects of the Thompson Creek Molybdenum Project on the environment, present mitigation measures which could be implemented by Cyprus Mines and which will allow Cyprus Mines to operate with minimal effects on environmental resources.
- Describe the monitoring programs which will provide timely feedback on the effectiveness of design, reclamation and mitigation measures in minimizing environmental effects.

Three important definitions for this chapter are:

Project components are the four major facilities which, when linked together, form the Thompson Creek Molybdenum Project. The project components for this EIS are:

- Mine and related waste dump areas.
- Tailings disposal system.
- Crusher, ore conveyance, concentrator.
- Corridors (i.e. roads and utilities).

Options are the various alternative methods or locations by which each project component could be accomplished or located.

An alternative is a grouping of viable project component options into a functional system. The project alternatives for this EIS are derived from these groupings.

The methodology employed in developing project alternatives used the following steps:

1) Identify project components and their options.

2) Describe the potential component options, and eliminate from further study those options which are not viable.

3) Formulate feasible alternatives based on viable component options.

4) Present (describe) these alternatives.

4.2 Overview of Proposed Action

Cyprus Mines Corporation proposes to construct a large open pit molybdenum mine and concentrator at Thompson Creek in central Idaho. The project is scheduled to commence operation in 1983 with an annual production rate of 15-20 million pounds of molybdenum contained in molybdenum disulfide concentrate. (See Appendix B for a detailed description of the proposed action and related process information.)

The proposed Thompson Creek Molybdenum Project is located in Custer County, Idaho, approximately five miles north of the Salmon River and 30 miles southwest of the county seat of Challis. The project is located in the Salmon River Mountains at an elevation of 6,200 feet to 8,800 feet. The project location is shown in Figure 1-1. The ore deposit is located within a 15 square mile (9,700 acres) claim block straddling the boundary between the Challis National Forest to the north and lands administered by the Salmon District, Bureau of Land Management to the south. Most of the claims are held in the name of Tuscarora Mining Corporation, a wholly-owned subsidiary of Cyprus Mines. The area which will be directly affected by the proposed mine and facilities is approximately 2,460 acres, or 3.84 square miles.

The project is scheduled to be constructed during a 28-month period after appropriate approvals have been obtained.

Prior to operation, removal of 130 million tons of overburden will be required. Overburden stripping and mining will involve drilling and blasting, followed by digging and loading with electric shovels. Overburden and other waste rock will be placed in waste dumps requiring approximately 1,600 acres located adjacent to the mine. Settling ponds will be constructed downstream of the waste dumps to provide for sedimentation of eroded soil particles.

Mined ore will be delivered by truck to a primary gyratory crusher located near the mine. The crusher will reduce rocks to less than eight inches in size. Crushed ore will be transported to concentrator facilities, which include circuits for grinding and flotation. The grinding circuit will have two lines, each consisting of a 32-foot diameter by 13 foot long semi-autogenous grinding mill, stationary 1/2 inch screens, a cyclone separator and a 16-1/2 foot diameter by 26 foot long ball mill. Grinding will be a wet process. The grinding circuit product will be a 35% solids slurry. The flotation operation will be carried out in seven stages. The first bulk separation will produce a "rougher" concentrate containing about 10% molybdenum disulfide, which then will be reground in a small ball mill and subjected to six additional stages of flotation, called "cleaner" stages, to upgrade the concentrate progressively to 90% molybdenum disulfide. The concentrate from the flotation process will be dried and packaged for shipment by truck to the railhead at Mackay. The final waste or tailings (a solids/liquid mixture) will be discharged by a slurry pipeline into an impoundment area where the water will be reclaimed for reuse in the flotation process.

In addition to crushing, grinding, and concentrating equipment, support facilities will be required. Such facilities include deep wells to provide a water supply; sewage disposal system; and various maintenance and storage facilities. Construction of an electrical transmission line* and an 11-mile long paved access road, in addition to several service and haul roads, also will be required.

The tailings impoundment area will be formed by constructing an embankment across an existing drainage. The embankment will utilize waste rock and coarse tailings for construction, and the impoundment will contain a mixture of fine particles and slime. The impoundment will have a capacity for at least 200 million tons of tailings, and will require an area of approximately 450 acres. Water will be reclaimed from the impoundment for reuse in the concentrating process. Tailings will be delivered from the concentrator facilities to the impoundment by a surface pipeline. A seepage control pond will be constructed downstream from the tailings embankment to collect runoff from the embankment and seepage from the drainage system within the embankment.

The mine will be operated 24 hours per day, seven days per week. Average daily production will be about 100,000 tons per day, consisting of 25,000 tons of ore and 75,000 tons of overburden and waste rock. An operational work force of approximately 550 persons will be required to sustain this production rate.

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* A 98-mile, 230-kv transmission line would extend from Moore, Idaho to Challis and to Squaw Creek near its confluence with Bruno Creek. The environmental assessment for this power line and related facilities was prepared by the BLM, Salmon District (BLM 1980). This DEIS addresses the power line corridor within the claim area.

Both short- and long-term reclamation activities are planned. Short-term reclamation would involve immediate reduction and prevention of erosion of the waste dumps, tailings embankment and other disturbed areas. Long-term activities would include reforestation of slopes associated with the tailings impoundment and waste dump areas; establishment of rangeland on level surfaces; and creation of a lake from the mine pit. (See Appendix C, Conceptual Reclamation Plan, for additional details.)

4.3 Formulation of Options

Two types of options for various project components were analyzed: methodological and locational. Project components which have methodological options include mining technique (open pit, underground, in-situ leaching), ore extraction (in-situ and heap leaching, and crushing/grinding/flotation), waste rock disposal and tailings disposal (surface, underground, other), tailings embankment construction, and ore conveyance method (tramway, slurry pipeline, truck, conveyor). Location options include sites for waste dumps, tailings impoundment, crusher, concentrator, and access/utility corridor(s).

Several of the potential options are not feasible and were therefore eliminated from detailed evaluation. These, and the reasons for their elimination, are presented below. The remaining viable component options are grouped to form the project alternatives evaluated in subsequent chapters.

4.3.1 Methodological Options

4.3.1.1 Mining Method Options

There are three potential mining methods: 1) in-situ leaching, 2) underground and 3) open pit. In addition, there are options with respect to pace and scale of mining.

The Thompson Creek orebody has a tubular shape approximately 800 x 4,000 feet lying under 500-1,000 feet of overburden. The current ore reserves are approximately 193 million tons averaging 0.112% Mo (0.187% MoS_2). The core of the ore body is relatively higher in grade than the overall deposit and a section containing about 80 million tons has been identified averaging 0.16% Mo (0.26% MoS_2).

In-situ leaching of the orebody was eliminated for both environmental and economic reasons. The deposit would require massive blasting to fragment rock to allow leaching solutions to percolate through the orebody. The leaching solutions could cause serious environmental damage if they entered nearby water systems.

The viability of underground mining, of at least the higher grade ore, was evaluated with the following conclusions:

(1) Compared to other successful underground molybdenum mines in North America, the Thompson Creek orebody core has smaller reserves and a lower grade.

(2) The manpower for the underground mine is approximately twice that required for an equivalent open pit because underground mining is labor intensive.

(3) The capital costs for an underground operation are slightly less favorable than for the equivalent open pit.

(4) The operating costs for the underground mine are approximately twice those for the equivalent open pit.

(5) Underground mining will recover no more than about 60-65% of the molybdenum available in the Thompson Creek orebody.

(6) The most feasible method of underground mining would be by block caving. The technical risks associated with a block caving operation are greater than an open-pit operation.

(7) The area affected by the waste dumps and tailings will be reduced. However, the surface effects (subsidence) of the underground caving operation will be significant and long-term, continuing after the mining operations have finished.

In addition to the viability of underground mining, the options of mining by either underground or open pit at a reduced pace of development was evaluated in order to select a feasible option that minimizes the impact of the operation.

With reference to a smaller open pit, the following comments are pertinent:

1) The same ore and waste rock is mined over a longer period hence the requirements for waste dumps and tailings disposal are unchanged.

2) The work force is <u>not</u> reduced in proportion to the production rate, hence there is not a proportionate reduction in socio-economic effects.

3) Because of specific requirements at Thompson Creek for preproduction stripping, initial impact of the pre-mine and construction period is not reduced. Both require pre-stripping of 130 million tons and produce the same total waste rock of 470 million tons.

4) Because the smaller operation has to bear most of the same costs as the larger operation, the economics are severely impaired.

Table 4.3-1 compares the options of open-pit versus underground mining at two production rates.

It may be pointed out that generally smaller operations, because they do not obtain the economics of scale, have to increase the cut-off grade of material which can be considered as ore. This generally results in increased pre-production stripping and total waste rock and decreased utilization of the resource.

A main consideration in evaluating these options is the respective manpower requirements which directly influence socioeconomic effects. A smaller open pit does not result in an attendant decrease in manpower that would significantly reduce socioeconomic effects. The much larger work force required for the underground operation would have a significantly greater socioeconomic impact.

Based on the above factors, a smaller scale open-pit operation and underground mining have been eliminated from further consideration. Therefore, an open pit mine at a 25,000 ton per day production rate is the option that will be addressed in this EIS.

4.3.1.2 Ore Extraction Method Options

There are three main options for ore extraction. These are: 1) crushing, grinding, and flotation, 2) in-situ leaching, and 3) heap leaching. The in-situ leaching option is discussed above under mining methods and is rejected here for the same reasons. Heap leaching is a modification of in-situ leaching, whereby the ore is mined, crushed and stacked on impermeable pads. A solution capable of dissolving the ore is applied to the top of the ore heap and allowed to percolate through to the pad. The solution is then collected and pumped to the concentrator where the ore is extracted. The heap leaching option at Thompson Creek was rejected for the following reasons:

- Molybdenum is not amenable to leaching, therefore the recovery of molybdenum would be very low.
- Spent ore, after the treatment with the solution, would have to be trucked to the tailings impoundment.
- Reclamation of the tailings impoundment area may not be feasible.

The only practicable, viable method for recovering molybdenum disulfide is the crushing, grinding and flotation option, which is conventionally employed at other major molybdenum extraction operations throughout the world.

TABLE 4.3-1

COMPARISON OF OPEN PIT AND UNDERGROUND MINING OPTIONS AT TWO PRODUCTION RATES

	Open Pit		Underground	
Alternative Mining Method[a]:	A Open Pit	B Open Pit	C U.G. Block Caving	D U.G. Block Caving
Planned annual production (million lbs. Mo in concentrate)	15-20	9-12	15-20	9-12
Mineable ore reserves (million tons)	193	193	80	80
Average ore grade (% Mo)	0.11	0.11	0.16	0.16
Ore processing rate required to achieve annual production (tons/day)	25,000	16,000	17,000	10,000
Mine life (years)	22	36	12	20
Development time (years)	2-3	2-3	5-8	5-8
Manpower	550	470	1,100	1,020

(a) Alternatives:
- A - Current mining plan
- *B - Smaller open pit
- *C - Underground operation producing same annual production as A.
- *D - Smaller underground mine.

(*Not economically feasible.)

4.3.1.3 Waste Disposal Method Options

Surface placement is the only major potential means of disposing of overburden and waste rock from the Thompson Creek Project. Oceanic or other underwater disposal and underground options are clearly not feasible. There are two potential surface disposal options: 1) valley fill and 2) backfill of the open pit.

The backfill method would require removing waste from the pit and placing it in temporary storage areas until completion of mining activities. This option is not considered feasible for the following reasons. First, material would need to be stored for up to 20 years, and the only areas which could be utilized for such storage are valleys and drainages that would be used in the valley fill option. At the completion of the project, the material would need to be moved uphill into the pit, a prohibitively expensive operation. Secondly, the volume of waste after fragmented storage (600 million tons) is estimated to swell by about 33% compared to in-place rock. Mining operations would result in the formation of a pit with an uneven rim. The actual bowl-like depression which could be used to receive backfill extends from about Elevation 7000 down to the pit bottom at Elevation 6400. This area would only hold an estimated 100 million tons of material. Thus, only 17% of the waste material could be returned to the pit.

Because of these considerations, only the valley fill method for mine waste disposal will be addressed in the following sections.

4.3.1.4 Tailings Disposal Method Options

There are three potential methods commonly employed for disposal of milling tailings waste. These are oceanic (or other underwater), underground and surface. Oceanic or other underwater disposal options are clearly not possible. There are no large previously mined-out cavities in the vicinity of the proposed project, therefore underground disposal is not possible. Thus, surface disposal is the only feasible option for the Thompson Creek Project. With this method, two options, similar to those for waste disposal, are possible: valley fill or backfill into the open pit. The mine backfill method would require temporary storage of tailings for the 20 years of operation. The only areas available for such storage in the vicinity of the mine are the same areas considered as disposal areas for overburden and waste rock. Use of these areas as storage areas for ultimate backfill would require the tailings to be dewatered, reloaded into trucks, hauled uphill to the mine and dumped back into the pit after the termination of mining. Moreover, the total amount of material or tailings is estimated to be approximately 200 million tons, while the ultimate open pit would hold only an estimated 100 million tons of backfill material. Therefore, disposal of the tailings back into the open pit upon completion of the mining operation is not considered feasible.

Because of these considerations, only the valley fill option for tailings disposal will be addressed in subsequent sections of this EIS.

4.3.1.5 Tailings Embankment Construction Method Options

There are four commonly used methods for building embankments to impound tailings. These are upstream construction, downstream construction, centerline construction, and earth embankments. The first three methods involve using the tailings material itself to construct the embankment and the fourth consists of using imported material such as mine waste or borrowed earth to build an embankment similar to a water storage dam.

A fifth disposal method has been proposed by Robinsky (1978). This method, called the "thickened discharge method," creates a deposit with steeper beach slopes with a relatively small embankment. By reducing the water content of the tailings slurry to a critical value (approximately 65 to 70% solids by weight) the coarse and fine tailings will settle simultaneously and come to rest at a pre-selected slope angle. The tailings are discharged at the head of a valley and slope downstream towards the small embankment.

Although in theory this latter method has many construction advantages, there are practical problems which have limited its implementation for tailings disposal. The largest problem is that there is no commercially available thickening equipment capable of producing a suitably thickened slurry. A second potential problem is liquefaction. Since only upward drainage will occur during consolidation of the tailings, the phreatic line within the deposit will occur at or near the surface. In the event of a seismic shock, much of the deposit could liquefy and, since there is no embankment to contain it, the tailings could flow downstream. Because there has been no recent breakthrough in thickening technology; because there are no operating examples where the thickened discharge method is being totally employed; and because seismicity is a design parameter at Thompson Creek, this method was not considered feasible for tailings disposal at the project.

Evaluation of the remaining four embankment construction method alternatives was initiated for each of the three most promising tailings impoundment sites (RPI 1980a). These sites were the Thompson Creek Sites (G and H), the Bruno Creek Sites (A/B and C), and the Basin Creek Site (I)*. Before the evaluation was completed, seismicity information was obtained which indicated that upstream construction is not feasible for any of the sites and therefore this method was eliminated from further consideration.

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* See Section 4.3.2.3 for Tailings Impoundment Location Options.

The remaining three alternate embankment construction methods were evaluated topographically and operationally for each site. The construction method evaluation matrix is shown on Table 4.3-2. A brief description of the evaluations is presented below.

Downstream embankment construction using cycloned tailings sand is considered feasible only for the Thompson Creek tailings site. Both the Bruno Creek and Basin Creek sites are restricted topographically. The upstream toe of the embankment would have to be started high enough within the impoundment so that the embankment crest would intersect the sides of the valley when the ultimate embankment height is reached. By moving the starter embankment upstream, the impoundment capacity is reduced. This would produce a faster rate of rise of the tailings overflow and ultimately require an increase in total embankment height to contain a given volume of tailings. In addition, this method of construction is more difficult because the crest pipeline must be moved laterally as well as vertically. A fixed pipe support system is not possible, therefore, the pipe must be drained and raised in sections with mobile machinery. Each time this crest pipeline is drained, cycloning must be suspended and sand needed for embankment construction is discharged into the impoundment. Downstream construction in Bruno Creek and Basin Creek would require supplemental fill to replace this lost sand volume. The Thompson Creek site is better suited in this regard because a smaller embankment is required.

Earth embankments in Bruno Creek or Basin Creek would have approximately the same geometry as downstream embankments. Therefore, volumetrically, the same conditions apply. However, if tailings sand is not utilized to construct the embankment, the sand requires space in the impoundment and a higher embankment is needed to impound the total tailings.

Both mine waste rock and rock borrow material were considered for embankment construction. The majority of the mine waste to be removed in the initial years is of volcanic origin. This rock is susceptible to chemical weathering and degradation upon contact with water. Particle size deterioration within an embankment can cause settlement, changes in shear strength, and reduction in permeabilities. Continuous testing in the pit and on the fill would be required to provide material control. Using mine waste to construct initial embankments would require hauling down steep grades from the mine to the bottom of streams. This haul is expensive and somewhat hazardous for the workers and equipment. Once the excavation proceeds to a lower level, conveyors might become feasible; however, crushing, sorting, and rehandling the waste on the embankment can also be expensive. Because of the doubtful quality and durability of a significant portion of the waste rock and expensive haulage costs to the embankment site, plus the additional height of embankment required to contain the total tailings, mine waste embankments are not considered a practical method.

TABLE 4.3-2

TAILINGS EMBANKMENT CONSTRUCTION METHOD EVALUATION MATRIX

Site	Downstream	Centerline	Mine Waste	Rock Borrow
Bruno Creek	Geometrically very difficult to accommodate without reducing impoundment capacity. Not enough tailings - must be supplemented with other material. Operationally difficult to raise lines fast enough to achieve rate of rise (.25 - .35)	Geometrically and operationally feasible Sand availability probable without supplemental fill. (.12 - .17)	Four to five mile haul with steep grades. Embankment reduces capacity of tailings storage. Overburden rock of volcanic origin - much sorting probable - difficult construction control (.35 - .45)	Sufficient quantity probably not available. Borrow outside impoundment increases area of disturbance. Embankment reduces tailings capacity. (.80 - 1.00)
Thompson Creek	Geometrically and operationally feasible for slower rate of rise. Sand availability probable without supplemental fill (.15 - .25)	Geometrically and operationally feasible. Sand availability certain without supplemental fill (.10 - .15)	Possible with crusher and conveyor or steep downhill truck haul. Tailings capacity not reduced. Material sorting difficult but possible (.25 - .35)	Sufficient quantity probable within impoundment (.60 - .80)
Basin Creek	Geometrically very difficult to accommodate without reducing impoundment capacity. Not enough tailings - must be supplemented with other material. Operationally difficult to raise lines fast enough to achieve rate of rise (.25 - .35)	Geometrically and operationally feasible. Sand availability probable without supplemental fill. (.15 - .20)	Two to three mile haul with steep grades. Embankment reduces capacity of tailings storage. Overburden rock of volcanic origin - much sorting probable - difficult construction control (.35 - .45)	Sufficient quantity probable within impoundment (.70 - .90

Note: (.xx - .yy) indicates range of embankment placement cost in dollars per ton of tailings impounded.

Rock borrow embankments are slighty better volumetrically in that a part or all of the rock can be excavated from within the impoundment. In addition, rock can be selected which is not as susceptible to weathering as the mine waste. However, use of rock borrowed from the impoundment area to construct the embankment would require that it be removed prior to covering with tailings. This rock would have to be stored near the embankment for later use or used to construct the embankment in its entirety--both options are unattractive from an engineering and economic standpoint. Construction of the embankment at one time could result in foundation instabilities due to high pore pressure build-up within the clay formations. Storage of the rock nearby would result in additional area disturbance as well as increased costs due to reloading, haul and placement of the rock at the embankment. The major problem with a rock embankment is the cost of drilling, blasting, loading, hauling, and placement. This cost is several times greater than the cost of the other alternatives.

Centerline cyclone embankment construction is feasible at all three sites. From an embankment construction standpoint alone it would be easier and less expensive to construct in Thompson Creek than the other sites because of the smaller quantity of sand required and slower rates of rise. In both Bruno Creek and Basin Creek, there is a possibility that some supplemental fill will be required to substitute for sand if sufficient quantities are not recovered from the cyclones. The centerline cyclone method of construction allows for raising the crest pipeline while it is operating, which will maximize sand production.

A range of estimated embankment construction costs per ton of tailings impounded for the various methods at the three sites are included in Table 4.3-2 for comparative purposes. These costs are based upon industry costs and may not accurately reflect detailed site variations. However, they do provide general cost trends for comparison. The cost order for each construction method, beginning with the least expensive, is: centerline cycloning; downstream cycloning; construction with mine waste; and construction with rock borrow.

In summary, the centerline method of constructing the tailings embankment with cycloned tailings sand was selected as the most feasible method after an evaluation of other known practical methods. The use of cycloned sand is economical and energy-efficient because the waste material is hydraulically transported (by gravity) and a significant portion is utilized as a construction material. This technique has been proven by broad industry use and has been thoroughly studied and documented in recent technical literature.

4.3.1.6 Ore Transport from Crusher to Concentrator Method Options

Four methods for transporting ore from the crusher to the concentrator have been considered; these are: 1) aerial tramway, 2) slurry pipeline, 3) trucks, and 4) conveyor.

Overhead tramways carry ore in buckets suspended from a moving cable. Although capable of traversing steep and rugged terrain, tramways have a limited carrying capacity--probably no more than 7,000-8,000 tons per day. The average ore production at Thompson Creek will be 25,000 tons per day, thus requiring multiple tramways. These would not only be difficult to feed, but also would impact a greater area than other transportation methods. Aerial tramways have been rejected for use at Thompson Creek for these reasons.

Use of a slurry pipeline was considered as a method for transporting ore. However, for this method to be practical, the ore would first have to be reduced to a particle size of 3/4-inch or less, and mixed with water to obtain a slurry for pumping. This would require moving all or a portion of the grinding units from the concentrator site to the crusher area. Moreover, due to the addition of the necessary quantities of water to obtain the slurry, this method would require the transporting of essentially double the amount of material. Because of this and inherent maintenance requirements, the slurry pipeline method would entail higher operating costs than other options. In addition, extensive cut and fill would be required to accommodate the crusher units. Therefore, the slurry method of ore transport was rejected.

Trucks could be used to carry the ore from the crusher to the concentrator. However, this would require a larger truck fleet, larger quantities of fuel, and additional personnel. It is estimated that as many as 14 additional trucks would be required over the life of the project. About 50 to 60 additional workers would be required to operate and service the expanded truck fleet. The use of trucks also would result in an increase (about 26%) in on-site vehicle emissions. The truck option also may have a greater effect on big game movement since truck traffic could inhibit wildlife passage. In addition, the necessary haul road would disturb more area than a conveyor and service road. For these reasons, the truck conveyance option has been eliminated from further consideration.

Preliminary engineering shows that the coarse ore can be carried from the crusher to the concentrator by a belt conveyor driven by three 1500-horsepower motors. The operating and maintenance crew for the conveyor would be about 10 to 15 workers on a regular basis. Construction of the conveyor requires cut and fill and an adjacent service road.

Because of the preceeding considerations, an overland conveyor is the option which will be addressed in the following sections.

4.3.2 Location Options

4.3.2.1 Mine

Because the ore body is fixed, there is no geographical location option for the mine.

4.3.2.2 Waste Dumps

The major considerations in selecting a location for a waste dump are: 1) minimum truck haul distance from the mine; 2) adequate storage capacity; and 3) minimum disturbance to upstream drainage areas. Sites within a two-mile radius of the mine pit include portions of Thompson Creek, Basin Creek, Bruno Creek, Buckskin Creek and Pat Hughes Creek.

The upper section of Thompson Creek was considered, but rejected because it is an active stream with year-round flow, and has a large drainage area which would be blocked by the waste dumps. Additional problems may be encountered in ensuring long-term stability, and there is a greater potential for sedimentation in the stream.

The Basin Creek area was reviewed and rejected because of its haul distance and difference in elevation from the mine. This location would require an average 800-foot lift to haul the material to the edge of the Basin Creek area prior to dumping, a high-cost operation. More distant sites would be even less attractive because the longer haulage routes would disturb greater surface areas, other drainage basins, and possibly migratory game routes.

The Bruno Creek area was considered for an overburden disposal site but it is the first option for the tailings impoundment, and was therefore eliminated from further consideration.

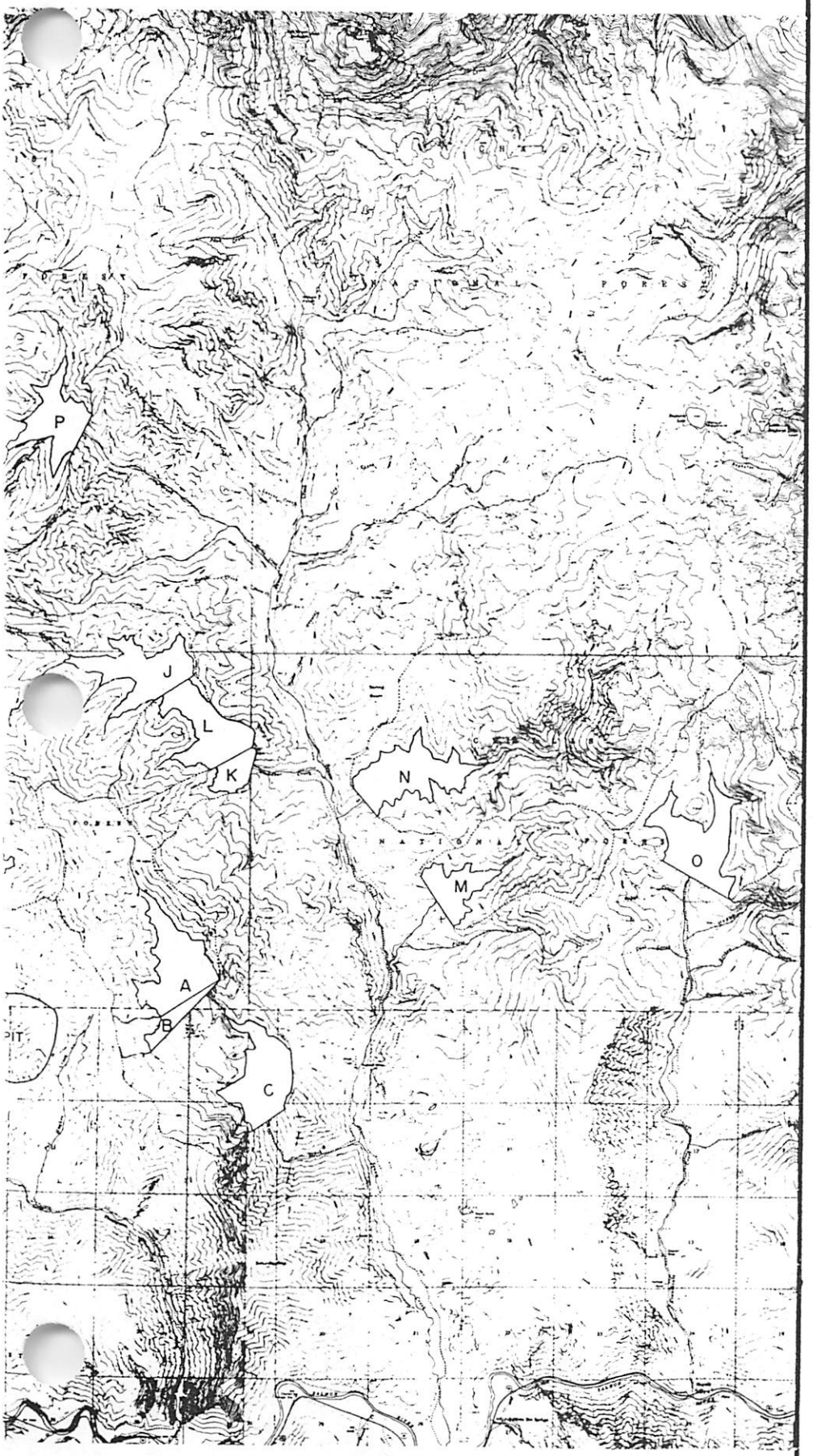
Therefore, areas in Buckskin Creek, Unnamed Creek and Pat Hughes Creek were selected for waste dumps.

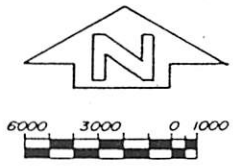
The waste dumps will be designed and constructed to ensure that base or mass failure will not occur. The overburden and waste rock will be hauled from the pit to the dumps in 170-ton trucks. When each dump is completed, the top will be covered with topsoil and seeded. The outer faces of the dumps will be revegetated or otherwise stabilized, and will be visually compatible with the talus slopes in the area.

4.3.2.3 Tailings Impoundment

Several sites within an eight-mile radius of the mine were evaluated as potential tailings disposal sites. The sites are shown on Figure 4-1. Important factors for comparing sites included:

(1) Minimum upstream drainage areas above impoundment.
(2) Maximum distance to major streams.
(3) Minimum distance from potential concentrator sites to minimize energy requirements.
(4) Minimum number and size of sites.
(5) Required capacity of 200 million tons.
(6) Potential for future expansion.
(7) Type and difficulty of conveyance of the tailings.

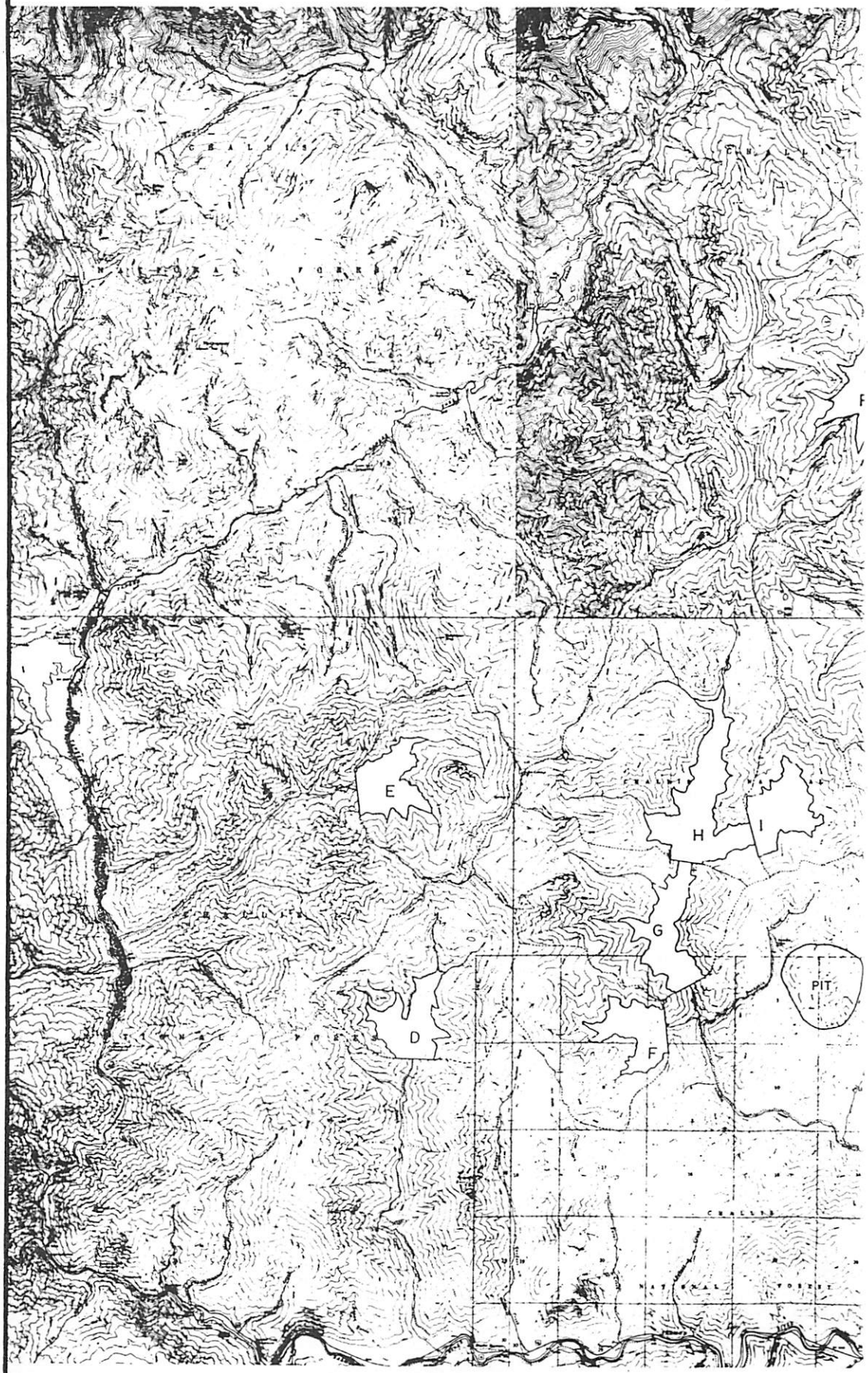




THOMPSON CREEK PROJECT
CYPRUS MINES CORPORATION

ALTERNATIVE TAILINGS SITE LOCATIONS

FIGURE 4-1


E
H
I
G
PIT
D
F

The evaluation, based on these factors, indicated the following:

(1) Site I on Basin Creek does not meet the total capacity requirement, and would necessitate use of an additional impoundment. It would also require a 1 to 2 mile longer tailings slurry pipeline and a second pipeline system for the additional impoundment. There is no potential for future expansion. In addition, there is a lack of adequate space for a settling pond between the impoundment and Thompson Creek.

(2) Sites G and H on Thompson Creek both meet the storage requirements; however, a large drainage area above the impoundments would be involved and the impoundments would affect fish spawning and rearing in the stream. Construction of an impoundment on Thompson Creek would eliminate four miles of riparian habitat and would require increasing the size of the claim block. The impoundment would affect a permanent stream and has the potential for greater water quality impacts.

(3) Site F on Alder Creek does not meet capacity requirements and also would require a high pressure slurry pipeline across Thompson Creek. This could result in potentially greater water quality and fishery impacts from pipeline breaks or leaks. Site F requires a 600-foot embankment toe which would reach Thompson Creek, thereby restricting the area for a settling pond below the impoundment. This site is within 1/3 mile of summer goat habitat, and requires increased timber removal. It also would eliminate a prehistoric site.

(4) Sites J, K and L on Cinnabar Creek could be used in combination (Site J plus either Site K or Site L) to provide sufficient storage area. However, the distance from the mine is longer and slurry pumping would be required. Moreover, these sites do not present any advantages over closer sites.

(5) The remaining sites, Peach Creek (Site D), Ramey Creek (Site E), Martin Creek (Site P), Cash Creek (Site N), Second Creek (Site M) and Kinnikinnic Creek (Site O) are farther away from the mine, would require high pressure slurry pumping, and do not have any advantages over the other sites.

Construction of a tailings impoundment outside the drainages near the mine would create similar impacts of greater magnitude. These include: loss of larger amounts of habitat (i.e. summer big game, riparian and fisheries habitat), interference with migration patterns, visual impacts, timber loss on more productive lands, loss of recreational lands and some loss of livestock grazing areas.

The evaluation of the sites based on the above considerations indicated Bruno Creek Sites A/B* and C were the preferred locations for the tailings impoundment. Site A/B in the upper portion of the creek has the capacity to store the total tailings utilizing one embankment which would ultimately be 600 feet high. Site C, in the lower portion of the creek, also could store the total tailings. However, utilization of this site would require an embankment which would ultimately be 850 feet high and a saddle dam on the east ridge. In addition, preliminary site studies indicated a potentially karstic limestone condition in the east abutment which would require sealing treatment. Therefore, development of a tailings impoundment at Site C alone is considered infeasible. However, consideration has been given to the development of a dual impoundment system utilizing Site C together with a smaller Site A/B. Under this scheme, the embankment height at Site C lowers to a more reasonable 520 feet; the embankment height at Site A/B would be correspondingly lowered. The use of Sites A/B and C requires the duplication of the tailings system components, including pipelines, embankment drainage network, water reclaim system, and a starter embankment at each site to handle the probable maximum flood. This more than doubles the capital costs over the other options, and significantly increases operating costs.

4.3.2.4 Concentrator

The following considerations were used for evaluating potential site locations for the concentrator: 1) proximity to the mine, crusher and tailings impoundment; 2) sufficient elevation to allow gravity flow of tailings to the impoundment; 3) sufficient area for coarse ore storage with minimum site preparation; 4) minimum excavation requirements and 5) accessibility.

Based on these considerations, three potential sites were evaluated for location of the concentrator (see Figure 4-2). The following summarizes the significant findings.

Site A would:

- Provide an adequate area for facilities without significant excavation.
- Allow straight-line routing of a single-flight overland conveyor.
- Allow gravity flow of tailings to the impoundment area.

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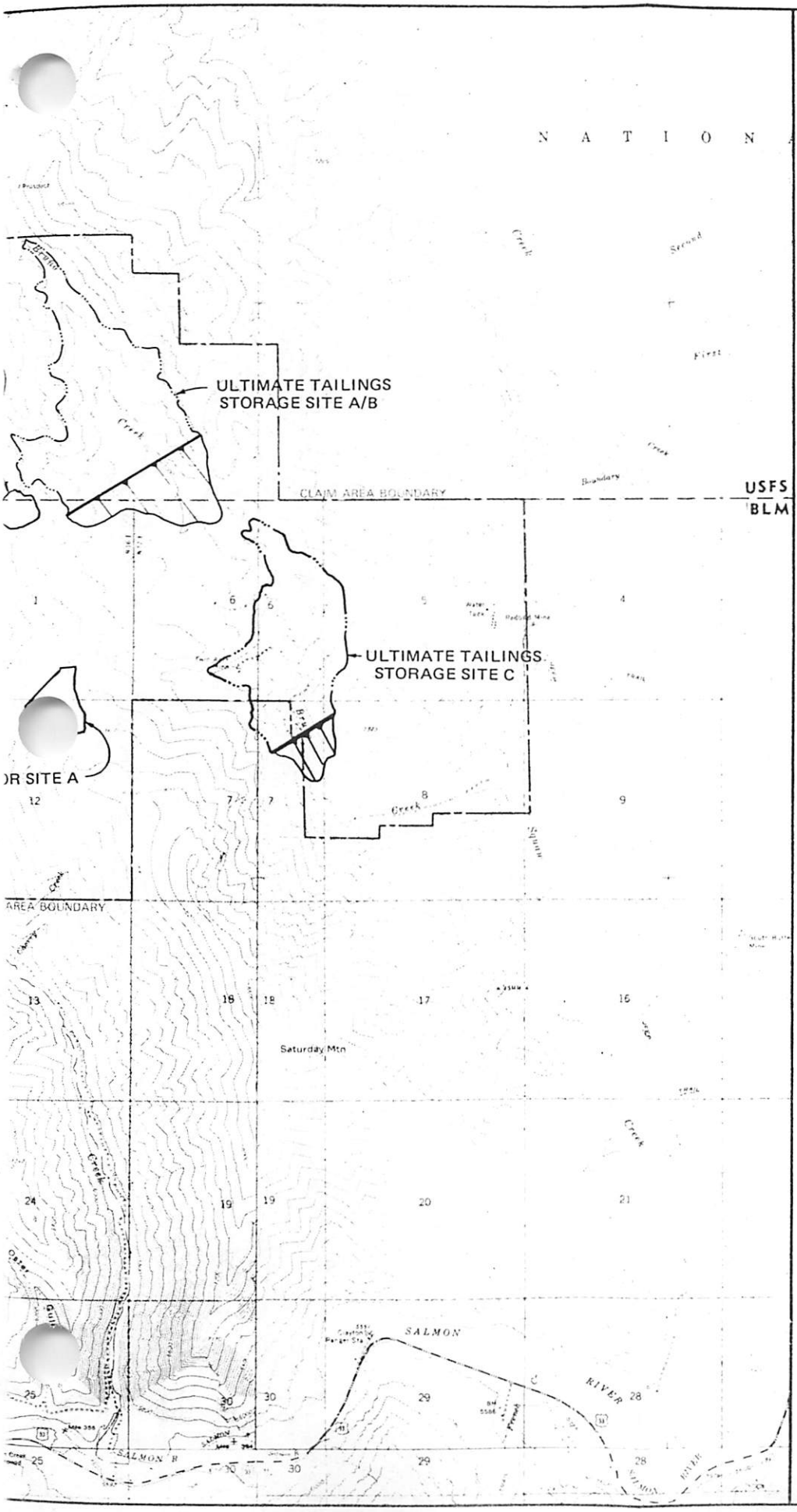
* Site A/B represents two embankment alignments for one tailings impoundment location; therefore this one impoundment site has been designated A/B. This designation is used herein to be consistent with other technical reports on the tailings disposal system.



LEGEND

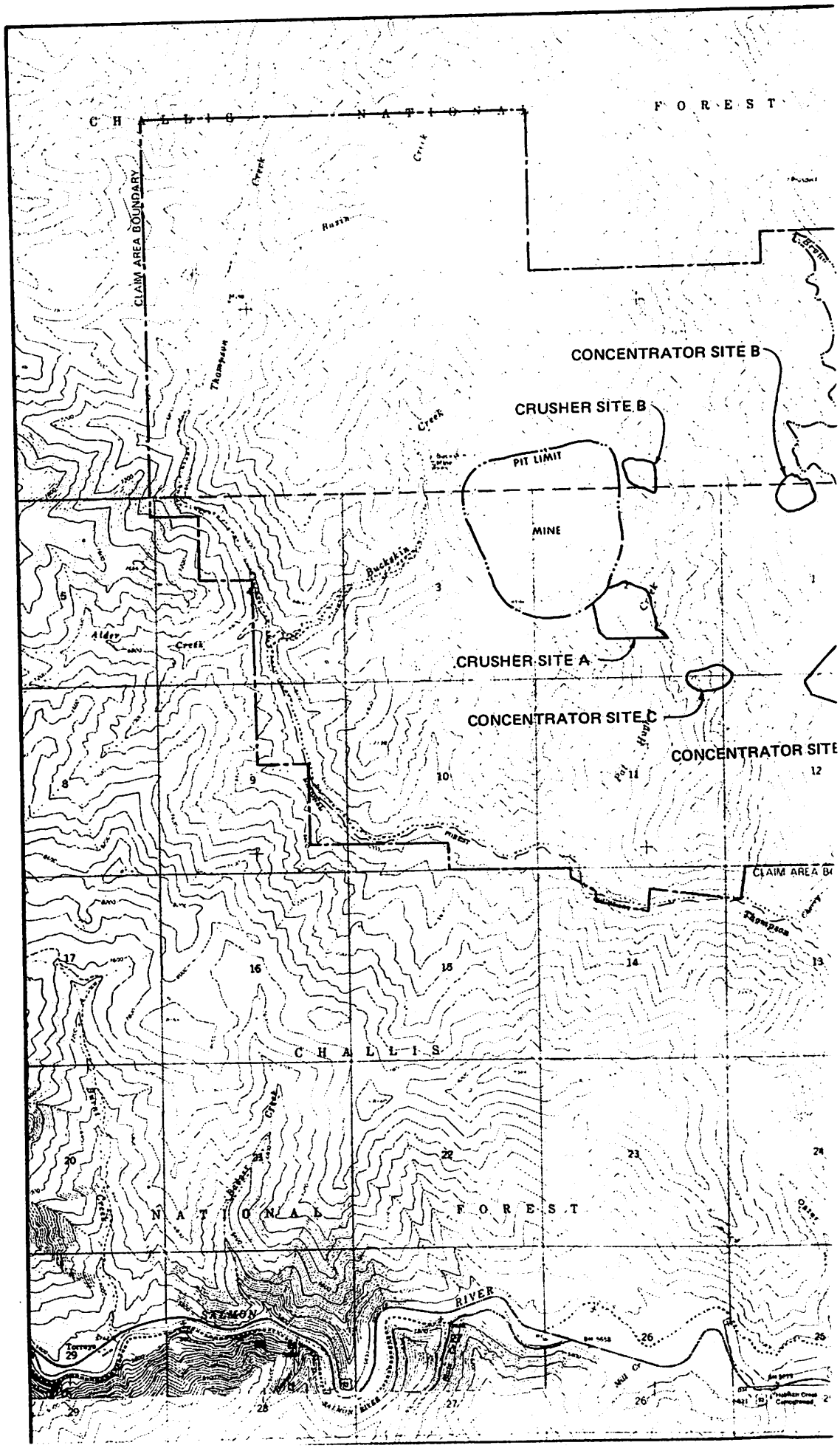
CLAIM AREA BOUNDARY

0 ¼ ½ ¾ 1 mile
SCALE

THOMPSON CREEK PROJECT
CYPRUS MINES CORPORATION

ALTERNATIVE CONCENTRATOR AND CRUSHER LOCATIONS

FIGURE 4-2


CLAIM AREA BOUNDARY
CONCENTRATOR SITE B
CRUSHER SITE B
PIT LIMIT
MINE
CRUSHER SITE A
CONCENTRATOR SITE C
CONCENTRATOR SITE
CLAIM AREA BO
CHALLIS
NATIONAL
FOREST
SALMON
RIVER
Thompson
Creek
Alder
Creek
Buckskin
Creek
Hurt
Creek
Baker
Creek
Mill Cr
Salmon River
Campground

- Require moderate cut and fill for the overland conveyor and service road.
- Utilize an access road along Squaw Creek.

Site B would:

- Provide an adequate area for facilities, but would require substantial excavation.
- Require a two-flight conveyor because of the higher lift.
- Use more energy because of the higher lift.
- Allow gravity flow of tailings to the impoundment area.
- Require significant cut and fill, including possible tunnel excavation, for the overland conveyor and service road.
- Utilize an access road along Squaw Creek.

Site C would:

- Not provide an adequate area for all facilities.
- Require pumping of tailings to the impoundment area.
- Require an access road along Thompson Creek.

For these reasons, Site C was eliminated from further consideration.

4.3.2.5 Crusher

Three factors are considered of primary importance in locating the crusher: 1) minimum truck haul distance and profile from the mine; 2) suitable rock foundation; and 3) outside the ultimate boundaries of the pit. The area required for the crusher is estimated to be approximately 44 acres. Based on these parameters, two crusher site options were selected (see Figure 4-2). Site A is located near the southeast rim of the pit at an elevation of 7,100 feet. Site B is near the northeast rim of the pit at an elevation of 7,850 feet. Disadvantages with Site B include a haulage profile with more vertical lift, greater distance of conveyance, and greater fuel consumption during operation. It also would require greater amounts of excavation for site development and hence greater initial capital costs. Also, Site B does not present any advantages over Site A. For these reasons, Site B was eliminated from further consideration.

4.3.2.6 Corridors

Access Road

A road will be required to provide access to the concentrator. Three options were considered; these are called the Bruno Creek, Redbird and Thompson Creek roads. The road would be utilized to transport workers, fuel and other supplies, and for shipping molybdenum concentrate.

The Bruno Creek access road would follow Squaw Creek from State Highway 75 to Bruno Creek. The road would then parallel Bruno Creek for approximately two miles before continuing to the concentrator site.

The Redbird road would have the same access from State Highway 75 as the Bruno Creek road. However, instead of following Bruno Creek from its intersection with Squaw Creek, the road would continue north up Squaw Creek for approximately 1-1/4 miles. From that point, the road would turn west for approximately 1-1/2 miles, then turn south and would rejoin the route of the proposed Bruno Creek road.

The third access road option considered is the Thompson Creek road. This road would have access from State Highway 75 near Thompson Creek and then follow Thompson Creek to Pat Hughes Creek. From that point, it would generally follow Pat Hughes Creek to the crusher site, then to the concentrator site.

The Thompson Creek road option was eliminated due to its greater distance, greater length of adverse grade, and interference with potential waste dump locations. Thus, only the Bruno Creek and Redbird roads will be considered further.

Utility Corridors

In addition to the access road options, corridor options for the power line and the water line were considered. There are two main options for the utility corridor: 1) follow the access road and 2) the Twin Apex route, which runs north from the water supply wells, then west to concentrator Site A. This latter route is appropriate only if used in conjunction with the concentrator Site A option.

4.4 Formulation and Description of Alternatives

4.4.1 No Action Alternative

For purposes of this environmental evaluation, the No Action Alternative is defined as no development of the project.

4.4.2 Project Alternatives

Three feasible project alternatives, in addition to the No Action Alternative, were developed from the evaluation of viable components. These are summarized in Table 4.4-1. The major differences in the alternatives are the location of the tailings impoundment and concentrator. The alternatives are arbitrarily numbered 1 through 3.

Access to all alternatives utilizes Squaw Creek Road from U.S. Highway 75 up to the confluence of Bruno and Squaw Creeks. At this junction there are two options: the Bruno Creek or Redbird roads. The Redbird option has a slightly greater potential for sedimentation to Squaw Creek because of the greater area that would be disturbed, the steep grade and the direct drainage to Squaw Creek. Similarly, adverse fisheries effects are potentially greater for the Redbird option. Adverse wildlife impacts also are potentially greater since the upper area of the Squaw Creek drainage is an important elk winter use area. For these reasons, the Redbird road is considered a less desirable option. Therefore, the Bruno Creek access road is preferred for Alternatives 1 and 2. For Alternative 3, the only feasible option is the Redbird access road because of the location of the tailings impoundment.

The preferred corridor option for the power line and water line is to follow the access road. Routing the utilities along the access road minimizes the area disturbed and allows for multiple use of the same general corridor. The Twin Apex route to concentrator Site A is shorter; however, use of this route would disturb additional areas on steep slopes that otherwise would be left undisturbed. For these reasons, the option of following the Bruno Creek access road is preferred for Alternatives 1 and 2. For Alternative 3, the more feasible option is the Twin Apex route because of construction difficulties and the length of pipeline and power line that would be required if the Redbird access road were followed.

Alternative 1

This is the alternative proposed by Cyprus Mines and is described in detail in Appendix B. Table 4.4-2 summarizes the major physical considerations associated with this alternative and Figure 4-3 shows the geographic aspects of the project components.

Alternative 2

The major difference between this alternative and Alternative 1 is the location of the concentrator at Site B. The coarse ore conveyor requires two flights and more cut and fill. This alternative would reduce the distance of the tailings slurry line and reclaim water line between the concentrator and the tailings impoundment. Table 4.4-2 summarizes the major physical considerations associated with this alternative, and Figure 4-4 shows the geographic aspects of the project components. This alternative is basically the same as the proposed development addressed in the 1975 Environmental Impact Assessment.

TABLE 4.4-1

THOMPSON CREEK PROJECT ALTERNATIVES

Alternative Number (a)	Tailings Impoundment Site	Mined Ore Conveyance	Crusher Site	Concentrator Site	Crushed Ore Conveyance	Access Road	Water Line	Power Line
1	A/B	Truck	A	A	Conveyor	Bruno Creek road	Follows access road	Follows access road
2	A/B	Truck	A	B	Conveyor	Bruno Creek road	Follows access road	Follows access road
3	A/B & C	Truck	A	A	Conveyor	Redbird road	Twin Apex route	Twin Apex route

(a) The preferred option for tailings embankment construction for all alternatives is the centerline method using cycloned tailings sand. In addition, the waste dump locations are the same for the three alternatives.

Alternative 3

This alternative is similar to Alternative 1 but would utilize tailings disposal Sites A/B and C in the upper and lower portions of Bruno Creek. The location of the crusher, concentrator and overland conveyor are the same as Alternative 1. The Bruno Creek road for access would not be possible and the Redbird road, passing to the north of the Site C tailings impoundment, would be required. The utility corridor would follow the Twin Apex route. Table 4.4-2 shows the major physical considerations associated with this alternative and Figure 4-5 shows the geographic aspects of the project components.

TABLE 4.4-2

MAJOR PHYSICAL CONSIDERATIONS FOR ALTERNATIVES

	Alternatives 1	2	3
Distance from southeast rim of mine to crusher site (feet)	1,000	1,000	1,000
Conveyor distance from crusher site to concentrator site (feet)	7,200	6,600	7,200
Conveyance profile from crusher site to concentrator site (elevations)	7,100 up to 7,600	7,100 up to 7,800	7,100 up to 7,600
Distance from concentrator site to tailings impoundment site (feet)[c]	6,600	3,000	6,600[a] 7,600[b]
Length of access road to concentrator[d]			
- Bruno Creek Road (miles)	7.3	6.9	--
- Redbird Road (miles)	--	--	7.8
Number of stream crossings[e]			
- Bruno Creek Road	2	2	--
- Redbird Road	--	--	2

[a] To Tailings Impoundment A/B

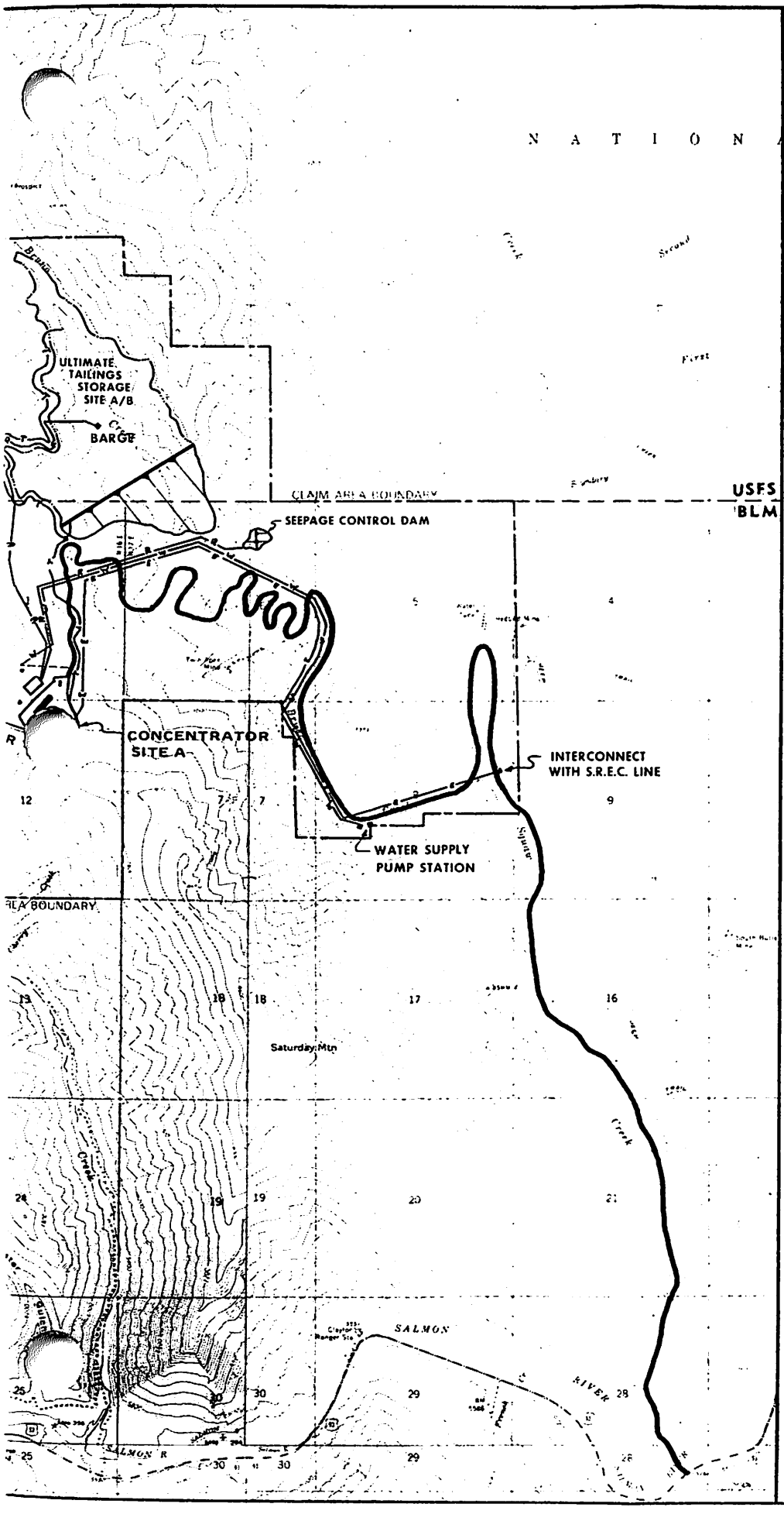
[b] To Tailings Impoundment C

[c] Measured from nearest edge of concentrator site to center of tailings embankment.

