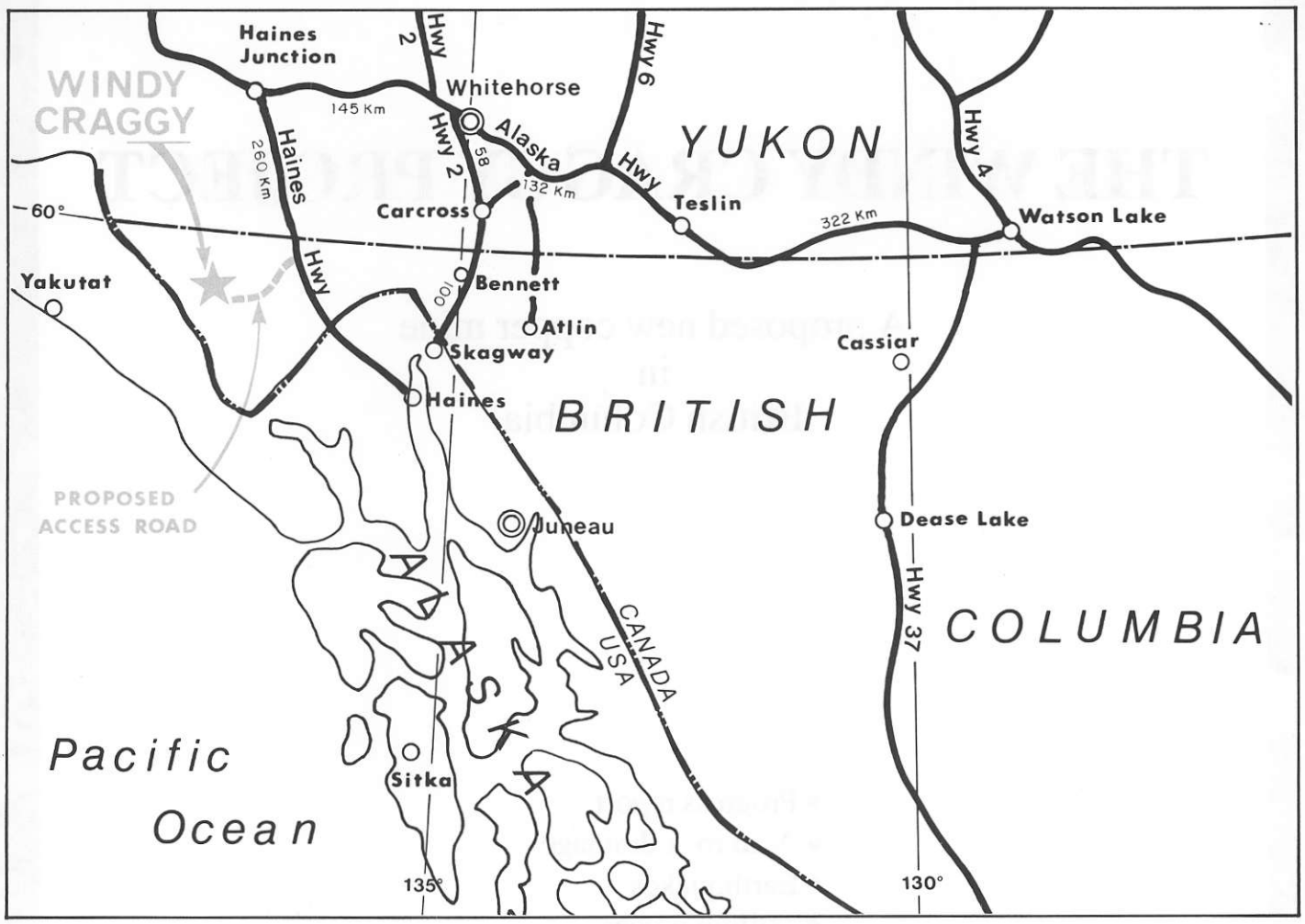
THE WINDY CRAGGY PROJECT

A proposed new copper mine
in
British Columbia

- Progress report
- Acid rock drainage
- Earthquakes
- Milling process
- Questions and answers

Newsletter No. 2

July 1990



Windy Craggy Project

1990 PUBLIC INFORMATION MEETINGS

Location	Date	Attendance* People	Attendance* Other
Whitehorse, Yukon	May 9	150	
Haines Junction, Yukon	May 10	29	
Haines, Alaska	May 14	200	
Haines, Alaska	May 15	80	
Juneau, Alaska	May 15	100	
Anchorage, Alaska	May 16	31	
Smithers, British Columbia	May 22	89	
Prince George, British Columbia	May 23	76	
Kamloops, British Columbia	May 24	84	
Vancouver, British Columbia	May 28	496	2 bears 1 deer 1 tree

*Excluding company, government and media representatives.

THE WINDY CRAGGY PROJECT

Geddes Resources Limited is proposing to develop a major mine on its Windy Craggy property in the northwestern corner of British Columbia. Windy Craggy is a world-scale copper deposit which has the capability of increasing the annual copper production of British Columbia and Canada by 120,000 tonnes, or about 1% of world production, for at least 20 years.

PROGRESS REPORT

In May 1990 public information meetings about the Windy Craggy project were held in nine communities, in British Columbia, Yukon and Alaska. This gave me an opportunity to meet many of the people who are interested in the project and listen to some valuable comments about our proposed development.

In British Columbia, proposals for new mines are subject to the provincial government's Mine Development Review Process. Under this established procedure, the Mine Development Steering Committee reviews a company's application to establish a mine and coordinates reviews of the proposal by other government agencies. In the case of Windy Craggy, these include agencies in Alaska, Yukon and the federal Canadian and U.S. governments.

Representatives of the Mine Development Steering Committee attended the public information meetings. Transcripts of the comments made at the meetings and our responses to these comments have also been delivered to the Steering Committee. The main issues covered are discussed on subsequent pages in this newsletter, our second.

The Stage One Environmental and Socioeconomic Impact Assessment Report on the Windy Craggy project, required at an early stage in the Mine Development Review Process, was submitted to the Mine Development Steering Committee in January 1990. The various government agencies which reviewed the report forwarded their comments on it to the Steering Committee while our public meetings were in progress. A general conclusion was that our proposed techniques for the disposal of waste rock and the prevention of acid rock drainage are not sufficiently proven.

As a result, we are reviewing our mine plan to determine if there are economic alternatives to our original Stage One proposal. Our objectives are to avoid disposing of sulphide rock on glaciers and to identify a disposal system which prevents acid drainage from starting in the first place. We are confident we can engineer such a mine plan and shall submit our findings to the Steering Committee in a Stage One Addendum Report.

At the Windy Craggy site baseline environmental data continue to be recorded. These studies include water sampling, fish counts and climatic measurements and are being carried out on an ongoing basis to ensure continuity of records.