[d] Measured from confluence of Bruno and Squaw Creeks.

[e] Includes only major stream crossings between confluence of Bruno and Squaw Creeks and concentrator site (excludes ephemeral streams).

NOTE: All distances and elevations are approximate.



LEGEND

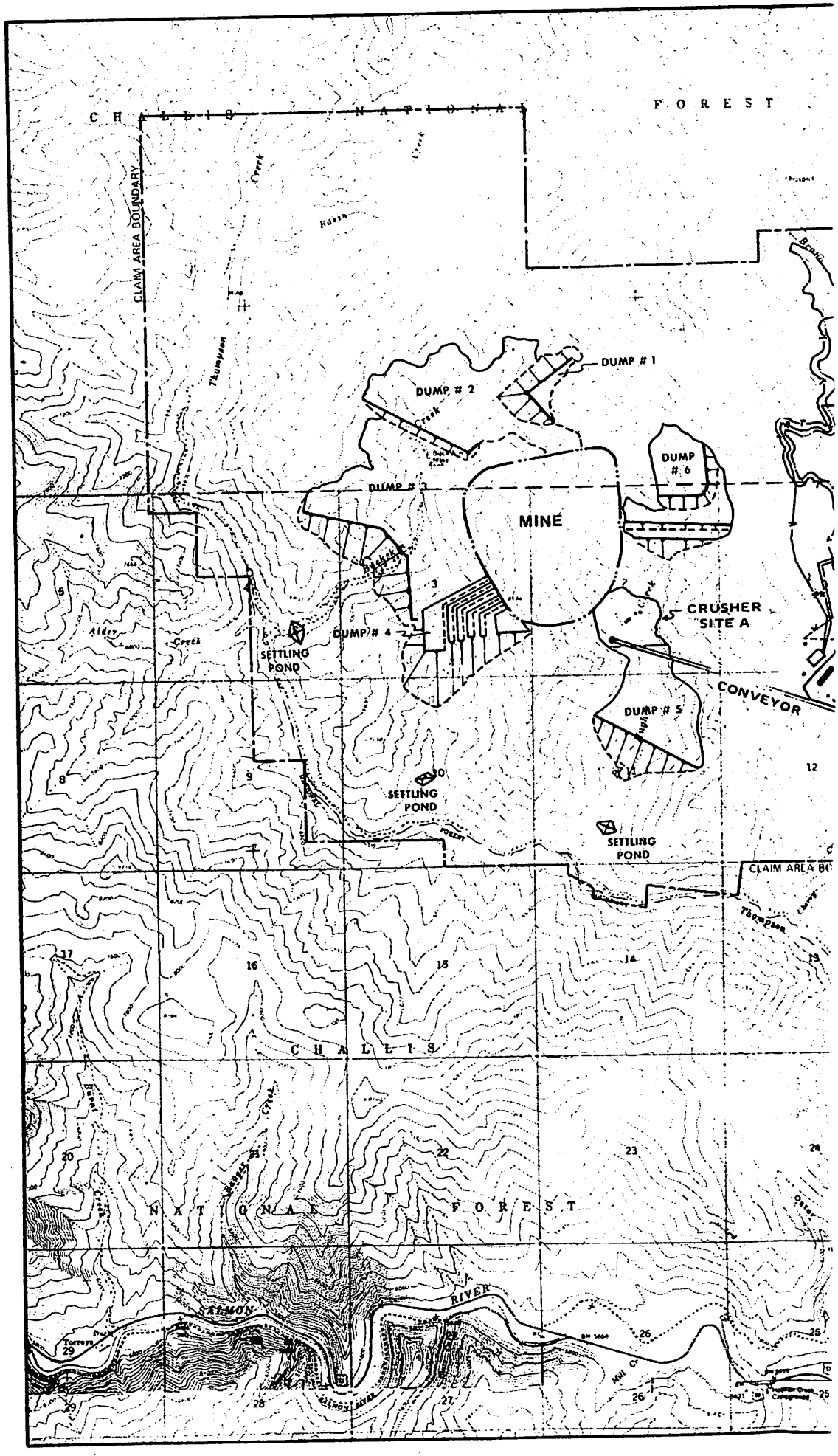
- CLAIM AREA BOUNDARY
- ACCESS ROAD
- E POWER LINE
- W FRESH WATER PIPELINE
- R RECLAIM WATER PIPELINE
- T TAILINGS WATER PIPELINE

0 ¼ ½ ¾ 1 mile
SCALE

THOMPSON CREEK PROJECT
CYPRUS MINES CORPORATION

ALTERNATIVE 1

FIGURE 4-3


CHALLIS NATIONAL
FOREST
CLAIM AREA BOUNDARY
Thompson Creek
Raven Creek
DUMP # 1
DUMP # 2
DUMP # 3
DUMP # 4
DUMP # 5
DUMP # 6
MINE
CRUSHER SITE A
CONVEYOR
SETTLING POND
SETTLING POND
SETTLING POND
Alder Creek
Bear Creek
Bear Creek
CLAIM AREA BO
Thompson
CHALLIS
NATIONAL FOREST
SALMON RIVER
Mill Cr
Torrey
Hoffer Creek Campground

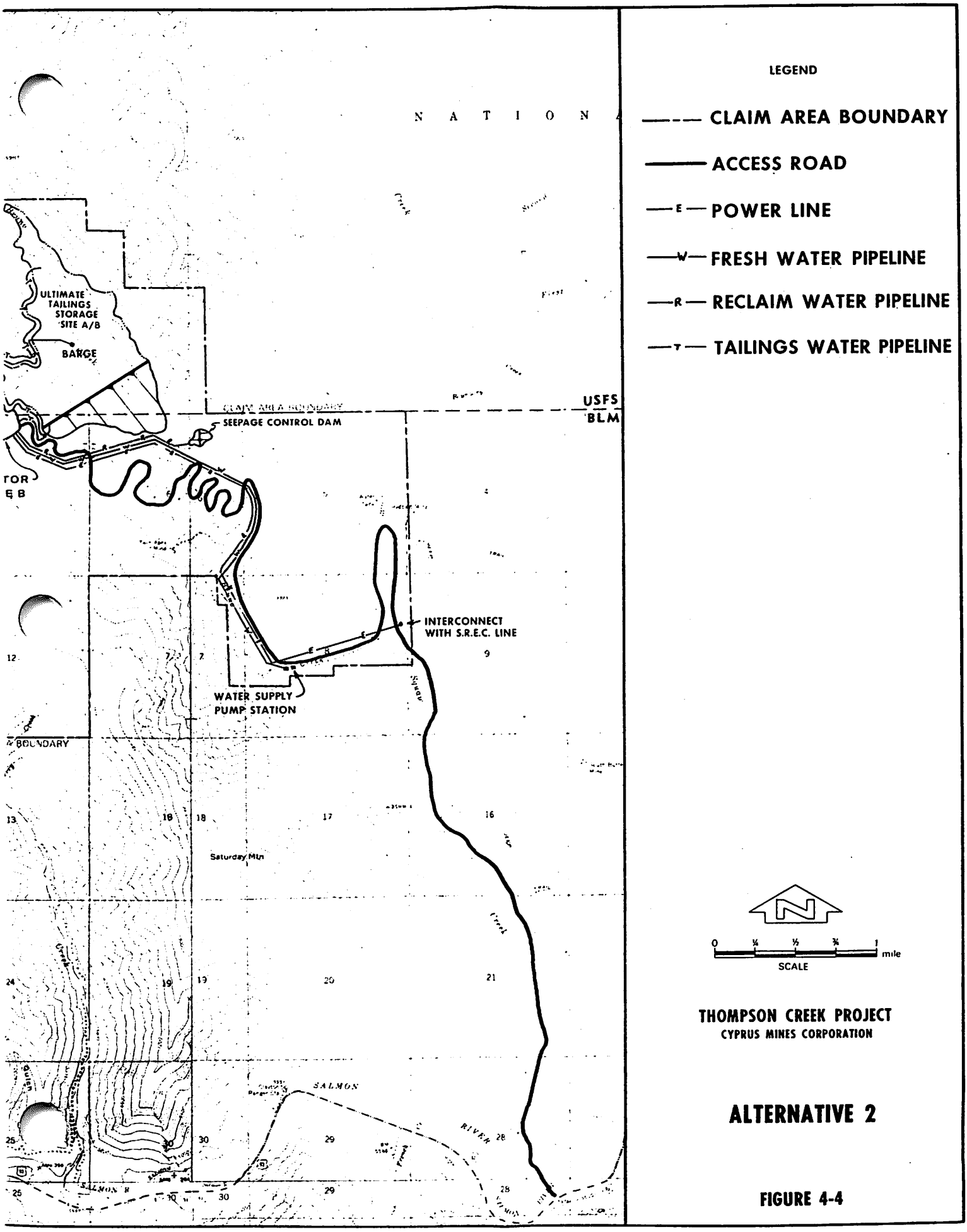
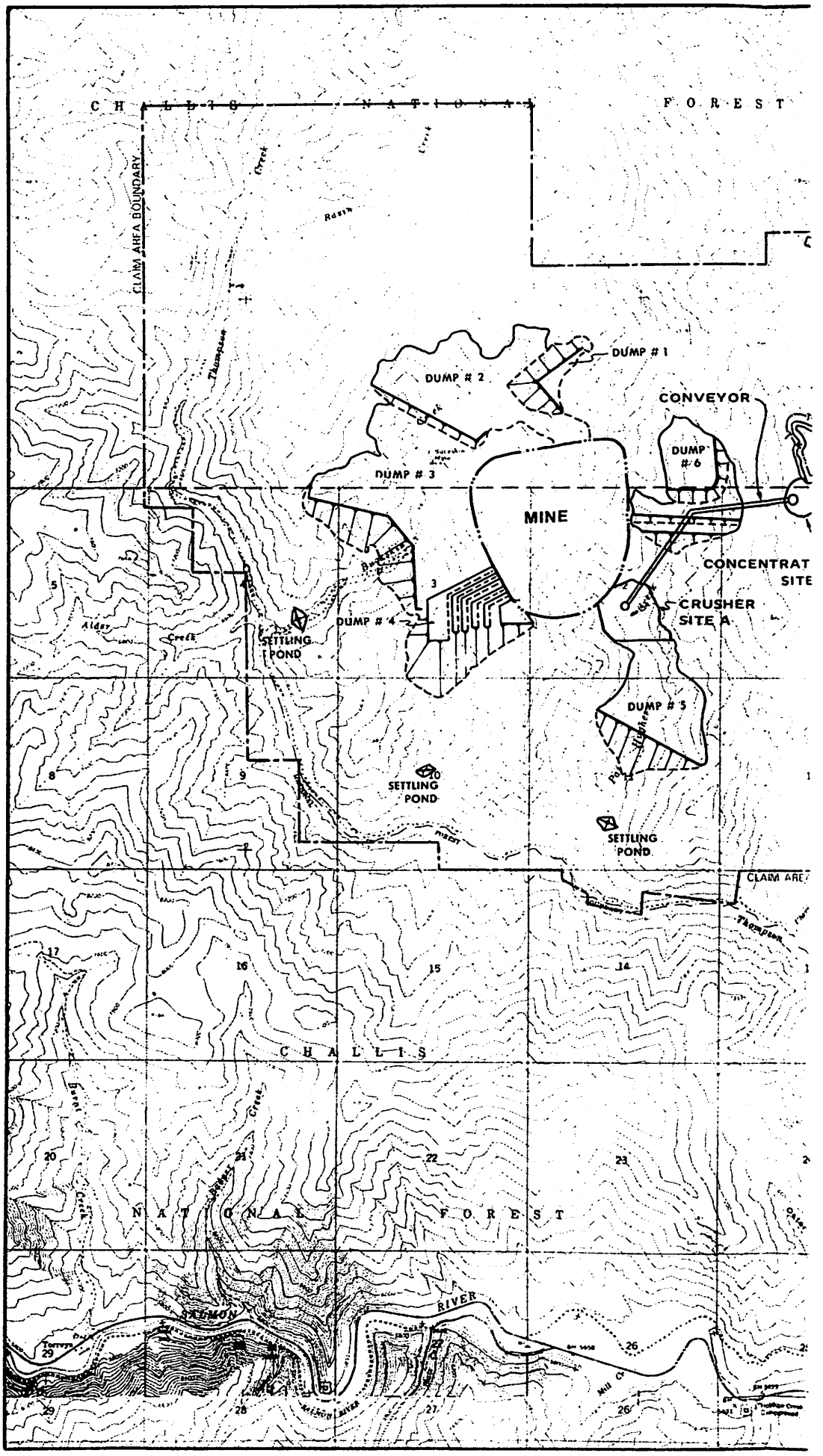
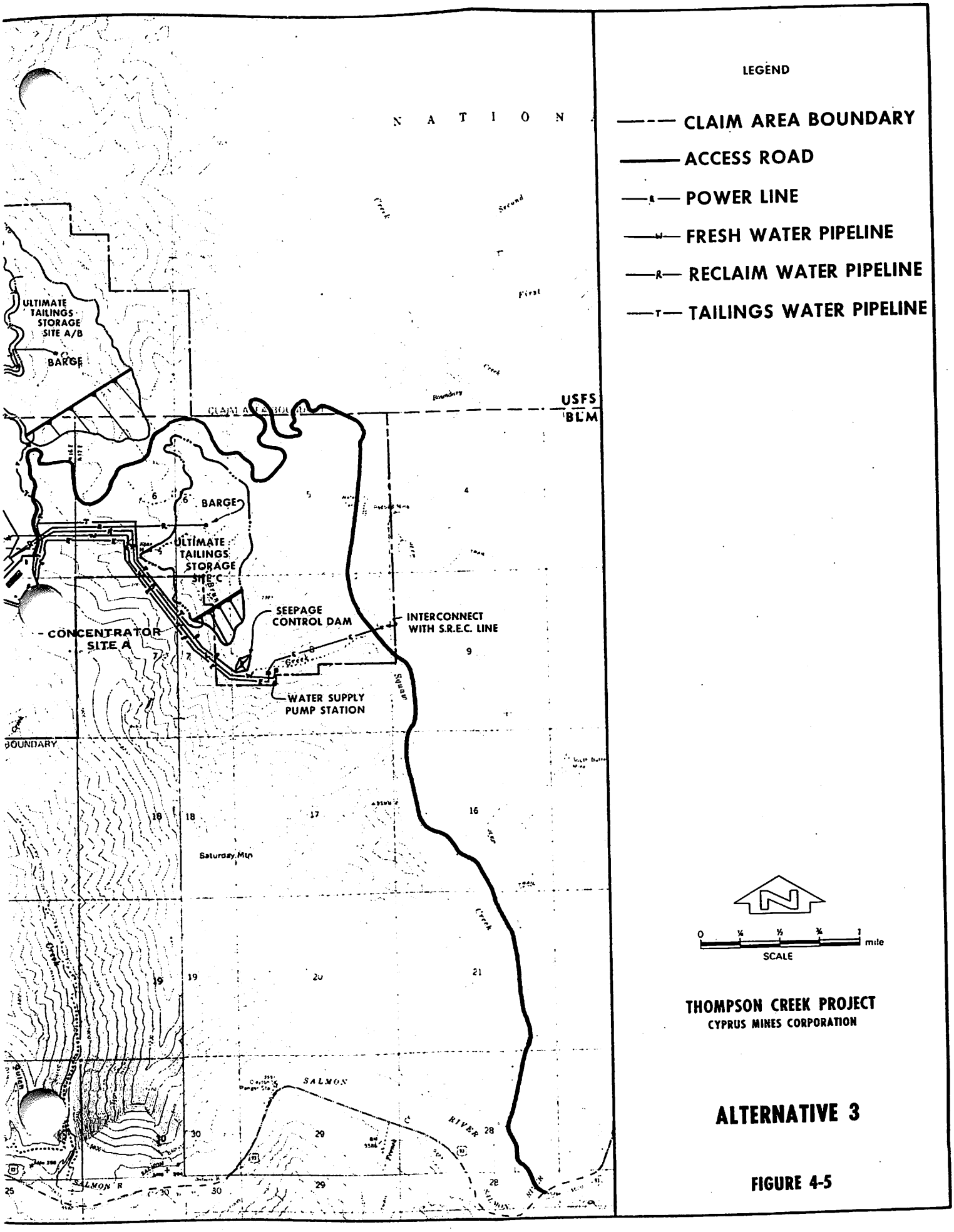
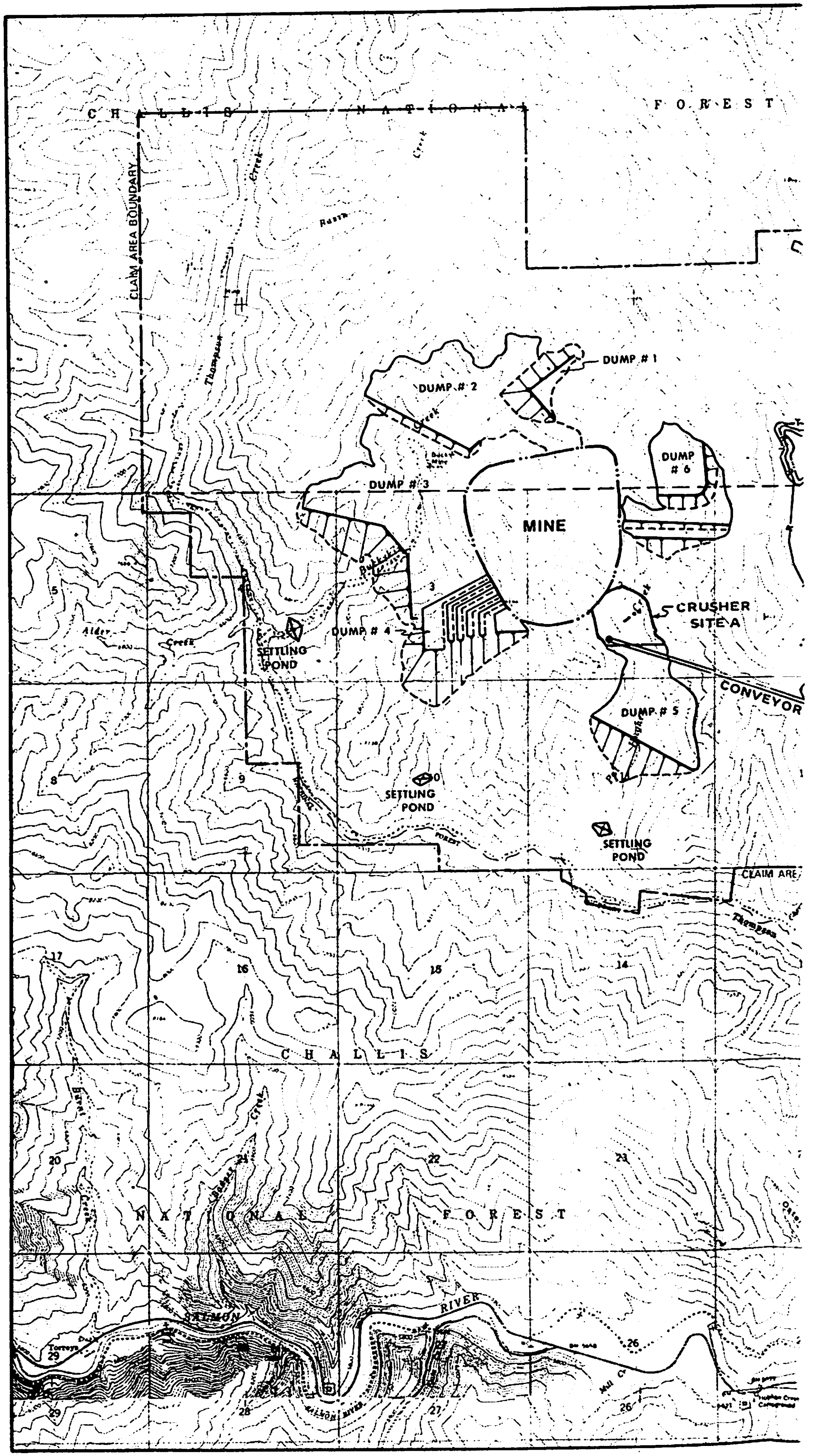

LEGEND
CLAIM AREA BOUNDARY
ACCESS ROAD
POWER LINE
FRESH WATER PIPELINE
RECLAIM WATER PIPELINE
TAILINGS WATER PIPELINE
N A T I O N
ULTIMATE TAILINGS STORAGE SITE A/B
BARGE
USFS
BLM
SEEPAGE CONTROL DAM
INTERCONNECT WITH S.R.E.C. LINE
WATER SUPPLY PUMP STATION
Saturday Mtn
SALMON
RIVER
0 ¼ ½ ¾ 1 mile
SCALE
THOMPSON CREEK PROJECT
CYPRUS MINES CORPORATION
ALTERNATIVE 2

FIGURE 4-4


CHALLIS NATIONAL FOREST
CLAIM AREA BOUNDARY
DUMP # 1
DUMP # 2
DUMP # 3
DUMP # 4
DUMP # 5
DUMP # 6
CONVEYOR
MINE
CONCENTRAT
SITE
CRUSHER
SITE A
SETTLING POND
SETTLING POND
SETTLING POND
CLAIM ARE
CHALLIS
NATIONAL FOREST
SALMON RIVER
Thompson Creek
Alder Creek
Barrel Creek
Mill Cr


LEGEND
CLAIM AREA BOUNDARY
ACCESS ROAD
POWER LINE
FRESH WATER PIPELINE
RECLAIM WATER PIPELINE
TAILINGS WATER PIPELINE
N A T I O N
ULTIMATE TAILINGS STORAGE SITE A/B
BARGE
USFS
BLM
BARGE
ULTIMATE TAILINGS STORAGE SITE C
SEEPAGE CONTROL DAM
INTERCONNECT WITH S.R.E.C. LINE
CONCENTRATOR SITE A
WATER SUPPLY PUMP STATION
Saturday Mtn
SALMON
RIVER
0 ¼ ½ ¾ 1 mile
SCALE
THOMPSON CREEK PROJECT
CYPRUS MINES CORPORATION
ALTERNATIVE 3
FIGURE 4-5



CHALLIS NATIONAL FOREST
CLAIM AREA BOUNDARY
DUMP # 1
DUMP # 2
DUMP # 3
DUMP # 4
DUMP # 5
DUMP # 6
MINE
CRUSHER SITE A
CONVEYOR
SETTLING POND
SETTLING POND
SETTLING POND
CLAIM ARE
Alder Creek
Thompson Creek
Buckskin Creek
CHALLIS
NATIONAL FOREST
SALMON RIVER
Mill Cr

4.5 Mitigation Measures

This section describes mitigation measures and techniques designed to reduce or eliminate impacts. Included within this discussion are management constraints and guidelines required by the Forest Service and BLM. In addition to the mitigation measures described below, there are environmental requirements associated with the various permits, licenses and approvals necessary for the project (see Section 1.5).

Mitigation measures also have been incorporated into the design of the project; these are discussed in Appendix B. In addition to the project design measures, Cyprus Mines will develop and implement a plan for reclamation of disturbed land. This plan will be subject to review and approval by the Forest Service, BLM and the State of Idaho. As the first step in this process, Cyprus Mines has prepared a Conceptual Reclamation Plan which is presented in Appendix C. The plan includes mitigation measures in addition to those presented below.

4.5.1 Atmospheric Emissions

Three specific project components have been designed to minimize particulate emissions:

1. Ore will be transported from the mine to the concentrator by means of a continuous, covered belt conveyor.

2. The ore feed system at the concentrator will be located underground.

3. The ore concentrating process is a wet process (flotation).

The individual control systems for other major facilities are discussed below.

Gyratory Crusher Spray System

Water will be sprayed at the feed hopper and at the base of the crusher. A surfactant will be dissolved in the water which will improve particle attraction with resulting improvements in control efficiency. The ore will be crushed to a minus 8-inch size so that significant amounts of fine material should not be generated.

Ore Feed Venturi Scrubber System

Material will be transported from the coarse ore stockpile to the concentrator by an underground system of conveyors, with emissions from the transfer points being vented to a Venturi scrubber. This scrubber system would control particulate matter in the 1-2 micron size range.

Concentrate Dryer Scrubber System

A scrubber system will be employed to control the emissions from a Holo-Flite dryer.

Fugitive Sources

Fugitive dust emissions will be kept to a minimum by several techniques:

- Surface areas disturbed during construction and operation will be minimized.
- Exposed areas will be mulched or otherwise treated to prevent erosion.
- Road surfaces will be sprayed lightly for dust abatement.

Oxides of Nitrogen, Carbon Monoxide and Hydrocarbon Emissions

These emissions will be kept to a minimum by the implementation of the following measures:

- Minimize truck travel distance and time. Keeping the travel time as short as possible will ensure that fuel usage will be minimized and, therefore, air pollution emissions will be kept as low as possible.
- Vehicles will be serviced regularly and maintenance work will be performed in accordance with the manufacturer's specifications. These measures will ensure that equipment is kept in good condition and that air pollution control systems are functioning properly.

4.5.2 Noise

The manufacturer's recommended service and maintenance schedules will be followed to maintain equipment noise levels as low as practicable.

To limit potential impacts from blasting, this activity will be of short duration (generally occurring over a period of one hour). In addition, blasting will be limited to the daylight hours, generally when manpower exposures are lowest (i.e., during shift changes, lunch periods, etc.).

4.5.3 Liquid Effluents

A system of blanket and finger drains will be constructed within the tailings embankment and at the foundation level. Water drained from the embankment will be collected in the seepage control pond.

Water which seeps into the soils and rock underlying the embankment will be monitored with observation wells. Captured surface water will be pumped back to the impoundment or directly to process water storage, as will ground water from monitor wells if it is polluted. Any water released to stream channels will be treated if required.

Settling ponds will be constructed below waste dump areas to receive runoff and allow for sediment settling prior to discharge to surface waters. Discharges will be required to meet NPDES effluent limitations. The effluent limitations have not been established at this time. On April 14, 1980, Cyprus Mines submitted an NPDES Permit Application to EPA, Region X. The application is being reviewed. If monitoring indicates that the water exceeds effluent limitations, it will be treated, as appropriate, prior to discharge.

Interception ditches will be constructed near tailings pipelines to prevent any spilled materials from entering stream courses.

All sewage will be collected and treated in an approved manner for eventual release (see Appendix B for a discussion of treatment systems).

Petroleum products, chemicals, and volatile materials will be stored in durable containers or impermeable containment structures. This storage will be such that any accidental spillage will be contained and will not drain into any watercourse.

4.5.4 Solid Waste

Garbage will initially be disposed of at the Challis Sanitary Landfill and later in the waste dumps on-site (see Appendix B for further details). Other demolition wastes generated during construction and operation will be buried in permitted landfills according to Idaho regulations.

4.5.5 Erosion and Sedimentation Control

- Vegetation will be removed only in those areas directly affected by project activities.
- Topsoil will be stockpiled and stabilized for later use in revegetation.
- All cut-and-fill slopes for the conveyor and service roads will be designed to prevent soil erosion. Drainage channels will be incorporated where necessary. Disturbed slopes will be revegetated or otherwise stabilized to prevent erosion.
- Fill slopes adjacent to streams will be rip-rapped or revegetated as a means of permanent erosion control.

- Embankment slopes will be graded and revegetated to prevent erosion.

- Runoff from roads, buildings and other structures will be handled through standard engineering control measures.

- Sediment traps, settling ponds, berms and other engineering measures will be used to minimize the amount of sedimentation during construction and operation.

- Abutments for new bridges and roads will be located and constructed so as not to alter or cause sedimentation in stream channels. Bridge decks will completely span all streams to eliminate the need to enter the stream bed during bridge erection.

- Off-road vehicle travel will be kept to a minimum.

- During tailings impoundment construction, Bruno Creek will be diverted around affected areas to minimize erosion.

- The tailings pipeline berms will be revegetated after pipeline installation.

Selective scheduling and close supervision of construction activities will be directed toward minimizing potential sedimentation in streams. Streams will be monitored to permit timely detection of significant sedimentation processes resulting from construction of project facilities. If significant sedimentation occurs, construction activities will cease until remedial actions are taken to prevent further sedimentation and to eliminate the source(s) of significant sedimentation.

Erosion control for permanent roads will be incorporated into the design of the road. To determine appropriate control measures, the following factors will be considered:

- Cut and fill slope length and steepness.
- Number and type of stream channel crossings.
- Road surface materials.
- Timing of and length of disturbance to vegetation.
- Reclamation plans for long-term stabilization.
- Roadside drainage.

Following the construction of permanent roads, the roadside will be stabilized. Stabilization will be provided by one or more of the following techniques:

- Reclamation during the first planting season following construction.

- Rip-rapping of slopes.
- Topsoil prestripping and replacement.
- Seeding with a drill on flatter slopes or by broadcasting on steeper slopes.
- Fertilization to appropriate nutrient levels.
- Application and anchoring of suitable mulches.
- Weed control for noxious weeds.
- Retaining walls where necessary.

All areas which are disturbed during construction, which will not continue to be used during operation, will be revegetated for permanent erosion control.

Waste dumps will be contoured to permit free runoff of precipitation. Drainages will be routed around waste dumps to minimize contact with loose sediment. The setting pond embankment surfaces will be stabilized with vegetation or rock cover as soon as practicable to provide erosion protection. The surface of the tailings impoundment will be similarly protected to prevent wind or water erosion.

4.5.6 Fisheries

In order to mitigate the fisheries impact on Bruno Creek, Cyprus Mines has committed to attempting to restore Squaw Creek as a viable anadromous fishery. The elimination of the small population of native cutthroat trout in Bruno Creek could be offset by the establishment or expansion of anadromous fisheries on Squaw Creek (i.e., salmon, steelhead). Downstream of its confluence with Bruno Creek, all or nearly all of the flow in Squaw Creek is diverted during the growing season for agricultural uses. This diversion virtually renders Squaw Creek dry and prevents the establishment of anadromous salmon fisheries therein because the diversion period and migration/spawning cycle coincide in time. To alleviate these conditions, Cyprus Mines has acquired some water rights on Squaw Creek, and is currently engaged in negotiations with the remaining landholder regarding installation of a new headgate for diversion and an agreement to allow flow of Cyprus water to bypass his diversion point. With a minimum flow in lower Squaw Creek, the Idaho Department of Fish & Game believes that anadromous fish will utilize the creek as a spawning area.

4.5.7 Terrestrial Vegetation and Wildlife

Mitigation to reduce the degree of interference to migration will include: use of the Thompson Creek road only for emergencies or under unusual circumstances; minimum rights-of-way along all roads to

minimize loss of vegetation cover; posted and enforced speed limits; controlled access; minimum fencing; appropriate big-game passageways approximately every quarter mile along the overland conveyor and above-ground pipelines. In addition, Cyprus Mines will provide funding for a wildlife study program to monitor big game migration patterns and the size, health and composition of local big game populations.

Mitigation of impacts associated with habitat loss will seek to reduce the disturbance of wildlife habitat and wildlife populations within the claim boundaries. The destruction of vegetation will be limited to those areas directly affected by project activities. Cyprus Mines has committed to work with the resource agencies regarding habitat improvement, both on-site and off-site. Cyprus Mines will cooperate in wildlife studies to examine habitat loss and develop recommendations for enhancing habitat, if necessary. Cyprus Mines has committed to work with the agencies in implementing appropriate mitigation measures.

With agency approval, hunting will be entirely prohibited within the claim area. No unnecessary off-road travel by machinery or vehicles will be allowed. Appropriate signs will be posted in the project area.

The anticipated adverse effects resulting from increased human population levels in Challis and the surrounding areas are considered to be the most significant impact to wildlife resulting from the proposed project. Mitigation for these effects will require cooperation of local, state and Federal agencies as well as Cyprus Mines. Measures which Cyprus Mines will take include: educating its employees as to wildlife management and fish and game laws, including development of an Environmental Awareness Training Program; developing rules and policies regarding the conservation and protection of wildlife; cooperation with enforcement agencies by taking strong disciplinary action against any employee violating company policies or local fish and game regulations, including termination of any employee convicted of willfully violating a fish and game regulation; and funding for one additional Fish and Game Conservation Officer in the Challis area at least through 1984.

4.5.8 Cultural Resources

A Memorandum of Agreement is currently being negotiated with the Advisory Council on Historic Preservation. The Memorandum will contain stipulations to avoid or satisfactorily mitigate unavoidable adverse effects to significant cultural properties. The Forest Service and BLM will ensure that Cyprus Mines will carry out the following measures:

- Prior to commencement of any project-related ground disturbance, locate, identify, and evaluate archaeological, architectural, or historic cultural resources within the area of impact that appear to meet the criteria for listing in the

National Register of Historic Places through ground surveys and other appropriate techniques, including, but not limited to archival research and oral history.

- Avoid by project design or by relocation, where prudent and feasible, those cultural resources that appear to meet the criteria or have been determined eligible by the Secretary of the Interior for listing in the National Register of Historic Places.

- Develop and implement, in consultation with the Forest Service, BLM, and State Historic Preservation Officer (SHPO), appropriate means for protecting cultural resources that appear to meet the criteria or have been determined eligible by the Secretary of the Interior for listing in the National Register of Historic Places.

When it is neither prudent nor feasible to avoid a cultural resource, the Forest Service or BLM, depending upon Federal jurisdiction, or the Forest Service in the case of private ownership, shall:

- Ensure that Cyprus Mines institutes a data recovery program if it is determined that the affected cultural resource meets the criteria for listing in the National Register principally because it may be likely to yield information important in prehistory or history and that it meets all the criteria detailed in Part I of the Council's "Guidelines for Making 'Adverse Effect' and 'No Adverse Effect' Determinations for Archaeological Resources in Accordance with 36 CFR Part 800" (Guidelines). This recovery plan will be developed and implemented in consultation with the SHPO in accordance with Part II of the Council's Guidelines, without affording the Council further opportunity to review and comment;

- Ensure that Cyprus Mines institutes a data recovery program for historic structures if it is determined that the affected properties meet the criteria for listing in the National Register principally because they may be likely to yield information concerning local building techniques and folk architecture. This data recovery program will be developed and implemented in consultation with the SHPO, without affording the Council further opportunity to review and comment;

- If it is determined that the affected cultural resource appears to meet the criteria for listing in the National Register for other reasons, or that it does not meet the criteria detailed in Part I of the Guidelines, the Forest Service or BLM will seek a determination of eligibility from the Secretary of the Interior, consult with the SHPO to determine the nature of the undertaking's effects, and forward to the Executive Director of the Council for comment

a preliminary case report and a proposal for a course of action to be implemented, developed in consultation with the SHPO, that would mitigate the adverse effect.

During the implementation of any ground disturbing activity that would be covered by the Memorandum, should previously unknown cultural resources be discovered on Federal or private lands, Cyprus Mines agrees to delay the activities within the area of impact until the Forest Service or BLM has had an opportunity to consult with the SHPO and comply, as appropriate, with the above provisions.

4.5.9 Socioeconomics

Since mid-1979, Cyprus Mines representatives have been meeting with local officials and interested citizens to discuss housing, schools, sewage, water supply, transportation and related matters to determine potential long-term requirements. From these efforts, certain plans have been developed to satisfy the anticipated growth in demand for local services. The work accomplished to date is summarized below. Since one of the primary areas of concern is the requirement for construction of facilities prior to the receipt of tax revenues, the use of provisions in the Idaho Tax Code allowing prepayment of property taxes will be utilized.

Since housing of the non-local work force is a major concern, major planning efforts have been undertaken by the City of Challis and Custer County. Land use plans to accommodate Cyprus Mines employee housing and related needs have been developed. A planning group composed of Cyprus Mines, local agencies, businessmen and developers has been involved in this effort. The two primary goals identified by this group are:

- Develop community expansion plans which are consistent with the long-range wishes and best interests of the City of Challis and Custer County.

- Provide housing at affordable prices and on a schedule consistent with the project schedule.

Specific mitigation measures which have been accomplished to date with the assistance of Cyprus Mines include the following:

- The City of Challis has obtained an EDA Planning Grant to fund a study on capital improvement needs and a capital improvement plan.

- A five-year capital improvements plan for Challis has been developed.

- The City Planning and Zoning Commission and the City Council have established:
  - new land use zoning districts to foster new commercial development which is complementary to the existing commercial core; and
  - new residential and subdivision ordinances.
- An annexation and development fee ordinance has been formulated to arrive at a "full cost pricing" method for assessing new developments to cover public services.
- The County Planning and Zoning Commission has formulated a county-wide planning and subdivision ordinance.

Other areas in which Cyprus Mines personnel have assisted city and county organizations include preparation of:

- Material for the HUD-EDA-FmHA water improvement project;
- Downtown development plan;
- Local development corporation and its work plan;
- Request for emergency EPA funds to repair sewer system;
- County solid waste disposal plan;
- Fire department applications for funding assistance;
- School facilities planning;
- School bus and communications equipment financing;
- Growth potential evaluations for local businesses, and
- Financial seminars for small businesses.

4.6 Environmental Monitoring

This section presents a general discussion of environmental monitoring programs for the project. The specific details of the monitoring programs will be developed jointly by Cyprus Mines, the Forest Service, BLM, and other agencies as appropriate. The monitoring programs will require presentation of collected data on a schedule determined by the Forest Service, BLM and other involved agencies.

The purpose of the monitoring programs is to determine the environmental changes that result from implementation of the project and to

evaluate the effectiveness of the mitigation measures described previously. The results of the programs will be reviewed by the regulatory agencies and Cyprus Mines. If environmental changes are judged to be significant and adverse, appropriate remedial measures will be implemented to reduce or eliminate project-related effects.

At present, the major areas which require environmental monitoring are:

- Surface and ground water quality and biological indicators during construction activities.
- Quantity and quality of the effluent released from the settling ponds below the waste dumps.
- Quantity and quality of water which seeps from the tailings impoundment, and stability of the tailings embankment.
- Stability of the waste dumps.
- Project effects on big game populations and migration routes.

The following monitoring programs will be implemented to address these issues.

4.6.1 Monitoring During Construction Activities

A construction monitoring program has been established by Federal and state agencies and Cyprus Mines. The monitoring program was developed by an interagency committee composed of the Forest Service, BLM, Idaho Department of Fish & Game, and Idaho Department of Health and Welfare (Division of Environment, Bureau of Water Quality). Cyprus Mines personnel will perform the monitoring. The interagency committee will oversee and review the results of the program. Compliance checking will be performed by the Bureau of Water Quality with assistance from the Forest Service.

The monitoring program includes the following elements:

- Surface water flows and quality
- Ground water quality
- Benthic macroinvertebrates
- Bed load sediment (physical and chemical analyses)
- Imbeddedness of spawning gravels

There will be nine surface water monitoring stations (3 on Squaw Creek, 2 on Thompson Creek and 1 each on Bruno, Buckskin, Unnamed and Pat Hughes Creeks). All nine stations will be sampled monthly during construction (approximately 2-3 years) for the following parameters:

Streamflow	Suspended solids
Temperature (water and air)	Total solids
pH	Total dissolved solids
Conductivity	Hardness
Dissolved oxygen	Alkalinity
Turbidity	
Sulfate	Total phosphate
Chloride	Nitrate
Cyanide	Total Kjeldahl nitrogen
Sodium	Total organic carbon
Potassium	Oil and grease
Calcium	Chemical oxygen demand
Magnesium	Lead
Arsenic	Manganese
Cadmium	Mercury
Chromium	Molybdenum
Copper	Selenium
Iron	Zinc

Ground water quality monitoring stations will be located at the:

- o Fresh water production wells on Bruno Creek.
- o Existing monitor well on lower Buckskin Creek.
- o Fresh water well for the construction camp.
- o Makeup water well and two manholes located down gradient from the construction camp sewage treatment facilities.
- o Approximately six or eight monitor wells located around the perimeter of the tailings impoundment.

These stations will be sampled on a quarterly basis during construction, with the exception of the wells around the tailings impoundment which will be sampled monthly during the first 2-3 years of operation. The ground water samples will be analyzed for the trace metals listed above plus sulfides and xanthates. Samples from stations at the construction camp will be analyzed for coliforms. The fresh water supply wells will be tested in accordance with Idaho requirements for drinking water supplies.

Benthic macroinvertebrates will be studied at two locations on Thompson Creek and at two locations on Squaw Creek (above and below the project). Sampling will be performed at high and low flows.

Bedload samples will be collected annually at the mine surface water monitoring stations and analyzed for grain size and trace metals.

Streams also will be monitored to permit timely detection of significant sedimentation processes resulting from construction of project facilities. The monitoring will consist of a study of spawning gravel sediment levels in Thompson and Squaw Creeks. The methods, intensity and frequency of monitoring will be established by the Forest Service,

BLM and appropriate state agencies in consultation with Cyprus Mines. If significant sedimentation occurs, construction activities will cease until remedial actions are taken to prevent further sedimentation and to eliminate the source(s) of significant sedimentation.

"Significant levels" for the various parameters monitored will be defined by the interagency committee based on ambient concentrations of the various water quality and sediment constituents; existing species abundance and diversity; and present characteristics and imbeddedness of spawning gravels. These levels will be determined in order to provide an early warning system so that corrective actions can be implemented before potential irreversible adverse impacts occur.

The details of the monitoring program are on file at the Challis National Forest. A Monitoring Manual is in preparation by Cyprus Mines and will be submitted to the interagency committee for approval.

All results of the monitoring program will be provided to the interagency committee. Results will be summarized in quarterly reports.

The monitoring program will be reevaluated periodically by the interagency committee as to methods, intensity, frequency, sampling locations, parameters measured, and any required additional studies.

4.6.2 Monitoring of Water Released from the Settling Ponds Below the Waste Dumps

The release of water from the settling ponds below the waste dumps is governed by NPDES Permit requirements. Surface water quality and discharge rates will be monitored at each settling pond as required by the NPDES permit. The frequency of measurement and parameters to be analyzed will be established by appropriate Federal and state agencies and Cyprus Mines. If the water does not meet assigned effluent limitations, it will be treated, as appropriate, prior to discharge.

Under the conditions of an NPDES permit, the operator is required to monitor, report, and in the event of a violation of the terms of the permit, notify the respective agencies. The operator is then required to cease activities or operation or provide a compliance plan whereby the situation creating the violation is remedied. Fines and/or other punishment can be levied on the operator.

More specifically, if the Thompson Creek Project were found to be in violation of its NPDES permit, the agencies could issue a cease and desist order if the operator failed to correct the situation through implementation of a compliance plan. A compliance plan could contain any number of commitments on the part of the operator, depending on the severity of the situation. Included in the compliance plan could be a temporary commitment to cease dump use until additional settling pond capacity was installed.

It is extremely important to recognize that regulatory constraints and conditions will be in place both during construction and operation. These constraints and conditions, in force under NPDES, require that the operator maintain water quality at the discharge points or, in the event of a violation, correct the situation to ensure compliance with the permit conditions.

In the event that EPA effluent limitations are exceeded, the respective agencies will be notified and evaluation of the significance will be immediately undertaken. In addition, under conditions of the Corps of Engineers General 404 Permit and the State of Idaho Stream Channel Alteration Permit(s), the Thompson Creek Project must adhere to certain general and specific conditions relative to Best Management Practices during construction and operation.

If, through visual observation and laboratory testing, it appears or is documented that the Thompson Creek Project is exceeding the EPA effluent limitations, Cyprus Mines will immediately advise respective agencies and implement corrective action(s). In most cases, State inspectors will be on site during the construction phase and they will be contacted immediately. Threshold for notification and corrective actions will be when the EPA effluent limitations are exceeded. Limitations have not yet been set for the water quality parameters. The limitation for sediment is expected to be 20 parts per million sediment on a monthly average and 30 parts per million on a daily basis.

The Cyprus Thompson Creek Project has already established a communications network with the various state and Federal agencies concerned with surface water quality and has implemented, in cooperation with those agencies, a comprehensive surface and ground water quality monitoring program (see Section 4.6.1).

4.6.3 Tailings Impoundment Monitoring Program

The following conceptual monitoring program is planned by Cyprus Mines for the tailings impoundment (RPI 1980).

Monitoring and observation programs will be conducted to evaluate the performance of the tailings facilities, to refine analyses and modify designs, and to document the performance for review by regulatory agencies. The level and quality of ground water, the quantity and quality of surface water, the level of the phreatic surface, pore-pressures, settlement within and beneath the embankment, and the embankment and impoundment levels will be monitored and recorded systematically. Almost continuous visual observations of the tailings system will be conducted by the operating personnel. Significant observations will be recorded.

Observation Program

Prior to tailings deposition, an operator's manual will be written which will explain the general design criteria and items to be observed during operation. The operator's manual will contain standard forms for recording and reporting observations from visual inspections and data obtained from monitoring systems.

During operation, visual observations will be made of the tailings disposal facilities on a daily basis to check the condition of the embankment, impoundment, pipelines, and water control facilities. Significant observations will be recorded in a field diary.

A photographic record of embankment construction will be started before deposition and will be continued at regular intervals during the life of the impoundment.

Impoundment/Embankment System

The impoundment and embankment will be instrumented to monitor piezometric levels and settlement. The impoundment piezometric levels will be measured by using pneumatic piezometers installed along the embankment crest. The phreatic surface within the embankment will be monitored with observation wells along the crest of the embankment and below the toe of the starter embankment. A network of pneumatic piezometers together with any necessary displacement guages will be installed in the volcanic foundation material beneath the embankment to monitor the dissipation of pore water pressures.

Embankment monitoring also will include regular sampling of cyclone underflow to determine gradations, in-place densities and deposition angles. Density control tests of underflow sand will be performed to establish when compaction is required in the base section for dynamic stability.

Hydrologic System

The objectives of this monitoring program are to identify any changes in the quantity and quality of surface water and ground water caused by seepage from the tailings impoundment. The monitoring process will involve four separate aspects: 1) ground water levels, 2) ground water quality, 3) surface water quantity, and 4) surface water quality.

Knowledge of changes in the hydrologic environment, together with baseline data already available, will permit evaluation of the performance of the tailings impoundment system. If performance is unsatisfactory, information will be available for the design and implementation of remedial measures.

Ground water or piezometric levels will be monitored in the tailings embankment and along the perimeter of the impoundment. The water levels in observation wells will be measured on a regular schedule.

Samples of ground water will be collected for laboratory analysis on a regular schedule. After the first year of operation, the results of monitoring will be reviewed and the program refined accordingly.

As presently planned, surface water flow stations, in addition to the existing USGS gauge on Lower Bruno Creek, will be installed below the tailings system. A continuous recording v-notch weir will be constructed between the tailings embankment and the seepage control pond to monitor the quantity of seepage water entering the pond. A non-recording gauge with a v-notch weir will be installed below the seepage control pond. If necessary, additional non-recording devices such as parshall flumes will be installed below seepage zones. Surface water samples also will be collected for water quality analyses.

Water Balance Monitoring

Each of the elements used to compute the water balance will be recorded as frequently as necessary in order to update annually the impoundment water balance. This information will include precipitation, runoff volumes, pumping rates and hours, tailings levels, water pond volumes, concentrator production volumes, seepage volumes, and slurry densities.

A snow survey will be conducted in order to predict the need to divert snowmelt runoff. This information, combined with a water balance simulation update, will help to determine whether the spring runoff should be bypassed.

4.6.4 Waste Dump Stability Monitoring

A recognized, engineered stability monitoring program for the waste dumps will be developed and implemented by Cyprus Mines.

4.6.5 Terrestrial Ecology

A monitoring program will be implemented to study big game populations (size, health, age composition), habitat loss, and migratory patterns of big game in the project vicinity. This program will be designed to evaluate the effects of mine construction and operation on big game populations and migration routes. This program will include aerial surveys during the winter months of each year.

4.6.6 Reporting

The data collected by the monitoring programs will be compiled into an annual report and made available to appropriate Federal and state agencies.

4.7 Regulatory Responsibilities

Project activities are controlled and regulated by a number of Federal and state agencies enforcing numerous laws and regulations. These laws

and regulations apply during various phases of the project including exploration, development, construction, operation, and, finally, closure. State and Federal laws and regulations differentiate between the various phases of a project, and some agencies are involved only during a certain phase(s). There is also a great deal of overlap in the legal responsibilities of the various state and Federal agencies.

Thompson Creek Project activities are generally reviewed and regulated by more than one agency. Many agencies, both state and Federal, issue specific licenses or permits for a specific activity or facility (see Section 1.5). Other agencies are required, by their own or other regulations, to review and comment on the proposed activity, but do not actually issue a permit. Their comments and/or concerns are utilized by the issuing agency in establishing conditions or stipulations attached to the permit. Many agencies, such as the Forest Service, are required to review all activities which take place on their land prior to issuing a general permit or Operating Plan.

Table 4.7-1 attempts to indicate the state and Federal agencies involved in the regulation of the Thompson Creek Project and their respective areas of general concern. The table indicates which agencies issue a specific permit or have direct regulatory responsibility for an activity or facility, and which agencies become involved in the review of permit applications. The table only lists the major Federal and state agencies involved and the major areas of concern and/or major permits.

TABLE 4.7-1

REGULATORY RESPONSIBILTIES

Major Areas of Concern and/or Major Permits	Forest Service	Environmental Protection Agency	ID Dept. of Lands-Bureau of Minerals	ID Dept. of H&W, Bureau of Air Quality	ID Dept. of H&W, Bureau of Water Quality	ID Dept. of Water Resources, Dam Safety	ID Dept. of Water Resources	BLM
Approve mining/operating plan	X	(X)	X					
Approve reclamation plan	X	(X)	X					
Water discharge from project	X	X	(X)		X	(X)	(X)	
Approve dump design	X	(X)	X		(X)		X	
Air quality permit, control of fugitive dust		X	(X)	X				
Settling pond/dam construction and operation	(X)	X	(X)		(X)	X	X	
Stream channel alteration permit	(X)		(X)		(X)		X	
Stream sedimentation control	X	X	(X)		(X)	X	X	
Tailings impoundment/ embankment								
a. Design	X	(X)	X		(X)	X	X	
b. Construction	X	(X)	X		(X)	X	X	
c. Operation	X	(X)	X	X	(X)	X		

TABLE 4.7-1 (cont.)

REGULATORY RESPONSIBILTIES

Major Areas of Concern and/or Major Permits	Forest Service	Environmental Protection Agency	ID Dept. of Lands-Bureau of Minerals	ID Dept. of H&W, Bureau of Air Quality	ID Dept. of H&W, Bureau of Water Quality	ID Dept. of Water Resources, Dam Safety	ID Dept. of Water Resources	BLM
Road construction	X	(X)	X	X	(X)		X	
Mill construction and operation		X	X	X	X		X	
Permit to drill production wells					X		X	
Permit for potable water					X			
Spill prevention control and containment	(X)	X	(X)		(X)			
Approval of monitoring programs	X	X	X	X	X	X	X	X
Reclamation and/or performance bond	X		X			X		

Key:

X --Issue permit or direct regulatory responsibility
(X) - Review and comment

CHAPTER 5.0

EFFECTS OF IMPLEMENTATION

5.1 Introduction

This chapter of the EIS describes the effects on the environment that will result from implementation of each project alternative. Where possible, these effects have been quantified. Otherwise, qualitative descriptions of effects are provided to identify differences in magnitude, significance or duration. It is the intent of this chapter to discuss the major issues, concerns and opportunities presented in Chapter 1.0.

The environmental effects are presented by discipline in the same order as the descriptions of the affected environment in Chapter 2.0. Within each discipline discussion, effects common to all project alternatives are presented first. The succeeding paragraphs then describe effects which are different for each alternative. This will provide the background for the relative comparison of alternatives presented in Chapter 6.0. The No Action Alternative also is discussed and compared with the project alternatives in Chapter 6.0.

This chapter is a summary of the Technical Memoranda for each discipline which present detailed discussions of project-related impacts.

The Technical Memoranda are on file with the U.S. Forest Service in Challis and the U.S. Bureau of Land Management in Salmon.

5.2 Environmental Changes

5.2.1 Air Quality

The project area lies within Air Quality Control Region No. 063 as assigned by the U.S. Environmental Protection Agency (EPA). This region is designated by EPA as an "attainment area." Attainment area implies that the existing concentrations of the criteria pollutants (sulfur dioxide, particulates, carbon monoxide, ozone, hydorcarbons, nitrogen oxides and lead) are within the National Ambient Air Quality Standards (NAAQS). New air pollutant sources are reviewed by EPA in its Prevention of Significant Deterioration permit process. A PSD permit application for the Thompson Creek Project was submitted to EPA on November 6, 1979. EPA has advised that the project is not subject to PSD review (Johnston 1980).

The major air pollutants associated with construction of the project are fugitive dust and vehicular particulate and gaseous emissions. Fugitive dust will result from blasting, overburden removal and disposal, and truck traffic. Air quality during operation of the project will be affected primarily by particulate emissions from ore processing

operations; fugitive emissions, primarily from mining operations; and emissions from concentrate dryers. Estimates of these emissions are presented in the Air Quality Technical Memorandum (VTN 1980 AQ).

Most of the particulate emissions will result from fugitive sources associated with surface mining operations. Some controlled particulate emissions will result from ore processing operations, and a negligible amount will be contributed by the combustion of fuel oil in the dryer system.

Sulfur dioxide (SO_2) will be generated from fuel combustion in the dryers and also from mobile sources. The dryers will use distillate oil for heating fuel and SO_2 emissions will depend upon the sulfur content of the fuel oil. If oil with a sulfur content of 1% is used, SO_2 emissions are estimated to be 5 tons per year. Sulfur dioxide emissions from mobile sources are estimated to be 51 tons per year.

Mobile sources are the only significant source of oxides of nitrogen, carbon monoxide and hydrocarbons, with an estimated emission rate of 826 tons per year, 151 tons per year and 49 tons per year, respectively. The emissions will occur primarily in the project area and are a direct result of mining and hauling overburden material to disposal areas and transport of ore.

The air quality impacts from particulate matter were estimated using the EPA-approved PTMTP model. The Atmospheric Stability Classes selected were C, E and F since these represented worst-case conditions expected at the site. The maximum one-hour averaged concentration predicted by the model was under Class C conditions; this was 52 ug/m^3. The maximum 24-hour averaged concentration was calculated to be 21 ug/m^3. This concentration is well below the National Ambient Air Quality Standard of 260 ug/m^3 for a 24-hour period. With an assumed background concentration of 30 ug/m^3, the total maximum 24-hour average particulate concentration would be 51 ug/m^3. This value is below the annual average primary standard of 75 ug/m^3 and secondary standard of 60 ug/m^3. Therefore, applicable state and Federal ambient particulate standards should not be exceeded during construction or operation of the project.

Air quality changes from project-related emissions of SO_2, NO_x, CO and HC also were calculated under stability Class C conditions. The total ground level concentrations for SO_2, NO_x, CO and HC are shown in Table 5.2-1.

TABLE 5.2-1

AIR QUALITY
GROUND LEVEL CONCENTRATIONS

	Calculated Ground Level Concentration Averaged Over 1-Hr. (ug/m^3)	Background Concentration (ug/m^3)	Total Concentration (ug/m^3)	State & Federal Standard (ug/m^3)
SO_2	4.84	20 ug/m3	24.84	365 (24-hr maximum)
NO_x	78.17	Insignificant	78.17	100 (Annual arithmetic mean)
CO	14.30	Insignificant	14.30	40,000 (1-hr maximum)
HC	4.69	No value assumed therefore considered to be minimal	4.69	160 (3-hr maximum)

Source: VTN 1980 AQ.

If the one-hour calculated concentration is averaged over a longer period, e.g. 2-hour, 24-hour or annual, then the resultant concentrations for SO_2, NO_x, CO and HC will be lower than those presented above. Therefore, the effects of project-related increases in SO_2, NO_x, CO and HC on air quality are expected to be minimal.

Emissions from the increased traffic due to the project will be concentrated on State Highway 75 between Stanley and U.S. Route 93. The estimated net increase in emissions as a result of the project is very low (VTN 1980 AQ). In addition, these emissions will be dispersed over a wide area along a 55-mile stretch of highway. Therefore, the emissions due to the increase in project-related traffic will have a very insignificant impact on the area.

Potential air quality impacts in Challis could result from increased vehicular traffic (primarily automobiles) associated with population changes induced by the project. In general, such air pollutant levels are expected to decrease over the next 10 years as older automobiles are replaced by newer models which emit less pollutants. Therefore, without the project, air pollutant levels would be expected to decrease in Challis. An emissions analysis (CO, HC, NO_x and total emissions),

based on projected population, was performed to assess potential project impacts. The analysis indicated that emissions in 1990, with the project, would be less than present emissions. Correspondingly, the expected decrease in emissions because of newer vehicles will not be as great with the project as without it.

The air quality impacts will be essentially the same for all project alternatives.

5.2.2 Noise

The main features of the project area that affect sound propagation are the steep-walled canyons that virtually surround the various project facilities, and the large amount of vegetation. To a lesser extent, meteorological parameters (e.g. winds, temperature, humidity) and the altitude of the area also affect sound propagation. The combination of these factors will tend to attenuate noise generated at the project site.

There are several noise sources associated with the proposed project. Typical noise levels at 50 feet range from 78 to 113 dBA. The two locations where noise sources will be concentrated are the primary crusher area and the concentrator area. The total noise generated at these areas and the distance of noise propagation were calculated (VTN 1980 NO). The results indicate that the intense sound will be restricted to an area less than 5,000 feet from the crusher/concentrator areas. Beyond this, noise should be at normal levels for a rural area, i.e. 30-50 dBA.

Blasting activity at the mine also will be a source of noise. Due to the occasional blasting, persons in nearby areas will hear a deep-toned "thud." It is not expected that this noise will have any effect except near the project site. Under certain meteorological conditions, however, this sound may travel great distances. Even so, blasting should hardly be noticeable to the general population. It will have an effect on wildlife in the area causing animals to move away during and immediately after the blasting activity.

Estimates also have been made of increased off-site noise levels due to project-related traffic (VTN 1980 NO). An assumption was made that the project-related traffic would be concentrated on State Highway 75 between Stanley and U.S. Route 93. The analysis indicates that there will be little or no increase in noise levels along State Highway 75.

Construction noise related to the project will be generated from the same types of equipment that are used during mine operation, and will have similar localized effects. An exception is the blasting required to construct the access road. The population of Clayton may hear this blasting. However, this noise source is expected to be short-term and temporary. Other on-site construction is not expected to generate significant noise levels.

In summary, project-generated noise should not impact nearby residents (the closest residents are 3.6 miles to the south), with the exception of occasional blasting. This may be perceived as a background "thud." Also, noise will drive wildlife away from the immediate location of the noise source. Some animals, however, may become accustomed to the noise generated and return to the area. These impacts essentially will be similar for all project alternatives.

5.2.3 Geology and Soils

The Thompson Creek Molybdenum Project will involve the disturbance and/or removal of soil, overburden and rock for construction of the mine, waste dumps, concentrator, tailings impoundment, pipelines, overland conveyor, access and service roads, and ancillary project facilities. The majority of the disturbed areas will not be returned to their present condition following mining activities.

The major topographic modification will be the development of the mine pit. A ridge whose highest elevation is 8,600 feet will be transformed into a crater-like open pit. The ultimate pit bottom will be at elevation 6,400, and the final pit will be about one mile in diameter.

Other topographic modifications will result from construction and development of the tailings impoundment and the waste dumps. These activities will affect several drainages within the claim area:

- Upper Bruno Creek due to blocking of the valley for tailings impoundment.

- Buckskin, Pat Hughes and Unnamed Creek as a result of placement of overburden and waste rock in these drainages.

Approximately 2,460 acres will be disturbed by construction of project facilities. The largest areas will be affected by the tailings impoundment, mine pit and waste dumps. These modifications will be unavoidable and irreversible. Disturbed topsoil will be stockpiled for use in reclamation where practicable.

The short- and long-term stability of the project structures is provided by assessing and designing for potential modes of failure which could result from natural processes. The potential modes of failure include natural physical weathering, slope and foundation instability, blockage of critical drainageways, flooding and erosion. Preliminary conceptual designs have considered these factors. Detailed designs will be developed following the results of site-specific investigations. The final designs will be subject to review and approval by appropriate Federal and state agencies.

Geotechnical investigations indicate there are no known major faults within 12 miles of the claim area. The tailings embankment will be designed with a factor of safety to withstand potential seismic events in accordance with applicable Federal and state regulations (RPI 1980).

Since Alternatives 1 through 3 require the same structures, all alternatives generally will have about the same effects in terms of area disturbed and the degree of topographic modification. Reclamation of the alternatives also will be about the same. The major difference among the alternatives is the amount of cut and fill required for the various project facilities. Also, the Redbird road would require additional clearing and more cut and fill than the Bruno Creek road.

Alternative 1

Adequate area will be available for the concentrator and crusher facilities, minimizing the amount of cut and fill. The overland conveyor may be constructed with moderate amounts of cut and fill. A mapped landslide exists in the path of the proposed access road and utility corridor and is a consideration with respect to slope stability.

Alternative 2

Significant excavation will be required for construction of the concentrator and overland conveyor, including possible tunnel excavation for the conveyor. Mapped landslides exist near the overland conveyor and in the path of the proposed access road and utility corridor, and are a consideration with respect to slope stability.

Alternative 3

The area affected by the crusher and concentrator would be the same as for Alternative 1. A mapped landslide exists in the location of the proposed tailings impoundment Site C and may cause short- or long-term stability problems within the tailings impoundment. This location would interfere with the Bruno Creek access road and could interfere with proposed water supply wells. Considerable amounts of clearing and cut and fill would be required to construct the access road along the Redbird route. A new source of water also could be required.

5.2.4 Surface and Ground Water Hydrology

The effects of the project alternatives on hydrology will be similar. There will be a modification of the amount and direction of surface and ground water flow within the claim area. The project will effect the hydrologic regime of several small drainages by construction of the mine pit, waste dumps, settling ponds, tailings impoundment and seepage control pond. However, the project will not create a significant

effect on the existing surface and ground water flows of Thompson Creek*, Squaw Creek or the Salmon River.

Mine, Waste Dumps and Settling Ponds

The mine, waste dumps and settling ponds are interrelated in their effects on the hydrology of the area. The development of the mine pit will eliminate several small first-order unnamed drainages and will gradually decrease the watershed surface areas of both Buckskin and Pat Hughes Creeks by approximately 12%.

Mine water will be discharged to the Buckskin and/or Pat Hughes settling ponds during the first three years of operation. Thereafter, mine water may be used as process water; however, if adequate storage is not available, it will continue to be discharged to the settling ponds. The maximum amount of mine water encountered during the first five years is estimated to be 1,500 gallons per minute (gpm) and during later years, 600 gpm. Control and release of this water will increase Thompson Creek runoff by a small amount. If mine water is used as process water it will not significantly decrease the runoff to Thompson Creek, since this water does not at present contribute significantly to surface flow (VTN 1980, SGWH). Cyprus Mines has filed an application, which has been approved by the Idaho Department of Water Resources, for appropriation of the mine water.

Overburden and waste rock removed during preproduction stripping and mine operation will be placed in waste dumps located near the mine in the Buckskin Creek, Unnamed Creek, and Pat Hughes Creek drainages. Prior to the placement of material in the dumps, settling ponds will be constructed near the mouths of the drainages. The settling ponds will impound the flow from the drainages and temporarily detain the runoff for sedimentation purposes prior to release to the natural drainages.

The major hydrologic effect of the topographic modifications in the mine area will be the detention of water in the settling ponds and the gradual release of the water after allowing for sedimentation. The settling ponds will create temporary (about 24+ hours) impoundments of runoff. The settling ponds will cause a change in the timing of the release of runoff from the three drainages to Thompson Creek. In effect, the ponds will result in a decrease in the peak runoff from the drainages (i.e., a release of the same amount of water over a longer

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* Cyprus Mines has filed an application, which has been approved by the Idaho Department of Water Resources, for the appropriation of 10 cfs from the waters of Thompson Creek. Water from Thompson Creek would only be used should other planned options (water supply wells) be proven unfeasible. In the unlikely event that water from Thompson Creek had to be used, arrangements would be made with appropriate regulatory agencies to withdraw the water in a manner that would maintain minimum flow requirements for fisheries protection.

period of time). The extent and duration of this effect will depend on the intensity/duration of precipitation events and variations in the factors affecting snowmelt.

Tailings Impoundment

As a result of construction of the tailings impoundment across Bruno Creek, a large portion of surface flow originating upstream and tributary to the impoundment structure will be intercepted, stored and pumped to the concentrator for use as process water. This will result in significant impacts to Bruno Creek below the impoundment. There will be greater periods of time, than at present, when there is no flow, particularly during late summer and winter. Ground water recharge and surface water runoff from the sides of the basin are not expected to be sufficient to maintain year-round surface flows. No significant impacts on the flow in Squaw Creek are anticipated, because of the much greater flow in Squaw Creek compared to the contribution of Bruno Creek (the average annual flow of Squaw Creek is 34.2 cfs; for Bruno Creek, it is 1.68 cfs).

The tailings impoundment is being designed as a "closed" water system, whereby seepage below and through the impoundment is ultimately collected through the use of a seepage control system located downstream of the impoundment structure. However, a certain portion of the seepage, particularly in the early years of operation, is expected to escape the seepage control system and continue down the Bruno Creek drainage as subsurface flow ("infiltration"). Preliminary indications are that this infiltration may amount to as much as 1,000 gallons per minute (gpm) in the early years of operation to much less than 100 gpm in the later years when the buildup of cycloned fines is expected to reduce permeabilities. For purposes of water management planning, a figure of 700 gpm has been established as the average subsurface flow (Cyprus 1980).

With regard to the disposition of infiltration, three general possibilities exist: 1) the entire flow could resurface at a downstream location on Bruno or Squaw Creeks; 2) a portion of the flow could resurface at such a downstream location; and 3) none of the flow may resurface. Detailed information to accurately predict the fate of this infiltration is unavailable. However, a surface-subsurface monitoring program will be established by Cyprus downstream of the tailings impoundment to monitor the effects it may have on Bruno and Squaw Creeks (see Section 4.6.3).

The effects of Alternatives 1 and 2 are the same. Alternative 3 may cause a slightly greater impact because the tailings impoundments will intercept a larger upstream drainage area.

Water Supply Wells

The water supply wells will be located in lower Bruno Creek. Geohydrologic tests of these water supply wells indicate no hydrologic connection between the producing zone and surface water (WEN 1980a). Therefore, there will be no impact on existing surface water and ground water flows to Bruno Creek. On a regional level, the maximum withdrawal of 9,000 gpm from this source is not considered significant and is not expected to have an effect on surface water flow of the Salmon River or its tributaries. (Note: Under average conditions, only 300-400 gpm will be withdrawn from the water suppy wells.)

Alternative 3 may interfere with the present location of water supply wells and therefore may require a new well water supply source. This new well source, should one be required, has not been determined.

Other Project Structures

Construction of the roads, overland conveyor, power line, pipelines and other impermeable structures will result in increased local runoff and channeling. Changes in local runoff will be short-term and temporary and will not affect the flow regimes of Squaw or Thompson Creeks.

5.2.5 Water Quality

There is a potential for several effects on the existing water quality of the surface and ground waters in the project area. These include potential effects from the waste dumps, tailings impoundment and ore storage areas, as well as potential chronic sedimentation, changes in the water temperature of streams, and effects of potential spills. Each of these are discussed separately below. The effects of the three project alternatives essentially will be the same. There may be some minor variations in impacts, but no significant distinction could be made among the alternatives.

Water Quality Effects of Waste Dumps

Overburden and waste rock which is removed during mine construction and operation will be deposited in the waste dumps. Precipitation will infiltrate the waste piles and will be collected in the settling ponds. There is a concern that this water will leach materials in toxic concentrations from the waste rock and that these materials will reach the surface and ground water systems.

Several laboratory tests (Colorado School of Mines 1980; Mountain States Research and Development 1980, 1980a, 1980b, 1980c) were performed on waste rock (low-grade ore) samples to: 1) characterize the leachate from the waste rock if acidic conditions occurred; 2) determine the weathering effects over 20 years to see if excessive breakdown of pyrite would cause acidic conditions; and 3) determine the quantity of acid that the waste rock could consume (neutralize).

The test results indicate that the effluent from the waste dumps during mine operation will not be overly acidic (lowest pH was 6.6). Also, acid consumption tests on the low-grade ore indicated that its natural buffering capacity is sufficient to neutralize the potential acid that could be generated. The results of the leachate tests indicated that the effluent from the waste dumps will not contain significant levels of toxic materials. It is probable that these conditions will continue after 20 years. Discharges* from the settling ponds to Thompson Creek will be required to meet the effluent limitations set forth in the NPDES permit. Also, seepage through the settling pond embankments is expected to be minimal (RPI 1980b).

Considering these factors, no adverse impacts to Thompson Creek and the local ground water systems due to potential leaching of trace metals are anticipated during the periods of construction, operation and abandonment of the project. Also effluent from the waste dumps would have minimal impacts on general water quality of surface and ground waters in the vicinity of the waste dumps.

Water Quality Effects of the Tailings Impoundment

There is concern that infiltration from the tailings impoundment will leach materials in toxic concentrations from the tailings and that these materials will reach the surface and ground water systems. Laboratory bench tests (Colorado School of Mines 1980; Mountain States Research and Development 1980) were conducted to simulate the proposed concentrating process and resultant tailings, tailings water and tailings recycle water. An extraction procedure at a pH of 5 was performed on the tailings to characterize the "worst-case" leachate.** Also an assay was performed on the tailings, and chemical analyses were performed on the simulated tailings water and recycle water and on the tailings extract. Additional pilot-scale tests are being performed to refine the expected process effluent quality.

The data from the above tests were used to evaluate the effects of water which escapes the seepage control system. For the analysis, it was assumed that this water ("infiltration") becomes surface flow at the mouth of Bruno Creek and then enters Squaw Creek.

The results of the extraction procedure indicate that the infiltration from the tailings impoundment may contain concentrations of iron and manganese which exceed EPA drinking water standards. The local ground

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* Includes water from mine dewatering, drainage from upstream areas, and effluent from the waste dumps.

**The water in the tailings impoundment is not expected to be acidic. Tailings are similar to low-grade ore, and the tests described in the previous section indicate that the low-grade ore will not cause acidic conditions. Further, the flotation process is alkaline, and the tailings water will have a pH of about 8.

water will be affected by this infiltration. Iron and manganese at these levels are of concern for drinking water primarily because of causing objectionable taste and staining rather than any toxicity to humans. In addition, iron and zinc concentrations of the infiltration from the tailings impoundment could exceed the EPA criteria for the protection of freshwater aquatic life. Because of this, Bruno Creek water at times also could exceed these criteria (during low flow periods). However, because of dilution with Squaw Creek water, the infiltration would not cause iron or zinc concentrations in Squaw Creek below Bruno Creek to exceed the EPA criteria (VTN 1980 WQ).

Also infiltration from the tailings impoundment may cause increases in concentrations of nitrate, total kjeldahl nitrogen, total organic carbon, and total volatile solids in local ground water.* The areal extent of this influence is unknown. These parameters could increase in Bruno Creek and Squaw Creek if the water resurfaces. The concentrations in the creeks would gradually decrease to background levels due to dilution and to biological activity. The greatest increases would occur during low flow periods. Also, TDS, total alkalinity and hardness concentrations could be slightly increased in Squaw Creek during low flow periods*.

Water Quality Effects of Ore Storage Areas

There are two areas where ore will be stored: near the primary crusher and near the concentrator. Drainage from the ore storage area by the concentrator will flow via the storm drainage system into the tailings impoundment or seepage control pond. The effluent from ore piles near the primary crusher will flow to one of the waste dump drainages. This water from the ore storage areas was considered in the previous evaluation of water quality effects from the waste dumps and tailings impoundment. No additional impacts are anticipated.

Water Quality Effects of Potential Spills

Fuel will be delivered in tanker trucks for transfer to large fuel storage tanks on-site. These storage tanks will be located near the mine pit and will be enclosed by berms which will contain any spills. If a fuel spill occurs in the storage area or elsewhere on the project site, appropriate cleanup measures will be employed in accordance with the EPA-approved Spill Prevention Control and Countermeasures Plan to be developed for the project.

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* The increases in concentrations of these water quality constituents cannot be quantified due to the numerous influencing factors involved. Such factors include the amount of dilution by other ground water and the rate and effect of physical and natural processes, including sorption, diffusion, complexation, microbial action, vegetative uptake, etc.

There is also a potential for spills of other substances during project operation. These include flotation reagents, concentrate slurry, tailings slurry, water pumped from the seepage control pond, and water reclaimed from the tailings impoundment.

Flotation reagents will be stored in a separate building adjacent to the concentrator. A sump inside this reagent building will contain any small spills. A containment area will be constructed around the reagent building to contain the largest possible spill.

The concentrator building will be designed with sloping floors to direct any spilled materials to sumps. Spilled slurry will be pumped from the sumps to the tailings discharge sump, while any accumulated solids will be removed either for return to the process or for discharge to the tailings impoundment.

The tailings slurry (approximately 35% solids) will flow through an above-ground pipeline to the tailings impoundment. In the event of a break in the pipeline, spillage will flow into an interceptor channel/spill control ditch paralleling the pipeline. The ditch will carry the spilled material by gravity into the tailings impoundment during the early years of operation or into the seepage control pond in later years. The amount of spilled tailings slurry water seeping into the ground water system should be minimal due to the short time of contact.

The water collected in the seepage control pond will be pumped back to the tailings impoundment or to process water storage. In the event that this pipeline should break, the water will flow back to the seepage control pond. Only a small amount will infiltrate to the ground water system due to the short contact time.

Water will be reclaimed from the tailings impoundment and pumped to a storage basin above the concentrator. If there is a break in the reclaim water pipeline, the water will flow downhill until it enters the tailings impoundment or an interceptor channel/spill control ditch paralleling the pipeline. This ditch would direct the flow to the tailings impoundment or seepage control pond. The amount of water which will infiltrate into the ground water system would be minimal due to the short time of contact.

Sedimentation

As a result of construction of project facilities, there will be an increase in erosion and the potential for increased sedimentation in streams. Construction and operation control measures will be implemented to minimize sedimentation. Such measures include the settling ponds below the waste dumps and tailings impoundment, mulching, riprapping, revegetation, soil stabilization, and the construction of berms, drainage ditches with flow checks, energy dissipators and/or sediment traps. However, during the initial stages of construction and prior to full implementation of the control measures, some

sedimentation is expected to occur as a result of activities near the streams. The effect of this is expected to be short-term and localized; however, it may be significant depending on the area impacted and the time of year. Selective scheduling and close supervision of construction activities will be directed toward minimizing potential impacts. Streams will be monitored to permit timely detection of significant sedimentation processes resulting from construction of project facilities. If significant sedimentation occurs, construction activities will cease until remedial actions are taken to prevent further sedimentation and to eliminate the source(s) of significant sedimentation.

Effects on Water Temperature of Streams

There are no plans at present to directly add ground water to surface streams. Therefore, no changes in temperature are anticipated.

The hydrologic impact analysis indicates that the project will not cause significant reductions in stream flow, except for Bruno Creek. The temperature of the water in Bruno Creek, when it is flowing, will more closely follow air temperatures because of the expected low volume of flow. During the summer, water temperatures might be slightly higher during the warmest part of the day than under the present conditions. The water temperatures of Bruno Creek also could be affected by the removal of vegetation for access road construction. Since the stream length along these areas of vegetation removal is small in comparison to the total stream length, anticipated increases in Bruno Creek water temperatures are small and probably will be confined to a few hours per day. The combination of these two effects may cause the water temperatures of Bruno Creek to be slightly higher, especially during the summer. However, this is not expected to cause a noticeable change in Squaw Creek because its flow is much larger than the flow of Bruno Creek.

The discharges from the settling ponds, other than overflows from runoff due to floods greater than the design flood, will be required to meet NPDES permit requirements for quantity and quality. In addition, the Idaho draft water quality standards require that point source discharges not change the daily and seasonal temperature cycles characteristic of the receiving water body and not interfere with designated uses of downstream water (IDHW 1980). If the NPDES and Idaho requirements are met, discharges from settling ponds would not cause a significant impact on the water temperature of Thompson Creek. Overflows from settling ponds would not be expected to cause significant impact on water temperatures of Thompson Creek because its flow rate would also be high at the same time.

5.2.6 Aquatic Ecology

The aquatic ecology will be affected by the project as a result of changes in hydrology and water quality, habitat loss and increased human activities.

The mine, waste dumps and settling ponds will affect the drainages of Buckskin Creek, Unnamed Creek and Pat Hughes Creek. None of these creeks are known to contain significant fish populations; therefore, the fishery resource loss would be minor. Buckskin and Pat Hughes Creeks produce some fish food organisms, some of which may drift at times into Thompson Creek. Loss of this resource would be minor. No major water quality or hydrology* changes in Thompson Creek are expected as a result of construction and operation of the mine, waste dumps or settling ponds. Therefore, no impacts on the fishery resource of Thompson Creek are anticipated.

Construction of the tailings impoundment will result in greater periods of time, than at present, when there is no flow in Bruno Creek, particularly during late summer and winter. This will result in the loss of the aquatic habitat and fishery resource of Bruno Creek. Bruno Creek supports a small native population of fish, primarily cutthroat trout, and contributes food organisms to Squaw Creek. There is little use made of the resource in Bruno Creek, but it undoubtedly contributes to downstream fisheries. The relative importance of this stream to maintenance of cutthroat trout in Squaw Creek is not known. The loss of cutthroat trout in Bruno Creek is regarded as a significant local impact. In terms of the whole Salmon River drainage, the impact will be minor. The tailings impoundment is not expected to result in significant changes in water quality or hydrology of Squaw Creek or the Salmon River.

In order to mitigate the fisheries impact on Bruno Creek, Cyprus Mines has committed to attempting to restore Squaw Creek as a viable anadromous fishery. The elimination of the small population of native cutthroat trout in Bruno Creek could be offset by the establishment or expansion of anadromous fisheries on Squaw Creek (i.e., salmon, steelhead). Downstream of its confluence with Bruno Creek, all or nearly all of the flow in Squaw Creek is diverted during the growing season for agricultural uses. This diversion virtually renders Squaw Creek dry and prevents the establishment of anadromous salmon fisheries therein because the diversion period and migration/spawning cycle coincide in time. To alleviate these conditions, Cyprus Mines has acquired some water rights on Squaw Creek, and is currently engaged in negotiations with the remaining landholder regarding installation of a new headgate for diversion and an agreement to allow flow of Cyprus water to bypass his diversion point. With the minimum flow in lower Squaw Creek, the Idaho Department of Fish & Game believes that anadromous fish will utilize the creek as a spawning area.

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* Cyprus Mines has an approved application to divert 10 cfs from the waters of Thompson Creek should other planned water supply options (wells) be proven unfeasible. In the unlikely event that water from Thompson Creek had to be diverted, arrangements would be made with appropriate regulatory agencies to withdraw the water in a manner that would maintain minimum flow requirements for the protection of fisheries.

Construction of the access road, crusher, concentrator, pipelines and other support facilities will result in minor alterations of drainage patterns. These alterations will be localized and should not affect the aquatic habitat or resources of Thompson Creek, Squaw Creek or the Salmon River.

Safeguards will be implemented to prevent accidental spills or other materials due to pipeline leaks from entering surface waters. If these safeguards are effective, there should be no impacts on Thompson and Squaw Creeks or the Salmon River.

With the proposed construction camp near Squaw Creek, there is potential for local impacts due to the camp facilities and the presence of humans. Although the camp will not physically encroach on Squaw Creek or its riparian vegetation, some habitat loss is expected from human usage of streamside areas. This loss, together with potential water quality degradation due to runoff from the camp, could significantly interfere with salmonid spawning and rearing in lower Squaw Creek. The construction camp possibly could compromise, for a period of time, the mitigation measure described previously, as a result of interference with spawning and rearing by increased human presence (i.e. habitat degradation, increased fishing pressure and poaching). The extent and effect of these influences on the mitigation measure are unknown.

As a result of construction of project facilities, there will be an increase in erosion and the potential for increased sedimentation in streams. As noted in the water quality section, control measures will be implemented to minimize sedimentation in streams. However, some sedimentation will occur. The effect of this is expected to be short-term and localized; however, it may be significant depending on the area affected and the time of year. Spawning and rearing habitat could be affected by sedimentation.

There are no endangered or threatened aquatic species in the project area. However, the self-sustaining population of native cutthroat trout in Bruno Creek would be lost. Except for Bruno Creek itself, the loss of these native cutthroat is considered minor on a regional basis since the species is widespread in the Salmon-Clearwater River watersheds.

The increase in the human population as a result of the project could have a significant effect on local and regional fisheries resources due to increased fishing pressure, poaching and habitat degradation from human activities near water bodies. It is expected that changes in fishing regulations and/or increased planting with catchable-sized fish may be required in response to declining fisheries levels and lowered fishing success.

The above impacts generally will be common to all alternatives. There are no discernable differences among the alternatives.

5.2.7 Terrestrial Ecology

Migration Interference

The mine pit, overburden and tailings disposal sites, overland conveyor, crusher, concentrator, access/service roads, and tailings pipelines are anticipated to interfere with seasonal movement of local elk and mule deer as they move through Bruno Creek, Pat Hughes Creek and adjacent drainages and ridges between their summer range and winter range. These facilities and related activities may block local migrations. Blockage of the migration route may mean that up to 150 deer could become cut off from wintering areas and possibly die. Big game passage facilities will be incorporated into the design of the conveyor, pipelines and service road; this will reduce the impact on migration during project operation. The design of the passage facilities will be determined by the Forest Service, IDFG and Cyprus Mines. If major project facilities/ structures (e.g., overland conveyor, pipelines, concentrator) are removed or modified after the project ceases, long-term impacts on migration should be minor.

Mule deer, and to some degree elk, generally move down the Salmon River Valley in the project region as winter progresses. The existence of the proposed access road along Squaw Creek may interfere with this movement. Such interference will result in some increase in road kill or reduced physical condition resulting in lower reproductive success. This effect is expected to be local in nature and to have a minor impact on local deer or elk populations. A temporary construction camp near the mouth of Squaw Creek, because of its location along the major migration route paralleling the Salmon River, could affect a greater number of animals from a wider geographic area and could result in a moderate to significant short-term impact.

Habitat Loss

Habitat loss and wildlife displacement will result from the direct removal of about 2,460 acres of habitat and an unknown amount of surrounding habitat which will not provide for existing levels of wildlife use because of nearby project disturbances.

In general the habitat that would be lost is not considered to be of unusual quality or to include known critical wildlife areas. Some Wyoming big sagebrush habitat will be lost; the total amount of lost habitat cannot be determined from the information available. Some riparian habitat along portions of Bruno Creek will be lost during construction of the access road. Present information indicates that little, if any, riparian vegetation will be removed along Squaw Creek for construction of the access road.

The proposed project also would impact habitat indirectly through disturbance to areas in proximity to construction and/or operation activities. Disturbance is expected to result primarily through noise

associated with blasting and equipment operation as well as human presence and traffic.

The major game species expected to be affected by direct and indirect habitat loss within and near the claim area are mule deer, elk, mountain lion, and blue grouse. Habitat loss will potentially impact mule deer through a reduction in the carrying capacity of the project area by the loss of a small amount of winter habitat, summer habitat and fawning habitat. Mule deer winter use of the claim area is negligible during years of heavy snowfall, but more extensive during years of light snowfall. The potential impacts to elk populations are similar to the impacts on deer. The loss of winter range areas may affect an estimated 30 elk, and there is some possibility that the loss of habitat could cause a depression in the local elk population levels. A reduction in mule deer, which is the principal prey species of mountain lion, and the presence of humans are expected to reduce mountain lion numbers in the vicinity of the claim area. Blue grouse wintering, nesting, and brooding habitats will be lost, resulting in a decrease in local population numbers. The reduction of prey-base species and potential nesting areas will depress raptor population levels on, and in the vicinity of, the disturbed areas. A shift from forest species such as accipiters to more open habitat associated species such as buteos is anticipated as the forest vegetation is removed. A variety of fur-bearers and non-game species, including amphibians and reptiles, which depend for survival on habitat areas which will be destroyed, will likely be lost during construction or from stress associated with displacement into unfamiliar areas.

The proposed Squaw Creek construction camp could directly remove a small amount of winter habitat for mule deer and possibly elk, and could indirectly impact habitat and/or populations of upland game birds and non-game wildlife.

The effects of direct and indirect habitat loss near the claim area and reduced carrying capacity as a result of the project are expected to be local and not affect regional wildlife population levels.

Timber Removal

The timber on 1,132 acres of National Forest and BLM lands will be commercially harvested prior to the mining activity. A total of 10.1 million board feet will be harvested; 7.7 million board feet from 792 acres of National Forest land and 2.4 million board feet from 340 acres of BLM land. Timber also will be harvested from Cyprus Mines' private land in the pit area. Most of the timber will be harvested during the early years of the project. However, timber covering the upper reaches of the tailings impoundment and some of the waste dump areas will not be harvested until the space is needed. Trees not suitable for timber will be made available to local residents for fire wood, where feasible.

Most of these timber stands have been classified as non-commercial and marginal timber and would not likely be harvested without the project. Therefore, very little sustained timber land would be foregone.

Increased Human Population

The increase in the human population of Custer County is expected to have a significant impact on wildlife as a result of increased urbanization, legal hunting, illegal hunting (poaching), increased ORV usage, increased traffic, and a general increase in adverse human-wildlife interactions.

Urbanization and its associated habitat loss could have an effect on wildlife populations in and near areas that are developed to house the increased population. It is expected that most habitat loss will occur on mule deer winter range. Other big game species as well as furbearers, game birds and non-game species would be impacted due to loss of habitat and disturbance to habitat.

It is expected that the increased human population will result in an expansion of legal hunting in the area which will require changes in hunting regulations in response to declining wildlife population levels and lowered hunting success. It is anticipated that hunting regulations governing elk and mule deer will require modification. Regulations governing pronghorn, mountain lion, black bear, blue, spruce, ruffed and sage grouse, partridge, chukar, and furbearing animals also may require modification. Illegal hunting (poaching) is currently considered a major factor in reducing wildlife populations in the Challis area and may become a serious problem, particularly during the winter months when ungulate species are concentrated near the Salmon River Valley.

ORV use, which can be detrimental to wildlife range, is expected to increase with the increase in human population. The most important species which are expected to be affected by ORV use are mule deer, pronghorn, elk, and to a lesser extent, bighorn sheep. Increases in human population also will result in an increase in traffic. This will potentially affect wildlife by increasing road kill and injury, particularly in winter and in spring when deer, elk, pronghorn and bighorn sheep often concentrate in areas near roads. Mountain goat, bighorn sheep, elk and antelope, as well as secretive predators, such as mountain lion and Canadian lynx, are expected to experience a reduction in population levels in Custer County due to the increase of human presence and associated noise, pets and activities.

These impacts due to increased human populations could be very significant and may have regional effects.

Endangered, Threatened and Sensitive Species

No plant species of special concern to the USFWS (listed, proposed, or candidate endangered or threatened species), or plant species considered rare by the Idaho Rare Plant Technical Committee, are present or are expected to occur on areas to be affected by the proposed project. Some possibility may exist, however, for off-site adverse impact to such species within the region due to the increase in human population of the area.

The proposed project is expected to have no direct impact on the bald eagle or peregrine falcon. However, the increase in human activity in the Challis area could result in disturbance to these species and a potential for increased illegal shooting of wintering bald eagles which roost near portions of Highways 93 and 75 along the Salmon River.

Individuals of bobcat, Canadian lynx, river otter, wolverine, and merlin could be adversely affected by direct habitat loss and/or indirectly by disturbances, such as traffic and noise from blasting, and by increased human activity in the area. This habitat loss and disturbance is expected to result in some reduction of carrying capacity, and consequently population levels of these species, within the claim boundaries and adjacent Salmon River area.

Effects of Project Alternatives

The effects on wildlife and habitat summarized above are essentially the same for each of the three project alternatives.

All alternatives are expected to have the same general potential for impact to big game migration. At the present time no clear advantages or disadvantages can be identified among the project alternatives. However, use of the Redbird access road (Alternative 3) would have the additional potential of interfering with big game movement in upper Squaw Creek.

The extent of direct and indirect habitat loss is essentially the same for each project alternative since the area required for major facilities is about the same. The Redbird access road (Alternative 3) has greater potential for adverse effects on elk than the Bruno Creek road due to the presence of an important elk winter concentration area in upper Squaw Creek.

The adverse effects associated with increased human population in the vicinity of Challis and the project area are expected to be similar for each of the three alternatives since the required numbers of construction and operation personnel, and the construction and operation schedules would not be significantly different.

The three alternatives are expected to have similar impacts on endangered, threatened and other plant and animal species of concern.

5.2.8 Land Use

Present Uses

Land use effects will be the same for all project alternatives. Implementation of the proposed project will change the present land uses in the claim area (grazing and limited recreation) to mining and concentrating operations. Portions of the area, designated under the BLM grazing allotments of Thompson and Bruno Creeks, will be removed from potential agricultural usage during the construction and operation period. Once project operations cease, the claim area could be returned to its present uses.

Land use in Custer County should not be significantly affected by implementation of the proposed project.

The proposed project would not directly affect land use in the City of Challis. However, development of the housing for the primary and secondary work force, will significantly affect land uses in and around Challis. Based on latest preliminary estimates, housing, related commercial development, and roadway needs would require approximately 157 acres, near or within the City of Challis. The proposed development area would be annexed by the city, and would thereby increase the total area of the city by about 92.5% and double the residential and commercial areas.

Land Use Plans

Multiple uses of the claim area, including mineral operations, are permitted under Forest Service plans. Thus, implementation of the proposed project would be consistent with the adopted plans for the claim area. The BLM's Challis Planning Unit Management Framework Plan (MFP) sets forth land uses for the claim area which include grazing allotments and mineral and forest product development. The proposed project would, therefore, be consistent with the MFP for the claim area.

Custer County does not have a General Plan which sets forth generalized land uses within the county. The major effect of the proposed project would be to induce changes in land use as a result of housing and other use requirements.

The City of Challis does not have a General Plan. The Comprehensive Plan for the City was prepared in 1975, and does not reflect potential changes that may result from the proposed project. A Growth Management Plan for the city is being prepared as part of the overall planning effort in anticipation of mining operations.

5.2.9 Socioeconomics

The socioeconomic effects of the proposed project will be similar for the three project alternatives. The project-related work force was the primary basis for analyzing socioeconomic effects. The majority of the construction work force (90%) will be housed in a construction camp located near the claim area to reduce the adverse impacts on Challis. The local effects of this work force will extend over the approximate 28-month construction period, and are not expected to be significant in comparison to the long-term effects of the operational personnel. The primary or project-related work force is expected to reach 550 workers in late 1983. In addition, demand for a secondary work force will be created to provide services for the primary work force. Major socioeconomic effects will result from the non-local (i.e., from outside the local area) primary and secondary work force. Based on previous experience and local labor availability, it is anticipated that approximately 75% of the work force will be from outside the local area. In the economic analysis, all dollar amounts are in 1979-1980 dollars.

5.2.9.1 Population

Estimates for the new non-local population were developed based on the relationship between average non-local work force throughout the year, and the population to employment ratio. The analysis indicates the total population from the non-local primary and secondary work force will increase from an annual average of 112 in 1980 to 1,475 in 1983.

The State of Idaho projections show population in Custer County increasing from 3,742 in 1980 to 3,912 in 1983, an increase of 4.5%. With addition of the primary and secondary non-local work force, population in Custer County is expected to increase to 5,387 in 1983.

The population effects in the City of Challis include a growth in population of about 11.2% during 1980. Population projections for Challis are not available at this time. However, based on the latest estimates for the city (1,009 in 1978), the 1983 population with the project would result in a gain of about 145% over the latest data, assuming the new population settles in Challis.

The major adverse population effect would occur as a result of the non-local work force (i.e., introducing a large number of people into the area over a short period of time). Maximum use of local labor, especially in the early stages of the project, would reduce the number of workers and families entering the Custer County area.

5.2.9.2 Housing

The proposed project will create a demand for housing of such a magnitude that it could not be met by the existing infrastructure. It is currently anticipated that the greatest impact to housing will be

generated by the operation phase of the project, due to the anticipated 394 mine employees who will move into the area with their families. For this reason, Cyprus Mines has purchased several large tracts of land in the vicinity of Challis for the planned development of housing and commercial properties. Private developers will construct the housing for sale to the primary and secondary work force coming into the area. Plans call for the housing to have a sale price in the $40,000 to $60,000 range, which should be affordable by the workers, based on their projected income.

It is currently estimated that the housing demand from the non-local primary and secondary work force will involve the need for 517* permanent dwelling units, ranging from apartments to four-bedroom, single family homes. Development of this proposed housing would increase the total dwelling units in Challis from 303 to 820 units, or a 171% increase.

In addition to creating a significant demand for housing, it is likely that the proposed project would contribute to inflation in the price of current housing stock and developable land. There already exists an upward trend, with prices increasing about 300% since 1972. The extent to which the current inflationary trend accelerates or decelerates, however, is likely to be closely related to the area's anticipated growth, which would be triggered by project-related activities.

5.2.9.3 Utilities

Electricity

Development of the proposed project will create a demand for electricity in the claim area, and increase requirements as a result of the proposed housing area near Challis. To accommodate these requirements and supply other expected activities in the Salmon River Electric Cooperative (SREC) Service Area, construction of a new transmission line serving the area is planned. This project will consist of constructing a transmission line of 230 kv to supplement the existing 69 kv line, and to meet the standard requirements of Bonneville Power Administration (BPA). The projected growth of the service area without the proposed project would have required supplementing the transmission line from Moore to Challis in the late 1980's. Implementation of the proposed project would accelerate the time period for development of the transmission line to the early 1980's.

Operation of the project requires utilization of equipment and processes which will create a demand for electrical energy. Based on latest estimates, approximately 42 megawatts of power will be required to meet peak period loads, with an average load of 30 megawatts.

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* Note: Data developed by Idaho State University (1980) has been adjusted for two-worker households.

Using this basis and an 80% load factor, total annual project usage of electricity is expected to be approximately 294,336,000 kilowatt-hours.

Total residential usage of electricity associated with housing for the primary and secondary work force is estimated to be approximately 6,200,000 kilowatt-hours per year. Total electrical usage from project operation and the housing development is estimated to be 300,536,000 kilowatt-hours per year. As a comparison, total electrical sales by the SREC in 1979 were 36,000,000 kilowatt-hours. Using 1979 as a base, the proposed project will increase total electrical consumption in the SREC service area approximately eight times, including a 45% increase in residential use.

Telephone

The proposed project would create a demand for residential telephone connections. Based on dwelling unit estimates, up to 362 residential connections could be required for the primary work force, plus 155 connections for the secondary work force. Current plans by the Custer Telephone Cooperative to upgrade the system would provide a level of service sufficient to accommodate the increased demand.

Water

Development of the proposed housing would create a demand for water. Current plans for the housing development anticipate drilling of water wells and construction of a distribution system separate from the existing municipal system. The proposed system would be designed to operate independently of the existing system, and would be financed by the housing developer. Development of the water system in this matter should mitigate potential adverse effects on the current water supply system. Water for project operations will be provided by on-site wells.

Waste Water Collection and Treatment

The population associated with the proposed project would generate additional waste water and associated treatment needs. As currently proposed, the new housing development would utilize its own internal collection system which would connect to the existing municipal system for waste water treatment. The existing municipal system currently serves a population of approximately 1,000 persons. Correction of the problems of excess infiltration and leaking of the water distribution system would permit the waste water treatment system to serve an additional 1,000 persons. Beyond that point, additional treatment facilities would be required. Based on the primary and secondary work force estimates and the associated population, this requirement would not occur until sometime during 1983. Waste water requirements in the claim area would be met by an on-site system.

Natural Gas

The propane utilized in the Challis area is provided by Vangas, Inc. of Challis. Vangas would provide service for customers in the housing development area on an individual basis, as required. Vangas is currently providing service to facilities in the claim area and anticipates continuing service as the project proceeds.

5.2.9.4 Community Services

Law Enforcement

The project will impact existing law enforcement capabilities by creating the need for additional personnel and equipment. Increased law enforcement needs associated with the operation phase of the project will primarily be in response to the larger Challis population. The addition of these personnel will be gradual, reflecting the anticipated four-year period of population influx. Such impact has been anticipated and is included in current plans of the Custer County Sheriff's Department.

A security force provided by Cyprus Mines will assume primary responsibility for keeping order at the claim area and within the construction camp. It is not anticipated that project-related impacts would create needs for law enforcement beyond those which are currently planned.

Fire Protection

A five-year plan has been developed by the Challis Fire Department in response to needs for increased fire protection capabilities. The plan involves the addition of personnel, equipment, facilities, and the conduct of appropriate training over a 5-year period, beginning in 1980. This plan provides for expanded areal coverage which would be necessary to accommodate the anticipated additional housing and businesses.

The mining activities within the claim area will provide an opportunity for fire occurrence which does not currently exist. However, Cyprus will provide appropriate fire fighting equipment including a 6,000-gallon, self-contained pumper unit at the mine, so there would not be a need for the BLM or Forest Service to alter their existing fire-fighting capability in the claim area. However, the increased population using public lands will increase the potential for forest and range fires, and may increase fire suppression costs.

Health Services

Given the current level of health care, which is viewed as adequate, it is expected that the influx of population would support an additional full-time dentist and another full-time doctor. It is not

anticipated that there would be an impact to the health care facilities, as the North Custer Health Clinic is currently underutilized and could accommodate additional staff. Emergency health care facilties, including two ambulances, will be provided by Cyprus Mines at the project site.

5.2.9.5 Schools

Based on population changes associated with the primary and secondary employment, the ultimate effect on school enrollment would be an increase of 412* new students from outside of District #181 by the end of the 1983-1984 school year, an increase of 88.4% over the 1979-1980 enrollment. Of the total, 243 students would be in the primary grades and 169 in secondary grades. Direct Cyprus Mines employment would account for 142 new primary students, and 99 additional secondary students. Although the initial enrollment increase will occur during the 1980-1981 school year, the largest influx of students is anticipated during the 1981-1982 school year, with 86 students resulting from Cyprus Mines employment and 69 from secondary employment.

It may be anticipated that most new students would arrive in the fall at the beginning of the school year, with a smaller number arriving for the spring semester, and some arriving throughout the school year. Since project employment would not follow this pattern, a time lag may occur between new employment in the area and the enrollment of students in the school system. (New employees may wish to become established before sending for their families or to allow children to complete the current school term before moving.) The extent of such time lags is unknown. The school enrollment figures presented below assume a direct relationship between the arrival of new employees and new students.

Given the present 15 to 1 student-teacher ratio in the District, a total of about 28 additional certified staff would be needed by the end of the 1983-1984 school year. In addition to certified teachers and administrators, support personnel would be needed.

Current plans for facilities and programs for the schools in Challis incorporate both the needs created by the project and other growth which is occurring independently. The elementary school is to be expanded to about three times its current size and capacity, from the current 13,500 to about 37,100 square feet, and student capacity from 185 to about 525. In addition, tentative plans are for a new four-year high school, to accommodate about 350 students, to be completed in 1983-84. Preliminary plans also call for a two-year junior high school to accommodate about 175 students, to be completed in 1986-87. Based on the above analysis, given the project schedule and the expected

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* Total school enrollment for new students to the District plus local students is projected to be 469.

time of arrival of workers and students, the present school facilities in the District would not be able to accommodate the additional students. Although this situation has not been resolved, Cyprus Mines has financed the architectural fees, so planning and design of the new school facilities can proceed. Section 5.2.9.7 discusses related considerations with respect to public finance.

5.2.9.6 Economics

Economic Base

Implementation of the proposed project would provide alternative employment to ranching operations, and eventually could cause a decline in ranching. However, based upon the character and background of the ranchers in the area, the proposed project more likely would provide a stable source of income from which ranching operations could be maintained. By providing a relatively large, stable source of employment, the project will provide a basis for expanding other economic activity in the area. The long-term effect for the area should be a more diverse economic base.

Employment

Change in the structure and pattern of employment will be a major local economic impact of the proposed project. In 1983, when full-scale operation is reached, the primary work force will be about 550, with approximately 394 being new to the area. The total secondary employment generated by the project to provide services for the primary work force will be about 517. Thus, total new primary and secondary employment, when the project is at full operation, will be 1,042 persons. The project will substantially increase total employment in the county. The main increase will occur in the mining sector, with large increases also in the trade and services sectors.

Personal Income

Based on latest estimates, the construction work force wage and salary payments are expected to total approximately $25.4 million (1979 dollars) during the construction period. The total direct payroll for the operation work force will be approximately $9.8 million per year (1979 dollars). The average annual wage and salary payment is expected to be approximately $18,000.

In addition to the wage and salary payments for the primary work force, income will be earned by the secondary work force. Although estimates for this income have not been established in a manner similar to the primary employment, an average range of $8,000 to $12,000 per year is anticipated. Total wage and salary payments for the secondary work force are expected to range from approximately $4.1 million to $6.2 million per year. Thus, total wage and salary payments resulting from the project are estimated to be $13.9 million to $16.0 million per year.

The annual spending in the local area during project operation is expected to be $2.6 million for the primary work force and $1.1 million to $1.7 million for the secondary work force, for a total of $3.7 million to $4.3 million. The annual state sales tax on this amount of spending would be $111,000 to $129,000, with 20% or $22,000 to $25,800 alloted to Custer County.

Tax Base Characteristics

The proposed project is expected to require total capital investment of approximately $350 million. Using the historical average assessment ratio of 19%, the assessed valuation is estimated to be approximately $66,500,000.

The housing associated with the primary and secondary work force also will affect assessed valuation in the county. Based on latest estimates, the housing, which has tentatively been proposed for development, would have an average market value of approximately $40,000 to $60,000 per unit. The total proposed housing development would thus have a market value of $21 to $31 million, and an assessed valuation of between $3.99 to $5.89 million.

5.2.9.7 Public Finance

A major consideration regarding tax effects is the timing of the requirements for facilities or services and the payment of expected revenue. The need for some public services and facilities will occur prior to the addition of property to the tax roll. Thus, a public agency may have to make capital expenditures prior to the receipt of property tax revenue. Up to this time, no alternative has been available in Idaho to mitigate this situation. However, recent legislation, House Bill 522, has been passed providing such an opportunity. Under this legislation, if a taxpayer intends to engage in a new business that will have an impact on public facilities in a county and has or will have taxable property in the county during the impact period, which shall not exceed 10 years, the taxpayer may be allowed to petition to prepay up to 50% of the estimated ad valorem taxes that will be due during the impact period.

Cyprus Mines intends to utilize the provisions of this legislation to prepay taxes on the land and improvements associated with the proposed project. The total amount of tax or the amount of prepayment have not been determined at this time. However, based upon the expected amount of investment (approximately $350 million), the tax levy for properties in the claim area (3.6225 mills), and an assessment ratio of 19%, the annual tax when the project begins operation is estimated to be approximately $2.4 million.

In addition to claim area tax base considerations, the development of housing would add to assessed valuation in the City of Challis. Based on the tax rate for this area, revenues to the city would range from

$114,000 to $172,000 and revenues to Challis School District #181, from $103,000 to $152,000.

Notwithstanding the potential increase in tax base and higher levels of revenues, long-term funding requirements are a consideration. The primary concern involves potential requirements for long-term public debt to finance capital expenditures which may be necessary to support development associated with the proposed project. This concern occurs since commitment of funds for capital expenditures will be required prior to any revenue flow from the additional tax base. The tax prepayment mechanism could potentially mitigate this situation.

The balance between revenues and expenditures that may result from the proposed development is anticipated to be adequate once the projected population has stabilized. The initial capital requirements to meet projected needs are expected to be derived from a) prepayment of taxes for expansion of school and solid waste facilities and law enforcement equipment; b) the developer's direct investment in sewer and water systems, roads and other infrastructure requirements associated with the new housing development; c) government surplus property; and d) a grant from the Department of Housing and Urban Development.

A characteristic that is significant in determining the future project-related needs for governmental services is the volunteer component. In Custer County, the fire department, emergency medical team, ambulance corps, and Search and Rescue are all volunteer. Police reserve units supplement the paid professional law enforcement staff. It is anticipated, based upon experience in the communities associated with other Cyprus mines and other mines in Idaho, that the volunteer staffing of essential services will expand to meet the incremental increase in demand.

Another source of support for expanding community services is a series of proposed cooperative agreements. Among the areas being investigated are shared emergency communications systems, buses to carry both workers to the mine and school children to sport and extracurricular activities, joint maintenance facilities for school buses and employee transport vehicles, and mutual support provisions between mine fire equipment and the rural fire department.

The major portion of future operation and maintenance revenues will be derived from increases in the property tax base including that generated by $21 to $31 million in new housing. Sales and associated sales tax revenue are estimated to increase along with the net-profit mine tax and mine license taxes. Fees for services such as sewer and water will support their respective operation and maintenance costs.

The development of the various funding sources described above, supplemented by the expansion in tax base, is expected to prevent any project-related increase in taxes from accruing to the present community.

The Salmon River Electric Cooperative and the Custer Telephone Cooperative have current plans to upgrade their systems. Implementation of the proposed project has accelerated the time period for upgrading the electric transmission line into the Challis area from the late 1980's to the early 1980's. Potentially, this upgrade will be financed by a combination of Cyprus Mines, the BPA and the SREC. Thus, public debt will not be required. The telephone coop is expected to utilize a Rural Electrification Administration loan to finance the proposed upgrading of its system.

As currently proposed, the water and sewer system required for the housing area will be constructed by the developer. Any cost of the system would potentially be recovered from purchasers of the housing. Thus, public expenditures would not be required. The planned improvements to the existing municipal water system would occur regardless of the proposed project.

Potentially, the municipal sewage treatment system would be affected by the proposed project. Current plans indicate the proposed housing would create an eventual need for construction of additional treatment facilities. This requirement would not occur until sometime in 1983, and potentially could be financed by creation of a sewer district.

The major area of concern will be the requirements of Challis School District #181. The lead-time required for construction of facilities could establish the need for commitment of funds for capital expenditures as early as mid-1980. This requirement would preceed any increase in tax base from either the project-related facilities or the anticipated housing development. Based on latest estimates, approximately $1,400,000 could be required to construct the school facilities. Potentially, financing could be accomplished by issuance of bonds or utilization of the provisions for tax prepayment. The school district currently has a bonding capacity of about $2,000,000, based on property tax valuations of $8,000,000. Provision for prepayment of taxes could be utilized to meet the construction funding requirements. Legislation is being developed to revise the school financing law to permit construction financing prior to the arrival of new students and not adversely affect the school district's ability to finance operations in later years.

5.2.9.8 Community Attitudes

Some positive and some negative impacts on community attitudes may be expected from implementation of the project. The project will provide jobs and create incentives for young people to stay in the area and, quite possibly, for some young people to return to the area. Also, the project will create rapid growth, a change in lifestyle, and the "loss" of a rural atmosphere as perceived by some members of the community.

Mitigation measures to offset potential adverse impacts to community attitudes are currently being sponsored by Cyprus Mines. These include community meetings, community planning efforts, provision for development of new housing, and prepayment of taxes to offset expenses to the community.

No assessment can be made at this time of changes in community attitudes that may occur after the project ceases. Effective planning for mine closure, as has occurred for mine opening, would likely assist in offsetting any adverse economic and attitudinal effects.

5.2.9.9 Recreation

Impacts to recreation resources are anticipated to occur primarily on the local level, that is, within Challis, the BLM Challis Planning Unit, and the Sawtooth National Recreation Area (SNRA) of the Sawtooth National Forest. Impacts are expected to be greatest within the immediate vicinity of Challis and to diminish with distance from the population center.

Recreation impacts would be related primarily to the influx of population and would put additional demand on existing resources. The City of Challis is the largest population center within the Challis Planning Unit and the Challis National Forest, and is expected to more than double in size as a result of the proposed project. Therefore, there is expected to be increased recreation use pressure throughout the area. Impacts are likely to occur to the more accessible areas first, and, as the population stabilizes and people become more knowledgeable about recreational opportunities, to those areas which are less well known. It is anticipated that the greatest increase in pressure would occur to areas in the vicinity of Challis, especially those along the East Fork and the main Salmon River.

The SNRA would likely receive additional use from the increased population. Such an increase is not anticipated to significantly affect resources of the SNRA. Current Forest Service plans have been developed to accommodate an annual 3% increase in usage over the next 20 years.

5.2.9.10 Cumulative Impacts

Implementation of other mining projects in the Custer County area is not clearly established at this time. Therefore, specific analysis of potential cumulative effects cannot be developed. Although not clearly known, these projects are expected to be of a much smaller scale than the Thompson Creek Project. The incremental impact of one of these projects near the Challis area (e.g. Bayhorse Mine) is expected to be slight. Once other projects are defined and scheduled, then the potential socioeconomic impacts can be analyzed. The method of analysis utilized in this EIS can be adapted to suit the pending project(s). Depending upon anticipated effects of these projects, additional environmental documentation may be required.

5.2.10 Transportation

Traffic

The traffic effects of the three project alternatives are the same. Implementation of the project would create traffic effects during construction and operation in the claim area, the nearby major highways, and in the localized area around Challis. The claim area traffic will be confined primarily to internal traffic related to project activities.

Examination of the design hourly volume on the major highways near the claim area indicates that average daily traffic (ADT) would have to increase approximately 5.5 times on U.S. Highway 93 south of its junction with State Highway 75 to approach the design capacities. Similarly, ADT on State Highway 75 between Stanley and its junction with U.S. Highway 93 would have to increase approximately five times to approach design capacities. Traffic related to construction activities is not expected to reach these volumes.

The total increase in traffic due to project operation includes additional automobile, bus and truck trips. Based on the estimates developed, 262 trips per day may be added in 1983 to State Highway 75 between the claim area and the junction with U.S Highway 93. This level of traffic would represent an increase of 32.5% compared to the projected ADT for this road segment. Although this would represent a significant increase in ADT, the expected level at any one time, such as during shift changes, would not approach the design hourly volume for the road segment.

Traffic impacts will occur from the transport of persons and materials to and from the claim area. The transport of workers will increase auto and bus traffic by 230 trips per day (200 auto, 30 bus), primarily between Challis and the claim area. (For purposes of this analysis, a "trip" is travel in one direction, either to or from the claim area.) The primary method of worker transport is expected to be by buses provided by Cyprus Mines. Based on the shift schedule, the number of workers per shift, and the number of workers expected to drive their own vehicles, approximately 87 vehicle trips would occur betwen 6 a.m. to 8 a.m. and 2 p.m. to 4 p.m., and 56 vehicle trips from 10 p.m. to midnight.

The truck transport of heavy materials will occur primarly between Mackay and the claim area. It is estimated that this will involve an average of 32 daily truck trips, hauling ore concentrate, supplies and equipment. About one-half of these trips would occur during the day shift.

Special permits from the State of Idaho will be required in order to transport loads which are oversized or which exceed 80,000 pounds/five-axle truck. It is expected that there will be short-term, temporary

slow-downs of traffic following such truck transports. It is anticipated these effects would occur only during the construction period.

Traffic in the Challis area related to residential development will create local congestion on existing roads. Specific data on routes of travel or destinations are not available. However, based on the number of dwelling units and a trip generation factor of 10 trips per dwelling unit per day, an additional 5,170 trips per day can be expected. The effect of these trips and appropriate traffic control measures can be determined after the expected routes of travel are known.

Demand for rail service at Mackay will increase due to the proposed project. Ore concentrate will be transported by truck to this location and loaded on rail cars for shipment. In addition, supplies and equipment will be shipped to Mackay for transport to the claim area. Since the facilities at Mackay are minimal, expansion will be required. Preliminary plans for this expansion have been proposed by the South Custer Development Corporation.

No impacts from the proposed project are anticipated on bus or air service.

5.2.11 Aesthetics

The influx of people will alter the aesthetic character of the Challis area, as additional housing, commercial establishments and automobiles become permanently established in the sparsely settled area. It is likely that this influx will be negatively perceived by some current residents. The aesthetic alteration of the area will be pronounced in the short-term, as most of the population-related changes are anticipated to occur within three years of project inception. Long-term impacts are likely to be of a more subtle nature and related to the manner in which development occurs, and the evolving perceptions of current residents. Preliminary planning for housing development around Challis is to maintain densities similar to those at present. Construction specifications, codes, covenants and restrictions are being developed to harmonize housing with existing styles characterizing Challis residences.

Within the claim area, aesthetic impacts will result from alteration of the existing unsettled mountain environment and the creation of an industrial site. Of the 9,700 acre (15 square mile) claim area, about 2,460 acres of vegetation will be removed to accommodate the mine, crusher, concentrator, waste dumps, tailings impoundment, and associated facilities. Aesthetic impacts also would include dust and noise.

Visual impacts within the claim area will be partially mitigated due to reclamation activities which will be an on-going part of project operations. These activities, designed to prevent water and wind erosion, also will reduce visual impacts. They include the planting of

disturbed areas, seeding topsoil storage areas with perennial grasses, and contouring and revegetating overburden disposal areas when dumping is completed. The first phase of such activities will commence upon completion of construction activities. This will involve reclaiming surface areas which have been disturbed by construction and which are not required for project operation.

The highest point of the project is the top edge of the mine pit, located at an elevation of about 8,600 feet. The mountainous terrain surrounding the project blocks the lines of sight from nearby areas. The rugged topography and mountains in the region also tend to interrupt or block lines of sight from other areas of high use within the region. Very little, if any, of the mining activities would be visible from primary travel routes or use areas.

The closest area of major use at the same or higher elevation is Railroad Ridge in the SNRA, about 12 linear miles south of the claim area. The Forest Service has recently (October 1979) taken oblique aerial photographs which indicate that the project (specifically the mine area, the highest project elevation) is only partially visible from the point at which the photographs were taken, which was both closer to the claim area and at a higher elevation than Railroad Ridge. Therefore, the project will not adversely affect the visual panorama from Railroad Ridge.

In addition to the above, visibility impacts of the project on the Sawtooth Wilderness Area in the SNRA have been analyzed. The Wilderness is about 20 miles southwest of the claim area. The analysis indicates that wilderness users should be unable to visually detect mining operations (VTN 1979; Ashton 1980).

The aesthetic impacts of the project alternatives will be about the same.

5.2.12 Cultural and Paleontological Resources

Pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended, Section 2 of Executive Order 11593, and Section 102 of the National Environmental Policy Act of 1969, the Forest Service, in cooperation with the BLM, is considering the possible effects of the project on significant historic and prehistoric cultural values. This is being accomplished in consultation with the Idaho State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation, as required by the "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800).

A comparison of the results of the cultural resources surveys and the present location of project facilities indicates that 25 of the 35 identified cultural resource sites could be affected by the project (Weder 1980). The remaining sites will either be avoided or were

considered to have no further historical or archaeological values beyond those recorded during the surveys.

Site test excavations are being conducted at affected historic and aboriginal sites. The testing plan, developed by the Forest Service in consultation with the BLM and SHPO, will evaluate the sites' scientific and National Register potential. A final report will be prepared to document all surveys, testing, and necessary mitigation measures. Copies will be provided to the SHPO and Advisory Council.

Efforts will be made to avoid or protect significant sites. Unavoidable adverse effects to significant (National Register-eligible) sites will be mitigated through implementation of an appropriate salvage/recovery/documentation plan developed in consultation with the BLM, SHPO, and Advisory Council (see Section 4.8). Additional work will not be required for nonsignificant sites or those significant sites which will not be affected by the project. All cultural resource activities will be conducted prior to project construction. This will result in the avoidance or mitigation of adverse effects to significant cultural values.

The Bruno Creek access road has been realigned since the Draft EIS. The new alignment does not disturb the known graptolite locality. Therefore, there will be no adverse impacts to the locality.

5.3 Expected Outputs and Costs

Certain outputs can be expected from implementation of the project. These are:

- Annual production of 15-20 million pounds of molybdenum contained in molybdenum disulfide concentrate, or approximately $120-$160 million (assuming a price of $8.10 per pound of molybdenum).

- Direct operational employment by the project of approximately 550 workers, with an estimated annual payroll of $9.8 million.

- Other indirect effects, including 517 secondary employment opportuniities, with an estimated annual payroll of $4.1 to $6.2 million.

- Addition of approximately $66.5 million to the Custer County assessed valuation tax base, with an estimated annual property tax payment of $2.4 million (based on an annual estimated investment of $350 million).

These expected outputs will be about the same regardless of the project alternative selected. The outputs would begin with project inception and would increase during the construction period. After the project is at full operation, outputs will remain relatively the same over the life of the project.

Notwithstanding the expected outputs, each alternative will have different capital and annual operating costs. Based on the designation of project components and options in Section 4.3 and 4.4, costs were determined for the three project alternatives. Costs for the alternative components and options are shown in Table 5.3-1.

The basic capital cost of the equipment is the same for each alternative. Cost differences are primarily due to options in location, length of routing, or number of units required. Cost differences shown for the tailings impoundment reflect the two embankments and tailings systems required for Alternative 3. The higher cost associated with concentrator Site B reflects the additional cost of excavation at this location. Access road, water and power line cost variations primarily reflect the length of the route associated with each option.

In addition to capital costs, annual operating costs for the various alternatives were developed. These costs reflect various unit operating costs based on either distance between components and/or topographical conditions. The data reflect only the cost of operating the specific project component; depreciation and other fixed costs are not included.

The total costs for each alternative are summarized in Table 5.3-2.

TABLE 5.3-1

CAPITAL AND ANNUAL OPERATING COST ESTIMATIONS FOR PROJECT ALTERNATIVES
($ MILLION)

Alter-native	Tailings Impoundment			Mined Ore Conveyance(a)			Crusher			Concentrator			Crushed Ore Conveyance(b)			Access Road(c)			Water and Power Lines		
No.	Site	Cap.	Ann. Oper.	Method	Cap.	Ann. Oper.	Site	Cap.	Ann. Oper.	Site	Cap.	Ann. Oper.	Method	Cap.	Ann. Oper.	Option	Cap.	Ann. Oper.	Option	Cap.	Ann. Oper.
1	A/B	$14.0	$ .97	Truck	$8.8	$1.1	A	$3.7	$ .36	A	$39.9	$15.1	Con-veyor	$10.8	$.42	Bruno Creek	$16.6	Neg.	Bruno Creek	$4.0	$1.0
2	A/B	13.8	1.0	Truck	8.8	1.1	A	3.7	.36	B	40.7 (d)	15.1	Con-veyor	10.3	.46	Bruno Creek	18.3	Neg.	Bruno Creek	4.1	1.1
3	A/B & C	29.8	1.7	Truck	8.8	1.1	A	3.7	.36	A	39.9	15.1	Con-veyor	10.8	.42	Redbird	17.5	Neg.	Twin Apex route	3.3	1.0

(a) Conveyance from mine to crusher
(b) Conveyance from crusher to concentrator
(c) Includes access road to concentrator and haul road from crusher to concentrator.
(d) Reflects additional excavation requirements.

NOTES: (1) Mining costs are not included, with the exception of the ore haulage costs given under Mined Ore Conveyance. Costs for mine equipment (excluding ore haulage trucks), preproduction stripping, certain off-site facilities (i.e. construction camp, railhead, etc.), non-site specific costs (i.e., engineering/contractors fees, etc.), and other contingencies are common to all alternatives, and estimated to be approximately $267.2 million.

(2) Neg.: Negligible

TABLE 5.3-2

SUMMARY
CAPITAL AND ANNUAL OPERATING COSTS
FOR THE PROJECT ALTERNATIVES[a]
($ Million)

Alternative	Capital Cost	Annual Operating Cost
1	$ 97.8	$18.95
2	99.7	19.12
3	113.8	19.68

(a) Mining and other costs common to all alternatives are not included. These costs are estimated to be $267.2 million.

CHAPTER 6.0

EVALUATION OF ALTERNATIVES

6.1 Introduction

Based on the effects of implementation described in Chapter 5.0, the project alternatives were compared to each other according to the evaluation criteria presented in Chapter 3.0. The environmental effects were reviewed and were characterized as major, moderate or minor according to the following definitions. Major effects are defined as impacts of large magnitude and severity. They are extensive in area or regional in nature, and are expected to continue after the project ceases. Major effects also include direct effects on unique concerns. Moderate effects are localized in area and are not expected to continue much beyond the life of the project. They are of moderate magnitude and severity and include indirect effects on unique concerns. Minor effects are limited in magnitude and severity and are highly localized (i.e., affect a small area). They are of a temporary nature and do not affect unique concerns.

6.2 Evaluation of Project Alternatives

The comparison of the project alternatives relative to the evaluation criteria is summarized in Table 6.2-1. The vertical columns indicate the significance of the effect of the project alternative on the evaluation criteria. The horizontal lines show a comparison of the effects of the three project alternatives with respect to each criterion.

This environmental comparison indicates that there are only minor variations in the environmental effects of the three project alternatives. The overall environmental effects of the alternatives are discussed in the following paragraphs together with capital and operating costs.

Alternative 1 will result in major effects on salmonid fisheries and wildlife due to increased human population. Major effects also are expected on land uses, socioeconomic factors and traffic in the vicinity of the City of Challis. Moderate impacts are expected on water quality in the claim area. Minor effects are expected: on salmonid fisheries due to changes in hydrology and water quality and direct habitat loss; on wildlife due to interference with migration and direct habitat loss; on endangered and threatened species; on surface and ground water hydrology; on air quality; on noise; and on cultural resources. Capital costs* for the components of Alternative 1 are $97.8 million. Annual operating costs* are $18.96 million.

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* The costs presented herein do not include mining and other costs common to all alternatives. These costs are estimated to be $267.2 million.

TABLE 6.2-1

ENVIRONMENTAL COMPARISON OF PROJECT ALTERNATIVES

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3
Effect on surface and ground water quality	■	■	■+
Effect on salmonid fisheries due to:			
- changes in hydrology and water quality	●	●	●+
- direct habitat loss	●	●	●
- increased human population	▲	▲	▲
Effect on wildlife due to:			
- migration interference	●	●	●+
- direct habitat loss	●	●	●+
- increased human population	▲	▲	▲
Effect on endangered and threatened species and their habitat	●	●	●
Effect on cultural resources [a]	●	●	●
Effect on surface and ground water hydrology	●	●	●+
Effect on air quality	●	●	●

TABLE 6.2-1 (Continued)

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3
Effect on acoustical environment	●	●	●
Effect on land uses[b]	▲/●	▲/●	▲/●
Socioeconomic effects[c]	▲	▲	▲
Effect on traffic flow[d]	▲/●	▲/●	▲/●
Effect on visual resources	●	●	●

KEY

▲ Major effect

■ Moderate effect

● Minor effect

+ Slightly greater effect

— Slightly lesser effect

Notes

(a) Due to realignment of access road there will be no effect on paleontological resources.

(b) Major effect in Challis area/minor effect in claim area.

(c) Includes:
- Effect of new population (social and physical)
- Effect on employment
- Effect of new housing demand
- Effect on community life support systems (i.e., community services and utilities)
- Effect on local government and services

(d) Major effect in Challis area/minor effect outside Challis area.

Environmental effects of Alternative 2 will be the same as Alternative 1. Capital costs for Alternative 2 are $99.7 million. Annual operating costs are $19.12 million.

Impacts associated with Alternative 3 will be similar to those for Alternatives 1 and 2. However, slightly greater impacts are expected on surface water quality and salmonid fisheries, wildlife migration and habitat, and surface and ground water hydrology. These effects will result from the larger tailings impoundment area and use of the Redbird access road. Capital costs for the components of Alternative 3 are $113.8 million. Annual operating costs are $19.68 million.

6.3 Evaluation of No Action Alternative

General

Under the No Action Alternative, the existing environmental conditions described in Chapter 2.0 generally will remain the same. There may be changes in some environmental elements with time, depending on the degree of growth in the area. In terms of the evaluation criteria, the No Action Alternative will not result in impacts on water quality and hydrology, fisheries, wildlife, endangered and threatened species, air quality, noise, visual resources or traffic. Possible cultural and paleontological resources located near project facilities might not be discovered under the No Action Alternative. In addition, this alternative may have some other adverse effects as a result of actions undertaken or planned in anticipation of the project. These are discussed in the following sections.

Land Use

Under the No Action Alternative, existing land use conditions in the claim area and the City of Challis would remain the same as present uses. This alternative would, most likely, foreclose for a period of time the opportunity to institute a plan for development for the City of Challis. Since land uses in the city have not been developed through a formal planning process, current uses have not always been compatible. Continuation of this trend would be an adverse impact.

Socioeconomic Factors

The No Action Alternative would continue existing socioeconomic trends in Custer County and the City of Challis. Population growth in Custer County would continue at a rate below the state average. The local economic base, employment and income characteristics would most likely not change from their present trends. Low population growth would limit the need to develop new housing areas, community services and utilities. Growth in government services would not be required if population growth does not occur. If there is little or no development in Custer County or Challis, these trends would continue.

Notwithstanding these effects, potential adverse effects could occur to attitudes in the community with selection of the No Action Alternative. Since extensive community planning efforts in the City of Challis have already been undertaken in anticipation of the project, the No Action Alternative could create adverse attitudes within the community toward those associated with the project. In addition to these effects, since some investment commitments have already been made in preparation for the project, financial losses could occur. The No Action Alternative for this project could potentially make it difficult to implement other mining projects in the area.

The No Action Alternative would prevent development of the project and the annual production of 15-20 million pounds of molybdenum. This production would represent approximately 7% of the projected 1985 Western World production. Based on the latest plans, this production would be marketed to both domestic and overseas users. The No Action Alternative would preclude marketing of the product to overseas markets, thus potentially adversely affecting the U.S. balance of payments.

CHAPTER 7.0

IDENTIFICATION OF THE FOREST SERVICE SELECTED ALTERNATIVE

The first step in the environmental evaluation of the Thompson Creek Molybdenum Project was the scoping process conducted in the summer of 1979. This process identified the major issues, concerns and opportunities to be addressed in the evaluation (Chapter 1.0). The Forest Service, in consultation with its environmental consultant, BLM, other interested agencies, and Cyprus Mines, developed a reasonable range of project alternatives from an evaluation of methodological and locational options for the major project components (Chapter 4.0). Concurrently, evaluation criteria were developed to compare the relative environmental effects of the project alternatives (Chapter 3.0). The environmental effects of the alternatives upon the existing environment (Chapter 2.0) were then analyzed and described (Chapter 5.0). The alternatives subsequently were compared on the basis of the evaluation criteria (Chapter 6.0).

Based on the environmental evaluation in this EIS, the Forest Service and BLM have identified Alternative 1 as the selected alternative. The reasons for this are documented in previous chapters of this EIS and are summarized below.

The No Action Alternative would have the least environmental effects, although there could be some adverse land use and socioeconomic effects. However, no action is not considered to be a valid alternative. The 1872 General Mining Law, as amended, grants locators of minerals the statutory right to mine the ore. The Forest Supervisor's authority is limited to approving the Operating Plan as submitted, or approving the Operating Plan with any changes or additions necessary to minimize environmental impacts where feasible. This latter option is preferred.

The evaluation of the three project alternatives indicates that Alternative 3 has the potential for greater environmental effects. In addition, the capital and operating costs are substantially higher than for the other project alternatives.

Alternatives 1 and 2 were judged to have essentially the same environmental effects. Capital and operating costs are similar, although slightly higher for Alternative 2. The main difference between these two alternatives is the location of the concentrator and the route of the overland conveyor between the crusher and the concentrator. Based on the analysis in Chapters 4.0 and 5.0, the Forest Service and BLM believe that Alternative 1 has certain advantages over Alternative 2. These are:

- Alternative 1 requires less excavation for the concentrator and conveyor than Alternative 2.

- Alternative 1 allows a straight-line, single-flight conveyor.

- Alternative 2 requires a two-flight conveyor with horizontal turning points, and possible tunnel excavation. Alternative 2 also would entail greater energy usage over the life of the project because of the greater lift required to convey ore to the concentrator.

Therefore, based on the preceeding considerations, Alternative 1 is the Forest Service and BLM selected alternative.

CHAPTER 8.0

CONSULTATION WITH OTHERS

8.1 Introduction

This EIS for the Thompson Creek Molybdenum Project was prepared by the Challis National Forest in a cooperative effort with the Salmon District, BLM. The Challis National Forest, as the lead agency, has implemented public and interagency consultation and coordination throughout the development of this EIS.

In the early stages of EIS development, the Forest Service established an Interdisciplinary Team (ID Team) composed of specialists from the Forest Service and BLM. The team members provided technical communication and coordination with the Forest Service's environmental consultant. The ID Team reviewed the Technical Memoranda which provide the detailed technical support for the EIS. Appropriate technical memoranda also were reviewed by the U.S. Fish and Wildlife Service, Idaho Department of Fish & Game, and Idaho Department of Health and Welfare. In addition, a working draft of the EIS was independently reviewed and evaluated by the ID Team and the above agencies prior to finalizing the document for release to the public.

8.2 Scoping Process

A "scoping" process was used to identify the major issues, concerns and opportunities addressed in the EIS. As the first step in this process, a preliminary scoping document, which identified environmental concerns, was developed by the Challis National Forest with input from the BLM, the U.S. Fish and Wildlife Service, interested State of Idaho agencies and local government entities. Two meetings were held to provide for public involvement and to solicit public comment. The first was a workshop, held on August 13, 1979, with local government officials, selected community leaders and representatives of interested organizations. The second was an open public meeting held on August 27, 1979. In addition, written comments were received from Federal and state agencies and many private individuals. Based on the results of the various meetings and the written comments, a Scoping Document was prepared and issued on November 19, 1979. The Scoping Document outlines the significant issues and concerns to be addressed in the EIS. It also identifies and eliminates from detailed study the issues which are not significant.

In addition, there have been community meetings, workshops, public letters and correspondence with private groups and individuals throughout the development of this EIS.

8.3 Notification of the Availability of the Draft EIS and Public Meetings

The Draft EIS was released to government agencies, private organizations, and interested individuals on July 8, 1980. The official deadline for submission of comments on the Draft was September 6, 1980.

Notification of the availability of the Draft EIS for public review and notification of public meetings on the project were made in newspapers, on radio and television, and by telephone as follows:

Newspapers

Arco Advertiser
Arco

Associated Press
Boise Office

Challis Messenger
Challis

Idaho State Journal
Poctaello

Idaho Statesman
Boise

Mountain Express & High County News
Ketchum

Post Register
Idaho Falls

Recorder Herald
Salmon

Times News
Twin Falls

United Press International
Boise Office

Wood River Journal
Hailey

Radio

KBOI - Boise
KLIX - Twin Falls
KSKI - Hailey
KSRA - Salmon

Television

KBOI - Boise
KID - Idaho Falls
KIFI - Idaho Falls
KIVI - Nampa
KPVI - Pocatallo
KTVB - Boise

Called regarding Draft EIS and Public meetings

Idaho Conservation League
Boise

Idaho Conservation League
Salmon

Idaho Environmental Council
Pocatello

Idaho Wildlife Federation
Meridian

Approximately 500 copies of the DEIS were distributed to Federal, state and local agencies, private organizations and individuals during the period of public review from July 8 to September 6, 1980.

8.4 Summary of Public Meetings and Comment Letters

Two public meetings were held by the Forest Service and BLM to discuss the project and the Draft EIS. The first of these was held in Challis on August 7, 1980, and was attended by about 150 residents of the local area and the general region. The second meeting was held in Boise on August 8, 1980 and was attended by 65 people. Attendees included residents of Boise, Challis, Twin Falls, Pocatello, Missoula, Montana and Vale, Oregon, as well as representatives from the City of Challis, the Idaho Conservation League, Idaho Environmental Council, Idaho State Grange, and the Western Equipment Company.

Both meetings followed a similar format consisting of: an introduction during which the NEPA process was outlined and the activities associated with the development of the Draft EIS were summarized; a period of public testimony on the Draft EIS; and a period in which the public could ask questions of the Forest Service and Cyprus Mines regarding the project or the Draft EIS. The attendance lists and the transcripts of these meetings are on file with the U.S. Forest Service in Challis and the U.S. Bureau of Land Management in Salmon. The responses to testimony are addressed in Appendix D.

In addition to the two public meetings, 34 comment letters on the Draft EIS were received during the comment period. The numbers of respondents from Federal, state and local government, private organizations and individuals were as follows:

Federal Government	12
State of Idaho	5
Local and Regional Government	1
Private Organizations	4
Individuals	12

A list of these comment letters is presented in Appendix D.

The major questions and comments expressed during the two public meetings and in the comment letters on the Draft EIS included:

- The potential for long-term effects, the nature of long-term monitoring and who would bear the cost.
- The handling of solid waste and sewage from the project operation and construction camp.
- The development of alternatives, the adequacy of their range and relative merits.

- The feasibility of underground mining.
- Marketing of molybdenum.
- Air quality standards and potential effects.
- Water requirements, availability, sources and effects.
- Stability and adequacy of the tailings embankment, particularly in regard to flooding and earthquakes.
- Stability of the waste dumps.
- Potential effects on water quality in Squaw Creek and the Salmon River.
- The extent of existing fish and wildlife resources and possible impacts.
- The techniques and expected success of reclamation and revegetation.
- The anticipated socioeconomic impacts and the adequacy of their coverage.
- Effects on land use.
- The availability and cost of electric power for the project.
- Financial concerns with respect to local taxes, Federal funding and assistance for Challis.
- Regulatory agency responsibilities.

8.5 Government Agencies

Many Federal, state and local government agencies were contacted and have contributed to the preparation of this EIS. The agencies contacted for consultation and/or who submitted comment letters on the Draft EIS include:

Federal Government

Advisory Council on Historic Preservation

Federal Energy Regulatory Commission

U.S. Department of Agriculture
  Challis National Forest
  Sawtooth National Forest
  Soil Conservation Service

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Assistant Secretary for Policy

U.S. Department of Energy
Bonneville Power Administration

U.S. Department of Housing and Urban Development

U.S. Department of Interior
Bureau of Land Management
Fish and Wildlife Service
Bureau of Mines

U.S. Department of Transportation

U.S. Environmental Protection Agency

U.S. Public Health Service

State of Idaho

Bureau of Economic Resources and Community Affairs

Department of Fish and Game

Department of Health and Welfare
Division of Environment
Bureau of Air Quality
Bureau of Water Quality

Department of Lands
Bureau of Minerals

Department of Transportation

Department of Water Resources

Idaho State Clearinghouse
Division of Economic and
Community Affairs

Idaho State Archaeologist and State Historic
Preservation Officer

Idaho State University

University of Idaho

Local and Regional Government

Challis School District #181

City of Challis

Custer County
- Auditor
- Commissioners
- Planning Board
- Resource Development and Economic Stabilization Committee
- Sheriff

East-Central Idaho Planning and Development Association

8.6 Private Groups and Individuals

Private groups and individuals who have participated in the consultation and coordination process for this EIS and/or who submitted comment letters on the Draft EIS are listed below.

Private Groups

American Fisheries Society, Idaho Chapter

Challis Advisory Committee

Challis Messenger

Custer County Telephone Cooperative

Cyprus Mines Corporation

Idaho Conservation League

Idaho Environmental Council

Idaho Wildlife Federation

North Custer Health Clinic

North Custer Hospital District

Pacific Northwest Resources Clinic

Salmon River Electric Cooperative

Strout Realty, Inc.

Van Gas, Inc.

Individuals

Pat Axline, Challis, ID

Kurt Becker, Salmon, ID

James T. Brock, Inkom, ID

Janice M. Brown, Idaho Falls, ID

Rebecca Brown, Bellingham, WA

Dale Bruns, Pocatello, ID

Pete Cole, Pocatello, ID

James P. Conner, Ph.D., Challis, ID

John P. Davis, P.E.

Ben Estes, Pocatello, ID

L.J. Ettinger, Challis, ID

Marie T. Feeley, Idaho Falls, ID

Allen Getty, Challis, ID

Shari Maughan, Challis, ID

John Miller, Bellingham, WA

Marlene I. Miller, Star, ID

Allen Parks, Challis, ID

Charles Sheroke, Coeur d' Alene, ID

Jim Smith, Challis, ID

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BLM, See U.S. Bureau of Land Management.

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GS	Geology and Soils
SGWH	Surface and Ground Water Hydrology
WQ	Surface and Ground Water Quality
AE	Aquatic Ecology
TE	Terrestrial Ecology
LU	Land Use
SE	Socioeconomics
TR	Transportation
AT	Aesthetics
CR	Cultural Resources
--	Project Description
--	Project Construction
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APPENDIX A

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APPENDIX A

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APPENDIX B

DESCRIPTION OF THE PROPOSED ACTION
THOMPSON CREEK MOLYBDENUM PROJECT
CUSTER COUNTY, IDAHO
CYPRUS MINES CORPORATION

APPENDIX B

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APPENDIX B

DESCRIPTION OF THE PROPOSED ACTION THOMPSON CREEK MOLYBDENUM PROJECT

General

The proposed Thompson Creek molybdenum mine and concentrator facilities are shown in Figure B-1. Ore will be delivered by 170-ton trucks from an open pit mine to the primary crusher. Crushed ore will then be transported overland by belt conveyor to a concentrator, which will be situated about 7000 feet to the east-southeast. Tailings from the concentrating process will flow north-northeast approximately 7000 feet via pipeline to the tailings impoundment area located in the upper reaches of the Bruno Creek watershed. The land area which will be directly affected by the proposed facilities is approximately 2,460 acres or 3.84 square miles.

The process proposed to recover molybdenite (molybdenum disulfide) at Thompson Creek involves the following steps:

(1) Fragmenting and excavating the in-place ore.

(2) Crushing and grinding the ore to a particle size which liberates the molybdenite particles from the host rock.

(3) Separating and recovering the molybdenite by means of flotation.

This proposed recovery method is very similar to those employed at other major molybdenum mines throughout the world.

Pertinent data and parameters for the proposed operation are summarized in Table B-1.

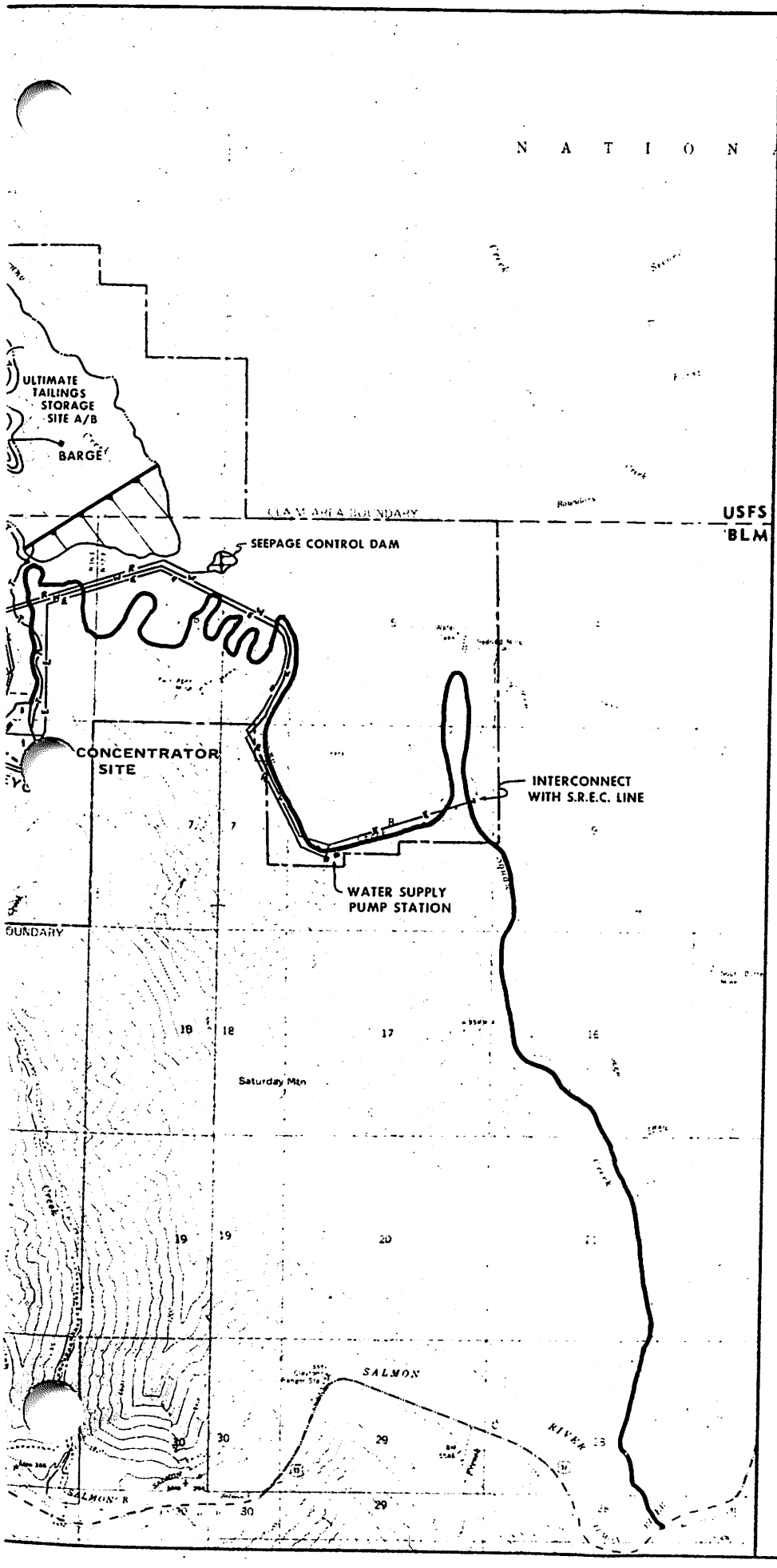
TABLE B-1

THOMPSON CREEK MOLYBDENUM PROJECT

Ore reserves - short tons	193 million
Average grade of ore - % molybdenum disulfide	0.187
Production rate - tons per day, ore	25,000
- tons per year, ore	8.9 million
Molybdenum - % recovery	90
- lbs. per annum	15-20 million
Concentrate % molybdenum disulfide	90+
- tons per day	50
Ratio of concentration	500:1
Overburden removal prior to operation - tons	130 million
Overburden/ore ratio (average)	3:1
Employment - during construction	600
- during operation	550
Overall operating time - days per year	355
mine - shifts per week	21
crusher - shifts per week	12
concentrator - shifts per week	21
Electrical power - peak demand	42 megawatts
- average demand	30-33 megawatts
Fresh water make-up - maximum	9,000 gallons per minute
- average	300-400 gallons per minute

Overburden and Waste Rock Removal and Disposal

Prior to the commencement of mining, approximately 130 million tons of overburden will be removed as "preproduction stripping" concurrently with the construction of project facilities. Most of this overburden will be placed in disposal areas ("waste dumps") surrounding the pit, but some will be used as fill during construction of the overland conveyor, the access road and possibly the starter embankment for the



LEGEND

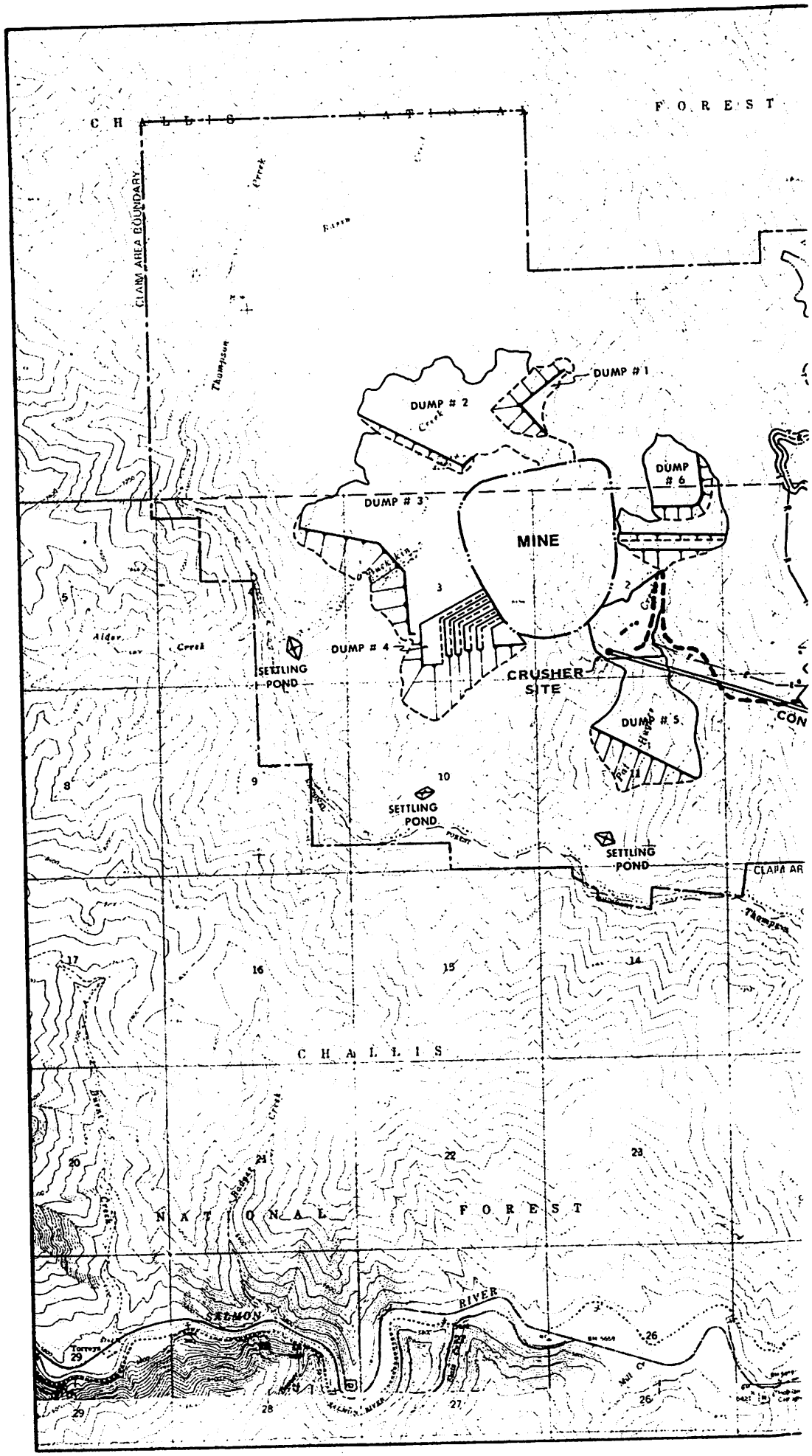
- CLAIM AREA BOUNDARY
- ACCESS ROAD
- SERVICE ROAD
- E POWER LINE
- W FRESH WATER PIPELINE
- R RECLAIM WATER PIPELINE
- T TAILINGS WATER PIPELINE

0 ¼ ½ ¾ 1 mile
SCALE

THOMPSON CREEK PROJECT
CYPRUS MINES CORPORATION

AREA PLAN

FIGURE B-1


FOREST
CLAIM AREA BOUNDARY
Thompson Creek
DUMP # 1
DUMP # 2
DUMP # 3
DUMP # 4
DUMP # 5
DUMP # 6
MINE
CRUSHER SITE
SETTLING POND
SETTLING POND
SETTLING POND
Alder Creek
CHALLIS
NATIONAL FOREST
SALMON RIVER

tailings impoundment. Overburden and waste rock removed during actual mine operations also will be placed in the dumps. The tops of the dumps will be contoured to permit proper drainage.

Prior to placement of material in the dumps, settling ponds will be constructed downstream to collect and detain runoff and allow for sedimentation of eroded soil particles. The heights of the dams for the settling ponds to be located on Unnamed, Buckskin and Pat Hughes Creeks will be 55, 56 and 60 feet, respectively.

Most of the preproduction stripping will be accomplished by the same large electric shovels and trucks which will mine ore during normal production.

Mining

Overburden removal and ore mining will include the following operations:

- o drilling, sampling and assaying to closely define the grade of the ore to be mined.
- o drilling and blasting to fragment the ore (about 10,000 tons per year of explosive will be consumed).
- o digging and loading with 22-cubic yard capacity electric shovels.

Cyprus Mines plans to operate the mine 24 hours per day, seven days per week. The average daily production rate, including overburden and ore, will be about 100,000 tons per day (i.e. 25,000 tons of ore and 75,000 tons of overburden and waste rock). During the early years, daily production will be as high as 175,000 tons per day.

The proposed equipment list for the mining operation is given in Table B-2. In addition to mining equipment, the list includes the support equipment required for road building, road maintenance, dust control, equipment maintenance and communications.

TABLE B-2

MINE EQUIPMENT LIST

Equipment	No. of Units	Remarks
22 cu. yd. shovels	5	Electric powered
15 cu. yd. front end loaders	2	Diesel engine powered
170 ton haul trucks	27	Diesel powered
12-1/4" blast hole drills	4 or 5	
9" blast hole drills	1	
Secondary drills	2	
D8 bulldozers (or similar)	3	
D9 bulldozers (or similar)	3	
30 cu. yd. rubber-tired scrapers	2	
Rubber-tired dozers	4 or 5	
Portable crushing plant 200 tons per hour	1	Production of aggregates for road construction
Road graders - size cat. #16 (or similar)	4	
Water trucks	3	Road spraying for dust control
Cable reel truck	1	
10 ton trucks	3	Transport blasting materials
Backhoe and stemming machine	3	Ditching work
Blast-hole dewatering truck	1	
Portable light plants and tower	4	Illumination of working areas at night
2 ton flatbed trucks w/hydraulic cranes	6	
Two-way radios	62	Plus base stations
90 ton mobile crane	1	
20 ton hydraulic crane	3	
10 ton truck mounted crane	3	

Note: Normal truck usage factor = 70-75%

Crushing and Conveying

The mined ore will be delivered by truck to a 60 x 89 inch gyratory primary crusher where rocks will be reduced to less than 8 inches in size. The crushed ore will then be fed onto a 60-inch wide belt conveyor for transport approximately 7,000 feet overland to the concentrator facilities. The ore will discharge from the belt conveyor into a "coarse ore" stockpile with about 75,000 tons live storage capacity located near the concentrator. These facilities are shown on Figure B-1.

The crusher and conveyor capacities and operating schedules will be matched to the mine ore production schedule--two shifts per day, six days per week. Both the crusher and conveyor will be designed with 3,500 tons per hour capacity. The coarse ore stockpile will provide sufficient surge capacity to ensure a steady supply of ore to the subsequent grinding steps.

The proposed crushing and conveying equipment are listed in Table B-3.

TABLE B-3

CRUSHING AND CONVEYING EQUIPMENT

Equipment	No. of Units	Remarks
Gyratory crusher, 60 inches by 89 inches	1	
Apron feeders--84 inches wide	2	To feed crushed ore onto the belt conveyor
Rock breaker	1	To break oversize rock for passage through the crusher
Dust collection system	1	
Belt conveyor, 60 inches wide by 7,000 feet long	1	
100 ton overhead crane	1	For crusher maintenance

Grinding and Flotation Concentrator

The concentrator facilities will be designed to process an average of 25,000 tons per day of coarse ore. The proposed facilities will be physically capable of handling up to 31,000 tons per day of ore. The grinding and flotation equipment described in Table B-4 will be housed in a single building. The two operations will be monitored and controlled from a central control room. The normal operating schedule will be 24 hours per day, 7 days per week.

The concentrator building will be designed with sloping floors to direct any spilled materials to sumps. Spilled slurry will be pumped from the sumps to the tailings discharge sump, while any accumulated solids will be removed either for return to the process or for discharge to the tailings impoundment.

Grinding: The grinding circuit will consist of two lines each sized to process 50% of the ore and each capable of operating independently. Crushed ore will be withdrawn continuously from the underside of the coarse ore stockpile, then transported by belt conveyors to the 32-foot diameter by 13-feet long semi-autogenous grinding mills. Water will be added at this point, and henceforth the operation will be "wet." The solids/water mixture, or "slurry" at about 60% solids, will move through the mills, with the actual grinding resulting from the tumbling action of the ore and balls in the rotating mill. The slurry discharging from the mill will be pumped to stationary screens to separate any remaining "oversize" material; this oversize will be returned to the semi-autogenous mill for additional grinding.

The screen "undersize" material, less than 1/2 inch in size, will be pumped to a sump feeding the cyclones in the ball mill grinding circuit for the second and final stage of grinding. The ball mills, each 16-1/2 foot diameter by 26-feet long, will be in "closed circuit" with the cyclones which separate and classify particles by centrifugal force.

Oversize material, in this case everything larger than fine sand, will discharge from the bottom of the cyclones to be recycled to the ball mill. Undersize material, considered the finished grinding circuit product, will overflow the cyclone and will flow by gravity as a 35% solids slurry to the flotation concentration step.

Flotation: Selective recovery of minerals by flotation concentration is a common mineral extraction methodology used throughout the world and in the United States. In a flotation process, a slurry mixture of finely ground ore and water is passed into flotation cells (or tanks) and then subjected to a certain amount of chemical treatment and recycled in order to achieve a concentrate product. Flotation is accomplished by bubbling air through the slurry in a series of mechanically agitated cells in the presence of two types of specific surface active reagents. The reagents include: (1) those that promote frothing

TABLE B-4

GRINDING AND FLOTATION EQUIPMENT

Equipment	No. of Units	Remarks
Vibrating feeders--48 inch wide	8	Coarse ore feed
Belt conveyors--48 inch wide	2	Coarse ore feed
Electronic weigh scales	4	Continuous scales, "SAG" mill feed control
Dust collection systems	2	Control of dust in coarse ore conveyor tunnels
Semi-autogenous grinding mills--32 feet diameter by 13 feet long	2	Each driven by two-4000 HP electric motors
Slurry pumps	6	Grinding mills feed and discharge
Stationary screens	2	Sizing SAG mill discharge
Ball mills - 16-1/2 feet diameter by 26 feet long	2	Each driven by one 4000 HP electric motor
Cyclone classifiers	12	
Sampler, rougher flotation feet	1	
40 ton crane	1	Grinding area repair
Mill liner handling machine	1	
Steel ball charging system	1	
Sump pumps	2	For grinding area
Flotation cells--1000 cubic feet	22	Rougher flotation
Rougher tailings sampler	2	
Rougher concentrate samplers	1	
Flotation slurry pumps	1 lot	
Ball mill, 7 feet diameter by 10 feet long	2	Regrinding rougher concentrates and first cleaner concentrates
Cyclones	2	With regrind ball mills
Flotation cells--100 cubic feet	24	First stage cleaning and scavenging
Flotation cells--60 cubic feet	12	2nd to 6th cleaning stages
Sampler	1	Final (sixth cleaner) concentrate
Sampler	1	Scavenger tailings
Sampler	1	Combined rougher and cleaner tailings
10 ton crane	1	Flotation area repair
Sump pumps	3	Flotation area
Flotation reagent storage, handling and metering equipment	1 lot	
Piping	1 lot	
Instruments	1 lot	For centralized control of the grinding and flotation operations

so that the desired mineral floats up with the froth bubbles, and (2) those that depress certain minerals and waste so as to minimize their tendency to float.

Flotation concentration circuits may range from the very complex, where two or more minerals are selectively recovered and separated to simple, single-mineral recovery circuits. At Thompson Creek, only one mineral, molybdenum disulfide is presently being considered for recovery.

The flotation operation at Thompson Creek will be carried out in seven stages. The first will entail bulk separation thereby producing a "rougher" concentrate containing about 10% molybdenum disulfide. The rougher concentrate is then reground in a small ball mill and subjected to the remaining six stages of flotation, called "cleaner" stages, to upgrade the concentrate progressively to 90% molybdenum disulfide.

The use of reagents in a flotation process is a key to the degree of recovery and separation of the desired product(s) and to its saleability and marketability. Based on the metallurgical testing conducted to date, the reagents required for the flotation process at Thompson Creek, are presented in Table B-5.

The flotation reagents will be mixed with the ground ore slurry in two banks of agitated cells in series. Air will be blown through the slurry, now at about 30% solids, and the molybdenum disulfide will adhere to the bubbles in the froth. The froth will overflow the tops of the cells, and the unwanted tailings slurry will discharge from the bottom of the cells. In subsequent steps, the molybdenum disulfide is reground and purified by additional flotation into the final product.

With regard to the disposition of the flotation reagents, the tailings will contain certain residuals from the flotation process. Sodium carbonate is added to maintain pH at approximately 8. Some of this reagent is consumed by acid constituents in the ore, forming the acid salt, carbon dioxide and water. The sodium silicate absorbs onto quartz and silicate surfaces and renders them less flotable. Since these minerals are the waste products, the sodium silicate flows to the tailings impoundment.

Fuel oil, the collector for molybdenite, is absorbed onto its surfaces, rendering it hydrophobic and therefore flotable. Some of the oil remains with the molybdenite (final concentrates will contain from 1-3% oil), a small amount is lost to oxidation and volatilization in the flotation process, and the remainder will flow to the tailings impoundment and undergo further oxidation and volatilization.

The pine oil and methyl isobutyl carbonyl are used to promote frothing. Some of the pine oil will absorb onto the surface of the molybdenite and will remain with the final concentrate. However, the majority of the pine oil and all the MIBC, except for small amounts that volatilize

TABLE B-5

PROPOSED FLOTATION REAGENTS

Reagent	Function	Where Added	Projected Consumption Lbs/Ton	Projected Consumption Lbs/Day
Burned lime or sodium carbonate	pH Control	Primary and Regrind Mills	1	25,000
No. 2 fuel oil	Molybdenite Collector	Primary and Regrind Mills; Cleaner cells as required	0.075-0.15	1,875-3,750
Methyl Isobutyl Carbonyl and Pine Oil (50/50 mixture)	Frother	Rougher Cells and Cleaner Cells as required	0.05	1,250
Sodium Silicate water glass, 60° Baume	Silica Depressant	Primary and Regrind mills	0.1-0.3	2,500-7,500
Sodium Hydrosulfide	Copper and Lead Depressant	Cleaner Flotation as required	0.5-2.0	12,500-50,000

Note: None of these reagents are listed as hazardous wastes by the U.S. Environmental Protection Agency.

will partially oxidize to carbon dioxide and water in the flotation cells and tailings impoundment.

The sodium hydrosulfide is used in the cleaning step of the process to depress other sulfide minerals from the molybdenite. When the sodium hydrosulfide is added to the slurry it reacts with the mineral surfaces, the ionized metal salts and air. At Thompson Creek, the principal metal salt with which it reacts is particulate colloidal ferric hydroxide. The air in the flotation process will oxidize some of the sulfur and hydrogen so that when the tailings leave the cleaner cells most of the hydrosulfide will have been converted to water, sulfates, sulfides and sodium hydroxide. All these flow to the tailings impoundment.

Laboratory bench tests (Colorado School of Mines 1980), were conducted to simulate the proposed concentrating process and resultant tailings, tailings water and tailings recycle water. An EPA extraction procedure at a pH of 5 was performed on the tailings to characterize the "worst-case" leachate. Also an assay was performed on the tailings, and chemical analyses were performed on the simulated tailings water and recycle water and on the tailings extract. The data from these tests were used to characterize and to evaluate the effects of infiltration from the tailings impoundment (see Section 5.2.5 and VTN 1980 WQ). Additional pilot-scale tests are being peformed to refine the expected process effluent quality.

Reagent Handling: Flotation reagents will be received at the site in tank trucks and/or steel drums and will be stored in a separate building adjacent to the concentrator. The various reagents will be prepared for use by mixing with water in small agitating tanks. The mixed reagents will be pumped to the flotation area and fed into the process with mechanical feeders.

A sump inside the reagent building will catch any small spills. A containment area will be constructed around the reagent building of sufficient size to contain the largest possible spill. Any spilled reagents will be returned to the flotation process.

Concentrate Drying and Packaging

About 50 tons per day of molybdenum disulfide concentrate from the flotation circuit will be dried and packaged for shipment to market.

The concentrate from the flotation circuit will be pumped to a thickener, where the concentrate will settle out to a density of 65% solids. The thickened slurry will then be pumped to a "vacuum disc" filter where more water will be removed.

The concentrate, then a wet cake containing 15-18% water, will be transported from the filter to the dryer by a "screw" type conveyor. The standard method for drying molybdenum disulfide is to pass hot

fluid through the hollow sections of the screw conveyor to provide the heat necessary to evaporate the water in the concentrate. The hot fluid is usually a special oil that remains stable at high temperatures. After circulation through the dryer, the oil is reheated externally by a fuel-fired heater. This "heat transfer" oil is completely enclosed in pipes throughout the process. If a fuel-fired heater is chosen to heat the dryer fluid, a stack will be provided along with suitable dust control equipment so that the products of combustion can be released into the atmosphere in accordance with regulatory requirements. Only nominal quantities of fuel oil will be used for the drying operation--about 50 gallons per hour.

When dry, the molybdenum disulfide concentrate will be a very fine powder and particular attention will be given to dust control in the design of the final handling and packaging facilities. Wet dust collectors will be installed to remove any dust resulting from the drying and packaging operations. The water/dust slurry will be recycled to the concentrate thickener.

The dry concentrate containing 5-8% moisture will be placed directly into 55-gallon steel drums or other suitable bulk containers. It will then be trucked to Mackay or other locations for rail shipment either to market or to existing roasting plants. At the proposed production rate, an average of 20-21 truck loads will be shipped each week, each carrying 20 tons.

The proposed concentrate drying and packaging equipment is listed in Table B-6.

Tailings Impoundment and Water Reclamation

The upper Bruno Creek site for the tailings impoundment shown on Figure B-1 was selected based on an evaluation of 16 sites within an eight-mile radius of the mine with respect to nine environmental and operating criteria. This site will have the ability to store at least 200 million tons of tailings (i.e. more than 20 years production).

The average quantity of tailings from the flotation concentrator will be 24,950 tons per day, i.e. the 25,000 tons per day feed to the concentrator less 50 tons per day of molybdenum disulfide concentrate. The tailings will flow as a 35% solids slurry at a rate of about 10,000 gallons per minute from the concentrator to a sump from which it will continue, initially by gravity, through a 24-inch diameter pipeline to the tailings impoundment approximately 7,000 feet north-northeast of the concentrator. The pipeline will not be buried.

The tailings slurry will be passed through cyclone separators to separate the coarse "sands" for building the embankment. The fine "slimes" and most of the contained water will pass into the impoundment.

TABLE B-6

CONCENTRATE DRYING AND PACKAGING EQUIPMENT

Equipment	No. of Units	Remarks
Final concentrate thickener 30 feet diameter	1	
Holding tanks - agitated	3	
Slurry pumps	1 lot	
Vacuum filters 6 feet diameter by 8 disc.	2	Plus associated vacuum pumps, etc.
Dryers 60 ton per package	2	
Drum packaging equipment	1	
Weigh scale	1	For product
Mobile equipment	1 lot	Drum packaging and storage
Dust collection systems	2	"Wet" collectors, one unit with dryers, one for packaging equipment

A 165-foot high starter embankment will be constructed prior to the commencement of production using material from borrow sources. The main embankment will be 600 feet high and will be constructed from the coarse tailings obtained from the cyclones stationed along the starter embankment crest. The underflow from the cyclones will be deposited downstream and, if necessary, mechanically placed and compacted by bulldozer to provide a slope of 3 horizontal to 1 vertical. The embankment will always be maintained at a height sufficient to capture the maximum flood run-off from the area above it. A diversion channel will be constructed around the west side of the impoundment to bypass peak flow events. Water from upstream of the impoundment will be transported around the impoundment to a natural drainage which enters Bruno Creek below the seepage control pond.

The impoundment area will receive the "slimes" and most of the water from the cyclone overflow. Discharge points of the tailings will be controlled to keep the resulting pool as remote as practicable from the embankment section. As solids settle out of the "slimes," up to 70-80% of the water will be available for reuse. The reclaim water system will consist of pumps on a floating barge in the impoundment, which will deliver the water by a 24-inch diameter pipeline to a 7 million gallon storage basin located above and near the concentrator. Water will flow by gravity from the storage basin back to the concentrator. Additional water will be reclaimed through the utilization of the seepage control network. This network will include a seepage control pond constructed downstream from the tailings embankment. This pond will collect runoff from the embankment and seepage from the drainage system within the embankment. Water will be pumped via pipeline from the pond to the concentrator. This water is included in the 70-80% reclaim amount.

Snow Management Program

Removal and management of snow at the Thompson Creek Project is required to ensure production efficiency and safety during winter mining operations. Snowfall data from the surrounding area indicates an annual average snowfall of 19.7 inches, mainly occurring in January. Winter snow storms at the project site will generally have an accumulation of less than one foot. However, drifting of snow is expected in some areas. In these areas, a short section of snow fence may be constructed as a means of controlling the pattern of drifting. Cyprus Mines plans to use methods and techniques for emplacement of snow fences as developed by Forest Service personnel at the Rocky Mountain Forest and Range Experiment Station in Laramie, Wyoming.

Snow removal and control techniques for the Thompson Creek Project will vary in accordance with ground conditions and requirements in each of five general areas. The following procedures and equipment* will be used:

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*In as much as the project involves the handling and transport of materials, much of the mining equipment to be used at Thompson Creek can efficiently manage the task of snow removal.

Access Road: The access road will be a paved road from Highway 75 to the concentrator. This road will be kept open with snowplows and a snowblower, where necessary. A sand truck will be utilized to minimize icing conditions. Accumulated snow will be allowed to stand off the downhill shoulder of the road during winter. Spring runoff will be diverted off the roadway and into the road culvert and drainage system.

Concentrator: Accumulated and drifted snow will be gathered throughout the traffic areas by the grader, dozer, and/or snowblower and stored for the winter on the downhill side of the road beds and work areas in such a manner that spring runoff will be directed, by ditches, into the tailings impoundment or into the Pat Hughes settling pond. If the snowfall or drifting are excessive, front end loaders and haul trucks will be utilized to move the snow to the tailings impoundment area.

Haulroad: The mine haulroad (located between the pit and crusher) is a wide (100-foot) all-weather gravel road used by the 170-ton trucks. The road will be constructed with a safety berm of mine-run material on the downhill edge and a drainage ditch on the uphill side. At intervals of approximately 200 feet, a 20-foot wide slot will be constructed through the safety berm to allow for drainage and snow removal. These slots will be located near natural drainages whenever possible so spring snowmelt will follow the natural water courses. All runoff water from this haulroad will either be captured by the mine dewatering system or by one of the three settling ponds.

The haulroad (100-foot wide) located between the crusher and the concentrator will be bermed and snow removed similar to the mine haulroad.

Both haulroads will be sanded and gravelled to prevent icing conditions.

Roads constructed during the severe winter months will not mix snow and road fill material in the compacted zone.

Minesite: Excessive snow will be removed from active work areas and active roadways throughout the minesite. This snow will be loaded into trucks as required and hauled to snow disposal areas located away from active waste dump areas. The snow disposal areas will be designed adjacent to natural drainages when practical, but will always drain into either the tailings impoundment or one of the three settling ponds.

Waste Dumps: In order to minimize any potential stability problems associated with the mixing of large amounts of snow and ice with the overburden and waste rock, special procedures will be followed during severe winter months. On the active waste dumps, snow will be disposed of in areas which will not receive waste until the snow melts. The co-mingling of minor amounts of snow and overburden and waste rock cannot be prevented in active waste dumps as snow will settle on the

dumping face during storms. In the situation where a dump area is advancing over another, snow accumulation on the horizontal surface being dumped upon will be removed and disposed of. Drainage ditches and backsloped surfaces will be provided on dump areas to allow spring runoff to be directed away from the dump crests and into the settling ponds.

Support Facilities

Water Supply: Fresh water will be required for drinking, fire fighting and general utility uses and to make up any process water requirements that cannot be met with reclaim water. The average requirement of fresh water may be as low as 300-400 gallons per minute. In order to allow for peak demand periods resulting from low flow conditions, the fresh water system will be designed to deliver at least 9,000 gallons per minute.

Water will be obtained from deep wells near lower Bruno Creek (Figure B-1) and will be pumped via buried pipeline to a fresh water tank located above and near the concentrator from where it will flow by gravity through pipelines to the various facilities. This tank will also hold a minimum 200,000-gallon fire water reserve. If necessary, drinking water will be treated prior to distribution.

Electrical Power: Power will be supplied to the project by a 230 kv transmission line to be constructed by the Salmon River Electric Cooperative (SREC). Overhead wooden pole lines will distribute power to the various project facilities from a substation located near the concentrator building.

The power required for construction and for pre-production stripping will be supplied from the existing transmission line near Clayton. Up to 5,600 kilowatts are available, sufficient for these project requirements.

Diesel generators will be installed where necessary to provide emergency power.

Access, Haul and Service Roads: The main access road to the project site will branch off Highway 75 and follow the existing road along Squaw Creek to Bruno Creek, then parallel Bruno Creek for approximately two miles before continuing up to the site of the concentrator. Construction of the portion of the road along Squaw Creek will consist of improving the existing road by paving.

The paved 11-mile long access road will be constructed to appropriate standards for 20-ton capacity trucks. Most traffic will result from transporting workers, fuel and other supplies to and from the site, and shipping molybdenum concentrates out. The location of the road is shown on Figure B-1.

A haulroad also will be constructed between the mine and the crusher and the crusher and the concentrator to accommodate two-way traffic for the 170-ton mine trucks. Four-wheel drive type service roads will be constructed along the routes of the overland conveyor, tailings pipeline, reclaim water line and fresh water pipeline.

A secondary project access road will be provided by improving the existing road along Thompson Creek to the Buckskin Creek area. While this road will be important during the construction period, it will handle minimal traffic during normal operation.

Maintenance Facilities: All maintenance facilities for the mine and the concentrator will be centralized in a building located near the concentrator with the exception of a lubrication shop (which will be located near the primary crusher) to service mine equipment.

Ancillary Buildings and Facilities: The following ancillary facilities will be provided:

- warehouse for parts and supplies
- analytical laboratory
- office building
- changehouse for workers
- car parking
- guardhouse/scalehouse
- first aid station
- fire fighting equipment

Fuel Supply and Storage: Fuel will be delivered in tanker trucks for transfer to large fuel storage tanks. Located near the primary crusher, the tanks will be enclosed by berms to contain any spills.

Site Drainage: A storm drainage system will be incorporated into the site development plan for the concentrator, wherein run-off will flow to a settling pond or the tailings impoundment. This system excludes process effluent and sanitary sewage. Surface water run-off from the primary crusher area will flow into the settling pond below a nearby waste dump.

Sewage Treatment and Solid Waste Disposal: Two sewage treatment plants will be provided; one will treat sanitary sewage from all facilities in the concentrator area by extended aeration, settling lagoons and chlorination of the effluent prior to discharge into the tailings impoundment; the other, a septic tank and drain field system, will handle sewage from the primary crusher area.

Solid waste disposal will occur in two phases. The first phase (the first 6-8 months) will comprise trucking of the solid waste from the site to the Challis Sanitary Landfill. Cyprus Mines is presently working with the City of Challis in planning for the upgrading of the landfill.

The second phase will comprise disposal of the solid wastes generated at the project site into the waste dumps adjacent to the mine pit. Cyprus Mines recently submitted an application for such a waste management facility to the State of Idaho, Department of Health and Welfare. The solid waste management facility at Thompson Creek is expected to comply with the Criteria for Classifying Solid Waste Disposal Facilities (40 CFR 257, September 13, 1979).

Solid wastes will include miscellaneous garbage and trash generated at the site (i.e. paper and food wastes, cans, unsalvageable and unusable equipment items, etc.). The quantity of solid waste generated will be insignificant relative to the approximately six-hundred million tons of overburden and waste rock which will ultimately be disposed of in the waste dumps.

Petroleum products (i.e. spent crankcase oil, etc.) will be combined with fuel oil and consumed as fuel by the haul trucks. No toxic or hazardous wastes will be disposed of in the waste dumps.

Security: Security in the claim area will be the responsibility of Cyprus Mines. The security system to be established for the project will include certain direct security measures supported by employees involved in the day-to-day operations. Access to the area will be controlled primarily by fencing although in certain areas control will be attained by the locally steep topography. Persons entering and leaving the concentrator area will be required to gain clearance through a guard/scale house located along the access road at the entrance to the concentrator area. This guard/scale house will be manned continuously for 24-hours, 7 days per week. Other areas will be fenced or controlled as determined necessary to protect property and the health and welfare of persons entering the project area. Security measures will be an important consideration as project planning continues and project designs are finalized.

Use of Explosives: The use of explosives at the Thompson Creek Project will be required in drilling and blasting for overburden removal and ore mining. About 10,000 tons per year of explosives will be consumed at the site. Explosives will include ANFO (ammonium nitrate-fuel oil mixture), water resistant slurries and certain Class A Explosives (i.e. dynamite, boosters, etc.). ANFO will be stored in covered silos. Slurry ingredients will be stored and mixed on site. Class A Explosives will be stored in approved magazines located in a security area(s) away from roads and buildings and will comply with applicable state and/or Federal regulations.

The use of explosives will be limited to the daylight hours generally when manpower exposures are lowest (i.e. during shift changes, lunch periods, etc.). Blasting will usually last no longer than one hour in duration.

Project Construction

The general excavation of the concentrator site, ore receiving area and the access road will begin immediately after a general construction office has been established on site. Topsoil will be stripped and stockpiled in reserved areas adjacent to the working site locations. Timber removal will begin immediately and will be closely coordinated with the Forest Service and BLM. The timber will be stacked and handled on a commercial basis. Site excavation generally will be in rock, with drilling and blasting handled on a three-shift basis. Material will be moved by a combination of scrapers and loader/truck methods.

The project is scheduled to be constructed during a 28-month period. A five-day work week will be used during the winter with an extended work week scheduled through the summer months.

Construction Camp

Cyprus Mines estimates that up to 600 workers will be employed to construct buildings, roads and other facilities for the Thompson Creek Project. Housing requirements are expected to be approximately as follows:

From the local area with own housing	60
From outside with trailers	180
From outside requiring single status accommodation	360
Total	600

Cyprus Mines and its contractors plan to construct a camp to house construction workers on the low lying pasture land east and north of the confluence of Squaw Creek with the Salmon River. The camp will include single status housing, trailer hook-ups and recreation facilities. It will be composed of eleven residence buildings, one kitchen/dining/recreation building, one maintenance/first aid building, one sewage treatment plant, one electrical generator building and associated vehicular parking areas and access roads. Two areas will be provided for recreational vehicle parking with a shower building at each area. All buildings will be constructed with wood siding of color that will harmonize with the natural terrain.

Utilities will be installed underground and the site will be finish graded to provide surface drainage away from the buildings and parking areas. Connecting walkways between buildings will be asphalt surfaced, and the ground surface in close proximity to the buildings will be covered with bark chips to limit erosion and blowing dust. Surfaced, drainage will be carried overland to absorption trenches for infiltration into the soil. Roads in and out of the camp will be located to minimize interference with nearby residences (if any).

The sewage treatment facilities, which have preliminary approval of the Idaho Department of Health and Welfare, Division of Environment, will be an aerated lagoon system (aerated lagoon, polishing lagoon, and infiltration beds) with zero discharge of effluent. Water will be obtained either directly from existing surface sources or a well system developed to obtain the water from available underground sources. Plans and specifications for the camp's water supply and sewage treatment systems will require approvals by the Idaho Department of Health and Welfare and Department of Water Resources.

When the mine is operational, the construction camp site will be stripped, graded and returned to its pasture state.

Contractors and individual construction workers will be informed by Cyprus Mines of all applicable fish and game regulations. Cyprus Mines will cooperate with the involved government agencies to ensure adequate enforcement of the regulations.

Some consideration has been given to housing the construction workers in temporary and/or permanent facilities to be constructed in and around Challis. One of the advantages of this alternative would be the possibility of converting some of the housing for construction workers to long-term residences for permanent employees. However, Challis residents have expressed serious concern about the impact of substantial numbers of temporary residents on Challis, particularly at a time of rapid general growth due to the Thompson Creek Project. Therefore, Cyprus Mines is proceeding with plans to house construction workers in the area described above.

Operating Personnel

Total project employment will be approximately 550 people at full production. The 550-person work force is described in Table B-7.

The two largest groups will be equipment operators (trucks, front end loaders, shovels, etc.) and maintenance workers (mechanics, electricians, etc.). Women are playing a steadily-increasing role in western mining operations in all positions including equipment operators and supervisors, and they will be encouraged to join the project. It is estimated that about 20% of the work force will be women. Housing for the operation work force is expected to be developed near the City of Challis.

Environmental Awareness Training Program

The Cyprus Thompson Creek Project has funded a grant to Boise State University to develop an Environmental Awareness Training Program which will be given to all Cyprus Thompson Creek Project employees. The purpose of the program is to teach employees about the environment, both project-oriented and the local area, in an attempt to help reduce any potential impacts due to increased population.

TABLE B-7

OPERATION WORK FORCE

General Management and Supervision[a]		85
Mine Operation[b]		188
Mine Maintenance[c]		130
Concentrator Operation[d]		49
Concentrator Maintenance[e]		35
General Administration and Other[f] (Purchasing, personnel, accounting, engineering, safety, security, etc.)		63
	Total	550

Skilled/Unskilled Labor Requirements:

(a) Professional personnel.
(b) Unskilled, to be trained by Cyprus Mines.
(c) 75 percent skilled
25 percent semi-skilled, to be further trained by Cyprus Mines.
(d) Unskilled, to be trained by Cyprus Mines
(e) Skilled
(f) 50 percent skilled
50 percent unskilled, to be trained by Cyprus Mines

The objectives of the Environmental Awareness Training Program are:

1. To develop an educational program to introduce employees of the Thompson Creek Project and their families to recreational and environmental opportunities and responsibilities in Custer County, Idaho.

2. To develop a long-range plan for the implementation and support of the program.

3. To develop an exemplary environmental awareness program to serve as a model for the mining industry.

4. To raise employee productivity by providing information beyond what is required for narrow job responsibilities.

Cyprus Mines believes the program will help educate Thompson Creek Project employees about the local environment and will help protect the local environment.

APPENDIX C

CONCEPTUAL RECLAMATION PLAN
THOMPSON CREEK MOLYBDENUM PROJECT
CUSTER COUNTY, IDAHO
CYPRUS MINES CORPORATION

FOREWORD

This appendix presents the Conceptual Reclamation Plan for the Thompson Creek Molybdenum Project as developed by Cyprus Mines and its consultants in March-April 1980. The Plan outlines the goals, objectives and general reclamation procedures for areas which will be disturbed by project activities. This Plan is preliminary; it will be refined in response to additional baseline data currently being collected and further development of project plans.

APPENDIX C

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APPENDIX C

CONCEPTUAL RECLAMATION PLAN
THOMPSON CREEK MOLYBDENUM PROJECT

Introduction

The first step in reclamation planning for the Thompson Creek Molybdenum Project has involved developing, with the consultation and knowledge of the U.S. Forest Service, Bureau of Land Management, Idaho Department of Lands, and other agencies, this conceptual reclamation plan. The Plan includes basic goals and suggested methods for implementation. The second step involves practical adjustments to this Plan in response to increased baseline information and further development of project plans.

General Reclamation Plan

Short-term objectives of reclamation center on the immediate reduction and prevention of erosion of the overburden and waste rock disposal areas, topsoil storage areas, tailings impoundment surface, and downstream faces of the settling pond embankments and tailings embankment. Erosion control also will be important in areas of lesser disturbance such as areas used for staging, storage, diversion, road cuts and other facilities.

The goals of the Thompson Creek Reclamation Plan are to minimize wind and water (weather) erosion during the mining operation and to reclaim the land to an end use similar to that which existed prior to mining. The pre-mining land uses in the project area are primarily forestry, limited wildlife habitat, and some marginal livestock grazing. The long-term objective is the establishment of a coniferous forest on slopes.

Reclamation does not comprise a procedure or set of procedures which are implemented at the end of the project. The Reclamation Plan commences with a set of goals or objectives at the beginning of a project which are refined and implemented throughout the project.

The Reclamation Plan and Mining Plan are integrated, and reclamation will be an on-going part of the mining and concentrating operations.

General Strategy

Reclamation plans will be developed that are compatible with the existing climate and site resources. The critical feature of the Thompson Creek Project area is its semi-arid nature, receiving 10 to 20 inches annual precipitation.

A second feature of importance is the mountainous nature of the site, with typically steep slopes and shallow immature soils. Thus, the primary strategy of the Reclamation Plan must be to conserve moisture while minimizing soil loss.

Techniques for successful revegetation have been well developed at other projects. They will be used at the Thompson Creek Project on a site-specific basis, as required, and adapted to achieve the reclamation goals. The techniques include:

- Sub-soil ripping
- Surface pitting and gouging
- Topsoil scarification
- Deep furrow drilling of seed
- Contour furrowing
- Mulching
- Providing wind breaks and snow fences
- Strategic irrigation
- Using adapted species and ecotypes
- Fallowing
- Applying chemical amendments to the soil
- Terracing
- Selective soil placement, and
- Site stabilization with interim vegetation

Due to the value of water in Idaho for recreation, fisheries, wildlife and irrigation, the creation of a lake or reservoir will be a preferred reclamation alternative.

Topsoil

Topsoil will be removed and segregated for use in reclamation where practicable. The mine and waste dump areas have little recoverable topsoil, so topsoil storage piles may not be necessary. Prior to the disturbance of an area, and where possible, timber will be marketed. Stored soil materials will be stockpiled, marked and stabilized for later use in permanent reclamation.

The overall goal of revegetation efforts will be to establish forest on sloping disturbed areas and rangeland on level disturbed areas. Research will be conducted during the life of the project to test plant species and method of establishment. Information and experience in high altitude mined land revegetation has been developed for other mines similar in environmental setting, and will be utilized at Thompson Creek.

The purpose of various species mixtures will be to establish plant growth cover which will lead to a climax stand. Some suggested plant species mixes have been included in the 1975 Environmental Assessment Report prepared by VTN.

Planting in areas being revegetated to rangeland will be hydro-mulched at a rate of approximately 60 pounds of seed per acre. Some site-specific seed drilling also may be utilized. The optimum seeding time for the project area is in the fall. This allows the seeds to over-winter and germinate in the warm, moist spring. Areas which will be exposed during the summer months will be either spring-seeded and/or mulched with straw or wood chips to prevent erosion.

Fertilization needs will be monitored annually until self-sustaining plant growth is achieved. Revegetated areas will be monitored for soil erosion throughout the life of the project. Where erosion occurs, measures such as mulching, replacement of topsoil and reseeding may be needed to re-establish vegetation.

Stabilization of waste dumps and topsoil storage areas will be consistent with short-term needs and long-range goals.

Selection of suitable topsoil storage areas, proper configuration of waste dumps, and minimization of construction time are important first steps in the process. Straw and synthetic mulches will be used to control drying and protect the soil surface from erosion by wind and water.

Measures to prevent losses of topsoil will be taken and other areas disturbed will be evaluated for erosion control. The topsoil storage areas will be seeded with grass, thereby providing an added benefit of supplying stockpiled soils with organic matter which otherwise would not be available during the stockpile period.

Staging areas, temporary lay down areas, road cuts and other disturbed areas will be revegetated with perennial grasses to prevent water and wind erosion.

Reclamation of the Mine Area

Hydrologic investigations completed thus far indicate that upon cessation of mining the pit will fill with water. The quality of water in the resulting pit lake is expected to be representative of typical oligotrophic mountain lakes.

Cyprus Mines will cooperate with the appropriate Federal and state regulatory agencies to develop mutually satisfactory reclamation and fisheries management objectives for the lake.

Those portions of the pit walls that remain above the waterline will be stablized. Ramp access will be maintained to the lake for recreational purposes and wildlife access. Where feasible, benches in the pit above the waterline not in solid rock will be contour ripped to provide a rooting and moisture storage zone for plants. These and other bench areas may be covered with suitable soil material for revegetation.

General revegetation procedures are:

- Test soil to determine fertilizer and chemical amendments necessary to achieve revegetation goals.

- Apply soil amendments as a part of seed bed tillage, which should include scarification to eliminate compaction.

- Plant a herbaceous shrub seed mix using the equivalent of a rangeland drill, allowing "skips."

- Transplant tree seedlings into the "skips" so competition for soil moisture for herbaceous species is minimized and a natural clumping visual aspect is created. Tree seedlings will be potted and inoculated with ectomycorrhizae such as Pisolithus tinctorius, and planted with a slow-release fertilizer tablet.

Reclamation of Tailings Impoundment

Preliminary leachate studies indicate Thompson Creek Project tailings will be typical of molybdneum mines. Problems that must be overcome in revegetating the tailings include cementation of the surface, lack of plant nutrients and high salt content. The following sequence of procedures has been successful at similar mines and may be implemented, with site-specific adjustments, after final analyses have been made on Thompson Creek tailings:

- After the tailings area has become solid enough to support reclamation equipment, the quantity of buffering materials needed to neutralize the upper 12 inches will be calculated and incorporated into the surface of the tailings.

- A layer of coarse, relatively inert material such as waste rock fragments will be spread over the buffering materials to serve as a subsoil. The need for, and thickness of the layer will be determined from analysis of the in-place tailings.

- Suitable soil material for plant growth will be spread over the buffered layer and any excessive compaction eliminated by scarification. Chemical amendments will be incorporated based upon laboratory soil tests and land use goals. Similar projects have utilized wood chips and sewage sludge as organic nutrients. Depending upon their availability, these resources may be utilized at Thompson Creek.

- Revegetation will be done by conventional dry-land farming techniques for moisture conservation and seed placement. Specific techniques and species mix will depend upon on-going revegetation tests.

Upper Bruno Creek peak flows will be diverted around the tailings impoundment. The channel will be lined and riprapped as needed to provide for water quality goals. The tailings embankment downstream slope will be stabilized and, as practical, revegetated upon cessation of project operations. Since the outerslope will be predominantly facing southeast, revegetation efforts will concentrate on establishing herbaceous and shrub species having utilitarian value. Procedures will involve terracing or contour furrowing, contour drill seeding, testing, fertilization, and mulching. Since the embankment will be a permanent structure, the downstream face will be covered with a suitable plant rooting medium prior to seeding. Scarification of the surface may be necessary to ensure a proper bonding of soil on the slope. If plant growth procedures and testing demonstrate the embankment soil material is adequate, topsoiling for reclamation on the embankment downstream slope will not be necessary. Where revegetation is not feasible the downstream slope of the embankment will be riprapped to prevent erosion.

Reclamation of Waste Dump Areas

Overburden and waste rock disposal areas will be revegetated as ecologically and economically feasible. The tops of the waste dumps will be relatively flat, and revegetation is expected to be easily implemented. Revegetation of waste dumps will not begin until dumping is completed on a particular area. Care will be exercised so the final outerslope material will be relatively inert, non-eroding talus.

In protected microsites, trees will be hand planted on north or east exposures. Probability of vegetation survival on these exposures is good. The material on the outerslopes of the waste dumps will be combined with coarse fragments to prevent erosion and, in some microsites, with sufficient fines to promote plant growth. The following examples are typical procedures utilized in the reclamation of waste dumps:

- The flat, compacted surfaces of the waste dumps will be ripped and cross-ripped, where the material allows, to a depth of at least two feet to provide a rooting and moisture storage zone.

- A suitable soil material will be spread, scarified and treated as necessary for a seed bed.

- Stabilizing herbaceous cover will be seeded with a rangeland drill and mulched. Shrub and tree seedlings will be planted into the mulch cover in clumps on selected areas not seeded to herbaceous species. Reforestation of the overburden outerslopes will be accomplished by planting a variety of seedlings. Cyprus Mines will interact with the Forest Service, BLM and state agencies in determining the number of

trees per acre required to establish lasting vegetation. These seedlings will be irrigated as appropriate.

Waste dumps will be contoured to provide adequate drainage and blending with surrounding topography. Waste dumps receiving water from upstream portions of the watershed will be shaped to transmit water to the natural drainages. The outerslopes of the waste dumps will be stabilized with mulch to reduce evaporation and erosion until vegetation is established.

Reclamation of Roads and Ancillary Facilities

Roads and facilities that have long-term beneficial use to the public or are necessary to reclamation maintenance will be left in place when the project is completed. Selection of these roads and facilities will be made by appropriate regulatory agencies and the mine operator prior to project cessation. Other roads and facilities will be dismantled, graded and/or ditched followed by revegetation to prevent erosion. Revegetation plans will be specifically designed to accommodate selected land use goals. Reclamation procedures generally include:

- Removing or burying of vegetative retarding material.
- Creating a suitable root zone by scarifying compacted areas.
- Spreading stored topsoil.
- Tilling, fertilizing, seeding and mulching.
- Stabilizing steep cut and fill slopes by appropriate means such as terracing, riprapping, retaining walls, and/or seeding with an adhesive mulch.

The proposed access road will consist of a 24-30 foot wide road bed. The topsoil, when encountered, will be removed and temporarily stored along the route. When the access road is completed, this topsoil will be respread along the outer shoulders and cuts, and then reseeded with selected grasses. Cut banks and fill slopes will be mulched to prevent erosion. Measures will be taken to control runoff water to minimize washing and gullying along the road.

Interim Erosion Control Reclamation Procedures

The first phase of reclamation will consist of reclaiming surface areas disturbed by construction which will not be required during operation. Areas reclaimed during this period include road banks on access roads and utility corridors. Reclamation will commence as soon as construction is completed. Reclamation procedures will be selected on a site-specific basis to achieve rapid site stabilization. Other areas that require interim erosion control are road cuts and fills, sediment control structures, stream bank diversions, and topsoil storage piles.

Reclamation of Settling Pond Embankments

Upon cessation of project operations, settling pond embankments will be covered with suitable soil material and drainage diverted around the settling ponds to prevent possible breeching of the embankments.

These areas would then be reseeded with site-specific species. During operations, the settling ponds will be regularly dredged for removal of accumulated sediment. This material, if suitable, will be stockpiled and saved for future use in reclamation. If not suitable, the dredged material will be disposed of in the waste dumps.

APPENDIX D

DRAFT EIS COMMENTS AND RESPONSES

APPENDIX D

DRAFT EIS COMMENTS AND RESPONSES

Introduction

The Draft EIS was released to government agencies, private organizations, and interested individuals on July 8, 1980. The official deadline for submission of comments on the Draft was September 6, 1980. The 34 comment letters received during this comment period and their alphabetic letter designations are listed in Table D-1. Comments to the Draft EIS and associated responses are reproduced on the following pages. In some instances the same or similar comment was made several times. In reply to these comments, the following numbered responses are presented at the beginning of this Appendix:

1. 1872 General Mining Law/No Action Alternative
2. Molybdenum Marketing
3. Tailings Embankment Design and Stability
4. Waste Dump Design and Stability

Testimony on the Draft EIS was presented at public meetings in Challis and Boise during the comment period. The concerns expressed were similar to those included in written comments on the Draft EIS and are summarized in Table D-2. The table also indicates those written comments/responses or text changes which are pertinent to each of the concerns expressed at the two public meetings.

TABLE D-1

COMMENT LETTERS ON THE THOMPSON CREEK MOLYBDENUM PROJECT DRAFT EIS

Letter Designation	Date Written	Name of Person and/or Group
A	7/16/80	John P. Davis, P.E. Consulting Engineer
B	7/23/80	James Frazier Director, Office of Equal Opportunity U.S. Department of Agriculture
C	7/24/80	Clifford J. Safranski Environmental Clearance Officer U.S. Department of Housing & Urban Development
D	8/5/80	Irvin C. Lloyd Environmental Specialist Region 10, Federal Highway Administration U.S. Department of Transportation
E	8/14/80	Gordon N. Johnston Regional Administrator U.S. Department of Housing and Urban Development, Region X
F	8/18/80	Thomas J. Green State Archaeologist Idaho State Historical Society
G	8/20/80	Marlene I. Miller, Star, ID
H	8/28/80*	Kurt Becker, Salmon, ID
I	8/29/80*	Jim Smith Sleeping Deer Ranch Challis, ID
J	8/29/80	Frank S. Lisella, Ph.D. Chief, Program Development Branch Environmental Health Services Division U.S. Public Health Service, Center for Disease Control
K	9/1/80	Janice M. Brown, Idaho Falls, ID

* Postmark

TABLE D-1 Continued)

Letter Designation	Date Written	Name of Person and/or Group
L	9/2/80	Dale Bruns Idaho State University
M	9/2/80	L.J. Ettinger, Challis, ID
N	9/3/80	Elizabeth Corbyn Chief, Environmental Evaluation Branch U.S. Environmental Protection Agency, Region X
O	9/3/80	J.S. Griffith, President American Fisheries Society Idaho Chapter
P	9/4/80	Thomas N. Shiflet Director of Ecological Services Soil Conservation Service U.S. Department of Agriculture
Q	9/4/80	James T. Brock, Inkom, ID
R	9/4/80	John Miller, Bellingham, WA
S	9/4/80*	Rebecca Brown, Bellingham, WA
T	9/5/80	Jerry M. Conley Director, State of Idaho Department of Fish and Game
U	9/5/80	Pat Ford Executive Director Idaho Conservation League (ICL)
V	9/5/80	James E. Conner, Ph.D. Consulting Chemist Challis, ID
W	9/5/80	Robert T. Miki Deputy Assistant Secretary for Regulatory Policy (Acting) U.S. Department of Commerce
X	9/5/80	Terence L. Thatcher Pacific Northwest Resources Clinic Eugene, OR

* Postmark

TABLE D-1 (Continued)

Letter Designation	Date Written	Name of Person and/or Group
Y	9/6/80	Jackie Johnson Maughan Board of Directors Idaho Environmental Council (IEC)
Z	9/8/80	John E. Kiley Environmental Manager Bonneville Power Administration U.S. Department of Energy
AA	9/8/80	Louis S. Wall Chief, Western Division of Project Review Advisory Council on Historic Preservation
BB	9/11/80	Charles S. Polityka Regional Environmental Officer Pacific Northwest Region U.S. Department of Interior
CC	8/4/80	Gary Jeppson Executive Director East-Central Idaho Planning and Development Association, Inc. (ECIPDA)
DD	8/6/80	State of Idaho Department of Health and Welfare Division of Environment
EE	8/12/80	Gloria Mabbutt, Coordinator Division of Economic & Community Affairs Idaho State Clearinghouse
FF	8/25/80	Charles Sheroke Cour d'Alene, ID
GG	8/29/80	Lee W. Stokes, Ph.D. Administrator, State of Idaho Department of Health & Welfare
HH	9/4/80	Jack M. Heinemann Advisor on Environmental Quality Federal Energy Regulatory Commission

TABLE D-2

PUBLIC MEETING TESTIMONY CONCERNS AND RESPONSES

Summary of Areas of of Concern Expressed During Testimony	Appropriate Comment, Response or Final EIS Section
Discrepancies within Draft EIS	Draft EIS has undergone thorough review including revisions where necessary.
Land use	Responses J-1 and P-2.
Air quality	Responses N-4 and X-17.
Rehabilitation	Response N-5 and Appendix C.
Standards and enforcement	Revised Section 4.6, new Section 4.7, Responses No. 3, 4, G-2, G-3, K-8, N-1, N-2 and N-7.
Fish and wildife resources in project area and impact to fish and wildlife are overrated	Comment letters I, L, T, and Response K-4.
Fish mitigation unclear	Revised Section 4.5.6.
Public involvement	See Chapter 8.0.
Concern over local economy	See Sections 4.5.9 and 5.2.9 and Response X-44.
People will be major impact	Agree, see Section 5.2.9.
No peregrine falcon	Agree, see Section 2.9.3.2.
Inadequate range of alternatives	Revised Section 4.3.1.1, Responses No. 1, H-1, K-2, X-13 and X-39.
Economics of the project	Responses No. 2 and K-3.
Tailings embankment safety	Responses No. 3, G-2, and X-12.
Socioeconomics not given enough significance in criteria section	Revised Section 3.0.
Power requirements	Responses C-1 and U-2 through U-7.

TABLE D-2 (Continued)

Summary of Areas of of Concern Expressed During Testimony	Appropriate Comment, Response or Final EIS Section
Hire local people	Cyprus Mines has committed to utilizing local labor whenever possible.
Question on tax limitation initiative	Response U-19.
Hiring women	Response B-1 and Appendix B. Women will be encouraged to become a part of the labor force for the project.

RESPONSE NO. 1

1872 General Mining Law/No Action Alternative

1872 General Mining Law

The General Mining Law of 1872, as amended, provides a statutory right for a locator of valuable minerals on government-owned lands to acquire title to and extract those minerals if certain minimal requirements are met. Those requirements are to perfect a discovery of valuable minerals, and to mark and record the mining claim in accordance with Federal, state and local laws. The courts have ruled that meeting these requirements has the effect of a grant by the United States for the right to present and exclusive possession of those minerals and use of the surface resources as needed to extract the minerals. There must be sufficient quantities of ore to be mined under a prudent management concept and the ore body must be in an area not withdrawn from mineral entry. The Thompson Creek claim area meets these requirements.

Based on the Organic Act of 1897, the Forest Service has developed regulations requiring approval and compliance of operations when there will be significant disturbance of surface resources. Approval is based on consideration of the economics of the operation along with other factors in determining reasonable requirements for surface resources protection. Compliance with Federal or state air and water quality and solid waste disposal laws and regulations are basically mandatory. Other compliance is based on practicable measures.

The Forest Supervisor has the authority to bring about a suspension of all or part of the operation when he determines that the Operating Plan is not being followed and the non-compliance is unecessarily or unreasonably causing injury and/or loss or damage to surface resources.

No Action Alternative

The Council on Environmental Quality regulations for implementing the National Environmental Policy Act direct that a "No Action" alternative shall be one of the alternatives evaluated by the decision-maker. A "No Action" alternative is easily defined when the applicant, whether a Federal agency or some segment of the public, has no permissive rights to the Federal estate under consideration. The decision-maker can deny the proposal in its entirety, and "No Action" and "No Development" are synonymous.

Because of the statutory right of the claimant, and for purposes of this EIS, it has been determined that no action--that is, no development of the mineral resource--is not a valid alternative.

The No Action Alternative need not be developed as a basis of comparing other alternatives, as that base is adequately addressed in Chapter 2.0, "Affected Environment" for the issues discussed in the EIS.

RESPONSE NO. 2

Thompson Creek Molybdenum Marketing

The Thompson Creek Project is expected to produce 15-20 million pounds per year of molybdenum contained in molybdenum disulfide concentrate. Western World molybdenum production was approximately 205 million pounds in 1979, and is expected to grow to about 250 million pounds by 1985 due to a steadily expanding use in most industrial nations. Thompson Creek production will be equivalent to about 7 percent of the projected 1985 Western World production.

Three independent market research organizations prepared estimates of the future demand for molybdenum for Cyprus Mines. While there were some differences in the year-by-year projections, all three agreed that molybdenum usage will inevitably expand. Among the factors considered in these studies were the following:

1. Steel consumption by grade (e.g. high strength - low alloy, stainless steel, etc.).

2. Molybdenum content of steel, by grade.

3. Potential substitution for molybdenum in alloy steels by other metals (e.g. nickel, chromium, columbium, etc.), including the effect of metal prices on substitution.

4. Non-steel uses of molybdenum (e.g. lubricants).

5. Relationship of projected demand to projected supply of molybdenum.

Cyprus Mines already participates in the molybdenum market through the production of 1-2 million pounds per year of by-product molybdenum from two Arizona copper properties. To assist its staff in Thompson Creek molybdenum sales, Cyprus Mines has engaged Phillip Brothers, one of the world's largest and most successful metal trading organizations. Phillip Brothers has offices covering virtually every country in the world and will be a major factor in helping Cyprus Mines develop diversified markets in the USA, western Europe, Japan, and other countries.

RESPONSE NO. 3

Tailings Embankment Design and Stability

Tailings embankment failures have been documented in recent literature. A few of these failures have cost human lives; however, these have occurred in relatively underdeveloped countries where little or no engineering design was performed prior to construction. There have been no recorded tailings embankment failures which have cost human life in the United States.

There are several potential modes of failure* of a tailings embankment. These modes may include overtopping of the embankment during floods, structural instability of the embankment or the foundation during construction or during an earthquake, piping or internal erosion of the embankment or solids within the impoundment, excessive settlement causing cracking or loss of freeboard, failure of buried conduits or subdrains, delivery pipeline breaks, or prolonged operator error, and other unforeseen events. Each of these potential failure modes has a finite possibility of occurrence which must be addressed in design.

The philosophy used in the development of preliminary designs for the Thompson Creek tailings disposal facility was to consider each failure mode in terms of potential for a sudden large magnitude release, and then to consider other modes in terms of slower or longer term release. The following modes were identified as having the potential for sudden, large volume releases: 1) liquefaction of the embankment as the result of an earthquake; 2) overtopping as the result of a large flood; or 3) rapid internal erosion or piping along a buried pipeline, crack, or other internal fissure in the foundation or embankment. The other potential failure modes were then considered in terms of their potential for a lesser rate of solids release.

The failure modes mentioned above have the greatest potential for threatening life because a sudden, large volume release could result in a viscous mass flow below the impoundment. The design concept used to effectively preclude these failure modes from occurring was to design for extreme events - the probable maximum flood and the maximum credible earthquake. The probability that these design events could be exceeded is extremely small.

Rapid internal erosion causing mass failure can occur in water retaining structures, but is very uncommon in tailings embankments. Tailings embankments constructed of coarse tailings, such as that proposed, are well-drained and low seepage gradients are operative throughout the

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*Failure being herein defined as an event which could result in a release of solids or process water from the impoundment which has a detrimental effect to human life or the environment.

embankment. The possibility of rapid internal erosion is therefore extremely remote. The design to prevent the occurrence of this failure mode incorporated conservative values of engineering parameters measured by testing and substantially "over-designing" to provide a high factor of safety. Monitoring of settlements, seepage, and water pressures will also be incorporated into the operation over the life of the structure to provide adequate warning that conditions conducive to internal erosion could be developing. If these conditions begin to develop, they can usually be corrected with available technology.

The potential for tailings release at lower rates with other failure modes was addressed in the design by providing secondary catchment facilities, backup facilities, and a construction method which is easy to operate, monitor and control. The preliminary design report of these facilities to prevent tailings release is on file at the Challis National Forest.

The possibility of a sudden failure which could endanger human life is extremely remote. Therefore, a "what if" failure scenario is inappropriate in terms of realistic potential impacts to the environment. Lesser magnitude releases due to other potential failure modes have a greater likelihood of occurrence, so backup measures have been provided to minimize the potential for release. If backup systems also fail, it is possible that tailings solids or process water could be discharged for short periods. The impact of these incidents will depend upon the magnitude and rate of release.

In the long term, embankment stability will increase with time as consolidation of the tailings progresses. A permanent spillway will be provided to prevent overtopping by large floods. The outer surfaces of the embankment will be stabilized to prevent erosion.

In summary, the potential for "failure " as defined herein, is remote due to the conservative nature of the initial design and the opportunity to monitor and modify the initial design over the 20-year construction life of the embankment. The construction technique being employed has been successfully used and tested for many years.

RESPONSE NO. 4

Waste Dump Design and Stability

The utilization, safety, and stability of the waste dumps proposed at Thompson Creek are important considerations relative to the successful operation of the project and the protection of the environment. Instability of mine waste dumps can cause environmental damage and disrupt mining operations.

Cyprus Mines' consultants have indicated that based on the current knowledge of the conditions at Thompson Creek, stable waste dumps can be constructed in the locations planned. This will require additional information to prepare detailed design, and a continuing program of monitoring, evaluation and supervision. Cyprus Mines has commenced studies with a recognized consultant to increase the baseline information to a satisfactory level, perform the required analyses, carry out detailed designs and recommend long-term monitoring procedures. This comprehensive study will be carried out within the guidelines of the U.S. Forest Service "Tentative Engineering Guide: Stability of Non-Water Impounding Mines Waste Embankments" (1980b).

The resulting waste rock dumping plan which will be developed in coordination with the Forest Service, the BLM and the State of Idaho will be designed to satisfy Cyprus Mines and the regulatory agencies as to the long-term stability of the dumps. Cyprus Mines is committed to an ongoing monitoring and supervision program which will be periodically reviewed by Cyprus Mines' consultants and regulatory agencies to ensure compliance with the plan, or in the case of changing conditions, suitable method of correction. Where required, rock drains will be employed to prevent impoundment or entrapment of water. Material will be end- and side-dumped, with gravity the prime force creating a stable mass.

Professionally engineered and constructed waste rock embankments are unlikely to fail. In addition, the long development time permits monitoring and suitable corrective action, if needed, which further reduces the possibility of large embankment movement. The location and configuration of the dump sites are such that the potential damage from a dump site failure is small.

It is important to differentiate between open pit mining and strip mining in reconciling the differences between waste disposal methods. When mining a "seam of bedded material" such as coal or phosphate, especially when near the earth's surface, the barren or waste material is set aside until a strip of the "bedded material" is mined. Then as additional strips of the desired material are removed, additional widths of the "bedded material" must first be stripped of its overburden. That overburden is placed in the adjacent, already mined area.

In open pit mining the mineral deposit usually lies at some depth requiring "preproduction stripping." All of this material must be removed at one time before any mineralized material is available for mining. As a result, the barren material is placed in adjacent, accessible areas, since it cannot be placed back in the excavated area because it would interfere with mining activities. In addition, because of "swelling" of the overburden material when it is blasted and removed, the pit thus created is not large enough to contain the material should it be returned at the conclusion of mining activities.

The barren material, when deposited in adjacent areas, assumes an angle of repose similar to the surrounding natural geography. With a minimum of reclamation, the waste material quickly assumes a compatible visual appearance to the native surroundings (i.e., talus slopes with pockets of vegetation).

LETTER A

July 16, 1980

Mr. Barry Davis
District Forest Ranger
Yankee Fork Ranger District
Challis National Forest
Clayton, ID 83227

Dear Mr. Davis:

In accordance with your oral request, I have reviewed the "DRAFT ENVIRONMENTAL IMPACT STATEMENT" on the Thompson Creek Molybdenum Mining Project and the "PRELIMINARY DESIGN REPORT ON THE THOMPSON CREEK PROJECT TAILINGS IMPOUNDMENT" by Robertson-Pincock, Inc. The comments in subsequent paragraphs are furnished without charges to the Forest Service and may be used as you see fit.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

This report appears to be comprehensive and generally adequate with a few exceptions.

1. a. Page 3-2, paragraph 3-2, criteria. An additional item of criteria should be added: "Effects on hazard to human life". In any project that includes a 600 feet high impoundment dam, the effects on human life and property downstreams from the dam should be considered. In this connection, it is noted from the Figure 2.2 of the Robertson-Pincock Preliminary Design Report that the flood plains along the lower half mile of Bruno Creek and along a considerable length of Squaw Creek are wide enough to permit residential development. If devlopers or Cyprus Mines are permitted to build permanent housing facilities in these areas, a potentially hazardous situation could develop.

2. b. Page 4-25 Gyrator Crusher Spray System. From the statement in this paragraph relative to spraying water at the feed hopper, the question arises as to how this can be done during extremely cold weather. No mention is made in the DEIS or the preliminary Design Report as to how the problems of icing of pipe lines, discharge outlets, intakes and associated equipment are to be handled. Fragil ice is a particularly troublesome problem at many hydroplants and pumping stations in northern latitudes. The Preliminary Design Report mentions that theCyclone Separators will operate only nine months out of the year because of freezing weather

RESPONSE TO LETTER A

A-1 Cyprus Mines controls a substantial portion of the land on Bruno Creek and Squaw Creek. There are no plans, by Cyprus Mines or others, to build permanent housing facilities in these areas. Also see Resonse No. 3 at the beginning of the Appendix.

A-2 Mining operations in Canada and at a higher elevations in the U.S. have been operated for more than fifty years under these conditions. The problems are preventable with proper design, construction and maintenance, and their avoidance is necessary to ensure the successful operation of the Thompson Creek Project and its various systems and subsystems.

At Thompson Creek, the major project facilities, including the concentrator, will be enclosed in heated buildings as protection against weather. All water pipelines will be buried below the frostline and, therefore, will not be susceptible to freezing. The tailings pipeline from the concentrator to the tailings impoundment is planned to be installed above-grade. Freezing of the tailings pipeline is not expected to be a problem due to the heat produced by the friction of the tailings moving through the pipeline and the higher than ambient temperature of the tailings and tailings water as they leave the concentrator. At no time during cold weather (i.e. during shutdown) will tailings be allowed to "stand" in the pipeline but will be drained to avoid freezing. Intakes, discharges, valves and associated equipment will be adequately protected by housing or other means to prevent ice buildup and freezing. Spray systems including that for the feed hopper to the crusher will be modified to incorporate an alcohol/water type spray or other means to prevent icing and ensure successful suppression of dust.

Embankment construction will not be conducted under severe freezing conditions which would result in ice formation within the embankment. For the purposes of the preliminary tailings design studies, nine months was assumed as a reasonable basis. The designers realize that actual conditions may vary from year to year. If conditions were to be encountered whereby design quantities of embankment material were not attainable by cycloning, then other material sources, such as earth borrow or mine waste could be substituted during the next construction season.

2 conditions. In the area of Clayton, severe freezing weather conditions normally exist for considerably longer than nine months. This question should be investigated in more detail as operations or non-operations of the cyclones will have an important effect on the material in the embankment and hence the stability of the embankment.

3 c. Another possible problem from freezing weather may arise because of freeze up of the toe drains to the impoundment embankment. If this should happen, a rapid build up of the piezometric grade line through the embankment could occur that might lead to failure.

4 d. Page 4-33 Monitoring program, Impoundment Embankment Systems. I do not concur in some of the details of the monitoring program. Lines of wells should be placed across the embankment, from the edge of the pool upstream from the center line of the dam, across the dam to the downstream toe so that the phreatic grade line can be accurately defined. Lines of wells should be placed across the dam at the mid point and at the quarter points (3 lines) as a minimum. Piezometric levels should be read at least once a month for the first several years and should be reported to the Forest Service within three or four days after they are read. The readings should be placed in graphical form (profiles) and maintained as a permanent record.

THOMPSON CREEK PROJECT, TAILINGS IMPOUNDMENT PRELIMINARY DESIGN REPORT

This report appears to cover all affects of design and operation of the impoundment dam in a fair amount of detail. However, the same comments that were made previously with regard to operation during freezing weather and to monitoring piezometric levels in the impoundment embankment are applicable to this report.

The assured integrity of the impoundment dam is of critical importance to all concerned: The State of Idaho, Custer County, the Forest Service, the Bureau of Land Management, Cyprus Mininc Co. and to the general public. Because of this, I believe, that consultants (at least 2) that are imminent in the field of soil mechanics and earth dams should be engaged to review and examine in detail all of the available information concerning the design calculations, the assumptions used and the overall safety of the proposed design. 5

Sincerely,

John P. Davis

John P. Davis, P.E.
Consulting Engineer

JPD/bc

A-3 Substantial operating experience in cold weather climates in Colorado and elsewhere has indicated that freeze-up of toe drains will not occur to the point that it will become a problem. Also, the phreatic surface in the embankment will be monitored as an additional safeguard against such an occurrence.

A-4 Details of the embankment stability monitoring network were not included in the preliminary design report. Cyprus Mines concurs in general with the recommendation in this regard and such will be included in the final design report being prepared at this time.

A-5 The Preliminary Tailings Impoundment Design Report was prepared by registered professional engineers who have specialized experience and knowledge in tailings impoundment designs and operations in cold climates and under irregular topographic conditions. The report has been reviewed internally by Mr. S. Hillis who is an eminent international consultant on large earth structures, particularly tailings impoundments, and externally by Mr. R. Soderberg, nationally recognized tailings embankment design expert from the U.S. Bureau of Mines, who has been selected as the review consultant for the Challis National Forest. The geohydrological aspects of the impoundment design are being reviewed by Dr. R. Williams of the University of Idaho.

LETTER B

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF EQUAL OPPORTUNITY
WASHINGTON, D.C. 20250

JUL 23 1980

IN REPLY
REFER TO: 8140 - Supplement 8

SUBJECT: Draft Environmental Impact Statement, Thompson Creek, Molybdenum Project, Challis National Forest, Idaho

TO: Jack E. Bills
Forest Supervisor

THRU: Dave Williams, Associate
Deputy Chief for Administration
Forest Service

We have reviewed the Draft Statement concerning the proposed Thompson Creek Project. Since the affected area contains so few minority persons, there do not appear to be any direct impacts of a civil rights nature.

1 We note the requirement for governmental actions on a variety of issues to deal with the secondary effects of the proposed project. These secondary effects do have civil rights implications which should be dealt with if the proposed project is approved. For example, equal opportunity in employment should be assured as should access to nondiscriminatory housing, education and community facilities.

Thank you for the opportunity to review this Statement.

JAMES FRAZIER
Director

RESPONSE TO LETTER B

B-1 Cyprus Mines has an equal opportunity program (Affirmative Action Plan) which covers all aspects of Cyprus Mines' operations. This includes employment opportunities and, for the proposed project, housing opportunities and financial assistance. Educational and community facilities are not under the control of Cyprus Mines.

LETTER C

Memorandum

U.S. DEPARTMENT OF
HOUSING AND URBAN DEVELOPMENT

TO Ryomi Tanino, CPD, 10C
Seattle Regional Office

DATE July 24, 1980

IN REPLY REFER TO:

FROM : Clifford T. Safranski, 10.2SS

SUBJECT: USDA Draft EIS, Thompson Creek Molybdenum Project
Custer County, Idaho

We would have preferred being included in the scoping process since significant population, housing and utility needs are being generated which will directly effect our housing and Community Development Block Grant programs.

However, substantial consideration has been given to those concerns so a supplemental EIS with references to the USDA EIS would be sufficient to accommodate our programs.

Some of our concerns are listed below with references to the USDA EIS.

5.2.9.3 Utilities

Page 5-22 "Using 1979 as a base, the proposed project will increase total electrical consumption approximately six times and 45% for residential uses."

1 How will the additional electricity be generated? What will the rates be?

Page 5-22 "Current plans for the housing development anticipate drilling of water wells and construction of a distribution system separate from the existing municipal system."

2 Who will maintain and operate the system?

What are the impacts on ground water levels and the existing wells?

PREVIOUS EDITION IS OBSOLETE

HUD-96 (7-75)

RESPONSE TO LETTER C

C-1 The electricity will be purchased from the Salmon River Electric Cooperative, Inc. which in turn purchases its electricity from the Bonneville Power Administration. The electricity rates for new residents will be the same as those charged currently to existing residential users in the area. Also see Responses U-3 and U-4 concerning power rates.

C-2 Although separate at the insistence of the city, the water system is built to standards equal or exceeding the city's system, and built to be directly interconnected to the remainder of the system at such time as the city chooses. The city's residents wish to establish that each part of the system is able to do its job without "leaning" on the other.

Studies by Cyprus Mines' geologists indicate that the wells are so widely spaced that the possibility of impacting existing wells is remote. A drawdown test will be conducted to determine if there are any effects on ground-water levels.

2

Waste Water Collection and Treatment

Page 5-22 "As currently proposed, the new housing development would utilize its own internal collection system which would connect to the existing municipal system for waste water treatment."

3 Who will correct the leaking water distribution system that contributes to infiltration that makes existing treatment facilities over-capacity?

4 Who will upgrade the treatment system in 1983 when increased capacity is projected to be needed?

5.2.9.5. Schools

Page 5-24 Footnote: "Total school enrollment for new students to the district plus local students is projected to be 469."

5

Elementary School	525
High School	350
Junior High School	175
	1,050
Current enrollment	466
	584

Is the capacity projected for 25% more than required in 1983? 1984?

5.2.9.9. Recreation

Page 5-29 "It is anticipated that the greatest increase in pressure would occur to areas in the vicinity of Challis, especially those along the East Fork and the main Salmon River."

6 Is a Recreation Plan being developed that uses national standards for playgrounds, neighborhood parks and regional parks?

7 Will the school-park system be used to maximize use of facilities economically?

8 Will the "lighted schoolhouse" or "community schools" programs be used?

9 Will natural swales be preserved for recreation as well as for drainage?

C-3 The city is addressing the problem of the leaking water distribution system. The correction is to be financed by a revenue bond issue recently appoved by the voters. EDA and FmHA grants are also included.

C-4 The city is addressing the problems with the current sewage treatment system and is planning for future expansion. The city has passed an ordinance establishing hookup fees to cover expansion for new dwelling units (DU's) and commercial units. The city requires a deposit of $2,500 per DU from all developers which will apply to sewage treatment and other services (e.g. fire and police protection, storm water drainage, etc.) to cover costs occasioned by expansion of DU's.

C-5 Yes, the size of the facilities were designed to handle an additional 25% student capacity to meet future growth from expected mining activities and other normal population growth.

C-6 Presently there is a city park in Challis which is seldom used, but its further development is currently being planned. Because of its small size and a previous commitment of land for the cemetery expansion, the subdivision plans do not include a neighborhood park. The plans do include land that will be dedicated for public walkways, and plans for a neighborhood park will be included in a future development which will have more land available for these purposes. In the Challis and Custer County area, most of the surrounding lands are controlled by the Forest Service and the BLM. These lands contain campgrounds, and users are free to visit and use these virtually unrestricted areas for recreational purposes.

C-7 Yes.

C-8 Yes, the school facilities will continue to be available for other community activities.

C-9 Yes, the swales will be landscaped for walkways as well as being maintained as natural drainages.

3

5.2.10 Transportation

Page 5-30 "Traffic in the Challis area related to residential development will create local congestion on existing roads."

10 { Is a transportation plan being developed?

11 { Will residences be set-back or buffered from arterials or major collectors so that the HUD noise standard of 65 Ldn will not be exceeded at residential structures?

12 { Will pavement width be held to minimums for conserving energy, reducing maintenance costs and reducing runoff excesses?

13 { Will school travel routes and crossings provide maximum safety?

5.2.11 Aesthetics

Page 5-31 "Construction specifications, codes, covenants, and restrictions are being developed to harmonize housing with existing styles characterizing Challis residences."

14 { Will solar access considerations be employed in site planning?

15 { Will passive solar designs be encouraged in architectural design?

16 { Will compatible land use be emphasized?

Additional concerns for a supplemental EIS, (not expected to be performed by USDA), are for the laws and regulations, which need to relate more specifically to the housing impacts and to the development impacts on the City of Challis.

Environmental Clearance Officer

C-10 Yes. Traffic planning has been incorporated into the new housing development. Pedestrian walkways and street overpasses are included in the design. The City of Challis has planned parking lots behind the business area to reduce traffic congestion along main street. A busing system to transport mine employees to and from Challis and the mine is being developed. The use of buses will minimize the traffic on the highways and on the streets in Challis by reducing the number of cars used for commuting.

C-11 The housing development will be located adjacent to the city to the south. The houses will be buffered from Highway 93 by a commercial zone extending the length of the subdivision. Only five lots in the subdivision are located next to the collector road, which will eventually connect to a future development, and none of the five lots has frontage on the collector road. Thus, the residential structures should not be affected by noise from the road system.

C-12 Yes, also the street pattern within the subdivision is less extensive relative to the total land area than streets already existing in the city. This is a result of having longer blocks and larger lots in the subdivision. This design will minimize maintenance costs and runoff.

C-13 Yes, in addition, an emergency communications system is being developed for school buses, as well as mine employee buses, so that in the event of an emergency the bus driver will be able to radio for assistance.

C-14 Yes, solar access considerations were included in the site specifications contained within the bid documents sent to general contractors.

C-15 Yes, passive solar designs are encouraged in housing designs. In order to harmonize with existing systems, the new housing will be designed to blend with existing styles.

C-16 Although the lot size existing in the city is smaller than the lot size in the development, the density for single family dwellings is being maintained with a coverage of 3 DU's per acre. Also, the extension of the existing road grid provides for compatible land use.

LETTER D

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION TEN
412 Mohawk Building
222 S. W. Morrison St.
Portland, Oregon 97204

August 5, 1980

HED-010.5

Mr. Jack E. Bills, Forest Supervisor
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

The Federal Highway Administration - Region 10 has reviewed the Thompson Creek Molybdenum Project Draft Environmental Impact Statement and we offer the following comments for your consideration:

1 1. We recommend a discussion be included in the document regarding the impact on the highway system that will serve the proposal. For example, the movement of heavy mining equipment and supplies into the area would have what impact on the State highway system, including U.S. 93 such as equipment overloads, overwidths, use during the time of spring thaw and mixing with the seasonal tourist traffic.

2. For specific information regarding potential impact to the highway system, we suggest you contact the District Engineer, District Six, Idaho Department of Transportation, Rigby, Idaho 83442, telephone: 745-7781.

We appreciate the opportunity to review the subject document and if this agency can be of further assistance to you on this project, you may wish to contact Richard Cowdery, Idaho Division Administrator, 3010 W. State Street, Boise, Idaho 83703, telephone: 554-1690.

Sincerely yours,

Irvin C. Lloyd
Environmental Specialist

RESPONSE TO LETTER D

D-1 Traffic impacts will occur from the transport of persons and materials to and from the claim area. The transport of workers will increase auto and bus traffic by 230 trips per day (200 auto, 30 bus), primarily between Challis and the claim area. (For purposes of this analysis, a "trip" is travel in one direction, either to or from the claim area.) The primary method of worker transport is expected to be by buses provided by Cyprus Mines. Based on the shift schedule, the number of workers per shift, and the number of workers expected to drive their own vehicles, approximately 87 vehicle trips would occur between 6 a.m. to 8 a.m. and 2 p.m. to 4 p.m., and 56 vehicle trips from 10 p.m. to midnight.

The truck transport of heavy materials will occur primarily between Mackay and the claim area. It is estimated that this will involve an average of 32 daily truck trips, hauling ore concentrate, supplies and equipment. About one-half of these trips would occur during the day shift.

Special permits from the State of Idaho will be required in order to transport loads which are oversized or which exceed 80,000 pounds/five-axle truck. It is expected that there will be short-term, temporary slow-downs of traffic following such truck transports. It is anticipated these effects would occur only during the construction period.

LETTER E

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
REGIONAL OFFICE
ARCADE PLAZA BUILDING, 1321 SECOND AVENUE
SEATTLE, WASHINGTON 98101

August 14, 1980

REGION X

IN REPLY REFER TO:
10C

Mr. Jack E. Bills
Forest Supervisor
United States Department
of Agriculture
Forest Service
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

Subject: Draft Environmental Impact Statement
Thompson Creek Molybdenum Project
Custer County, Idaho

We have reviewed the Impact Statement submitted with your July 8, 1980 letter. Our Portland Area Office has also reviewed the Statement and their comments are attached.

We have a high degree of interest in your statement because of the possible impact of the project on our Housing and Community Development programs. Furthermore, we may be relying on your statement to assist us in our environmental assessment process.

Although your technical data may cover most of the concerns that we raise, we feel that certain information should be made of general knowledge and be included in the statement proper.

Following are some general comments for your consideration. The Portland Area Office comments are in more detail.

1 1. What will be the duration of the mining operation? This will be significant from the standpoint of the kind of financial investment to be made in housing and other community facilities.

2 2. The map included in the statement shows the communities of Clayton, Sun Beam and Stanley as being much closer to the mining site than Challis, however, the statement speaks principally about the community impacts on Challis. What types of communities are these? Are they too small to be considered as possible housing sites?

AREA OFFICES
Portland, Oregon • Seattle, Washington • Anchorage, Alaska • Boise, Idaho
Insuring Office
Spokane, Washington

RESPONSE TO LETTER E

E-1 Twenty years.

E-2 Stanley is a community of 80 full-time residents. It sits inside the Sawtooth National Recreation Area. The goverment has purchased scenic easements from land owners to maintain the surrounding pastorial scene and restrict development. The area is a very heavily used recreation area during the summer. Sunbeam consists of a small grocery store, coffee shop and cabins and is located on National Forest land and operated under special use permit. Clayton is a very small town of 20 residents. The town is bordered on the south by the Salmon River and on the north by a steep mountain. There is no room for major expansion. These restrictions do not allow these communities to be considered as possible housing sites.

3 3. Has the alternative of providing a "company town" been considered?

4 4. Will the mining company provide any financial assistance for planning, construction of community facilities and housing?

5 5. What will be the expected income of the people employed by the mine?

6 6. Will there be any restoration plans for after the mining operation is over?

7 7. What will be the degree of hazard from the toxic wastes generated by the mining operation?

8 8. Page 3-2 Criteria separates Significant Criteria and General Criteria. We believe it improper to consider only impacts on the natural environment to be significant. We believe impacts on the human environment to be equally or more significant. Thus we suggest that the general classification be changed to "Significant Impacts on the Human Environment".

I understand that most of these comments have been discussed with your office by our Boise Office.

We appreciate the opportunity to comment on your statement.

Sincerely,

for Gordon N. Johnston
Regional Administrator

cc: Pat LaCrosse/HUD
Cliff Safranski/HUD
Reno Kramer/HUD
George Karas/HUD

E-3 Yes. However, through extensive public interaction, it became apparent that the Challis community was not in favor of a company town. Thereupon, planning procedures were initiated whereby housing and commercial establishments necessary to support the new population would be incorporated into the existing infrastructure of Challis.

E-4 Yes. Refer to Section 4.5.9 of the EIS.

E-5 See Section 5.2.9.6 of the EIS. The average annual wage and salary payment will be about $18,000.

E-6 Yes. See Section 4.5, Mitigation Measures, and Appendix C, Conceptual Reclamation Plan.

E-7 Potential environmental effects are addressed in Chapter 5.0 of the EIS. Cyprus Mines will meet applicable Federal and state regulations for the protection of employees.

E-8 Comment noted. An appropriate change has been made in Chapter 3.0.

LETTER F

IDAHO STATE HISTORICAL SOCIETY
610 NORTH JULIA DAVIS DRIVE BOISE, 83706

STATE MUSEUM

August 18, 1980

Mr. Jack Bills
USDA, Forest Service
Challis National Forest
Challis, ID 83226

Dear Mr. Bills:

We have reviewed the Draft EIS for the Thompson Creek Molybdenum Project. Our comments concern the effect of the project on archaeological and historic properties:

1 1) The mitigation plan should include archaeological or historic sites which may receive secondary impacts of the mine construction and operation.

2 2) If salvage excavations are necessary they should be considered as an irretrievable commitment of archaeological resources. Partially adverse impacts may occur from leaching should sites be allowed to be covered with tailings. Such impacts may be reversable. These impacts and commitments should be discussed in the document.

3 3) Comments should be obtained by the Idaho State Historic Preservation Office on future archaeological surveys.

4) Proper evaluation of this document and its conclusions requires pending archaeological research to be completed. We wish to comment further at that time.

Sincerely,

Thomas J. Green
State Archaeologist
State Historic Preservation Office

cc: Jerry Wylie

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NOTED ACTION
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RESPONSE TO LETTER F

F-1 Additional testing of cultural resource sites is being conducted to determine if the sites may qualify for nomination to the National Register of Historic Places (NRHP) and/or may provide additional information on the regional culture history. Secondary or indirect impacts have been identified (Weder 1980). The U.S. Forest Service, Zone Archaeologist, Boise National Forest, Boise, Idaho, is coordinating the above activities and any required mitigation measures. The Idaho State Historic Preservation Officer has been involved in continuing surveys, testing, mitigation plans and/or salvage documentation. Also see revised Sections 2.14, 4.5.8 and 5.2.12.

LETTER G

MARLENE MILLER
ROUTE #1
STAR, IDAHO
83669

Aug. 20, 1980

In Response to the Proposed Cyprus Mines

I have been a citizen of Idaho all 22 years of my life and am proud to tell anyone I am. I've seen alot of good and bad changes come about during that time but none has really struck home like the molybdenum mine that's going in near Challis. What's to exclude Idaho? Montana has one of the largest man-made holes in the earth, Utah has one, so does Nevada why shouldn't Idaho? Hell, let's put one in every state.

I'm sure not much attention will be directed to these letters of public input you'll receive but at least you and the oil company can say you've given us all a chance to say something on the matter. but you tell me, who'll listen? This is just another legal technicality you have to pass over. Heck, the mine is already going in, the subdivision in Challis is already underway for the mine workers housing - who's really going to care what people have to say now?

But I want to have some answers to

1 to several of my questions. ① What gives us a full guarantee that the results of this mining won't cause irreversible environmental impact on the natural habit surrounding the area and also encompassing the entire Salmon

2 River? ② What guarantees us that no chemical waste what so ever well end up in the Salmon River or creeks or streams emptying into the Salmon River? Unless

3 there is an outside investigating panel to check up on mining activities and how wastes are disposed of (that is not sanctioned by the U.S.F.S. or the Cyprus Mines Corporation (Standard Oil Company) and something more than a payoff to Boise State University to make operations go more smoothly and satisfy those who think that will take care of everything (opposition by environmentalists that is), I and many others like myself will not let a coverup of operations happen to this state!!! and

4 finally ③ Is the Forest Service to be held responsible for anything that happens or the outcome of chemical pollution of Thompson Creek or the Salmon River? What is to be said or paid for if something is spilled into the Salmon?

Sincerely,
Marlene Inez Mille

RESPONSE TO LETTER G

G-1 There is no such guarantee. There will be some irreversible environmental impacts from the project on the claim area (see Chapter 5.0). No such impacts, however, are expected to the Salmon River Basin.

G-2 Again, there is no such guarantee. However, the project and its structures are being designed (by Cyprus Mines and its consultants); reviewed (by independent consultants, and Federal and state agencies); constructed (by Cyprus Mines and its consultants); inspected (by Federal and state agencies); and monitored (by Cyprus Mines and Federal and state agencies) to provide assurance that project structures will function as planned and that adverse environmental effects will be minimized. Based on available data, a worst-case analysis has indicated that toxic concentrations of chemicals will not occur in Thompson and Squaw Creeks or the Salmon River.

G-3 During the operation of the project, Cyprus Mines will be held responsible for any water pollution from the project. Monthly stream monitoring will be supervised and compliance enforced by the Idaho Department of Health and Welfare, Division of Environment, Bureau of Water Quality. Also, see revised Section 4.6 and Response K-1.

G-4 See Response G-2 and new Section 4.7 on Regulatory Responsibilities.

Kurt Becker
Box 2336
Salmon, Idaho 83467

LETTER H

Jack E. Bills, Forest Supervisor
Challis National Forest
Challis, Idaho 83226

Dear Jack:

I have reviewed the draft E.I.S. for the Thompson Creek molybdenum project and would like to offer the following comments.

Overall, I feel that the Draft E.I.S. is objective, straight forward, and accurate. I did however notice that the range of possible alternatives was quite limited and that underground mining, an alternative that would result in the least environmental damage, was not "fully and impartially developed" (FSM 1951.6) In fact, I could only find one paragraph in the Draft E.I.S. that addressed this possible alternative (4.3.1.1).

1 Although underground mining would reduce the amount of recoverable reserves, because of the enormous yards of overburden to be removed, it still may shake out to be economically feasible. It is my understanding that by pillaring and back-hauling, more than 50% of the total reserves could be extracted, not 35% as the report suggests. I recommend that the final E.I.S. be re-vamped to incorporate this alternative and to evaluate it on a level equal to the other possible alternatives. Without it, options to reduce environmental impacts are severely restricted.

Sincerely,

Kurt Becker

RESPONSE TO LETTER H

H-1 An evaluation of this alternative has been added to the EIS (see Section 4.3.1.1).

LETTER I

Sleeping Deer Ranch

Jim Smith
Managers
Mike Thomas

BOX 99 – PHONE (208) 879-2334
CHALLIS, IDAHO 83226

Dear Gordon,

Just a note to get on record concerning the Cyprus E.I.S.

Depending upon outfitting for my livelihood my main concern is with the impact on wildlife and mainly big game. However, I believe with some very simple management practices by the Forest Service and Cyprus the impact could be minimized.

In my opinion along with many other "natives" the elk and deer herds reached a low point in the recent past, but have steadily increased the past 3 years until the present populations look quite favorable. The main reasons increases have been noted is due to reduced hunting pressure from shorter season (3 weeks in mining area) and a bull and buck only law.

With the influx of people due to the Cyprus project short seasons will still be necessary

Sleeping Deer Ranch

Jim Smith
Managers
Mike Thomas

BOX 99 – PHONE (208) 879-2334
CHALLIS, IDAHO 83226

(2)

as well as the "bull only" law, as additional management tools I would propose —

1 (1) the road up Squaw creek near the red bird mine be closed to motorized travel from Oct 1 thru June 1. This would limit a large number of hunters concentrating in that area. Use of horses would be ~~[illegible]~~. It would still allow heavy use for summer recreation, but winter snow machine would not be allowed on this critical winter range for both elk and deer.

2 (2) the same thing would apply to other roads such as the west fork of Morgan creek (logging operations would be allowed all winter) and Sleeping Deer Road at Iron Peak. Oct 1 thru June 1 or until conditions permit.

3 (3) two more conservation officers to be funded by Cyprus in the mining area. Severe fines and penalties for wildlife violations

RESPONSE TO LETTER 1

I-1 & I-2 Your proposal for seasonal closures of areas to protect wildlife from the increased population will be evaluated in the 1981 update of the Forest Travel Plan. Copies of your letter have been submitted to the BLM and Idaho Department of Fish & Game for their consideration.

I-3 The wildlife mitigation measures presented in Section 4.5 have been developed by the Idaho Department of Fish & Game and Cyprus Mines. These include the funding of one conservation officer at least through 1984.

Sleeping Deer Ranch

Jim Smith
Manager
Mike Thomas

BOX 99 – PHONE (208) 879-2334
CHALLIS, IDAHO 83226

(3)

The primary reason for these management practices is to hold ~~down~~ the number of animals harvested at a level that will maintain the current season. As game numbers go down so does the season. With reduced seasons or going to a permit system our business could be greatly effected.

Even with the management practices mentioned wildlife values and functions are going to go down. Increasing human populations and wildlife have never been compatible, and the Cyprus project is no different. However the human impact on wildlife can be minimized if the Forest Service will take a firm stand on road closures, if the fish + Game ~~department~~ department will monitor harvest and population densities, and

4 { if Cyprus will pump funding into law enforcement, educate the people to wildlife values, and implement range and water improvement

Sleeping Deer Ranch

Jim Smith
[redacted]
Managers
Mike Thomas

BOX 99 – PHONE (208) 879-2334
CHALLIS, IDAHO 83226

(4)

Thank you.

Sincerely
Jim Smith
licensed outfitter in the
mining area for 10 years.
B.S. Wildlife management
utah state university 1969.

LETTER J

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
ATLANTA, GEORGIA 30333

August 29, 1980

Mr. Jack E. Bills
Forest Supervisor
U.S. Department of Agriculture,
Forest Service
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

We have completed our review of the Draft Environmental Impact Statement (EIS) for the Thompson Creek Molybdenum Project, Custer County, Idaho. We are responding on behalf of the U.S. Public Health Service and are offering the following comments for your consideration in preparing the Final EIS.

1 The EIS indicates that the proposed project will have significant secondary impacts upon the land uses in and around Challis. In fact, the secondary development "would increase the total area of the city by about 92.5% and double the residential and commercial areas." The effectiveness of local planning, zoning and building codes to control and possibly prevent non-compatible development in wetlands, flood plains, adverse noise zones of airports, highways, industry, etc., should be discussed. The existence of local sanitary codes or permits to regulate the construction and use of on-site systems should also be mentioned.

2 The potential health and safety impacts of the mining development and its operation upon the local population should be discussed. What precautions will be taken to keep unauthorized individuals away from or protect visitors from hazardous operations and facilities?

3 It may be beneficial to provide a brief paragraph on the detrimental and beneficial aspects of molybdenum. The health effects associated with the production of molybdenum and any byproducts should be explained. Special protective measures may have to be developed and implemented for workers and visitors.

4 Will there be any radioactivity released in the air and water as a result of mining or concentrating molybdenum?

We appreciate the opportunity to review this EIS. Please send us one copy of the final document when it becomes available.

Sincerely yours,

Frank S. Lisella

Frank S. Lisella, Ph.D.
Chief, Program Development Branch
Environmental Health Services Division
Bureau of State Services

RESPONSE TO LETTER J

J-1 The City of Challis adopted a zoning and subdivision ordinance in 1979, setting forth permitted uses and inspection and enforcement conditions (see EIS, Section 2.10, Land Use). The new residential and commercial development associated with the project will be annexed to the city, thereby coming under the provisions of the ordinance and applicable state and local building codes and procedures. Recent planning efforts conducted by the City of Challis and supported by Cyprus Mines were undertaken to ensure planned, orderly and compatible development. Cyprus Mines will not develop any housing along highways, or near the small local airport. There is no industrial development in Challis.

J-2 See Response E-7. Also see the subsection on Security in Appendix B.

J-3 A discussion of the cited aspects of molybdenum is not required for this EIS. No special protective measures for workers, related to molybdenum, are known to be required based on the long history of mining and processing molybdenum and of its widespread use in metallurgy and chemistry. With respect to other facets of project operation, Cyprus Mines will meet applicable Federal and state regulations for the protection of employees and visitors.

J-4 Yes, but only in very small amounts, not significantly above existing background levels. There is a small amount of radioactivity associated with the host rock at Thompson Creek, as there is with all igneous rocks occurring throughout the world. Metallurgical test results indicate that the background level of uranium in the naturally occurring overburden at the project site is about 2-6 ppm, which is typical for this type of granite and igneous rock. Uranium values in the orebody are slightly higher, 6-10 ppm. As a comparison, the lower grades of ore that are processed at a uranium mine and mill contain 400-500 ppm of uranium. The uranium which occurs at Thompson Creek will not pose a threat to the health of the workers or the general public.

To Bill Ehrhorel

Page 1 of 9

LETTER K

486 N. Ridge Ave.
Idaho Falls, ID 83401

September 1, 1980

Dear Sirs:

I attended the hearing held August 6, 1980 in Challis and listened to various concerns raised regarding the Thompson Creek Molybdenum Project. Most of my questions were addressed at that time; however, I have several remarks to make on the draft EIS.

1 1. There is no long-term care fund specifically provided for monitoring and care of the mining area after the 30 year operational period. I understand that a bond must be posted to ensure that all mitigation and precautionary measures have been taken prior to site closure. Nonetheless, some form of environmental monitoring will be necessary, especially on the ground and surface water systems. According to a Cyprus contractor, it is up to the State of Idaho to make certain that some of the property taxes paid during mine operations be set aside if such a fund were desired. If these state monies were available, I am not sure whether the U.S. Forest Service or the BLM would have access to them to defray any additional wildlife or habitat monitoring costs. In any case, the issue of a long-term care fund, or any discussion of activities beyond 30 years, is lacking from the EIS. Although the short-term environmental impacts may be slight and tolerable to some, it is the long-term, compounded effects of mining and other industrial development which have caused the greatest problems in the past.

2 2. The EIS, as written, gives no foundation for disagreeing with Alternative 1. Alternatives 2&3 appear to be thrown in for balance, and no real argument is made for their serious consideration. As a possible alternative, I wondered why the pit couldn't be gradually backfilled rather than leaving a huge hole. All the EIS alludes to is economic feasibility and the 17% replacement figure. In reality, if residual moly, unrecoverable now, can be economically retrieved from waste and tailings in 20 or 30 years, then it will be easier to get to it in piles rather than from a backfilled mine pit. The EIS should clearly state the possibility of mining beyond a 30 year period, in case the waste and tailings someday become valuable.

3

RESPONSE TO LETTER K

K-1 No long term monitoring fund has been set up by Cyprus. At the end of the project, the reclamation of the area will be completed. Any water quality monitoring will be done by state or Federal agencies. If ownership of the mining property has been acquired by Cyprus Mines through patent, they will be held responsible for any degradation of waters flowing from the property. If the property remains in Federal ownership, the responsibility will remain with government agencies. Also, refer to Responses U-11, U-12 and T-1 regarding bonding.

K-2 As noted in Section 4.3.1.3 there are several reasons why backfilling the pit is not considered feasible. Backfilling would require storage of the 130 million tons of overburden material as well as an additional 470 million tons of waste rock produced during pit development over the life of the project. The only areas for storage in the vicinity of the mine are the same areas considered for the waste dumps. Use of these areas as storage areas for ultimate backfill would require that the waste be reloaded into trucks, hauled uphill to the mine and dumped back into the pit, an operation that would ultimately render the project uneconomical. In addition, the pit would not be able to hold all the material, and therefore the waste dumps would still be required.

K-3 There is the potential that the mining operation will continue beyond the planned 20-year life depending on future conditions.

Periodically during the life of the mine, the mining plan will be reviewed using updated economics to calculate new mineable ore reserves. The review will consider current production costs, waste/ore ratios, molybdenum prices, market demand and other factors. As a result of such studies, it is likely that some ore previously considered economically "unmineable" will be transferred to "mineable" reserves thus extending the mine life.

It must be stressed that the initial mine plan has been prepared on a conservative technical and cost basis and that short-term fluctuations in costs and revenues will not adversely affect the 20-year life.

4 3. The impact on wildlife appears to be more significant than indicated in the EIS. It was stated that an increase in population would have greater impact than the actual habitat removal and migration blockages. Discussion at the hearing led me to believe that not enough is known regarding actual wildlife numbers in the area to make such a judgment. An effort by the Fish and Game Department to substantiate the Forest Service figures and conclusions would be of some worth. Until more supportive evidence is printed, I will disagree with the chart on page 6-2, and would at least request that the first two wildlife impacts be given a "moderate" effect.

5 Also, the only mitigation measures mentioned in the document are alternate migration routes that never are 100% successful. I would like to see additional discussion of what other measures WILL BE taken to minimize the threat to a healthy wildlife population.

6 4. No mention was made of a company transportation system - the document just concluded that increased highway traffic would be 32.5% based on 262 trips per day (page 5-30). Surely this doesn't indicate bussed employees? Also, I question the ADT figures. Considering most traffic would occur only two hours each day, how can this be averaged over the full daylight or 24-hour period? If each employee drove his/her own vehicle to work, traffic during the peak hours would exceed 5 times the current rate. My conclusion is, without an employee bus service, major impact would likely occur on the highway at peak hours of travel.

7 5. Some mention should be made in the EIS of the project undertaken by Boise State University to provide environmental awareness training to Cyprus employees. The value of such new employee education could be especially significant in reducing impact on wildlife. Recreation opportunities for youth in Challis really are limited, but the EIS does not clearly indicate this (page 5-29). With increasing numbers of adolescents, the impact on the area around Challis could be significant due to dirt bkes, vandalism, etc. Again, more definite mitigation measures should be outlined in this section. (Also, there are Girl and Boy Scout troops in Challis that serve quite a few kids.)

8 6. A great deal of concern has been expressed regarding adherence to federal and state environmental regulations. I think it would be helpful to include in the

K-4 The Idaho Department of Fish & Game participated in the development of the EIS and provided direct guidance on vegetation, wildlife and fisheries. The numbers presented in the EIS were developed in consultation with the Department of Fish & Game. Also see Comment Letter T from the Department.

K-5 The wildlife mitigation measures developed by the Department of Fish & Game and agreed to by Cyprus Mines are presented in Section 4.5.

K-6 A busing system to transport mine employees to and from Challis and the mine is being developed. The use of buses will minimize the traffic on the highways and on the streets in Challis by reducing the number of cars used for commuting.

The 262 trips per day includes buses. The ADT figures were provided by the State Department of Transportation. Use of ADT is an accepted method of describing traffic flow. Also see Response D-1.

K-7 A general description of the Environmental Awareness Program has been added to Appendix B. Recreation opportunities are discussed in Section 2.11.9 of the EIS. Impacts to such are discussed in Section 5.2.9.9. The comment that, "Recreation opportunities for youth in Challis really are limited. . ." is a subjective evaluation, perhaps comparing Challis to an urban area. A normal range of school social and athletic events are offered, plus 4-H, bowling leagues for all ages, Boy Scout and Girl Scout troops as mentioned in the comment, plus other community activities typical of rural areas. It is anticipated that the impact from increasing numbers of adolescents will be determined primarily by their rate of arrival, and the extent to which they are assimilated into the existing community.

Presently there is a city park in Challis which is seldom used, but its further development is currently being planned. The surrounding countryside offers virtually unrestricted areas for recreational purposes.

K-8 See Section 1.5 and new Section 4.7.

8 EIS: 1) what laws/regulations Cyprus will have to follow and 2) what state/federal agency will be responsible for enforcement. Since this is not required in an EIS, perhaps it could be published separately as a public service. I realize this list could be lengthy, but even if it were a brief summary, it would help the public understand the parameters under which Cyprus must operate. Those who are particulary interested in release levels of potential pollutants would be able to speak directly with the appropriate regulatory agency.

In conclusion, it appears the Thompson Creek Mine will be given the go-ahead by the U.S. Forest Service if the EIS reflects the true, accomodating nature of the personnel involved. However, if public comments are honestly going to make a difference, my greatest concerns continue to be long-term effects and monitoring, plus the overall impact on wildlife. I do not oppose the mine in theory, but would like these concerns addressed before any endorsement of the project is formally made by the Forest Service. Thank you.

Sincerely,

Janice H Brown

Janice M. Brown

LETTER L

Idaho State University
Pocatello, Idaho
83209

Department of Biology

September 2, 1980

Mr. Jack E. Bills
Forest Supervisor
Challis National Forest
Challis, Idaho 83266

Dear Mr. Bills:

I am a research assistant in stream ecology (Dept. of Biology) at Idaho State University. I would like to comment on the Draft Environmental Impact Statement (DEIS) concerning the proposed Thompson Creek open pit molybdenum mining operation near Challis, Idaho. Please consider this letter as part of the public record.

Since it is somewhat difficult to evaluate and critique the DEIS without convenient access to technical data, I assume that the ecological data on the stream ecosystems of concern were collected according to standard scientific methods. Therefore, instead of critiquing the content of the DEIS, I would like to focus on what I consider to be important omissions. These should be adequately addressed in the Final Environmental Impact Statement (FEIS).

1 Given the narrow options of alternatives 1-3, the loss of the self-sustaining population of native cutthroat trout is perhaps unavoidable short of the No Action Alternative. Also, for some people it may seem reasonable to view this loss as minor since the species is widespread in distribution. Nevertheless, the management decision to allow this degradation of a native fishery will exhibit a definite impact on a regional basis. This decision may set a precedent for future management policies on public lands (F.S., BLM, etc.,). Thus, future mining proposals may cite Bruno Creek as an example of a fisheries resource that could be sacrificed to development interests because it was of only local significance. Unfortunately, a series of such incidents could have a regional impact. The decision making process itself has just as much effect on our natural environment as the policies and activities that are implemented. Potential effects of the decision making process should be an explicit part of any holistic environmental assessment for sound management of natural resources.

2 Forest Service management plans (Federal Register Vol. 44, No. 181, section 219.1(b)(1)) call for the recognition of principles of ecology in all management decisions. However, the proposed monitoring program of the aquatic environment fails to address any biological parameters even though the salmonid fisheries are predicted to sustain major impacts from the operation (specifically from increased human populations, DEIS: p. 6-2; and also potentially from sedimentation, DEIS: p. 5-14). This omission is not permissible given that "... monitoring programs were designed to reduce or eliminate environmental impacts" (DEIS: p. S-2). If no biological parameters are monitored, the environmental impacts (on the biota) cannot be assessed. The FEIS should explicitly outline its position on monitoring of aquatic ecology on the streams and rivers of concern and it should state its contingency plans.

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RESPONSE TO LETTER L

L-1 The loss of a small population of cutthroat trout, although singly insignificant on a regional basis, could be significant if repeated in numerous local streams.

The other possible tailings disposal sites considered would have as great, or greater, adverse impact on fisheries than the Bruno Creek site. They would also have caused greater overall adverse impacts. Therefore, this situtation is unavoidable short of the No Action Alternative.

The Idaho Department of Fish & Game believes that mitigation of this loss, by providing spawning and rearing habitat for anadromous fisheries in Squaw Creek, far exceeds the value of the cutthroat population which would be lost.

L-2 The water quality and biological monitoring programs described in Section 4.6.1 were developed by the U.S. Forest Service, BLM, Idaho Department of Fish & Game, Idaho Department of Health & Welfare (Division of Environment, Bureau of Water Quality) and agreed to by Cyprus Mines. The parameters to be monitored were established by the agencies with responsibility and expertise in these areas. Baseline data collection is continuing on a monthly basis.

Idaho State University
Pocatello, Idaho
83209

Department of Biology

3 I propose that algae (plus other major primary producers), macroinvertebrates, and fishes be monitored on a seasonal basis three to four times a year at minimum for at least the first several years of full operation. General methods should follow Mason (1978, Methods for Assessment and Prediction of Mineral Mining Impacts on Aquatic Communities: Review and Analysis, FWS/OBS-78/30). Sites above and below mining operations on both Squaw and Thompson creeks should be monitored for the above parameters.

4 In addition, the same parameters should be monitored on the mainstream Salmon River: one site above its confluence with Squaw and Thompson creeks (as control), and one site below these tributaries. The inclusion of the mainstream Salmon River sites is absolutely necessary. For example in Arizona, impacts from mining activities along small tributaries have been measured in mainstream rivers on the order of 20-30 miles below the mining site. The Salmon River is one of few large rivers in the United States (excluding Alaska) that is relatively unmodified. It has been the focus of on-going scientific research on riverine ecosystem structure and function. Thus, if degradation of the Salmon River should ensue, not only will scientific resources be lost, but management agencies will suffer from the loss of sound principles of ecological management that result from on-going research.

The advantages of biological monitoring should be pointed out. First, biological parameters will monitor synergistic effects. Potential synergistic toxic reactions regarding mining activities in Idaho (e.g. between pH and heavy metals) has been discussed by Platts et al. (1979, Water Quality in an Idaho strear degraded by acid mine waters. USDA For. Serv. Gen. Tech. Rep. INT-67, 19 pp). Second, biological parameters integrate toxic effects over time and can monitor periodic perturbations ("slug" effects) much better than grab sampling of chemical parameters. Third, biological sampling may be justified over the sampling of unnecessary chemical parameters and may result in economic savings. And, fourth, biological parameters represent a better early warning system so that potential problems can be located and mitigated before conditions get too bad to warrant shut-down and before costs of reclamation become too prohibitive.

Thank you for considering my comments.

Sincerely,

Dale Bruns

Dale Bruns

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L-3 The sampling sites, sampling frequency and the physical, chemical and biological parameters to be monitored were determined collectively by the above agencies in order to monitor potential project impacts. The inclusion of additional parameters (such as primary producers) was discussed and judged not to be appropriate to this monitoring program (versus a research-type study).

L-4 Sampling sites on the Salmon River were considered but were rejected because no impacts are expected on the Salmon River during normal operation of the project. Mining activities in Arizona cannot be used for comparison without establishing parallels in biota, existing environmental conditions, type of mining project and method of mining.

LETTER M

P. O. Box 795
Challis, Idaho 83226

September 2, 1980

Challis National Forest
Challis, Idaho 83226

Attn: Gordon Reid

Dear Mr. Reid:

Re: Thompson Creek Draft Environmental Impact Statement

1 The make up of the Thompson Creek Draft Environmental Impact Statement bothers me in the alternatives to an open pit mining operation.

As of now, there are no alternatives to an open pit mine listed. Legitimate and reasonable alternatives should include:

1. an underground mining operation,
2. possible combination of underground and open pit operation, and
3. no mining operation.

It has been publically stated that an underground operation is economically feasible at the present time, although not desireable, by Cyprus because the net returns would be less than an open pit operation.

The differences in environmental impact of an underground operation from that of an open pit operation would be substantial in surface disturbance, wildlife, manpower, blasting, etc.

Any environmental impact statement that were approved without listing an underground mining operation as an alternative would be incomplete and would always be suspect in the future in that it smacks of something that is being swept under the rug.

RESPONSE TO LETTER M

M-1 The text of the EIS has been expanded appropriately (see Section 4.3.1.1). The "no project" alternative was discussed in the Draft EIS and is included in the Final EIS. Also see Response No. 1 at the beginning of this Appendix.

The listed alternatives in the present draft statement are really nothing but a joke, presented only to satisfy the requirements of alternatives for the final statement.

This letter is not written with the objective of saying that an underground operation is preferable to an open pit operation, but only to point out that if we talk about alternative ways to mine a molybdenite deposit that would have different effects on the environment, let's look at the real alternatives and not make a joke out of it.

Sincerely,

L. J. Ettinger

LETTER N

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

1200 SIXTH AVENUE

SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: M/S 443

SEP 3 1980

Jack E. Bliss, Forest Supervisor
U.S. Department of Agriculture
Forest Service
Challis National Forest
Challis, Idaho 83266

RE: Review Thompson Creek Molybdenum Project

Dear Mr. Bliss:

We have completed our review of the Thompson Creek Molybdenum Project Draft Environmental Impact Statement (DEIS). We have rated the Thompson Creek DEIS as LO-1 (LO - Lack of Objections; 1 - Adequate Information). This rating will be published in the Federal Register in accordance with EPA's responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act, as amended.

In general, we feel the DEIS addresses those areas that are of concern to our agency's disciplines. There are, however, some issues which we feel deserve additional analysis and discussion in the Final EIS. We have outlined these below and provide more detailed comments in the attachment. Our comments are based not only on our review of the DEIS document but also our on-site visit which was conducted by your staff and the Cyprus Mining Company staff.

Mining Plan

1 The proposed mine operating plan, as outlined in the DEIS, appears to adequately account for environmental issues. Our primary concern is with the continued implementation and enforcement of this operating plan, particularly as it relates to the tailings pond site.

2 As we understand the process, the company must have an approved mining plan from the U.S. Forest Service before it can construct a tailings pond on Forest Service land. When this mine plan is approved and the tailings pond is constructed, the company can then patent the tailings pond site. Once this later action is taken, the approved mine plan will no longer be in effect.

RESPONSE TO LETTER N

N-1 Continued implementation, inspection and enforcement of the Forest Service Operating Plan for the project will be the responsibility of the Forest Service. In addition, several other Federal and state agencies regulate and/or review various project activities (see new Section 4.7).

N-2 The Forest Services will work closely with the Idaho Department of Lands to ensure that parts of the Forest Service Operating Plan that can legally be enforced by the State are included in their approved mining plan. Also see new Section 4.7.

2 The only remaining oversight of the mining operation will be through enforcement of the State of Idaho's approved mining plan. As such, we strongly urge the U.S. Forest Service to work closely with the State of Idaho to ensure that your approved plan is incorporated in the State's plan. We feel this would ultimately afford the best protection to the Thompson Creek environment.

Water Quality

3 There are primarily two water quality issues which merit additional discussion in the final EIS. One is the potential for contamination of the ground water from leaching and the other concerns infiltration from the discharge of pollutants into respective waste and tailings impoundments. We have also provided more specific comments on water quality concerns in the attachment.

Air Quality

4 The final EIS should address the air quality impacts in the City of Challis resulting from the significant population and traffic changes induced by the project. This may be most easily accomplished by a worst case emission burden analysis.

Mitigation/Reclamation Plan

5 We feel that the preliminary Conceptual Reclamation Plan and the mitigation measures discussed in the DEIS should be committed to use in the FEIS and record of decision. The FEIS should outline areas of responsibility and authority for implementing the reclamation plan and appropriate mitigation measures. We also suggest that the U.S. Forest Service request other resource agencies, such as mining agencies and mining schools, to review the reclamation plan. Their expertise and comments may enhance the overall reclamation plan.

Solid/Hazardous Waste Management

6 The FEIS should discuss the generation of hazardous wastes at the Thompson Creek site. Specifically, the type of chemical wastes that will be generated from the use of reagents in the milling process and the flotation tailings process should be described. Also, the constituents of the solid wastes to be disposed of in the waste dumps should be identified. The FEIS should specifically explain how the waste management plans will comply with the Resource Conservation and Recovery Act (RCRA). Along with this, the solid waste management facility should be evaluated by the State to determine its conformance with the Criteria for Classifying Solid Waste Disposal Facilities (40 CFR Part 257, September 13, 1979).

Permit Applications

7 On May 19, 1980 EPA issued its Consolidated Permit Regulations, 40 CFR Parts 122, 123, 124, and 125; Federal Register 33287, which affect

N-3 These issues are discussed in Section 5.2.5 of the EIS.

N-4 Potential air quality impacts in Challis could result from increased vehicular traffic (primarily automobiles) associated with population changes induced by the project. In general, air pollutant levels are expected to decrease over the next 10 years as older automobiles are replaced by newer models which emit less pollutants. Therefore, without the project, air pollutant levels would be expected to decrease in Challis. An emissions analysis (CO, HC, NO_x and total emissions), based on projected population, was performed to assess potential project impacts. The analysis indicted that emissions in 1990, with the project, would be less than present emissions. Correspondingly, the expected decrease in emissions because of newer vehicles will not be as great with the project as without it.

N-5 The conceptual reclamation plan and mitigation measures contained in the EIS will be followed. Cyprus Mines intends to use State Universities, and other state and Federal expertise, in refining the reclamation plan. Revegetation test plots will be established on the project to help determine species' adaptability for reclamation. Also see Appendix C.

N-6 At the current time, Cyprus Mines does not intend to use any chemicals or reagents classified as hazardous under RCRA regulations. However, Cyprus was legally required to submit a "Notification of Hazardous Waste Activity" because the project is classified as F013, non-specific hazardous waste. This classification is generally described as all "flotation tailings from selective flotation of minerals recovery operations." Cyprus Mines has requested EPA to clarify the F013 classification, thereby exempting general flotation circuits which do not use hazardous chemicals or reagents from coverage under RCRA. We understand that a recent congressional amendment has suspended regulation of mining wastes pending a 3-year study.

A discussion of solid waste disposal plans and the flotation reagents is given in Appendix B.

7 sections 402 and 404 of the Clean Water Act. These regulations define fill material as any "pollutant" which replaces portions of the "waters of the United States" with dry land or which changes the bottom elevation of a water body for any purpose (40 CFR §122.3; 45 Federal Register 33419). As such, all discharges of pollutants which meet the new definition of fill material, including solid waste discharges will require a Section 404 permit issued by the Army Corps of Engineers (COE). To allow for the construction of the dump sites, settling ponds, and the tailings disposal site, we suggest that the Cyprus Mining Company contact the Corps of Engineers to determine the requirements for a Section 404 permit, pursuant to EPA's Consolidated Permit Regulations. The information relative to these permit requirements should be included in the FEIS.

I would like to thank you and your staff for taking the time to give us a comprehensive tour of the proposed operations. It was an invaluable aid in our understanding of the project. If you have any questions about our concerns with the Thompson Creek project, please feel free to contact me or Bub Loiselle of my staff at (206) 442-1285 or (FTS) 399-1285.

Sincerely,

Elizabeth Corbyn

Elizabeth Corbyn, Chief
Environmental Evaluation Branch

Attachment

N-7 The EPA Region X and Corps of Engineers have determined that this project must comply with the Section 404 General Permit; however, site-specific 404 permits are not required unless construction activities take place in streams with a mean annual flow of greater than 5 cfs. The project will not affect streams with flows greater than 5 cfs; therefore the project is only subject to the General Permit and associated conditions.

All activities and construction which take place in stream channels are required to obtain State of Idaho Stream Channel Alteration Permits. Stream Channel Alteration Permits are required for any activities which take place below the mean highwater line in any continuously moving stream, regardless of size. These permit applications are individually reviewed by the Idaho Department of Water Resources and by the Corps of Engineers.

Attachment A

EPA's Comments on: Thompson Creek DEIS

The following comments and questions are provided in an effort to identify areas where additional explanation is necessary in the FEIS.

Water Quality

8 Page 2-8 - The construction of two wells each with a capacity exceeding 4000 gpm does not fit with the statement that the geohydrologic tests indicate relatively low permeabilities throughout the claim area. A well capable of yielding 4000 gpm is indicative of a highly permeable aquifer. In order to assess the potential impact on ground water quality from infiltration, more information should be contained in the FEIS related to permeability at and around the waste disposal sites as well as the tailings storage site.

9 Page 2-15 - Along with the Special Resource Water designation of the Salmon River south of the project site, it should be made clear in the FEIS that this reach of the river should also be designated as a primary contact recreation water and domestic water supply.

10 Page 4-27 - What is meant by "eventual release of treated sewage?" Will there be an effluent discharge to a stream or subsurface disposal?

11 Page 5-8 - The withdrawal of 9000 gpm is equivalent to 20 cubic feet per second (cfs). This quantity appears significant in comparison with the base flows of the tributary streams listed in Table 2.6-1. It is difficult to conceive of an aquifer in Central Idaho capable yielding 9000 gpm that does not have a discharge to a surface stream. Did the well tests show that the aquifer did not have a surface discharge?

12 Page 5-9 - The Draft EIS gives extensive data on the existing water quality of the various streams involved. Yet there is no data available on exactly which pollutants are being discharged and in what quantities. Page 5-9 states that there is a potential for several effects on the existing water quality, but does not show what these effects could be. This same page also states that the surface water effects for all three projects are essentially the same, but there is no way to verify this. We suggest that the final EIS address this problem and give more specific information on the discharges. Also on page 5-9 the DEIS states that garbage will be disposed of in waste dumps. We feel the FEIS should evaluate the effects of leaching through garbage within the waste dumps.

13 Page 5-10 - To more realistically evaluate the effects on water quality, the FEIS should discuss the type and the amount of chemical reagents incorporated in the tailings. Also, since many of the reagents are toxic, their leaching or migration should be addressed.

N-8 The text of the EIS has been changed for clarification (see Section 2.5). Section 5.2.5 discusses potential impacts on ground water quality.

N-9 Comment noted. No change is warranted.

N-10 See "Sewage Treatment and Solid Waste Disposal" subsection in Appendix B.

N-11 Under average conditions only 300 to 400 gpm will be pumped from water supply wells. Pump tests on these wells have indicated the lack of a hydrologic connection between the water-yielding portions of the formations in which the wells are completed and surface water. Also see Response R-1.

N-12 The data and the results of the chemical analyses and extraction procedures are presented in the Technical Memorandum (VTN 1980 WQ). The only planned discharges are from the settling ponds; information on these discharges is contained in the NPDES permit application on file with EPA, Region X. The "potential for several effects on the existing water quality" mentioned in the first paragraph of Section 5.2.5 is discussed in the succeeding paragraphs. The statement that essentially the same effects will occur for the three alternatives should be obvious since the project facilities and processes related to potential water quality effects are the same for all alternatives (see Description of Alternatives in Chapter 4.0).

The effects of leaching through garbage will be insignificant due to the quantity of material in comparison to the effects of leaching through waste rock, which is addressed in the EIS. Also see subsection on Sewage Treatment and Solid Waste Disposal in Appendix B.

N-13 Information on flotation reagents is contained in Appendix B. Also see Response N-12.

Socioeconomics

14 Page 2-42-51 - Will housing, utilities, and schools be sufficiently upgraded to adequately fulfill the communities' needs by the time the bulk of the work force arrives? Also, will recreation areas that now exist be subject to excessive use to the point that overcrowding may become an issue? Will multiple use areas on Forest Service land be regulated to prevent significant deterioration to road corridors from overuse? Will current land uses, such as agricultural land be in jeopardy from development?

Solid/Hazardous Waste Management

15 Page 4-3 - We feel more information is needed in the FEIS on the generation and ultimate deposition of hazardous wastes at the Thompson Creek site. Specifically, the description of the flotation process should include a list of the mill reagents that will be used in processing the ore, the daily consumption of these reagents and their ultimate fate, which ones end up in the tailings and which ones end up in the concentrate. Will these reagents interfere with the reuse of the wastewater in the milling operation?

16 Page 4-27 - More information is needed on the disposal of garbage in the waste dumps. Specifically, does "waste dumps" refer to landfills? Does "approved manner" refer to state, county or local regulations for disposing of garbage? Also, where are the landfills located in relation to the project area as well as surface water supplies?

General

17 Page 1-3 - Although the "loss of aquatic habitat and fishery resource" in Bruno Creek is considered minor on a regional basis (page 5-4), and the biotic resources of Buckskin, Pat Hughes, and unnamed creeks within the project area may be "considered limited" (page 5-5), their importance to the overall productivity of Thompson Creek and Squaw Creek as well as the Salmon River should be clarified in the FEIS. Specifically, will the degradation of these water systems attenuate the potential for Thompson Creek, Squaw Creek, and the Salmon River to become "potentially important" spawning and rearing areas for anadromous fish?

18 Page 2-4 - How many cfs of water from Squaw Creek will be diverted to the tailings impoundment? According to Table 2.7-2, the flow of Squaw Creek is slightly greater the 5 cfs. Thusly, diversion may require a 404 Permit from the Corps of Engineers especially if any dredge and fill is required. Also, if diversion of Thompson Creek is necessary, how many cfs will that entail? Will diversion of Thompson Creek jeopardize the minimum flow requirement necessary for the fisheries?

N-14 The goal of ongoing planning efforts by the City of Challis and Cyprus Mines is to assure that community services and facilities will be able to handle the work force when it arrives.

Discussion of project-related impacts on land use and recreation areas is contained in Sections 5.2.8 and 5.2.9.9 of the EIS and in supporting Technical Memoranda on Land Use and Socioeconomics (VTN 1980 LU, SE).

N-15 See Responses N-6 and N-13.

N-16 Information on solid waste disposal has been added to Appendix B.

N-17 Buckskin, Pat Hughes, and Unnamed Creeks in the Thompson Creek drainage provide limited to no potential for spawning or rearing by anadromous fish due to their low or no flows, unsuitable substrate, and blocks near their entrance. The loss of these systems will not measurably affect the fisheries potential for Thompson Creek or the Salmon River.

Bruno Creek, in the lower reaches, possibly does provide spawning/rearing as well as general habitat for a native cutthroat population. However, the loss of Bruno Creek is considered minor because of low flows, the presence of mainstem upstream areas in Squaw Creek that may be more important, and the ubiquitous nature of native populations of cutthroat trout in the Salmon River drainage. Chinook (king) salmon probably do not utilize the Bruno Creek system for either spawning or rearing.

N-18 No water will be diverted from Squaw Creek. With respect to a 404 Permit, see Response N-7.

At the present time Cyprus Mines does not contemplate or intend to divert water from Thompson Creek. However, should the need to divert become necessary, the water could be diverted without significant adverse impact.

In order to divert 10 cfs from Thompson Creek, a series of infiltration gallaries (closely spaced, large diameter wells) would be installed in the alluvium alongside Thompson Creek. These infiltration galleries would utilize the subsurface flow in the alluvium surrounding the creek channel and would not depend on any surface diversion. Pumping of the galleries would be coordinated with on-site storage so as to reduce pumping requirements during low flow months. Use of these procedures should maintain a viable flow in Thompson Creek for the protection of fisheries.

19 Page 4-27 - "Approved manner" for sewage treatment should be defined in the FEIS. Specifically, what type of treatment will be required for the housing area near the mouth of Squaw Creek and what treatment will be required at the project site?

20 Page 4-28 - Who will make the determination to cease construction activities should significant sedimentation occur? What will be the criteria used to determine "significant sedimentation?"

21 Page 4-29 - It appears to be an exercise in futility to try to establish an anadromous fishery in a stream that is almost entirely diverted for agricultural use, especially since migration/spawning coincide with agricultural diversion. How does Cyprus Mines and the Idaho Department of Fish and Game propose to alleviate this condition?

22 Page 4-32 - It would be helpful in assessing the effectiveness of the monitoring program if the FEIS listed the agencies that will establish the monitoring schedule and the data presentation format. Also, the FEIS should list the regulatory agencies that will be responsible in evaluating the adequacy of the monitoring program.

23 Page 4-32 - Another area that should be added to the list of required monitoring is the water quality (ground and surface) in the vicinity of the proposed treatment plant which will facilitate the housing area near the mouth of Squaw Creek.

24 Page 5-6 - If any dredge and fill is required to implement the diversion of 10 cfs from Thompson Creek, a 404 permit from the Corps of Engineers may be needed. This should be discussed in the FEIS.

25 Page 5-7 - Will the entire flow from Bruno Creek and its tributaries above the tailings embankment be impounded for the life of the project?

26 Page 5-10 - More information should be contained in the FEIS regarding zinc and iron concentration in Bruno and Squaw Creeks. Specifically, if low flow periods coincide with the highest rates of agricultural diversion, will dilution between the two creeks be less than what was initially expected? If so, will it be possible for zinc and iron concentrations to exceed EPA criteria for the protection of freshwater aquatic life?

27 Page 5-10 - Will water quality monitoring be more intensive during periods of low flow? If so, will this allow for a better evaluation of the effects of infiltration through the tailings impoundment on receiving waters?

28 Page 5-12 - If possible, a construction schedule should be provided in the FEIS for those activities that will create the greatest amount of sedimentation, i.e., road construction, settling pond construction, etc. These activities should be coordinated with various resource agencies to minimize the effects of sedimentation.

N-19 This is defined in Appendix B. Also, information on the sewage treatment facilities for the construction camp has been added to Appendix B.

N-20 Refer to revised Section 4.6 and new Section 4.7, Regulatory Responsibilities.

N-21 Additional information has been added to Section 4.5.6.

N-22 See revised Section 4.6.

N-23 This is planned and has been incorporated into Section 4.6.

N-24 No dredge or fill is required. See Response N-18.

N-25 Yes, except during periods of exceptionally large discharge at which time the flow from upper Bruno Creek will be diverted around the impoundment.

N-26 Zinc and iron concentrations in Bruno and Squaw Creeks are discussed in Sections 2.7 and 5.2.5 of the EIS. The details of the impact analysis of effects from the tailings impoundment are presented in the Technical Memorandum (VTN 1980 WQ). Conservative assumptions were used in this analysis to define the relative flows of Bruno and Squaw Creeks. The agricultural diversion from Squaw Creek occurs near its mouth and downstream of Bruno Creek. Therefore, these diversions would not affect the impact analysis. The flow of Squaw Creek was assumed to be equal to the minimum mean daily flow for the period of record at the Squaw Creek gaging station. This value occurred during the 1977 drought, and is much lower than normal low flows. Therefore, the analysis presented in the EIS (Section 5.2.5) is considered "worst-case."

N-27 No. The frequency of monitoring at the tailings impoundment will be established by appropriate Federal and state agencies and Cyprus Mines. Also, see revised Section 4.6.

N-28 As project plans develop, a detailed construction schedule will be provided by Cyprus Mines to the approriate resource agencies.

29 Page 5-13 - Will any attempt be made to relocate the fish that may be stranded in Bruno Creek if flow ceases as a result of tailings impoundment construction? If not, why?

30 Page 5-14 - We feel that there should be some mitigation measures discussed in the FEIS that would eliminate or reduce excessive runoff from the construction camp area as well as the staging area. The main reason for this is location of the camp and staging area in relation to the Salmon River. We feel that excessive sedimentation, spills, etc., that enter Squaw Creek could not help but impact the Salmon River.

31 Page 5-16 - The "unknown amount of additional habitat" that may be lost should be clarified. Specifically, why is it unknown? What are its current uses? If 2,360 acres lost is an estimate, additional estimates should be made to clarify the "unknown amount." Will the loss of habitat within project site, construction camp, and staging area create undue stress on neighboring habitats and threaten their carrying capacities?

N-29 Yes.

N-30 Surface drainage from paved areas will be collected and carried to absorption trenches for infiltration into the soil.

N-31 The "unknown amount of additional habitat" refers to habitat, surrounding the areas of project activity, which will remain physically intact but will support lower wildlife levels due to the presence of the mine and associated traffic, noise, vibration and human activity. The size of this area and the extent to which it becomes less suitable to wildlife is dependent upon the individual responses of the species in the area to the disturbance and cannot be precisely predicted. The amount of lost habitat should be small and confined to the Thompson, Bruno and lower Squaw Creek drainages. This habitat is not unusual and does not support unsually high or diverse wildlife populations for the area.

AMERICAN FISHERIES SOCIETY

IDAHO CHAPTER

3 September 1980

LETTER O

Forest Supervisor
Challis National Forest
Challis, Idaho 83226

DRAFT ENVIRONMENTAL IMPACT STATEMENT

THOMPSON CREEK MOLYBDENUM PROJECT

The Idaho Chapter of the American Fisheries Society is a group of approximately 150 professional fishery biologists throughout the State of Idaho. We have reviewed the Draft EIS and feel that it does a relatively realistic job of identifying the anticipated impacts on fish populations. Although the magnitude of the project is somewhat overwhelming, we feel that both Cyprus and the Forest Service have done a commendable job to date.

1 We have two specific comments to make. First, we strongly support the Squaw Creek fishery replacement program mentioned on p. 4-29. The obligations of Cyprus in that program are only vaugely touched upon, however, and we would like to see them described in greater detail, hopefully in the final EIS.

2 Secondly, the water quality program appears extensive but the frequency of sampling is not described. We would like to review such a schedule and would like to see its inclusion in the final EIS.

Yours truly,

J. S. Griffith
President

RESPONSE TO LETTER O

O-1 The text of the EIS has been updated (see Sections 4.5.6 and 5.2.6).

O-2 Information on sampling frequency has been added to the EIS (see Section 4.6).

United States Department of Agriculture
Soil Conservation Service
P.O. Box 2890
Washington, D.C.
20013

September 4, 1980

LETTER P

Jack E. Bills
Forest Supervisor
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

This letter is in response to your letter of July 8, 1980, in which you requested comments concerning the Thompson Creek open pit molybdenum operation draft environmental impact statement. We offer the following comments for your consideration.

1 1. Part 5.2.4, Other Project Structures, page 5-8: How significant will be the "increased local runoff and channeling" expected to occur during construction of these structures? The Soil Conservation Service urges use of erosion control methods during construction to avoid as much of the off-site damages due to sediment as possible.

2 2. Part 5.2.8, Land Use, page 5-19: Although land use changes expected in the project area are expected to be consistent with the Management Framework Plan, what will be the impacts to agricultural land occasioned by construction of housing and associated support facilities? Those impacts should be addressed.

We appreciate the opportunity to review the draft environmental impact statement.

Sincerely,

Thomas N. Shiflet

THOMAS N. SHIFLET
Director of Ecological Sciences

The Soil Conservation Service is an agency of the Department of Agriculture

WO-AS-1
10-79

RESPONSE TO LETTER P

P-1 The increase in local runoff and channeling during construction of these structures is expected to be minor. The changes will be localized and short-term, and will not affect the flow regimes of Thompson and Squaw Creeks. The control methods, described in Section 4.5.5, will be employed to minimize the effects of erosion by controlling runoff and the sediment that is carried from disturbed areas.

P-2 The only agricultural land near the claim area to be affected by the project is the pasture land, owned by Cyprus Mines, which will be used for the construction camp. The camp will be located east and north of the confluence of Squaw Creek with the Salmon River. The construction camp area will be returned to its pasture state when the mine becomes operational. Approximately 444 acres of private hay and pasture land adjacent to the City of Challis will be used for the housing development and will be lost to agricultural production.

LETTER Q

4 September 1980
P.O. Box 76
Rapid Creek Road
Inkom, Idaho 83245

Mr. Jack E. Bills
Forest Supervisor
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

As a concerned resident of Idaho, and a biologist who is involved in ecological research in the Salmon River Basin, I would like to comment on the Draft Environmental Impact Statement (DEIS) for the Thompson Creek Molybdenum project.

In reading the DEIS, I have been impressed by the general thoroughness with which the document treats anticipated environmental impacts, as well as the extensive precautions which Cyprus Mines Corporation plans to take to minimize environmental degradation caused by their mining operation. Your agency as well as Cyprus should be commended for the high quality of the impact analysis and preparation.

My personal attitude towards the project, based on aesthetic preferences, leads me to support a no action alternative. However, since it appears to be a foregone conclusion that the mine will become a reality, my comments are offered with the hope that they might help to ensure that this large mining operation has minimal impact on the Salmon Basin's environment. After considering the massiveness of the proposed project (e.g., the 600 foot high sand embankment behind which will be deposited 200 million tons of mine tailings), I have concluded that despite the numerous steps which will be taken by Cyprus to minimize effects of the mining operation, the immediate project area will suffer permanent degradation. My primary concern is that sufficient steps are taken to ensure that these impacts remain localized so as to not extend beyond the immediate claim area.

The primary focus of my concern deals with the introduction of elevated levels of sediment into adjacent watercourses and ultimately the Main Salmon River. Despite the various safeguards which will be taken to check soil erosion (e.g., proposed settling ponds, riprapping, and attempted revegetation), more than 2,000 acres will be disturbed by the project, and it is difficult to imagine how all of the 100 million tons of overburden and 200 million tons of tailings can be kept from eventually entering the stream channels. Apart from a catastrophic failure of the tailings impoundment (which I am not convinced is beyond the realm of the possible), the construction phase of the project has the greatest potential for erosive sediment losses. Areas under construction commonly produce several orders of magnitude more sediment than do comparable rural or natural areas (T. Dunne and L. Leopold, 1978. Water in Environmental Planning). The DEIS explicitly addresses this concern, stating that

selective scheduling and close supervision of construction activities will be directed toward minimizing potential sedimentation in streams. Streams will be monitored to permit timely detection of significant [my emphasis] sedimentation processes resulting from construction of project facilities. If significant sedimentation occurs, construction activities will cease until remedial actions are taken to prevent further sedimentation and to eliminate the source(s) of significant sedimentation(p4-28).

1 I urge you to require that the entire question of sediment monitoring and the determination of "significant"levels be elaborated on in the Final EIS. Specifically, what steps will be taken to ensure that suspended sediment levels are adequately monitored (which can require daily measurement during runoff periods), what levels are "significant" and what will be the actual mechanism by which "significant" sedimentation will bring about a cessation of construction? If the developer is not required to state the specific procedures in advance for the regulation of the construction activities, than we can expect that economic expediency will override environmental concerns when push comes to shove, and high sand levels in the creek are balanced against million dollar profits or the layoff of construction workers.

2 It is my belief that a major ommission occurs in the "Environmental Monitoring" section (4.6) of the DEIS. Not discussed under the "areas which require environmental monitoring" are the aquatic communities which are potentially subject to major impact by the proposed project. Aquatic communities act as sensitive indicators of changes in their environment, and since they can integrate conditions over time, they are useful for detecting unacceptably high environmental contaminant levels (e.g., pollutant sluge) which might pass by undetected using routine weekly or monthly water quality approaches. Support for my suggestion that biotic monitoring is a major ommission from the proposed program to evaluate impacts of the project lies in the existence of a specific methods handbook dealing with the subject (W.T. Mason , ed., 1978, "Methods for the Assessment and Prediction of Mineral Mining Impacts on Aquatic Communities".FWS/OBS-78-30).

I urge that Cyprus Mines be required to conduct a thorough program of biological monitoring in the watersheds affected by their mining activity. This should include seasonal sampling of periphyton, benthic macroinvertebrates, and fish in Thompson and Squaw Creeks above and below the claim area, as well as the Main Salmon River above and below the affected area. Although the DEIS states that "no effects on the water quality of the Salmon River are anticipated as a result of the project activities (p.S-4)", monitoring above and below the site is necessary to confirm this assertion. The routine chemistry and sediment sampling program described for Squaw and Thompson Creeks should be extended to the Main Salmon River to augment the biologic monitoring I have proposed. All such monitoring should clearly be done at the expense of the developer.

Cyprus Mines is confident that the Thompson Creek molybdenum deposit can be extracted and concentrated without creating significant environmental detriments. Perhaps with appropriate planning and proper techniques it will indeed be possible for the mining operation to proceed with the environmental impact localized to the immediate claim site. Thank you for making it possible to comment on the DEIS, and thereby to participate in the planning process.

RESPONSE TO LETTER Q

Q-1 The level of sedimentation which is significant will be identified by the interagency review committee based on studies of the present imbeddedness of spawning gravels in Thompson and Squaw Creeks. Section 4.6 has been revised to address this topic.

Q-2 See Responses L-2, L-3 and L-4.

Sincerely yours,

James T Brock

James T. Brock

LETTER R

2602 Park St.
Bellingham, WA 98225
September 4, 1980

Jack E. Bills, Supervisor
Challis National Forest
Challis, ID 83226

Dear Forest Supervisor,

Please consider the following comments on the draft environmental impact statement, "Thompson Creek Molybdenum Project."

1 1. On page 5-8 under the section Water Supply Wells it is stated that the maximum withdrawal of 9,000 gpm "is not considered significant." I feel that the total quantity of water to be withdrawn over the life of the project and the effect of that on the water table of the area should have been addressed in the draft.

2 2. In view of the molybdenum project planned on the Colville Indian Reservation, Washington, I feel that the sections of the draft which deal with economics should have included a discussion of the world market for this mineral. There seems to me a possibility that with both the Colville and Thompson Creek projects in operation the world supply of molybdenum could be increased to the point that the market price for the mineral would drop below the cost of extraction; and, thus, force closure or, at least, curtailed activity at the proposed Thompson Creek site.

3 3. On page 4-29 under section 4.5.5 Erosion and Sedimentation Control "Weed control for noxious weeds" is listed as one of the mitigation measures to be used on disturbed roadsides. I am concerned that toxic chemicals may be chosen as the alternative to accomplish this task. Of course, your staff knows that Forest Service Policy requires that an Integrated Pest Management plan be drawn up for the control of noxious weeds. This should have been covered in the draft; and, I certainly hope, is included in the final environmental impact statement.

Thank you for the opportunity to comment on what is otherwise a very well prepared draft environmental statement. I eagerly await receiving a copy of the final environmental statement on the Thompson Creek project.

If you have extra copies of the following VTN Technical Memoranda, may I receive a copy of each?

WQ Surface and Ground Water Quality
AE Aquatic Ecology
SE Socioeconomics
AT Aesthetics

Cordially yours,

John Miller

John Miller

RESPONSE TO LETTER R

R-1 The maximum withdrawal of 9,000 gpm will be of relatively short duration, occurring primarily during the early stages of production. As the concentrator becomes fully operational, water will be reclaimed from the tailings impoundment and reused. The average long-term withdrawal from the water supply wells will be about 300 to 400 gpm. This may cause minor, local effects on the deep ground water flow system (i.e., slight drawdown of the water table). There will be no effect on the alluvial water table because the wells will extract water from 500 to 750 feet below the ground surface. Pump tests indicate there is no connection between these deep water-bearing zones and alluvial or surface waters.

R-2 Refer to Response No. 2 at the beginning of this Appendix. Other producers of molybdenum were considered in the market analysis for the project.

R-3 If weed growth presents a problem to successful reclamation, chemicals or deterrents would be utilized if other measures are not available or effective. If this is the case, only state and Federally-approved chemicals will be utilized, and their application would be performed by a qualified applicator, licensed in the State of Idaho.

LETTER S

Rebecca Brown
2602 Park St.
Bellingham, Wa
98225

Jack E. Bills
Supervisor, Challis Nat. Forest
Challis, Idaho 83226

Dear Forest Supervisor,

Please consider these ~~comm~~ comments on the Draft E.I.S. concerning the Thompson Creek Molybdenum Project. In Chapter four, weed control for noxious weeds is mentioned as a mitigation measure. I am concerned that toxic substances will be the method of weed control chosen. If so, the resulting adverse environmental impacts should have been addressed in the draft. (See page 4-29, item 5).

1

2

Sincerely,
Rebecca Brown

RESPONSE TO LETTER S

S-1 See Response R-3.

LETTER T

STATE OF IDAHO

DEPARTMENT OF FISH AND GAME

600 SO. WALNUT ST. — P.O. BOX 25
BOISE, IDAHO 83707

September 5, 1980

Mr. Jack E. Bills
Forest Supervisor
Challis National Forest
Box 247
Challis, ID 83226

Dear Mr. Bills:

Our review of the draft environmental impact statement covering the Thompson Creek Molybdenum Project in Custer County revealed no substantial change from the predraft document we had previously reviewed. The figures and distribution data pertaining to fish and wildlife resources used in the draft are reasonable. Although specific and precise figures on some species are not readily attainable, we feel those used are accurate enough to adequately describe the existing environment.

1 Section 4.5 relating to mitigation measures should be strengthened by incorporating into the section the monitoring plan pertaining to water quality and aquatic organisms that was recently accepted by the Bureau of Land Management.

2 In addition to an acceptable monitoring program, we support the mitigative measures for fish and wildlife as outlined in sections 4.5.6 (Fisheries) and 4.5.7 (Terrestrial Vegetation and Wildlife). Not addressed in the fisheries section is the method by which Cyprus will assure adequate flows for fish passage as well as satisfy irrigation needs of the landowners.

As a result of the increased human population being imposed upon the Challis area by mine development and operation the demand for and impact on fish and wildlife resources will be greatly accelerated. In order to fully evaluate these new uses and impacts there is a need to intensify the collection of biological data, not only at the mine site, but also in areas heavily impacted by the additional people. The need for increased enforcement effort is also essential, especially since the mine will be operating on a 24-hour-per-day basis.

EQUAL OPPORTUNITY EMPLOYER

RESPONSE TO LETTER T

T-1 Section 4.6 of the EIS has been updated accordingly.

T-2 This recent information has been added to Section 4.5.6.

Mr. Jack E. Bills
September 5, 1980
Page 2

Because of the above needs, it is our intent to negotiate with Cyprus to fund both a wildlife biologist and a conservation officer on a fulltime basis, at least through the year 1984. Such funding will include not only salaries but also operational costs and capital outlay. Specific funding for special data collection and monitoring projects such as trapping and tagging, aerial surveys, etc., will also be requested. We are presently preparing a complete mitigation proposal covering all fish and wildlife mitigative measures for submission to Cyprus in the very near future.

3 We are greatly concerned over the construction of the tailings dam and the potential impacts to the fishery resources in the Salmon River should the dam fail or prove to be inadequate to retain toxic materials. Every effort should be pursued to assure the infallibility of the structure. We assume that adequate bonding would be required as a condition of permit issuance for this impoundment as well as the construction of settling ponds. This bonding should be sufficient to cover replacement costs of any resources destroyed as a result of the failure of these structures, both during and following operations.

It is our intent to work closely with Cyprus and agencies involved in the mine development and operation. We feel this is essential to preclude impacts to fish and wildlife resources that are not anticipated at this time.

The opportunity afforded us to work with Cyprus and its consultants in providing the information requested on fish and wildlife resources is appreciated. We anticipate this cooperative effort will continue through the development and operating phases of the mining operation.

Sincerely,

DEPARTMENT OF FISH AND GAME

Jerry M. Conley
Director

cc: Clearinghouse (SAI#00704568)
Region 6
Bur. Wildlife
Bur. Fisheries
Salmon office
USFWS (Heberger)

T-3 Refer to Response No. 3 at the beginning of this Appendix. The Forest Service can only require a bond for the cost of stabilizing, rehabilitating and reclaiming the area of operations (36 CFR 252.13 [b]).

LETTER U

Idaho Conservation League
Box 844 Boise, Idaho 83701 (208) 345-6933

September 5, 1980

Mr. Jack Bills, Forest Supervisor
Challis National Forest
Challis ID 83226

Dear Mr. Bills,

We have reviewed the environmental statement for the Cyprus Mine Thompson Creek Molybdenum Project. Our comments fall into five categories.

Range of Alternatives

The statement considers four alternatives, but three of those are identical except for placement of mine facilities. As far as the mining operation itself goes, there are just two alternatives presented--no mine or a mine of the size and at the pace proposed by Cyprus. We do not believe this is sufficient.

1 Alternatives should be presented which vary the scale of the mine, and the pace of mining. Alternatives of different scale and pace than the preferred alternative can have a substantial impact on the adverse effects of the operation. The statement says, probably rightly, that the major adverse impacts of the mine are those associated with the population growth it will cause in Challis and Custer County. A smaller mine, operated over a longer period of years, would certainly reduce those impacts. As the statement stands, it contains no alternatives to the off-site impacts. If these are the major impacts, alternatives need to be explored.

When this question was raised at the public meeting on the project in Boise, the reply was that the Forest Service had no real control over the pace and scale under present law. That, it was said, is the company's choice.

That argument is not convincing. The legal question is murky, but the Forest Service clearly has some degree of control in the matter, through presentation of the options, the impacts, and through independent judgment of what is optimal for the resource in the Service's care. The Payette National Forest is currently supervising preparation of an environmental statement for the Canadian Superior mine proposal near Stibnite. That statement will contain alternatives of scale and pace. The

100% RECYCLED

RESPONSE TO LETTER U

U-1 The EIS has been revised to consider such alternatives (see Section 4.3.1.1).

U-2 The 30 megawatt (MW) number used in the Draft EIS was an average load based on a preliminary load study rather than a peak load. Further design work on the mine, concentrator, and ancillary facilities has resulted in a better "best estimate" of the average load (30-33 MW). The 42 MW number more accurately reflects the estimate for the Cyprus Mines peak load. The EIS has been changed accordingly.

U-3 SREC will provide the power required for Thompson Creek. SREC presently receives all of its power from the Bonneville Power Administration (BPA). The BPA allocates its preference power (low cost hydro based) to certain publicly owned utilities. At the time that the Cyprus Mines load will come on-line in 1983, SREC will be allocated approximately 25 MW of preference power. Since the estimated non-Cyprus base load is 8-15 and the peak Cyprus Mines load is 42 MW, approximately 30 MW of power for the Cyprus Mines load must be obtained from other sources. SREC is presently investigating possible sources to provide this needed power. These possibilities include a mix of hydro and thermal sources with costs in the range of 20 to 60 mills/KWH.

U-4 SREC has stated that BPA preference power will first be allocated to its residential, irrigation, and commercial users with demand less than 2.5 MW. The table below indicates the amount and cost of allocated preference power. Current and projected loads for all SREC customers in the above category (presently all users except Cyprus Mines) indicate that they will always have preference power available since their total will be significantly less than the BPA allocation. Cyprus Mines and other future large industrial customers with demand greater than 2.5 MW will receive what is left of the BPA allocation of preference power and their shortfall must come from other sources. Thus, all future residential, irrigation, and commercial SREC customers with demand less than 2.5 MW should not be affected by the addition of the Thompson Creek load.

Year	Allocation Average MW Units	Cost Mills/KWH
1984	25.8	18.5
1985	25.8	19.4
1986	25.8	20.4
1987	25.8	21.4
1988	25.8	22.5
1989	25.8	23.6
1990	25.8	24.0
1991	25.8	26.0

ICL Cyprus comments
Page 2

1 Forest Service-BLM-USGS environmental statement on phosphate development in southeast Idaho contained alternatives altering pace and scale. The purpose of an environmental impact statement is to show the impacts of a project and alternatives to it. Its scope is determined by the National Environmental Policy Act, not the 1872 Mining Law.

The Forest Service should also recognize that this statement is the definitive public document on the Cyprus project. If the Forest Service considers itself powerless on matters of pace and scale, certainly the state of Idaho and its people are not. Are there ways to reduce the impacts, and still have an economically feasible mine? What is the result if the mine is reduced by ¼ in scale? Exploration of these kinds of questions in the statement would be of great service to those concerned with this project.

A wider presentation of alternatives is necessary for the Forest Service to adequately assess impacts to the resource in its care. And it is the only practical way the people and state of Idaho can have a shot at doing the same. We urge study of alternatives of pace and scale. There is precedent and there is excellent reason.

Energy Requirements and Impacts

2 This section of the statement needs considerable expansion. The statement says that "approximately 30 megawatts of power will be required to meet peak period loads." (Page 5-22) How was that figure determined? A BPA-Salmon River Electric Coop Load Study, dated March 1980, estimates the peak need at 42 megawatts (Page 24). That's a fairly large discrepancy, and it leads us to believe some documentation of the 30-megawatt figure would be useful.

3 The statement contains no discussion of where the power is to come from. At the public meeting in Boise, Mr. Magee of Cyprus stated that the company was beginning negotiations with the Bonneville Power Administration regarding delivery and price of the power. The statement should report on the status of those negotiations--what is being asked for, what BPA's response is, what agreements have been reached. We believe the final statement should contain a letter or memo from BPA regarding this matter--will they provide the power, where will it come from, at what price, etc.

4 The effects of delivery of this power on present and future customers of Salmon River Electric must be analyzed. As we understand BPA's policy, they are not guaranteeing more than 25 megawatts of firm power to coop customers now below that amount. Will the 30-42 megawatts delivered to Cyprus affect availability or cost of BPA power for future residential, commercial, and irrigation customers of Salmon River? Will the Cyprus project affect negotiations between BPA and Salmon River for a new contract when their present one expires? In telephone conversations one of our members had with BPA on this matter, we were told that BPA

The Regional Power Bill is intended to bring supply and demand into balance rather than to allocate shortages. If passed, BPA would be authorized to invest in conservation and to purchase power to meet preference customers' full requirements after 1983, plus other loads. Preference customers would continue to receive first call on power from BPA and would be protected as to price and supply. BPA would be free to procure other power (thermal, hydro, etc.) under long-term contracts between the suppliers and regional industrial loads.

If the Regional Power Bill is not adopted, the likely policy successor would be the BPA allocations policy. Under this policy, BPA would not be able to fully meet the energy requirements of its preference customers. However, the 66 small rural electric cooperatives who use less than 25 MW average would be entitled to receive their full requirements up to that amount. SREC falls into that category.

Therefore, passage or non-passage of the bill will only impact the energy availability and cost to Cyprus Mines and future large industrial consumers of the SREC system.

4 would be able to supply only around 2/3 of SREC's power demands, and the rest would have to found elsewhere. Since the Cyprus mine is the reason SREC's demand will increase beyond BPA's ability to serve, the statement should address possible sources for the shortfall, possible prices, and how (if) SREC will guarantee that whatever preference power is available will flow to existing and future residential and irrigation (domestic and rural) customers. The statement should also analyze whether passage by Congress of the Northwest Power Bill will have any effect on the power situation of SREC and Cyprus.

5 If Cyprus obtains preference power in any amount from BPA, the statement shoudl discuss how this affects BPA's ability to deliver preference power to residential and irrigation customers elsewhere in the region.

6 This entire matter of energy availability and cost is extremely important. The Salmon River Electric Coop March 1980 load study states on page 1, "allocation and long-range power supply for SREC are uncertain." Price could have been added to that statement as well. In such a situation, sudden new loads of the size needed by Cyprus need detailed investigation on behalf of existing customers, future customers, and Cyprus itself. The implications and possibilities need explanation to the public. The matter goes beyond SREC and BPA. If BPA's surmise above (that it will not be able to supply all of SREC's needs is correct), the possibility clearly exists that Cyprus may need power at some point from other Idaho sources--Idaho Power or Utah Power and Light. Customers of those utilities need to know the implications for them if that occurs.

7 Energy conservation should also be discussed. Has Cyprus conducted an energy audit of its operation, to ensure that conservation potentials have been thoroughly analyzed? Are there alternatives to electrical energy for any of Cyprus' projected load?

8 SREC's existing rates should be listed, and potential effects discussed. Even if the Cyprus operation pays marginal cost or full cost for its power, the major influx of residential and commercial customers caused by the mine will likely influence present rates. That area should be examined.

Water Quality

Of the mine's direct effects, this area concerns us most, and it is unfortunately also the one we feel least confident of in our ability to ask the right questions or assess the statement. ICL and Idaho conservationists generally have just concluded an eight-year effort to protect 2.2 million acres of the Salmon River drainage as wilderness. We are continuing our efforts to insure protection (wilderness or otherwise) for areas of the drainage outside the new wilderness. In this effort, we have a number of goals: maintenance of the recreational industry which depends on the unspoiled nature of the Salmon drainage; protection of the habitat necessary for reestablishment of the anadromous fish runs into Idaho; protection of wildlife habitat in the entire drainage;

U-5 As stated above, the amount of power BPA will make available to SREC is not related to the addition of the Cyprus Mines' load. Therefore, negotiations between BPA and SREC should not be affected by the Thompson Creek Project.

U-6 SREC has stated that residential, irrigation, and commercial users with demand less than 2.5 MW will be first in line to receive preference power. The demand from these customers is estimated at a total of 9 MW in 1984 climbing to 13 MW in 1993. This demand can be entirely met by SREC's BPA allocation of 25 MW. Only Cyprus Mines and other future large industrial users (demand greater than 25 MW) will be required to pay for the non-preference power which must flow into the SREC system to make up the shortfall.

As previously stated, SREC is presently investigating alternative power sources to supply the Thompson Creek demand. Only those utilities which have stated their ability and willingness to enter into a long-term power supply contract with SREC are being considered. These utilities will be selling excess capacity to SREC which allows them to make better use of their generating facilities. This should not effect their existing customers.

U-7 The peak demand estimate for the Thompson Creek Project must of necessity be conservative and include worst case conditions for power consumption. Since the Thompson Creek Project will be a profit motivated organization, good management requires that energy consumption be reduced to the absolute minimum needed to produce a quality product. During mine and concentrator startup extensive studies will be performed to maximize efficiency and reduce electric energy consumption to the minimum practical level consistent with plant and personnel safety and the production of quality grade concentrate.

A limited number of alternative power sources for the project are possible but environmental and economic factors preclude further consideration.

U-8 Refer to Response U-4.

and continued availability to Idahoans and Americans of this remarkable piece of wild and near-wild country that is the Salmon River drainage.

A mining operation of the size of Cyprus' proposal concerns us greatly. The Salmon River has suffered much from past mining, but it hasn't seen anything of this scale before. Protection of the Salmon River drainage is more important to Idaho, economically and environmentally, than any mine.

9 At the public meeting in Boise, an engineer working under contract to Cyprus stated that there was "no possibility" of failure of the tailings embankment. In discussions with other engineers since, we have been told that there is always a possibility of failure of any structure, and that to say there is no possibility is both untrue and unprofessional. This is an important enough point that we would like some discussion in the environmental statement specifically on this matter. Is there a possibility of failure? If so, how could it occur? What would be the range of consequences? Is there a way to assess the odds against it? Have tailings embankments failed in the past? How does time enter into the equation--does failure become more likely with time or less? How will failure 100 years from now be guarded against? Is the technique being used to construct this embankment a tested technique or new?

10 What monitoring (both parameters and periodicity) will be done around the tailings for groundwater pollution? Who will do that monitoring?

11 How will the settling ponds below the waste dumps and tailings embankment be sealed? How will failure of these structures be protected against, over what time period?

12 What post-mining monitoring and action will Cyprus commit to at this point? How far into the future do dangers from the operation extend, and what are the plans for monitoring and preventing those dangers?

13 We would urge a unified discussion of the whole area of water quality monitoring and preventative or emergency action. What Cyprus, Forest Service, BLM, and state staff will be doing monitoring, of what kind, over what time periods, and with what frequency? (For instance, how often will the state water quality staff in Pocatello get to the mine, what information will they receive in the interim, etc.) Will these staff people have other jobs? How much time will they spend on this mine? Who has primary responsibility and authority for water quality control, and how will the company and other agencies coordinate under that lead?

Fish and Wildlife

14 We were told rather strongly at the public meeting in Boise that wildlife impacts were overestimated in the environmental statement. But this was not said by those present with fish and wildlife expertise. As a result we are somewhat confused. Perhaps

U-9 Refer to Response No. 3 at the beginning of this Appendix.

U-10 This topic is dicussed in Section 4.6.3 of the EIS.

U-11 The seepage control dam located downstream from the main tailings embankment will be a conventional water retention earthen dam. It will be constructed using a grout curtain to prevent seepage through the dam foundation. The grout will be placed by drilling a number of holes along the axis of the dam and pumping the grout under pressure, into the holes to seal the area.

The seepage control dam is being designed for total containment with no discharge to surface water. All collected seepage from the main embankment will be pumped back into the tailings impoundment. The dam will be designed and constructed according to specifications of the Idaho Department of Water Resources, Dam Safety Division. The seepage control pond is being designed to contain 10-15 days of seepage without any return to the tailings impoundment. The dam is sized based on the drainage area between the tailings embankment and the seepage control dam. The seepage control dam will have a designed spillway which will safely pass flood water above the 100-year flood, thereby preventing total loss of the structure. The tailings impoundment area and the seepage control pond will not be lined.

The three settling pond dams also will be constructed as conventional earthen water retention structures, but will not be grouted. The settling ponds are being designed principally for removal of solids. All three settling pond dams will be constructed according to the specifications of the Idaho Department of Water Resources, Dam Safety Division. Performance bonds will be posted by Cyprus Mines for all dam construction regulated by the State of Idaho. The settling pond dams have been sized according to drainage areas and are designed to contain the 10-year flood and safely pass, through a designed spillway, any precipitation event greater than the 10-year flood. National Pollutant Discharge Elimination System (NPDES) monitoring points are located downstream of all three settling ponds.

With respect to potential failure of the tailings embankment, see Response No. 3 at the beginning of this Appendix.

14 the Department of Fish and Game's comments will clarify this some. At any rate, there is apparently needed some reexamination of the wildlife impacts in the final statement.

15 We would like further clarification of the fishery mitigation proposed. On page 5-14, the statement says: "To alleviate these conditions [Squaw Creek running dry at key times] Cyprus Mines will work with the Idaho Department of Fish and Game to ensure passage of anadromous fish up Squaw Creek." At the public meeting in Boise, we were told that this means Cyprus is negotiating with water right holder(s) in Squaw Creek in an attempt to purchase enough water to guarantee a necessary flow. But it was also half-said, half-hinted that those negotiations might not be successful.

The statement cannot say that expansion of anadromous fisheries on Squaw Creek will mitigate the Bruno Creek fishery loss (page 5-14) unless there is some certainty that it will occur. Will water be guaranteed in Squaw Creek? If not, are there alternative mitigation plans?

16 Wildlife impacts are always difficult to assess in advance. What kind of monitoring will accompany the operation to determine what the impacts are? Will this monitoring be tied to any kind of mitigation agreement?

Impacts to the City of Challis

This is not our area of expertise, so here we have just a few comments to make.

17 Does Challis have adequate water supplies to handle the anticipated growth? We understand the present supply source is inadequate. If this is true, a discussion of alternatives sources and their cost is needed.

18 Conversations we have had with conservationists in other states with more mining experience have led us to conclude that capturing 19% of the molydenum market is not going to be without risk. It may not happen. If it doesn't happen, what happens to the Cyprus Mine, and, more importantly, what would happen to the city of Challis. Is there a possibility the mine will close down, and, if so, does that have impacts on the city?

19 There have been questions raised about the relation of the 1% property tax limitation and the taxes Challis and Custer County will receive from the mine. A Cyprus consultant said at the public meeting in Boise that that question had been resolved, and that there would be no trouble with prepayment of taxes. That needs documentation, presumably from the State Tax Commission, in the final statement. The statement should also analyze whether the 1% law affects tax revenues from the mine in any other way besides the prepayment that is planned.

U-12 Upon completion of the Thompson Creek Project all dams and embankments will be reclaimed according to the Reclamation Plan(s) on file with the Forest Service and the State of Idaho, Department of Lands. Return of the Reclamation Bonds to Cyprus Mines will not take place until reclamation and stabilization are complete.

Post-mining monitoring and reclamation will continue at the Thompson Creek Project until such time as the area and facilities are reclaimed and stabilized. The Reclamation Plan at the Thompson Creek Project is being designed to ensure the long-term stability of the various components. When reclamation, revegetation and stabilization are completed, and the bonds returned to Cyprus Mines, the component facilities of the project are expected to be stable and not require long-term monitoring. It should be pointed out, however, that the U.S. Forest Service was monitoring the surface waters of the project area prior to the presence of Cyprus Mines, and it is anticipated that their program, as in other areas of the country, would be reinstated after operations cease.

U-13 Section 4.6 of the EIS has been updated to provide more detail on monitoring programs. Also see the new Section 4.7 on Regulatory Responsibilities. Commitments of agency personnel are not within the scope of this EIS.

U-14 Refer to Response K-4 and Comment Letter T.

U-15 Section 4.5.6 has been updated.

U-16 See Section 4.5.7 and 4.6. There is no formal mitigation agreement.

U-17 Water for the new housing development will be supplied from a well drilled in the area to be annexed. The water system will be separate from the existing one serving current Challis residents, but it will be designed to be compatible with the existing system for potential interconnection in the future. Cost for the new water system will be borne by the developer. Also see Response C-2.

U-18 Refer to Response No. 2 at the beginning of this Appendix.

U-19 The Idaho State Tax Commissioner has indicated legislation authorizing partial tax prepayments by Cyprus Mines specifically exempts these prepayments from the effects of the property tax freeze. This information, which was reported by the Cyprus Mines' consultant at the Boise Public Meeting was based on a statement by State Tax Commissioner, Mr. D. Loveland, as widely reported in newspapers throughout Idaho.

20 This ends our substantive comments. We would like to make a point about the EIS itself. It was written under new guidelines, in an effort to be concise and readable. We understand the thrust of the new guidelines, but following them also made it very difficult to review the technical parts of the statement. The detail was to be found in backup documents available in Challis, Salmon, and Boise (one copy). Getting and reading those backup technical memoranda ranged from difficult to impossible just because of their scarcity and location.

There is no perfect answer to this dilemma, but those at ICL involved in preparing these comments came to a consensus that we would rather see the technical matter in the statement itself, no matter the size. A compromise might be to provide the technical detail on the major impacts, but not on the minor. Or to provide supplementary EIS appendixes, which can be sent to those who request them.

Thank you.

Sincerely,

Pat Ford

Pat Ford
Executive Director

cc: Bonneville Power Administration, Idaho Falls Office

U-20 Comment noted. The Technical Memoranda not only were available for review in Challis and Salmon, but also were sent to those who requested copies.

LETTER V

JAMES E. CONNOR, Ph.D
CONSULTING CHEMIST

P.O. BOX 703
CHALLIS, IDAHO 83226
(208) 879-2741

September 5, 1980

Jack Bills
Forest Supervisor,
Challis National Forest
Challis, Idaho 83226

Dear Jack,

I would like to make a few comments on the Draft Environmental Impact Statement (DEIS) prepared by VTN for the proposed Cyprus-Thompson Creek Molybdenum project located in T 11, 12 N; R 16, 17 E BM, Custer County, Idaho.

Generally the DEIS would seem to indicate untoward adverse environmental impacts need not occur outside the mining area itself. For a project of such magnitude it would seem this could be quite a "clean" operation.

1 Like many Custer County natives and long term residents, I fear the largest impact will be on the local lifestyle and economic base, that the transition may be painful for us, or even harmful. Cyprus has been working with local groups and governmental agencies in order to smooth the transition with, I believe, some good results. Are there plans that this evaluation process would continue over the next several years or even for the lifetime of the project? Has thought been given to how long this interaction between Cyprus and the local community should continue? At what point would it become interference by Cyprus?

2 Pertaining more directly to the mining operation itself, on page B-10 (table B-5) it is stated that some considerable amounts of organic reagents will be utilized in the floatation process: No. 2 fuel oil, 4-methyl-2-pentanol(methyl isobutyl carbinol), and pine oil. What will be the fate of these reagents carried with the slime into the tailings ponds? Will they be air oxidized or anaerobically decomposed by bacterial action? Will they remain inert or suffer partial oxidation to iso-butyric acid and the like? Will they evaporate from the surface of the pond? If this is the case, are they included in the datum listed in table 5.2-1 (page 5-3) for the calculated ground level concentration of hydrocarbons (HC) of 4-69 $\mu g/m^3$?

3 The last question could be asked of the emissions from the concentrate drier; more than water must be removed from the concentrate; No. 2 fuel oil must be removed also.

4 What will be the estimated cost of planting hundreds of thousands of anadromous fishes in Thompson Creek and Squaw Creek? At this time might not these monies be better used to improve conditions for the fish in the Columbia River: both habitat and regulatory? It sometimes seems that stocking Steelhead and Salmon treats only symptoms and has no effect on the real problems causing vanishingly small return runs.

What will be the effect of increased fishing pressure on the game fish the Salmon River does provide now? Might it not be well to protect populations of Rainbow and Cutthroat trout, Dolly Varden, and even Eastern Brook, char, and to some extent the Rocky Mountain White

RESPONSE TO LETTER V

V-1 Coordinating and constructive assistance will continue until after construction of the first housing subdivision, at which time it is anticipated city and county government will be experienced in accommodating mine-associated impacts. It is further anticipated that many of the new residents will bring with them experience in dealing with such impacts.

The indepth community interviews will continue until it becomes apparent all other socioeconomic planning activities have been successful and that the community's attitude has stabilized.

A planner has been assigned by East-Central Idaho Planning and Development Association, full time for six months, for transition to more traditional community planning.

V-2 In general, these organic reagents will undergo the following reactions in this system: oxidation, volatilization and bacterial degradation. In terms of order of magnitude, the most important breakdown mechanisms would be: partial oxidation, followed by bacterial degradation and volatilization to a lesser degree. All of these reactions will be of an incomplete nature, and as a result will contribute to residual presence of either oxidative/reductive end products in the tailings impoundment. Some compounds will oxidize completely (those nearer the surface) while others will only partially oxidize. Anaerobic bacterial degradation also will occur. Initially, it will be rapid (resulting in methylated compounds), but will retard with time. As noted above, most of the organic compounds will undergo some kind of decomposition, and as such will not be inert. Indeed, partial oxidation to iso-butyric acid (very weak acid) and its homologs may occur. Volatilization from the impoundment surface will be very small compared to the other degradative mechanisms mentioned above. In summary, as a result of incomplete oxidation, limited volatilization and bacterial kinetics, there will be degradation product residuals of MIBC and other flotation reagents in the flotation cells and tailings impoundment.

V-3 The air quality analysis did not include the emissions due to the carryover of the reagents into the tailings impoundment. The emissions from the impoundment will be negligible, therefore, they were not included in the data listed in Table 5.2.1. Emissions due to the evaporation of #2 fuel oil from the concentrate are insignificant compared to the emissions from the combustion of #2 fuel oil in the dryers, therefore, evaporative emissions were not calculated.

V-4 Making the natural spawning habitat in Squaw Creek available to chinook salmon and steelhead is the recommended mitigation for the loss of cutthroat trout in Bruno Creek, by the Idaho

4 fish? At the present time the Salmon River is open to year round fishing. I would prefer to see that situation continue over the condition of indiscriminately stocking anadromous fishes and jeopardizing a fairly healthy trout population.

Please don't mistake me, I would be most pleased to see a return of large Salmon and Steelhead runs if it can be accomplished.

5 In table 2.7-2 (page 2-22), column 7, an anomolous value of cadmium is reported in lower Thompson Creek water. Is this datum a true geochemical anomoly or spurious laboratory valve? No indication is given in the DEIS which might be the case. On page 2-27 (paragraph 3) and in table 2.7-5 (page 2-29) both cadmium and zinc data are indicated as anomolous in the Bruno Creek drainage from the Twin Apex Mine adit discharge. It appears cadmium may exist in anomolous amounts near the surface in the claim area. Has this been studied? Is there a danger of contamination of surface waters with cadmium and zinc during early stages of the operation? (I assume once the operation is underway any such contamination would be captured in the tailings pond.)

6 This brings to mind the question, what contaminants will be monitored routinly? Will this monitoring consist of checking numerous possible contaminants or only those chemicals and ions resulting directly from mining and milling operations?

7 A couple of typographical errors caught my eye in the DEIS: In figure 2.6-1 (page 2-11) 1cfs=1.699 m^3/min, not 1.699cmm as stated; on figure 2.6-2 (page 2-13) the same relationship holds that 1cfs=1.7 m^3/min., not 1.7 m /sec.

I see no reason the Cyprus-Thompson Creek project should not proceed. While I have no engineering background it would appear that alternative one is the best of the choices offered. I have no better ones.

Regards,

Jim Connor

Department of Fish & Game. Cyprus Mines is not financing the planting of fish. The requirement for, or the details of any potential stocking in Thompson and Squaw Creeks, have not been established. At the present time the mitigation measures presented in Section 4.5.6, which were developed by the Idaho Department of Fish & Game and Cyprus Mines, are considered to be appropriate. Your suggestions will be provided to the Department of Fish & Game. The effect of increased fishing pressure is discussed in Section 5.2.6.

V-5 The text of the EIS has been changed (see Section 2.7.3).

V-6 There is not sufficient data to confirm the presence of anomalous amounts near the surface. Twin Apex is the only location where large amounts of zinc and cadmium have been found.

V-7 The monitoring program includes a wide range of water quality parameters, not just those related to mining and milling. The revised Section 4.6 lists the parameters to be measured and the sampling locations.

V-8 The text of the EIS has been changed.

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Policy
Washington, D.C. 20230

LETTER W

SEP 5 1980

Mr. Jack E. Bills
Forest Supervisor
U.S. Department of Agriculture
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

This is in reference to your draft environmental impact statement entitled "Thompson Creek Molybdenum Project; Custer County, Idaho-Cyprus Mines Corporation." The enclosed comment from the National Oceanic and Atmospheric Administration's National Ocean Survey is forwarded for your consideration.

Thank you for giving us an opportunity to provide this comment, which we hope will be of assistance to you. We would appreciate receiving four (4) copies of the final statement.

Sincerely,

Robert T. Miki
Deputy Assistant Secretary for
Regulatory Policy (Acting)

Enclosure Memo from Robert B. Rollins
National Ocean Survey
National Oceanic and Atmospheric
Administration

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md 20852

AUC OA/C52x6:JLR

REC'D PP/EC
AUG 25 1980

TO: PP/EC - Joyce M. Wood

FROM: OA/C5 - Robert B. Rollins

SUBJECT: DEIS #8007.12 - Thompson Creek Molybdenum Project; Custer County, Idaho-Cyprus Mines Corporation

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments.

NOAA

RESPONSE TO LETTER W

W-1 If there is any project activity which would disturb or destroy geodetic control survey monuments, the National Ocean Survey will be notified in advance of such activity.

LETTER X

National Wildlife Federation
University of Oregon
School of Law

Pacific Northwest Resources Clinic

Law Center, University of Oregon, Eugene, Oregon 97403
503-686-3823

September 5, 1980

Mr. Jack E. Bills
Forest Supervisor
Challis National Forest
Challis, ID 83226

Dear Mr. Bills:

Pursuant to your invitation we wish to submit the following comments on behalf of the Idaho Wildlife Federation on the draft environmental impact statement (DEIS) for the proposed Thompson Creek Molybdenum Mine - Cypress Mines Corporation. Since the purpose of these comments is to suggest improvements or changes in the DEIS, we will limit ourselves to criticisms rather than our areas of agreement with the EIS. It should not be assumed, however, from our comments here, that we have found all sections of the DEIS inadequate. So too, because of our own limited resources and time, it should not be assumed that the criticisms that we have suggested in these comments represent a complete list of all the weaknesses of the DEIS.

I. General Issues

Before turning to specific weaknesses in the DEIS analysis or the proposed reclamation plan, we should make clear what we consider to be a number of general weaknesses with the DEIS.

1 Optimistic Assumptions--Because of our own limited resources we have not been able to have mining experts assess the proposed reclamation plan and DEIS. As laypersons, however, conscious of the fact that engineering methods are not always successful, that dams do break, that fills do slide, and that spills often do occur in an uncontained fashion, we are struck by the consistent use of magnificently optimistic assumptions about the ability of Cypress Mines to prevent or mitigate all but the most obvious environmental damage (such as the actual construction of the pit). Considering the fact that the National Environmental Policy Act (NEPA) requires an analysis not only of expected effects but of all worst case possibilities, we consider the failure to assess possible failures of engineering designs and the failure to analyze the impact of natural catastrophy (such as earthquakes in an earthquake-prone area or a major storm event such as occurred in the South Fork Salmon River drainage in 1965) to be completely inadequate.

2 Limited Nature of Alternatives--It quickly becomes clear in the DEIS that the three major action alternatives proposed, except for certain differences in area disturbed and road choice, produce virtually identical environmental impacts. This demonstrates better

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RESPONSE TO LETTER X

X-1 Refer to Response Nos. 3 and 4 at the beginning of this Appendix, and Response G-2.

Mr. Jack E. Bills September 5, 1980
Page Two

2 that anything that we could say that the alternatives considered are extremely limited. It would appear that many of the more diverse alternatives were eliminated from serious consideration in the brief discussions of options found in the early part of Chapter 4. If a DEIS is supposed to help the decisionmaker make tradeoffs between economics and the environment or between various environmental problems, then the kinds of choices the decisionmaker is given in the alternatives section of this DEIS are inadequate.

3 The 1872 General Mining Law-Underlying the DEIS is a fundamental assumption about the 1872 General Mining Law that remains unspoken until Chapter 7. That premise is that the 1872 Law grants the operator an absolute right to proceed with its mining operation. A corrolary appears to be that a mine operator complies voluntarily only with any environmental constraints required by the government. The assumption is simply wrong. A mine operator or claim holder only has a right to mine an area if it contains a "valuable mineral" deposit. The determination of the "value" of the deposit can and should include an analysis of the costs of mitigation or prevention of environmental damage. Thus, assuming that its actions are not arbitrary and capricious, the Forest Service has every right to impose such restrictions on a mining operation that it deems necessary to prevent environmental degradation. If compliance with those requirements is considered economically unfeasible, then the operator has not discovered ore in commercial quantities and has no right to mine. Cf. Natural Resources Defense Council v. Berkland, 458 F. Supp. 925 (DDC 1978)(application of environemtnal costs to determine commercial quantitites in preference right coal leases). Whether or not such an analysis would make a difference in this case, the public is not well served by the assumption of BLM and the Forest Service that they have so little power to control mining operations on public land. In fact, through the valuable deposit analysis, they have extensive power. The Cypress deposit should be analyzed accordingly and environmental protection measures should not be ignored simply because they are expensive. If protection costs too much, then there is not valuable deposit.

4 Baseline Data--We are concerned that there is little indication that sufficient baseline data will be collected so as to determine during monitoring procedures the exact environmental impact of the mine, particularly on stream benthic life, fisheries, and big game. Before operations ever commence, baseline data that is satisfactory to state and federal agencies and/or that is sufficient to make reasonable determinations of impact later during the monitoring program, should be collected.

5 Definition of "Significant"--Throughout the DEIS there is a commitment on the part of the mine to cease construction operations or to take mitigative measures if "significant" environmental damage is found to occur. There are two basic problems with this

X-2 The alternatives chapter has been expanded.

X-3 Refer to Response No. 1 at the beginning of this Appendix.

X-4 Baseline data have been collected in the past and are reported in the EIS and technical memoranda. Additional baseline monitoring programs are underway or planned prior to operation. These programs have been/will be approved by appropriate Federal and state agencies to ensure that sufficient information is available against which to evaluate project-related impacts. Also see revised Section 4.6.

5 approach. First, the commitment to stop construction activities if damage is seen to be occurring is commendable. But that commitment should be extended beyond construction activities to include mining activities as well. There is absolutely no commitment on the part of the operators to cease mining operations, to cease filling dump sites or to in any way significantly limit its ongoing operations if environmental damage is found to be occurring. Second, before this operation starts there should be some general agreement among all parties, including the resources agencies, such as the Fish & Wildlife Service and the Idaho Department of Fish and Game, as to what will constitute "a significant" degradation. For instance, the type and extent of sediment deposited in a stream may well be considered significant by the resources agencies but not by the operator. If an agreement now on the threshhold for "significance" is not reached, it leaves absolutely no teeth in the agreement to cease operations, and in fact simply guarantees that there will be unending arguments over significance and little done during those arguments.

6 Quantification--Despite the DEIS's claim that effects are quantified where possible, in numerous instances-such as big game impacts, water use, sedimentation--where quantification would be extremely helpful, it is simply foregone. The decisionmaker and the public are left with adjective-laden conclusions with little factual substance.

II. Specific Comments

Analysis of Streamflow Characteristics, § 2.6.1.

7 The EIS should make clear in its analysis of streamflow characteristics of the affected stream whether or not the streamflow data used reflects normal water, high water, or drought years. In order to assess the impacts of the mine on streamflows in both the best and worst case scenario, it is necessary to separate out the data and indicate the impact depending on the condition of natural streamflow. This may be particularly important during a drought year when the interaction of underground water with surface water may become much more important for the protection of streamflows.

Water Quality, § 2.7.

8 We note that, in discussing Idaho state water quality standards, the DEIS has left out (as did the new Idaho water quality standards) any mention of the federal and previous state anti-degradation policies. See 35 C.F.R. § 1550(e). You should be aware that there is currently some controversy over Idaho's elimination of that anti-degradation policy and Idaho Wildlife Federation is in communication with EPA to determine the legality of Idaho's new water quality standards on this point.

X-5 Section 4.6.1 has been revised to include a discussion of "significant." Also see Section 4.6.2 regarding operation.

X-6 Comment noted. Effects were quantified where possible.

X-7 Section 2.6 describes average conditions as well as maximum and minimum observed values within the text and in Table 2.6-1 and Figure 2.6-1. The average values presented in the text would be considered normal conditions. The Technical Memoranda on Surface Water Hydrology and Water Quality provide additional information on the natural streamflow and provide a worst-case analysis. Also see Response N-26.

X-8 Comment noted.

Mining Method Options, § 4.3.1.1.

9 We note that there has been no careful analysis of whether or not the initial stripping operation for 100 million tons of overburden is necessary. Since such a massive operation will leave considerable exposed area, contributing erosion and sedimentation, will require even more storage of material for longer periods of time, and will severely effect game habitat and migration, the DEIS should discuss whether or not a smaller original stripping operation would be feasible, and if not, why not.

10 We note also, that methods of concurrent reclamation through the use of parallel pits and automatic backfilling is nowhere discussed in the mining method options. Since this would eliminate the need for initial large waste disposal areas and would diminish the amount of area that was disturbed at any one time, this too should be assessed as an alternative. If there is a tradeoff between economics and the environment here, the DEIS never spells it out.

Waste Disposal Options, § 4.3.1.3.

11 The option of disposal of waste in the pit should be further discussed. We are not convinced by the discussion that even given a swell-factor, at least a substantial proportion of the waste material could not be returned to the pit. Even if only the estimated 17% could be returned to the pit, there might be significant environmental value in placing the waste material in the pit rather than head of valley fills, as is proposed. This option should not be dismissed so casually, with absolutely no analysis of the environmental advantages and disadvantages of employing it.

Tailings Disposal Method, § 4.3.1.4.

See discussion of § 4.3.1.3.

Tailings Embankment Construction, § 4.3.1.5.

12 The discussion of tailings embankment construction is particularly disturbning. Although the centerline method is adopted as the only option to be further assessed, the DEIS nowhere notes that the Nuclear Regulatory Commission now strongly recommends that only the downstream method be used for impoundments it regulates and discourages other techniques. See NRC Regulatory Guide, 3.11. Moreover, the discussion nowhere mentions that over the last 20 years there have been 15 failures of uranium mill tailings dams, not counting the Church Rock, New Mexico (United Nuclear) disaster of 1979. NRC Regulatory Guide 3.11.1., p. 6-7. Those failures, plus the disaster at Teton Dam and Buffalo Creek surely demonstrate that the DEIS is seriously inadequate since nowhere does it assess the consequences of a failure at this mine. Its optimistic reliance on "broad industry use" and "thorough study" is of no use to the public or the Forest Service decisionmakers.

X-9 The development of the mining plan for Thompson Creek included a considerable amount of analysis directed toward minimizing the initial pre-production stripping because of its adverse effect on project economics. The designed initial stripping operation is the minimum in the opinion of the project's consultants, that will allow safe, continuous ore production after the completion of the pre-production stripping period.

The following factors were taken into account in the evaluation:

1. Depth of ore body.
2. Physical characteristics of overlying waste rock (overburden).
3. Requirements for pit slope stability and for reentry for waste stripping above the ore.
4. Required production rate and size of equipment to be employed.
5. Risk to project economics caused by interruption of ore supply.

In the case of Thompson Creek the ore first occurs at 600 feet to 1,000 feet below the surface. To obtain access to this it will be necessary to excavate the overlying waste rock. The slopes of this excavation are determined by the requirements for pit slope stability and for sufficient area to reenter the slope and to restart stripping. The average slope at the end of preproduction stripping is 30° with intermediate slopes as steep as 40°. The slopes could not be steepened without increasing the risk to the operation. At the start of ore production approximately 6 months of ore is exposed for mining. This is the necessary minimum to ensure a continuous ore supply and to compensate for the possibility of interruption to waste stripping or unanticipated internal waste.

X-10 Due to the configuration and depth of ore body and the ruggedness of the local terrain, the use of concurrent reclamation through the use of parallel pits and backfilling is infeasible at Thompson Creek. Although the Thompson Creek ore body is at a relatively shallow depth (part of the intrusive crops out), the high grade molybdenum occurs at the core of an approximate 800-foot wide by 4,000-foot long tubular ore body at an approximate depth of 1,000 feet with lower grade values extending to the edges of the ore body, including the surface outcrops. In order to reach the higher grade portions of the ore body, substantial technical studies have dictated the required removal of approximately 130 million tons of overlying overburden and waste rock. This requires a substantial capital expenditure but it allows access to the economic mineralization. Because the initial pre-production stripping is the minimum, the use of "parallel pits and automatic backfilling" is not possible.

September 5, 1980

Waste Dumps, § 4.3.2.2.

13 The discussion of where to place waste dumps at pages 4-11 and 4-12 nowhere considers the environmental advantages or disadvantages of the various sites. The Basin Creek area was eliminated because of distance from the site. On the other hand, the alternative chosen in lieu of Basin Creek requires the use of three basins rather than one. And the choice was made on economic grounds with no assessment of the environmental advantages or disadvantages of the choice.

14 The DEIS also contains here its typical optimistic assumption that such waste dumps will be easily constructed to insure that failure will not occur. The construction of valley fills is an area of considerable engineering controversy and, in fact, some recent studies have indicated that there is no significant guarantee of stability. "Environmental Assessment of Strip Mining Method Head of Hollow Fill and Mountaintop Removal," performed by Skelly and Loy, EPA Contract No. 68-03-2356, Final Report, (March, 1978). As the Forest Service must know, the Federal Office of Surface Mining has assessed the construction of the valley fills in relation to coal mining (and since the question is one of disposing of overburden, the type of mine should not make any difference in the analysis) and has established very strict standards for the construction of these fills. There is no indication in the DEIS anywhere of what type of construction Cypress intends to use. Will it construct a rock core drain prior to dumping? Will it end and side dump the material and expect gravity to create a stable mass? (This technique has serious problems, [44 Fed. Reg. 15202-15208, March 13, 1979] and is allowed in coal mining context only in certain specified circumstances, see 30 C.F.R. § 816.74.) Will the Forest Service require that material be placed and compacted rather than simply dumped? Considering the potential damage if a dump site fails, the DEIS must consider these questions.

Atmospheric Emissions, § 4.5.1.

15 Although we have not been able to review the technical literature and EPA analysis that Cypress relies upon, we consider their analysis of the limited nature of fugitive emissions and the consequent air quality problem, particularly in the localized area, to be overly optimistic. Surface mines create an immense amount of fugitive dust despite the best control measures that have yet been developed. Because of the confusion in the Environmental Protection Agency over whether or not fugitive dust from mines can in fact be included in an analysis for prevention of significant deterioration permits, we have no way of knowing exactly what the fugitive emissions might be from this site. But, at least, the DEIS should contain quantification and analysis of the potential for fugitive emissions.

X-11 See Response K-2.

X-12 Regarding the "centerline" construction method, the Nuclear Regulatory Commission Guide No. 3.11 in Paragraph (a) of Section 3.0 states that the downstream method is preferred. However, in Paragraph (b) it further states that the upstream or centerline methods are acceptable if "extensive exploration and testing reveal the extent and characteristics of deposited tailings to have adequate strength under static and dynamic loading conditions for the stability and support of the added materials." Extensive analyses were conducted during the preliminary design of the Thompson Creek tailings embankment and extensive testing of the tailings material is being done at this time. Additional analysis will be performed with these data to refine preliminary designs. These final designs will be subject to review by the Idaho Department of Water Resources, the technical staff of the U.S. Forest Service and Mr. R. Soderberg of the U.S. Bureau of Mines. The final designs will be conservative, to provide maximum safety, considering probable maximum seismic and flood conditions.

Methods of construction other than centerline were considered and were discussed in Section 4.3.1.5 of the EIS. Downstream construction was rejected as an option because it was less compatible with the geometry of the site and would result in higher rates of rise during the initial years of construction yielding a less conservative design.

The failures of Teton Dam and Buffalo Creek are well documented but are not relevant to the Thompson Creek tailings impoundment because neither were designed or constructed as tailings embankments. The Teton Dam was designed as a water retention dam, which was rapidly filled when construction was completed. The structure which failed at Buffalo Creek was a water impounding coal mine refuse dump which was not a designed structure.

The causes of failure of other metal tailings embankments were taken into account in the selection of conservative criteria for the Thompson Creek tailings embankment design. This approach is not an "optimistic reliance" on past experience, but is using past experience in order to make the possibility of failure extremely remote. Also see Response No. 3 at the beginning of this Appendix.

16 We also note that in an effort to eliminate fugitive dust the DEIS claims that "surface areas disturbed during construction and operation will be minimized." This is directly contrary to the plan to strip 100 million tons of overburden rather than conducting a more limited operation with a form of concurrent backfilling and reclamation. Again that option should be considered more effectively in the EIS.

17 Finally, we see no indication here that there will be any monitoring of air quality impacts to determine whether or not additional mitigative measures should be taken as the opertion proceeds. We consider such air quality monitoring around strip mined sites to be absolutely essential.

Erosion and Sedimentation Control, § 4.5.5.

18 Perhaps in this section, above all others, we see an instance of the magnificently optimistic assumptions without detail that are included in this DEIS, one suspects with the purpose of leading the reader to believe that there will not be significant sedimentation. (Of course, later in the EIS it is admitted that some sedimentation may occur, although it is not quantified. See pages 5-14.) The DEIS claims that runoff from roads, buildings, and other structures will be handled through "standard engineering control measures," yet says little about the effectiveness of those measures. As is well known, construction of roads and the disturbance of land in the Idaho batholith creates sedimentation that is extremely difficult to control. The reliance on "standard engineering control measures" leads us to believe that there will be considerable sedimentation that will remain uncontrolled, and is not adequately quantified or discussed in the DEIS.

19 The DEIS indicates that "if significant sedimentation occurs, construction activities will cease under remedial actions are taken to prevent further sedimentation. . . ." Pages 4-28. As we stated in our general concerns, there are two difficulties with that approach. Without a definition of "significant"--a definition that should be reached in full consultation with fish and wildlife agencies--probably no construction activity will ever cease since there will be a continuous debate over what is "significant." Secondly, we see no justification for including the guarantee (or what passes for one) that construction activities will cease if serious sedimentation occurs, but excluding a similar commitment to close down the mining operations in such an instance. While we would anticipate some economic arguments against such a closure, the Federal Surface Mining Control and Reclamation Act of 1977 contains a model for such an approach. 30 U.S.C. §1271(a)(2). The Forest Service should accept no less.

X-13 As stated in the EIS, use of the Basin Creek site would disturb greater surface areas (obviously with related impacts on soils, hydrology and wildlife habitat), other drainage basins, and possibly migratory game routes. Other environmental factors considered in the evaluation included minimum upstream drainage area and sedimentation potential. The implication that three drainage basins would be disturbed rather than one is misleading. First, in order to travel to Basin Creek, several drainage areas would be crossed. Second, the Buckskin, Unnamed and Pat Hughes drainages will be disturbed by the mining operation even if they are not used for waste dumps. Selection of these three areas for waste dumps minimizes disturbance to drainage areas and confines the disturbance to the area near the mine site.

X-14 Refer to Response No. 4 at the beginning of this Appendix.

X-15 The EIS does consider fugitive emissions (see Section 5.2.1).

X-16 See Responses X-9, X-10 and X-11.

X-17 An application has been submitted to the State of Idaho, Department of Health and Welfare, Division of Environment, Bureau of Air Quality, for a New Industrial Air Emission Permit. This permit will cover all point sources for the Thompson Creek Project. The State of Idaho will determine monitoring requirements. The proposed project is not a strip mine and should not be confused with one.

X-18 The effectiveness of the sediment control measures will be monitored (see Section 4.6). The surficial geologic units throughout the claim area are primarily the Challis volcanics not the rock units associated with the Idaho batholith.

X-19 See Response X-5.

Fisheries, § 4.5.6.

20 Cypress Mines proposes to implement a fisheries replacement program on Squaw Creek. There is absolutely no discussion of how this program will be implemented.

Terrestrial Vegetation and Wildlife, § 4.5.7.

21 Cypress intends to conduct a threatened and endangered plant survey in the summer of 1980. It then claims that if species are present it will take "mitigating measures." Again, there is a magnificent assumption that mitigation rather than prevention will protect the plants. We are concerned that the mine project seems to be going forward without the initial determination as to the presence of or the impact on endangered species.

22 There is also a commitment, although of unknown proportions, to provide funds to improve habitat within or near the claim area to mitigate the loss of habitat within the claim area because of the mine construction and operation. We consider this discussion totally inadequate. While it is admitted that there will be significant impact on big game in this area, no indication is given of how much "mitigation" will be funded or implemented. A decisionmaker can hardly make a reasoned choice with such vague information.

23 Furthermore, considering the fact, admitted in the DEIS, major impact on big game may be through increased population pressures, we consider the commitment to fund an additional conservation officer in the Challis area through 1984 to be inadequate. The commitment should be for a conservation officer or biolgoist through the life of the project at least.

Environmental Monitoring, § 4.6

24 Because of the vagueness of the monitoring proposed in the DEIS, the public is left to rely on the good faith of Cypress and the various federal agencies. While we do not wish to impugn any party, we would suggest that the monitoring program needs to be set out in more detail before a decision on the project is made. (We have already discussed the problem of determining significance in order to decide when remedial action and cessation of operations is necessary.) We would add the following specific comments on what is provided.

25 First, the stability of waste dumps, since they will be constructed in valleys, should be monitored. Second, the actions to be taken if "significant" observations are recorded in the tailings impoundment embankment or waste dumps should be described. Third, baseline data, not only on water quality, but on fishery resources, benthic life forms, and big game movement must be established before the project starts.

X-20 Section 4.5.6 has been revised to include the most recent information.

X-21 The survey for endangered, threatened and other sensitive plant species has been completed and the text in EIS has been updated. See Section 2.9.3 and Appendix E.

X-22 The mitigation measures presented in Section 4.5.7 were developed by the Idaho Department of Fish & Game and Cyprus Mines. Cyprus Mines will fund the salary and operational costs of a full-time Fish and Game Conservation Officer for four years. This funding will amount to $35,000 the first year and $25,000 per year thereafter. The conservation officer will concentrate his or her efforts in the planning units in the immediate Thompson Creek/Challis vicinities where the project-related impacts will be greatest. In addition, Cyprus Mines will fund a program of on- and near-site wildlife and migration studies for three years. This three year effort is budgeted at $9,700 for the first year and $5,300 for each year thereafter. Cyprus Mines also has committed to work with the agencies in developing and implementing appropriate mitigation measures if necessary.

X-23 Your comment is noted.

X-24 See revised Section 4.6.

X-25 The stability of the waste dumps and tailings embankment will be monitored. Corrective actions, if required, will be determined based on an analysis of the conditions encountered. Regarding baseline data, see Response X-4.

Noise, § 5.2.2.

26 Despite the claims that the DEIS attempts to quantify wherever possible the discussion of noise belies that assertion. First, blasting is described as "occasional." It would seem, as a matter of common sense (and some experience with mining operations bears this out) that the term "occasional," at least during the early phases when overburden is being removed, is misleading. In any case, the DEIS could at least quantify the expected use of explosives within a reasonable range.

27 We also note the unsupported assertion that "some animals, however, may become accustomed to the noise. . . ." Which animals? Will they become accustomed to the noise immediately, or later? Will those animals that are forced to "move away" during the blasting ever return to the area or will a large area surrounding the claim and mining site be lost to wildlife habitat because of the deterrent effect of the noise? Surely, with a search of biological bibliographies, the DEIS can give a better assessment than the problematic statements contained in page 5-4.

Geology and Soils, § 5.2.3.

28 This section is completely devoid of any analysis of the probability of failure of waste dumps or impoundments, or of the consequences of such failrue. As we have already mentioned, there is certainly a history of failure of mine and mill tailings impoundments and the effectiveness of valley fills and their long-term continued stability is uncertain. In order to discuss a worst case scenario, the DEIS must consider potential failures and their impacts.

Surface and Groundwater Hydrology, § 5.2.4.

29 The DEIS takes as unlikely that water from Thompson Creek will be diverted for project use. On the other hand, an application for a 10 cfs appropriation has been made and the DEIS admits the possibility that the water will be diverted. While saying in one breath that "if water is diverted from Thompson Creek its flow would be reduced by the amount of the diversion", the DEIS also says, in an unsupported statement, that "arrangements would be made with appropriate regulatory agencies to maintain minimum flow requirements for fisheries protection." Considering the fact that the average annual flow in Thompson Creek is only 18.8 cfs and the minimum daily flow is as low as 1.1 cfs, (see page 2-10) we are at a loss to know how 10 cfs could be removed from Thompson Creek without affecting, or potentially affecting, fisheries. At the least the DEIS could have quantified the potential impacts. The unsupported claims that the fisheries will be protected are hardly reassuring.

X-26 The use of the word "occasional" is not misleading in the context of this type of project. The EIS does quantify the expected use of explosives, see Appendix B.

X-27 Animals which generally are expected to become accustomed to the noise are upland game birds, many non-game birds, deer, small carnivores, rodents, lagomorphs, reptiles and amphibians; elk, mountain lion, bear, mountain goat, bighorn sheep, and raptors, in general, will not. Also see Response N-31.

X-28 Refer to Response No. 4 at the beginning of this Appendix.

X-29 See Response N-18. Cyprus Mines has made a commitment to protect fisheries.

September 5, 1980

Mines, Waste Dumps, and Settling Ponds (page 5-7)

30 We note that the mine water will be discharged to the Buckskin and/or Pat Hughes settling ponds. It may thereafter be used as process water or it may continue to be discharged. Considering the fact that Bruno Creek is going to be essentially de-watered by this operation, at the very least the DEIS should consider the possibility that Bruno Creek water should not be used as process water if water obtained from de-watering the mine pit is available or that water from de-watering the mine pit should be diverted into Bruno Creek (after removal of sediment) in order to maintain the flows in Bruno. There is nowhere an adequate analysis of the actual amount of water that will be necessary for the needs of the mine and therefore it is difficult to assess whether, in fact, there would be water left over that would be useful for maintaining flows in Bruno Creek. At a minimum, the DEIS should consider the various alternatives for obtaining water for the mine and for maintaining the flow in Bruno Creek.

31 It is assumed that there may be as much as 1000 gallons per minute leading through the impoundment wall in the early operation of the tailings impoundment. One might assume that that water will be carrying material from the tailings or moving some of the fine sands that are found in the impoundment wall. Yet there is no analysis of the water quality effects of this infiltration. Nor is there any discussion as to the potential effects on the stability of the dam of this infiltration.

Water Quality Effects of Waste Dumps (page 5-9)

32 The DEIS indicates that effluent will not contain significant levels of toxic materials. At a minimum the DEIS should indicate what toxic materials might be present and in what quantity so that the decisionmaker and the public can determine whether or not the definition of "significant" used by the drafters of the DEIS is appropriate.

Water Quality Effects of Tailings Impoundments (page 5-10)

33 Although Bruno Creek is expected occasionally to exceed the aquatic life safety criteria for iron and zinc concentration, it is assumed that "because dilution of Squaw Creek water" Squaw Creek will not exceed the EPA criteria. The question that arises, of course, is: how large a mixing zone may be present at the confluence of Bruno Creek and Squaw Creek? Might there be toxic effects on migrating anadromous fish in the critical area where Bruno Creek enters Squaw Creek? The DEIS never assesses this possibility of such a site-specific toxic zone.

X-30 Discharging mine water to Bruno Creek was considered and eliminated from further analysis because the amount of flow is uncertain and it would not be a constant, steady flow, thereby alternately wetting and drying the creek bed. This option would not maintain flows in Bruno Creek. Project water requirements are presented in Appendix B.

X-31 The seepage control dam impounds all water seeping through the tailings embankment. This water is used in the process or returned to the tailings impoundment.

The tailings embankment has been designed and will be operated such that neither seepage water nor infiltration will carry solids from the impoundment. The total estimated infiltration would occur in very small flow paths through cracks and pore spaces of natural formations. Detailed surficial geologic mapping and permeability testing of subsoils have not indicated the presence of structures or formations which would allow concentrated flow at gradients sufficient to affect the stability of the tailings embankment.

X-32 The data and results of the chemical analyses and extraction procedures are presented in the Technical Memorandum (VTN 1980 WQ). The memorandum has been reviewed by the decision-makers and is available to concerned members of the public.

X-33 Bruno Creek flow presently represents about 5 percent of the flow in Squaw Creek. As such, there is no potential for Bruno Creek waters to enter Squaw Creek and form a cross-sectional barrier to migrating anadromous fish. Any mixing zone would occur in a small area near the confluence of the creeks.

Sedimentation (pages 5-12 through 5-13)

34 The DEIS discussion on sedimentation, (particularly in its failure to quantify impacts) is inadequate. In addition, the DEIS never discusses exactly what precipitation event will constitute "the design flood" for this facility, nor what the impact would be if an event greater than the design flood occurred and water was diverted through the settling ponds without sufficient retention time available. Rather, the DEIS makes it seem as if little sediment, if any, would get through the settling ponds, which, of course, is overly optimistic.

Aquatic Ecology, § 5.2.6.

35 The contribution of the various streams in the claim area to the energy and life cycles of the larger streams, such as Squaw Creek and Thopmson Creek, is generally discounted. Without more, and without any quantification, this unsupported optimism is simply inadequate. The energy chain and food chain necessities for healthy fisheries are too often overlooked, as here and must be assessed in order to determine overall fisheries impacts. See, generally, "The Potential Effects of Clearing and Snagging on Stream Ecosystems" G. Richard Marzolf, U.S. Fish and Wildlife Biological Services Program, FWS/OBS-78/14, January 1980. The bald statement that "the relative important of [Bruno Creek] to the maintenance of cutthroat trout in Squaw Creek is not known." is likewise inadequate if this Environmental Impact Statement is to be taken seriously. We suggest that the contribution of Bruno to Squaw Creek be understood before the former is destroyed.

36 The continued optimism of the DEIS is carried forward in the statement that "if these safeguards [to prevent spills] are effective there should be no impacts on Thopmson and Squaw Creeks or the Salmon River." There is no careful analysis however of the probability of spills and the possibility of failure of the protective devices. Considering the importance of the Salmon River and Thompson and Squaw Creeks as its tributaries, the blind assumption that controls will be effective is inadequate in this DEIS.

37 So too the assumption that sedimentation which occurs will have only "short term and localized" effects is belied by the experience in other areas of the Idaho batholith and, in particular, the South Fork of the Salmon River. If sedimentation does occur, perhaps caused by a significant storm event, one can expect the impacts on spawning and rearing habitat in the surrounding streams will be long lasting and regionally significant. There is no evidence cited in the DEIS that sedimentation impacts are short lived in this area of Idaho. There is certainly plenty of evidence to the contrary.

X-34 Accurate estimates of sedimentation cannot be quantified. The "design flood" for the settling ponds is the 10-year, 24-hour precipitation event. If this event is exceeded, runoff will be diverted through a spillway designed to accommodate a 100-year event. If the 10-year, 24-hour event is exceeded, there would be no measurable adverse impact from release of the diverted water, since the natural sediment load of Thompson Creek will be as high or higher than the discharge.

X-35 Pat Hughes, Buckskin and Unnamed Creeks have low or no flows relative to Thompson Creek, unsuitable substrate, and blocks near their entrance which minimize their use as fishery habitat. The contribution of energy from their watersheds to Thompson Creek and the Salmon River is insignificant relative to the total stream and river systems.

The Bruno Creek drainage provides only about 5 percent of the flow to Squaw Creek and is not expected to produce an amount of allochthonous or autochthonous material that would measurably affect fisheries resources. Bruno Creek, in the lower reaches, does provide spawning/rearing as well as general habitat for a native cutthroat population. However, the loss of Bruno Creek is considered minor because of low flows, the presence of mainstem upstream areas in Squaw Creek that may be more important, and the ubiquitous nature of native populations of cutthroat trout in the Salmon River drainage. Chinook (king) salmon probably do not utilize the Bruno Creek system for either spawning or rearing.

X-36 The structures for spill containment are passive (as opposed to active or reactive). Therefore, if they are designed, constructed and maintained properly they will contain spills (the probability of a spill is irrelevant here). Design review, and construction and maintenance inspection will be performed by Federal and state agencies to assure that the structures meet the necessary requirements and accomplish their intended function. Also see Section 5.2.5 for details on the "safeguards."

X-37 The project is not located in the Idaho batholith. Sedimentation from natural sources (and resultant effects) due to a "significant" (please define) storm event will be greater than discharges from the settling ponds. See Response X-18.

Terrestrial Ecology, § 5.2.7.

38 It is predicted that blockage of deer migration routes may mean that up to 150 deer could become cut off from wintering areas and possibly die. This is certainly another reason to consider the possibility of a concurrent mining and reclamation operation, but there is no discussion in the DEIS of factors other than "adequate big game passage facilities" to mitigate these impacts. Nor are we told even what the "adequate" passage facilities are that would be incorporated into the design of the conveyors, piplines, and roads. Finally the assumption that long term impacts on migration should be "minor" assumes that twenty years is not long-term and that 150 deer is minor. We would think that perhaps those value judgments should be left to the decisionmakers rather than be incorporated in an argumentative fashion into the DEIS.

39 It is also noted in the DEIS that a temporary construction camp will be built at the mouth of Squaw Creek along the major migration route paralleling the Salmon River. Why did the DEIS not consider the possibility of locating that temporary construction camp somewhere other than on a major migration route? Evidently the commitment to mitigation is not wholehearted.

Habitat Loss, (page 5-16)

40 The DEIS states that an unknown amount of habitat other than those specific acreages disturbed by the mine will be lost and notes that the amount of loss of habitat "cannot be determined from the information available." We would suggest that the information could be gathered and should be gathered before a final Environmental Impact Statement is produced. In addition, on page 5-18, the DEIS states that "existing data are insufficient to determine any site-specific differences in a quality of habitat loss under various alternatives." Surely with the amount of money that is being invested in this project an effort could be made to survey the habitat loss under each alternative and determine which is more or less significant. Since each alternative is so similar it seems incumbent upon the company and the Forest Service to make every effort to determine the differences in environmental impacts among the alternatives. Otherwise the decisionmaker has no rational basis for choosing among those alternatives.

Socio-economics, § 5.2.9.

41 The DEIS asserts boldly that "the local effects of a (temporary construction workforce) are not expected to be significant." We find this difficult to believe considering the size of the temporary workforce and the impacts that temporary workers, particularly without any family base in the area, can have on the social fabric of a small town. We suggest that the DEIS assess more fully the

X-38 See Responses K-2, X-9, X-10 and X-22. Other comments noted.

Big-game passage facilities will be designed by the Forest Service, Idaho Department of Fish & Game and Cyprus Mines. Cyprus Mines is financing migration studies to be conducted by Fish & Game to identify potential long-term impacts and appropriate mitigation measures.

X-39 Consideration of alternate locations for the construction camp is not within the scope of the EIS. Selection of the location along Squaw Creek, however, was not made indiscriminately.

Initially, several available construction camp sites were examined for environmental suitability. These sites were located at various points along the Salmon River from Challis to the border of the Sawtooth National Recreation Area. Generally, all the sites examined had a similar effect on the travel patterns of winter-ranging animals.

Siting the camp near Challis was presented to community groups, and their universal response was that a camp near the town would create the atmosphere usually associated with boom towns and was undesirable. Consequently, only sites further away than ten miles were considered. With two exceptions, the site locations would necessitate travel through the town of Clayton and associated increases in daily traffic. With one exception (the Squaw Creek site), the sites lay immediately adjacent to the Salmon River, in plain view of the roadway, and would result in visual impacts.

Alternative locations away from the Salmon River were limited by rugged topographic conditions, proximity to unstable talus slopes, or land ownership restrictions (i.e. some flat land was viable ranchland that was not for sale or lease).

The site along Squaw Creek was selected for the following reasons:

1. It is set back from the Salmon River banks and from the visual impact zone along State Scenic Highway 75 paralleling the Salmon River (materials to be used in the exterior construction are being selected to further reduce the possibility that the camp will be noticeable from Highway 75 even at a distance).

2. It minimizes traffic related impacts by eliminating commuting on State Scenic Highway 75.

3. The ground is presently being used for cattle grazing, so that no timber clearance or disruption of a site with recreational values would be necessary.

41 impact of the construction workforce over the period of time that it will exist in the area.

Utilities, § 5.2.9.3.

42 There is no way to determine the overall impact of the use of electricity of this mine unless the DEIS indicates whether or not new generation facilities may be necessary to service the mine and what percentage of the electricity now produced by the Salmon River Electrical Cooperative is represented by the proposed mine's use.

43 While the DEIS admits that the development of proposed housing would create a demand for water, there is no indication of how much water or how easily it is obtained or what the impact of increased water use would be on a general water situation in the area.

Public Finance, § 5.2.9.7.

44 The DEIS is at its most eloquently optimistic when it discusses the socio-economic impacts and the need for public financing to cover the improvement of needed public facilities. We are simply told that it is anticipated that "everything will work out all right." Without more of an analysis of these matters, the DEIS cannot be accepted as adequate. Despite the provision for prepayment of taxes by Cypress Mine, there is little concrete information in this DEIS that Challis will avoid the "boom town" problems that have hit many other small communities disrupted by large mining operations.

Transportation, § 5.2.10.

45 Again, despite the claims that the DEIS would quantify issues, there is absolutely no discussion here of how many sizable trucks will be moving from the mine site to the railservice at McKay. Anyone who has lived around, or talked to those who live around, mining operations will confirm that heavy truck operations on small country roads, or even two lane highways, is of major concern.

Socio-economic - General Remarks

46 While the DEIS has discussed some socio-economic impacts from the mining operation, it does little or nothing to discuss the environmental impacts of the population growth in the Challis area. For instance, we are told the water usage will increase--but little more. We are told that a new sewage treatment plant may become necessary--but little more. We are told that more houses will be built--but little about the environmental effects of that construction. According to CEQ regulations, an EIS must consider indirect effects of a project. 40 C.F.R. §1502.16(b). "Indirect effects"

X-40 See Response N-31.

X-41 The text of the EIS has been clarified to qualify this statement. There will be short-term, local effects due to the construction work force. The major impact areas are expected to be in law enforcement related to normal social behavior of construction workers. Further details regarding the construction camp and policies affecting construction personnel are contained in the Housing Section of the Technical Memorandum on Socioeconomics (VTN 1980 SE).

X-42 See Responses U-2 through U-7.

X-43 The water requirement for the housing development is expected to be 50 gallons per minute. Wells have been drilled and tested on the west side of Challis near the proposed development. The best well produced close to 100 gallons per minute. Also see Response C-2.

X-44 The EIS does not state that it is anticipated that "everything will work out all right." The EIS addresses the need for public financing.

"Boom town" conditions result when population growth occurs so rapidly that existing institutions and infrastructure cannot accommodate the increased needs for facilities and services. Several actions initiated by Cyprus Mines and the City of Challis will act to alleviate the potential for such occurrences. Cyprus Mines has made large land acquisitions adjacent to Challis. These lands are planned for housing/commercial development in accordance with local growth management policies such that speculative developments will not be able to surround the town. Local planning agencies have developed new zoning laws and annexation ordinances with appropriate environmental controls and infrastructure support to facilitate orderly growth.

The City of Challis, with assistance from Cyprus Mines, is planning for capital improvements to service the new demand, and has required an "average cost of service" of $2,500 for each of the projected new dwelling units. These costs assumed no Federal or state assistance and were incorporated into the Cyprus Mines' subdivision annexation agreement and into an ordinance of general application for any development requiring public services.

To help ensure adequate educational facilities, Cyprus Mines has arranged for more than $1 million in tax prepayment and other monies to support a school construction program. This will include the addition of 12 classrooms and other facilities to the elementary school and will be adequate to meet the projected school enrollment needs.

46 are defined to include "growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." 40 C.F.R. §1508.8(b).

We appreciate the opportunity to comment on this DEIS.

Very truly yours,

Terence L. Thatcher

TLT:eeh

Extensive planning efforts should enable Challis to grow in response to the mining activity without exhibiting the typical adverse "boom town" characteristics which frequently accompany such rapid growth. These planning efforts include:

1) Early provision for capital improvement funds;
2) New zoning and subdivision ordinances for both the city and county;
3) Developer-sponsored housing and business construction programs;
4) Control of developable land, surrounding the Challis area and close coordination between developer and the community.

These and other actions and programs have enabled Challis to pre-plan for the inevitable impacts resulting from development of the project. Also see Section 4.5.9 of the EIS.

X-45 The EIS has been revised to include an expanded discussion of traffic impacts. Also see Response D-1.

X-46 The population, housing, school and community effects discussed in the EIS include both direct and indirect effects. These are included in Section 5.2.9. Also see Responses to Letter C. Related effects on air and water are discussed in Responses N-4 and X-43.

LETTER Y

Idaho Environmental Council

Box 8264

Pocatello, Idaho 83209
September 6, 1980

Jack E. Bills, forest supervisor
Challis National Forest
Challis, Idaho 83467

The following are comments regarding the DEIS for the Thompson Creek molybdenum project.

After extensive discussions with numerous persons related to the project, such as Charles McLean and Jeffrey Thatcher of Denver Research Group, Inc., William Wrobel of VTN, Jerry Tucker of the Challis Outdoor Recreation Project, and Gordon Reid of the Challis National Forest, I have reached the conclusion that the mine project is well-planned and that Standard Oil of Indiana has put a great deal of effort into making it so.

The problems regarding the project lie principally with the DEIS rather than the mine plan itself. I believe the points which I will later outline are of great importance because this is among the first major DEIS's to be written under the new NEPA Forest Service guidelines.

1 The Thompson Creek DEIS does not offer a reasonable range of alternatives as required by FSM 1950.2.8, 1951.3, 1951.6, and 1951.8.

The DEIS, in all alternatives except "no action," assumes maximum production of the mine. The alternatives offered are only variations of the mine plan itself, consequently we have a DEIS which assumes all or nothing and offers no middle range of activity. If the lead agency does not think alternatives based on lower production levels are reasonable due to economics or existing laws (1872 mining act) then this should be stated either in the DEIS section which deals with the development of criteria (FSM 1951.3.2) or in the discussion of the alternative itself.

The narrow range of alternatives is not in compliance with FSM 1951.6 which states, "The range of alternative must be broad enough to respond to major issues, concerns and opportunities." Since socioeconomic impacts have been one, or perhaps the, principal concern all along, it seems very strange not to address an alternative which would mitigate these impacts--i.e. smaller, more long-term mine production schedule.

2 The no action alternative is not seriously addressed in the DEIS. One suspects that it is included only as a matter of form, thereby to comply with the letter but not the spirit of NEPA. In FSM 1951.6 it is stated, "Care should be taken to insure that the range of alternatives does not prematurely foreclose options which might enhance environmental quality or have fewer detrimental effects." The very biased discussion of the no action alternative indeed prematurely forecloses this option. No where in the discussion of the no action alternative are the positive impacts of this alternative addressed. In addition, the narrow range of alternatives offered also prematurely forecloses less drastic actions--again such as a smaller, more long-term mine production schedule.

(more)

RESPONSE TO LETTER Y

Y-1 The EIS has been expanded to discuss this alternative (see Section 4.3.1.1).

Y-2 See Response No. 1 at the beginning of this Appendix.

Again, the narrow range of alternatives offered and the failure to seriously address the "no action" alternative would seem to prevent a good basis on which to evaluate alternatives as required under FSM 1951.8. The concerns of current and future outputs, cost and physical, biological, economic and social changes for each alternative become somewhat of a five-finger exercise if there is nothing to compare them to.

3 The DEIS is not an impartial analysis of reasonable alternatives as required by FSM 1950.3.6. In some ways the DEIS reads more like a public relations document for the Thompson Creek project than a dispassionate discussion of it. There is no real measure of the scope of the project. No where is it mentioned that the tailings embankment is a mammoth structure (bigger than the Teton and Grand Coulee dams) or that the mine output is greater than any single operation in the whole state. No where is it acknowledged that the numbers of primary and secondary personel which will settle in the area will fundamentally alter the character of central Idaho, nor is it mentioned, as indicated it should by FSM 1050.5* , that a project of similar scope in personel is in the planning stages by Noranda near Salmon. With the Thompson Creek and Noranda mines combined, we're looking at perhaps 4,000 persons settling in the central Idaho area in the next few years. To understate this impact by not looking at it within the context of the region or state, a priori makes the DEIS biased in favor of the mine. Although this may not be the intent of the DEIS, in effect it amounts to withholding evidence to allow a more favorable verdict.

4 Again, when addressing the "no action" alternative, none of the beneficial impacts of this alternative are delineated. Among these positive impacts (or maintaining the status quo) are: 1. no threat of a boom and bust economy, 2. no increased demand on local and regional services such as electrical power, schools, law enforcement, streets, sewage disposal, and transportation, 3. no environmental degradation, 4. no increased cost of living for those who could least afford it such as the aged and others on fixed incomes, those with no job skills, those who might lose their homes due to increased property taxes--in sum those at the bottom of the economic heap who might very well suffer, not benefit, from the mine, 5. no increased human pressure on natural resources, 6. no increased management costs to the lead and secondary agencies, 7. preservation of the rural way of life, and 8. less human pressure on surrounding recreation and wilderness areas such as the Sawtooth NPA or the River of No Return Wilderness.

5 In the DEIS summary of Environmental Effects, it is assumed that local reaction to the "no action" alternative would be negative in all cases. This is assumed in spite of studies done by the Challis Outdoor Recreation Project which show that not all locals are in favor of the project. This fact is never registered in the DEIS. The mention that there would be no land use plan without the mine is really fatuous since the county still hasn't adopted one, and likely won't in the immediate future--mine or no mine.

(more)

* In FSM 1950.5--Definitions--under *Significantly:* (a) Context, it states, "This means that the significance of an action must be analyzed in several contexts such as society as a whole..., the affected region, the affected interests, and the locality."

Y-3 The tailings embankment, including its size, has been described in Appendix B. The impacts of the increased number of people have been described in Chapter 5.0. Cumulative impacts of other mining projects in Custer County were discussed in Section 5.2.9.10. The Scoping Document for this project delineated the geographical area to be analyzed for indirect effects; this was the "...Stanley, Challis, Ellis area."

Y-4 The circumstance that a potential impact will not occur because a project will not be implemented is not a beneficial impact of a "no project" alternative. The absence of an occurrence cannot be compared or weighted against tangible, realistic factors. A proper comparison addresses conditions that would occur if the project is not implemented versus conditions expected if the project is implemented. Use of negative logic is not valid for a comparison of reasonable alternatives.

Y-5 The EIS does not assume local reaction to the "no action" alternative would be negative in all cases. The EIS states that No Action "...could create adverse attitudes within the community toward those associated with the project." The EIS in Chapters 2.0 and 5.0 presents both favorable and unfavorable community attitudes toward the project.

Idaho Environmental Council, p 3

Another serious failing of the DEIS is the exclusion of any economic considerations. In FSM 1951.5--*Situation Assessment*. it states, "Situation assessment is a means of translating collected data and information into an understanding of the current and expected future conditions related to the issues and concerns. This may include assessment of supply and demand relationships and other relevant physical, biological, economic and social factors. Assumptions and other methhods used in the analysis should be recorded for subsequent use in the EA or EIS."

6 The Situation Assessment in the Thompson Creek DEIS does indeed assume that Standard Oil of Indiana will be able to guarantee itself 19 percent of the world market in molybdenum. No where is this assumption substantiated. Since this assumption cannot be substantiated, then it becomes an uncertainty. Since it is an uncertainty, then FSM 1951.7 would seem to apply. In this case, to quote, "the information relevant to adverse impacts is important to the decision and the means to obtain it are not known***the agency shall weigh the need for the action against the risks and severity of possible adverse impacts were the action to proceed in the fact of uncertainity. If the agency proceeds, it shall include a worst-case analysis and an indication of probability or improbability of its occurrence..." There is no worst-case analysis of what would happen should Standard Oil of Indiana not be able to achieve its "balanced marketing plan." This is a major oversight.

7 Whether or not Standard Oil of Indiana can achieve a balanced marketing plan is extremely relevant in terms of economic and social factors. No consideration of competitor operations is given. Since Standard Oil is understandably reluctant to publically reveal its marketing plan, then the only option seems to be to operate under the worst-case analysis.

8 In general, the DEIS is a narrow site-specific analysis which does not take into consideration that the Salmon River, the Sawtooth NRA, and other areas which would be effected by increased population are certainly national, not local, resources. Whether or not the state of Idaho has the laws and resources to properly monitor the mine operation is not considered. The amounts and kinds of federal aid needed to prepare the Challis area for the mine are not mentioned. The benefits to the state in terms of tax revenues are not mentioned. The impacts of the mine--demands related to increased population--are not presented in proportion to their significance. The fact that the aquisition of power

9 from the BPA is a major problem is not mentioned. Will Standard Oil be coming to Idaho Power to ask for a coal fired plant? Will it come to the IPUC to lobby for a dam site on the Salmon River? If it can't get BPA power, where will it come from? Again, this is not a local, but a regional impact.

10 While the IEC is not in favor of the kind of massive and confused report such as that done under RARE II, the Thompson Creek project goes too far the other way by including too little data and operating under too narrow an estimation of impacts. The various mine plans are probably of more interest to the company than they are to the public since the results to the public under each are much the same. Less attention should be paid to these in the final EIS and more space devoted to socioeconomic impacts.

(more)

Y-6 See Response No. 2 at the beginning of this appendix and Response K-3.

Y-7 Refer to Response No. 2 at the beginning of this Appendix. Competitor operations were considered in the market analysis.

Y-8 Comments noted. Also, see new Section 4.7 on Regulatory Responsibilities. Federal and tax revenues are discussed in the EIS. Also see Response X-44. The Forest Service and BLM believe the impacts related to increased population are presented in proportion to their significance.

Y-9 See Responses U-2 to U-7 regarding electric power.

The IEC does appreciate the efforts of the company to enlighten us as to its plans. We also appreciate the fact that the Challis National Forest is operating under new, and consequently untested, regulations. However, we do believe that our two principal criticisms of the DEIS are serious enough that they must be redressed in the final EIS.

Sincerely,

Jackie Johnson Maughan

Jackie Johnson Maughan,
board of directors, IEC

LETTER Y-1

Jackie Johnson Maughan,
board of directors,
Idaho Environmental Council
Box P264
Pocatello, Idaho 83209

Jack Bills, supervisor
Challis National Forest
Challis, Idaho 83226

To Jack Bills:

I noticed two points in the Idaho Environmental Council's comments on the Thompson Creek DEIS which I would like to clarify.

One concerns the 1872 General Mining Law in which I said the reasons for dismissing the "no action" alternative, such as provisions of the 1872 Mining Law, should be addressed in the discussion of the alternative. I noticed that this point is addressed in the discussion of the alternative. However, I do think it needs further clarification and discussion with specific quotes from the germane clauses of the law itself. This is especially important as there seems to be some question as to just how much the law prevents Forest Service discretion regarding management of lands on which there are mining claims. 10

The second point is similar to the first. In the IEC comments I said that the DEIS did not delineate tax benefits to state and local government. This is an error on my part, as I later discovered, since these were mentioned in the DEIS.

Please include this letter with the IEC comments.

Jackie Johnson Maughan

Jackie Johnson Maughan

Y-10 See Response No. 1 at the beginning of this Appendix.

LETTER Z

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to: SJ

SEP 8 - 1980

Mr. Jack E. Bills, Forest Supervisor
Challis National Forest
USDA, Forest Service
Challis, Idaho 83226

Dear Mr. Bills:

Thank you for providing us with copies of the draft environmental impact statement (EIS) on the proposed Thompson Creek Molybdenum Project in Custer County, Idaho. We have reviewed sections pertaining to electric utilities, population, employment, and related economic impacts of the proposed project and offer the following specific comments for consideration:

1 Page S-3, first paragraph: The total shown for annual output of molybdenum disulfide differs from the production detail shown in appendix B-1.

Pages 1-2 and 4-2: We suggest a change in wording to indicate more clearly that the annual production total of 15-20 million pounds represents the molybdenum content of the molybdenum disulfide concentrate.

Page 1-7: The export value total should be reviewed. The U.S. Bureau of Mines molybdenum export total and value per pound of contained molybdenum for 1979 indicates an export value figure considerably less than the $1 billion shown.

2 Page 2-43: The Custer County population projections need clarification to show that the Idaho State population totals do not take into account the Cyprus Mines employment-population growth to the year 2000.

3 Page 5-22: From Bonneville Power Administration (BPA) sales records, it appears that the total shown for Salmon River Electric Cooperative is that for 1978 rather than 1979 as shown. BPA sales to Salmon River Electric Cooperative in calendar year 1979 totaled 40,259,000 kWh.

RESPONSE TO LETTER Z

Z-1 Appropriate changes have been made to the text.

Z-2 The information presented in Chapter 2.0 describes the existing environment for all disciplines prior to project-related activity. The population projections presented in the text show a total county-wide increase of 1,181 persons from 1978 to the year 2000. Consideration of this increase over the time specified indicates that it is too small to have included growth induced by the Thompson Creek project.

Z-3 SREC sales to consumers in 1979 were 36,000,000 kwh. SREC purchases from BPA were 40,261,200 kwh. The diffrence between the figures is represented by line losses.

4 Pages 5-33 and 6-5: The annual production totals for molybdenum disulfide shown in the text on these pages should be rechecked with the production detail shown in appendix table B-1.

The project will significantly add to the loads of the Salmon River Electric Cooperative, whose contract with BPA expires in August 1983. Cyprus mines will require 30 MW of new load which will increase total electrical consumption of the SREC service area approximately sixfold with a 45 percent increase in residential loads (page 5-22).

5 In regard to electrical service to the proposed mine, BPA's involvement was not specifically defined at the time your draft EIS was prepared. BPA has recently accepted responsibility for the proposed 230-kV transmission line between BPA's Lost River Substation and a new substation to be located near Challis, Idaho, referred to as Round Butte Substation. We have provided a description of BPA's proposed action to the Bureau of Land Management (BLM) for inclusion within their environmental assessment (EA). We will continue to work with BLM's Salmon District to assure that the EA describing their transmission system proposal will include adequate discussion of the environmental impacts of BPA's proposed action.

Sincerely,

John E. Kiley
Environmental Manager

LETTER AA

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

Reply to:

Lake Plaza South, Suite 616
44 Union Boulevard
Lakewood, CO 80228

September 8, 1980

Mr. Jack E. Bills
Forest Supervisor
Forest Service
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

Thank you for your request of July 21, 1980, for comments on the draft environmental statement (DES) for the proposed Thompson Creek Molybdenum Project. Pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969 and the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800), we have determined that your DES mentions properties of cultural and/or historical significance; however, we need more information in order to evaluate the effects of the undertaking on these resources. Please furnish additional data indicating:

Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320).

The environmental statement must demonstrate that either of the following conditions exists:

1. No properties included in or that may be eligible for inclusion in the National Register of Historic Places are located within the area of environmental impact, and the undertaking will not affect any such property. In making this determination, the Council requires:

--evidence that you have consulted the latest edition of the National Register (Federal Register, March 18, 1980, and its monthly supplements);

--evidence of an effort to ensure the identification of properties eligible for inclusion in the National Register, including evidence of contact with the State Historic Preservation Officer, whose comments should be included in the final environmental statement. The SHPO for Idaho is Dr. Merle W. Wells.

2. Properties included in or that may be eligible for inclusion in the National Register are located within the area of environmental impact, and

RESPONSE TO LETTER AA

AA-1 Compliance with Section 106 of the National Historic Preservation Act will be ensured by the U.S. Forest Service, Zone Archaeologist, Boise National Forest, Boise, Idaho. The SHPO and ACHP will be consulted as appropriate. Also refer to Response F-1.

1 the undertaking will or will not affect any such property. In cases where there will be an effect, the final environmental statement should contain evidence of compliance with Section 106 of the National Historic Preservation Act through the Council's regulations (36 CFR Part 800).

If you have any questions, please call Ms. Marjorie Ingle at (303) 234-4946, an FTS number.

Sincerely,

Louis S. Wall
Chief, Western Division
of Project Review

LETTER BB

United States Department of the Interior

OFFICE OF THE SECRETARY

PACIFIC NORTHWEST REGION

500 N.E. Multnomah Street, Suite 1692, Portland, Oregon 97232

September 11, 1980

ER-80/821

Mr. Jack E. Bills
Forest Supervisor
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

Thank you for the opportunity to review and comment on the draft environmental impact statement for the Thompson Creek Molybdenum Project, Custer County, Idaho.

General Comments:

1 The proposed project site is located in an undeveloped scenic area close to the Sawtooth Mountains, an area renowned for its scenic and recreation values. The project will result in a large open pit and several small fills from waste and tailings. One long term impact, extending well beyond the project life, will be a visual impact, yet the draft EIS provides no concept of the probable residual impact following reclamation. The inclusion of oblique aerial photographs, with artist's renditions of expected landscape alterations, would be helpful in understanding this visual impact and is recommended for the final EIS.

2 In the discussion of mitigation measures (Chapter 4 and Appendix C), the final statement should describe how and to what extent fills from waste and tailings will be shaped to achieve a natural appearance. It also should describe the expected future results of erosion on these fills, which will be a factor if the fills block natural drainage patterns.

3 The statement should more adequately assess ground-water impacts and the possibility of local ground water/surface water interrelationships (p. 5-4, 2-7, 2-8, and 5-8). The discussion should include the most pertinent results of the aquifer test(s) in the water-supply area, especially drawdown and specific capacity after a given period of pumping and calculated values for the coefficients of transmissivity and storage. The length of the test(s) should be stated; large variations in discharge rate, if any, should be discussed; and indications of recharge effects or impermeable boundary effects, if any, should be included. A typical time-drawdown graph would aid greatly in impact assessment. Characteristics of the aquifer(s) tested should be given.

RESPONSE TO LETTER BB

BB-1 As noted in Section 5.2.11, the mountainous terrain surrounding the project blocks the lines of sight from nearby areas. Because of this, artists' renderings are not considered necessary. The description presented in the EIS adequately addresses aesthetic impacts. Oblique aerial photos are on file at the Challis National Forest.

BB-2 The face of the dumps will resemble natural talus slopes. Pockets of vegetation will be established on the faces where possible. Surfaces will be shaped to correspond with the natural terrain, covered with topsoil and revegetated.

Little, if any erosion is expected to occur from the dumps. The faces will be coarsely fractured rock. Drains made of large rocks will allow water to move through the base of the dumps without causing erosion. A rock toe dam will be constructed at the final base of the tailings embankment. Any erosion from the face of the embankment will be trapped behind the toe dam.

BB-3 This specific information related to aquifer tests is not necessary to an understanding of ground water impacts and therefore was not presented in the EIS. This information is on file at the Challis National Forest.

4 The statement should also evaluate more adequately the possibility of effects of mine pit dewatering and abandonment. It is indicated that the mine pit will extend at least 1,000 feet below the top of the zone of saturation (p. 2-8, 5-5). The extent and magnitude of the effects of lowering the water level and maintaining it below the mine pit should be assessed on the basis of test results. Since it is anticipated that the mine pit will fill with water after the completion of the project (p. C-3), the statement should assess the possibility of beneficial and/or adverse effects on ground-water resources from the development and existence of the resultant deep lake.

5 Clarification of capital recovery and inflation factors used in cost estimates, such as those given in Tables 5.3-1, 5.3-2, and those in the text on page 6-1, would be helpful. One can only assume (1) that estimates of annual operating costs do not include recovery (amortization) of capital, (2) that inflation has been factored into all capital estimates and, (3) inflation is only factored into annual costs through the first operating year. These points should be clarified.

6 The levels at which impacts may become significant must be identified prior to implementation of the project. Without these specific determinations for each of the monitored variables, the monitoring program would be of little value with respect to protecting aquatic and terrestrial values and resources. In certain cases EPA criteria for water quality would suffice; however for sedimentation, a physical and biological assessment of the pre-project condition of the various drainages is required. We strongly urge the Forest Service to implement, in coordination with the BLM, Idaho Fish and Game, and the U.S. Fish and Wildlife Service a pre-project survey of physical and biological stream conditions to establish a needed baseline of information from which sedimentation impacts on aquatic communities can be measured.

7 During such a pre-project survey and the proposed monitoring, an interagency task force should be formed to oversee and review program results. Monitoring of benthic populations may have to be intensified to enhance method sensitivity and affect a useful monitoring program. Flexibility of design will be needed to accommodate a functional monitoring program. Also, the final EIS and Record of Decision should address the monitoring program in sufficient detail to achieve regulation after project implementation.

Specific Comments:

8 Page 4-3. We are concerned that fine particle, native tailing materials will be used in construction of the tailings pond embankment. The monitoring program must be sufficiently intensive to detect sedimentation from construction of the embankment and any erosion of the structure prior to stabilization. A level of "significant sedimentation" must be determined prior to construction.

9 Page 4-27. We believe that returning ground or surface water to the impoundment would not sufficiently treat a water quality problem. EPA water quality standards should be strictly enforced.

BB-4 The effects of mine pit dewatering are addressed in the EIS and are discussed in more detail in the Technical Memorandum (VTN 1980 SGWH). The creation of a lake in the mine pit should not affect ground water resources. A small but insignificant amount of surface water from Pat Hughes and Buckskin Creeks may be lost to ground water recharge. Thompson Creek would not be affected.

BB-5 The estimates of annual operating costs do not include depreciation. Inflation has not been factored into capital estimates. All costs are in 1979-80 dollars.

BB-6 Section 4.6 of the EIS has been revised to address this topic.

BB-7 The water quality and macroinvertebrate monitoring program was established by an interagency committee composed of the Forest Service, BLM, Idaho Department of Fish & Game, and Idaho Department of Health and Welfare (Division of Environment, Bureau of Water Quality). This committee will oversee and review the program. Compliance checking will be done by the Bureau of Water Quality with assistance from the Forest Service. This interagency effort will be expanded to include other areas of monitoring.

BB-8 Section 4.6 of the EIS has been revised to address this topic.

BB-9 State water quality standards and EPA effluent limitations will be adhered to. Effluents will be treated, as appropriate, prior to discharge.

10 Pages 4-32 and 5-12. "Significant sedimentation" processes must be identified prior to construction. We are encouraged by the statement in the DEIS that, "...construction activities will cease until remedial actions are taken to prevent further sedimentation...". The monitoring program must be sufficiently intensive to detect a problem before excessive environmental damage occurs.

11 Page 5-2. A discussion of adverse impacts on benthos populations and on fish via decrease in allochthonous and autochthonous food sources would add dimensionally to the "Aquatic Ecology" section in the final document.

12 Pages 6-1 and S-7. The asterisks in the text preceding the $267.2 million "mining and other costs" given are confusing because they relate to both annual costs and one-time capital cost; those associated with "annual operating costs" should be eliminated.

13 Page B-6. The "Remarks" column of Table B-3 should be checked against the "Equipment" column of same table. The first two remarks should be lowered on that page to align with the proper equipment.

Sincerely yours,

Charles S. Polityka

Charles S. Polityka
Regional Environmental Officer

BB-10 Comment noted.

BB-11 Neither allochthonous nor autochthonous production was measured in any of the drainages, thus it is not possible to quantify the impacts of its loss. However, the low or no flow of the tributaries to Thompson Creek that will be affected by the project suggests that no measurable impact will occur.

The Bruno Creek drainage provides only about 5% of the flow to Squaw Creek and is not expected to produce an amount of allochthonous or autochthonous material that would measurably affect fisheries resources.

BB-12 The "mining and other costs" relate only to capital costs.

BB-13 The change has been made.

E.C.I.P.D.A.

EAST-CENTRAL IDAHO PLANNING AND DEVELOPMENT ASSOCIATION, INC.
12 NORTH CENTER • REXBURG, IDAHO 83440
P.O. BOX 351 • 356-4524

August 4, 1980

State Clearinghouse
Division of Budget, Policy
Planning and Coordination
Statehouse
Boise, Idaho 83720

RE: DEIS on Thompson Creek Molybdenum Project

SAI# 00704568

Applicant Agency: USDA Forest Service

List of Reviewers: Delwyn Berrett - ECIPDA

List of Respondents: None

ECIPDA Findings:

Affirmative Findings

Negative Findings/Needs Attention

ECIPDA Comments:

No comments

Thank you.

Sincerely,

Gary Jeppson
Executive Director

STATE OF IDAHO

DEPARTMENT OF HEALTH AND WELFARE

DIVISION OF ENVIRONMENT
636 Pershing
Pocatello, Idaho
83201

6 August 1980

State Clearinghouse
Division of Budget, Policy Planning
and Coordination
Statehouse
Boise, Idaho 83720

Re: A-95 Logs Dated July 7, 10,11, 17, 22

Gentlemen:

We have reviewed the subject A-95 Logs and have the following comments for your consideration.

SAI #00680696: Heritage Estates Subdivision, Rexburg (Madison County) - Please refer to our comments dated 12 July 1978. A copy is attached for your information.

#00704531: National Wildlife Refuge Master Planning Process, Gray's Lake National Refuge (Bonneville County) - No comment.

#00704532: Eastern Idaho Community Food/Nutrition Program, Idaho Falls (Bonneville and Jefferson Counties) - No comment.

#00704568: USDA Forest Service, Thompson Creek Moly Project, Challis (Custer County) - The Division's comments will be submitted from the administrative office in Boise.

#00704573: Mackay Street Improvment Project (Custer County) - We concur for the need of the project.

#00704579: Westside Interceptor Sewer, Idaho Falls (Bonneville County) - We concur for the need of the project.

#00704631: American Falls Water System Improvement (Power County) - Title 39-118, Idaho Code, requires that plans and specifications for new/modified public water facilities be approved by the Department prior to construction.

#00704634: Ucon Sewer System Design & Construction (Bonneville County) - We concur for the need of the project.

›h V. Evans, *Governor*
amel T. Emborg, *Administrator*

State Capitol Building
Boise, Idaho 83720

DIVISION OF ECONOMIC AND COMMUNITY AFFAIRS

August 12, 1980

Mr. Jack E. Bills, Forest Supervisor
USDA Forest Service
Challis National Forest
Challis, ID 83226

Dear Mr. Bills:

The Idaho State Clearinghouse has completed its review process of your Draft Environmental Impact Statement on the Thompson Creek Molybdenum Project in Custer County, SAI# 00704568.

We distributed copies of the DEIS to the following agencies for their review and comment:

East-Central Idaho Planning and Development Association
Idaho Division of Financial Management
Idaho Division of Economic and Community Affairs
Idaho Department of Fish and Game
Idaho Department of Lands
Idaho Department of Health & Welfare/Division of Environment

No comments were received from any of the above mentioned agencies; however, they may have submitted comments directly to you. The Department of Fish and Game has comments forthcoming.

Thank you for letting us take part in the review of this document. If you have any questions, please call us.

Sincerely,

Holly Holmes for

Gloria Mabbutt, Coordinator
Idaho State Clearinghouse

GM:hh

Enclosures

IDAHO
A Land For All Seasons

August 25, 1980

Forest Supervisor
Challis National Forest
Challis, ID 83226

Dear Sir or Madam:

This letter is to request a copy of the Draft EIS re: Cyprus Mine/Thompson Creek Open Pit Molydenum Mine.

Additionally, I would like to express my opposition to the proposed open pit mining. The adverse environmental impacts upon aquatic life and in particular Salmon and Cutthroat Trout should necessitate rejection of such activities in this area.

Aside from the adverse impacts which will admittedly occur from seepage and runoff to aquatic life, deer and elk migration routes will be irretrievably altered. The impact of increased populations, road, noise and continuous mining activity can only further deplete wildlife populations. As a citizen of the State of Idaho, I would hope for once that the Forest Service and the Bureau of Land Management will oppose such offensive and repugnant activities in our National Forests.

Very truly yours,

Charles Sheroke

Charles Sheroke
Attorney at Law
1621 Lost Avenue
Coeur d'Alene, ID 83814

CS/pds

RECEIVED
Challis National Forest
Challis, Idaho
AUG 27 '80

NOTED ACTION
FS
AS
RC
SC
PLANNER
CONT-SPE
AA-PMS
AA-BF/R
ENG-SD
ENG-CM
RANGE
TM
R&I
FIRE
VC
PC
PA
P/C for
DFA's

LETTER GG

STATE OF IDAHO

DEPARTMENT OF HEALTH
AND WELFARE

DIVISION OF ENVIRONMENT
Statehouse
Boise, Idaho 83720

August 29, 1980

Mr. Jack E. Bills, Forest Supervisor
USDA, Forest Service
Challis National Forest
Challis, Idaho 83226

Dear Supervisor Bills:

The Division of Environment, Idaho Department of Health and Welfare, has reviewed the draft EIS *Thompson Creek Molybdenum Project, Custer County, Idaho Cyprus Mines Corporation* and wishes to submit the following comments:

1) The draft EIS adequately addresses the myriad potential impacts, particularly with regard to water quality and quantity.

2) With regard to construction or improvement of water supply and especially wastewater treatment facilities serving Challis, flexibility must be considered of prime importance. Systems must be designed to continue proper operation regardless of population fluctuations.

Thank you for the opportunity to comment on this Environmental Impact Statement.

Sincerely,

Lee W. Stokes, Ph.D.
Administrator

LWS/WH/b

LETTER HH

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON 20426

IN REPLY REFER TO:

September 4, 1980

Mr. Jack E. Bills
Forest Supervisor
U. S. Department of Agriculture
Challis National Forest
Challis, Idaho 83226

Dear Mr. Bills:

I am replying to your request of July 8, 1980 to the Federal Energy Regulatory Commission for comments on the Draft Environmental Impact Statement for the Proposed Thompson Creek Molybdenum Project in Idaho. This Draft EIS has been reviewed by appropriate FERC staff components upon whose evaluation this response is based.

This staff concentrates its review of other agencies' environmental impact statements basically on those areas of the electric power, natural gas, and oil pipeline industries for which the Commission has jurisdiction by law, or where staff has special expertise in evaluating environmental impacts involed with the proposed action. It does not appear that there would be any significant impacts in these areas of concern nor serious conflicts with this agency's responsibilities should this action be undertaken.

Thank you for the opportunity to review this statement.

Sincerely,

Jack M. Heinemann
Advisor on Environmental Quality

APPENDIX E

CONSULTATION LETTERS

1. U.S. Fish and Wildlife Service, USDI
   Re: Threatened and Endangered Species

2. Memorandum Re: Survey of Sensitive
   Plant Species

3. Idaho State Archaeologist, State
   Historic Preservation Officer

United States Department of the Interior

FISH AND WILDLIFE SERVICE

AREA OFFICE - IDAHO AND OREGON
4620 OVERLAND ROAD, ROOM 238
BOISE, IDAHO 83705
FTS: 554-1960 / COMM: 208/384-1960

F. S.
RECEIVED
AUG 13 1980
WILDLIFE MANAGEMENT

AUG 11 1980

X = Action
√ = Info

	Director
	Planning
	Habitat Typing
	Aquatic
	Aquatic Planning
	Water Lab
	Administrative
	Terrestrial
	E&T - ABS
	Secretary
	Clerk Steno
	V/L File

Jeff M. Sirmon
Regional Forester
Forest Service
324 25th Street
Ogden, Utah 84401

Dear Mr. Sirmon:

This responds to your request of July 24, 1980, for a list of endangered and threatened species that may be present within the area of the proposed Thompson Creek molybdenum mining operation. To the best of our knowledge, there are no listed or proposed threatened or endangered species within the area of the project. I have attached a list of candidate species for your information. These species are presently being reviewed by this Service for consideration as endangered or threatened. It should be noted that candidate species have no protection under the Endangered Species Act, but are included for your early consideration. It is possible the candidates could become formal proposals and be listed during the construction period, thereby falling within the scope of Section 7 of the Endangered Species Act. For this reason we suggest you consider informal consultation with this office if your project is likely to adversely impact a candidate species.

The National Marine Fisheries Service is conducting status studies to determine the need to list various salmon species of the Columbia River System. You may wish to contact Dale Evans, National Marine Fisheries Service, Environmental and Technical Services Division, P.O. Box 4332, Portland, Oregon 97208, (phone: FTS 429-4301) to determine your responsibilities regarding protecting salmon on the Salmon River near your project.

This fulfills the requirements of the Fish and Wildlife Service pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended. If you have any additional questions regarding your responsibilities under the Act, please contact Jay Gore, Endangered Species Team Leader, at

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this address:

U.S. Fish and Wildlife Service
Endangered Species Team
Boise Area Office
4620 Overland Road
Boise, Idaho 83705
Ph: FTS 554-1806, (208) 334-1806

Your interest in endangered species is appreciated.

Sincerely yours,

L. A. Mehrhoff
Area Manager

Attachment

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE PROPOSED THOMPSON CREEK MOLYBDENUM MINING OPERATION PROJECT IN CUSTER COUNTY, IDAHO NUMBER 1-4-80-SP-130

LISTED

None

PROPOSED

None

CANDIDATE

Physaria alpestris var. *purpurea*

Thelypodium repandum

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

CHALLIS NATIONAL FOREST
Challis, Idaho 83226

REPLY TO: 1920 Land Management Planning

August 20, 1980

SUBJECT: Mining EIS

TO: Forest Supervisor

During the summer of 1980 (June through August), we conducted a survey of sensitive plant species on the Yankee Fork Ranger District. As a part of this survey we intensively examined the areas to be impacted by the development of the Thompson Creek molybdenum open pit mine. This investigation covered lands administered by the Forest Service and Bureau of Land Management.

Based on this survey and existing knowledge of the distribution and habitat of Idaho's rare plants, we believe there are no federally endangered plant species (listed or proposed), or plant species considered rare by the Idaho Rare Plant Technical Committee on the Cyprus mine impact areas.

This survey was conducted under direction and technical supervision of Douglass M. Henderson, Professor of Systematic Botany, Director of Herbarium, University of Idaho. The survey was conducted as part of a cooperative program between the University of Idaho and the Challis National Forest.

Mr. Henderson is also a member of the Idaho Rare Plant Technical Committee.

Steven J. Brunsfeld

Steven J. Brunsfeld
Curator FWR Herbarium
University of Idaho
Member Idaho Rare Plant Technical Committee

Pamela G. Brunsfeld

Pamela G. Brunsfeld
Department of Life Sciences
University of Idaho

IDAHO STATE HISTORICAL SOCIETY
610 NORTH JULIA DAVIS DRIVE BOISE, 83706

October 3, 1980

STATE MUSEUM

Mr. Jack Bills
Supervisor
Challis National Forest
Challis, Idaho

Dear Mr. Bills:

Thank you for consulting with our office concerning the Cypress Mine project on Thompson Creek. The procedures we developed will satisfy federal requirements for the protection of significant cultural properties.

When the cultural resource studies are completed we will comment on the eligibility of archaeological and historic sites, and the effect of the project on these properties.

Sincerely,

Thomas J. Green

Thomas J. Green
State Archaeologist
State Historic Preservation Office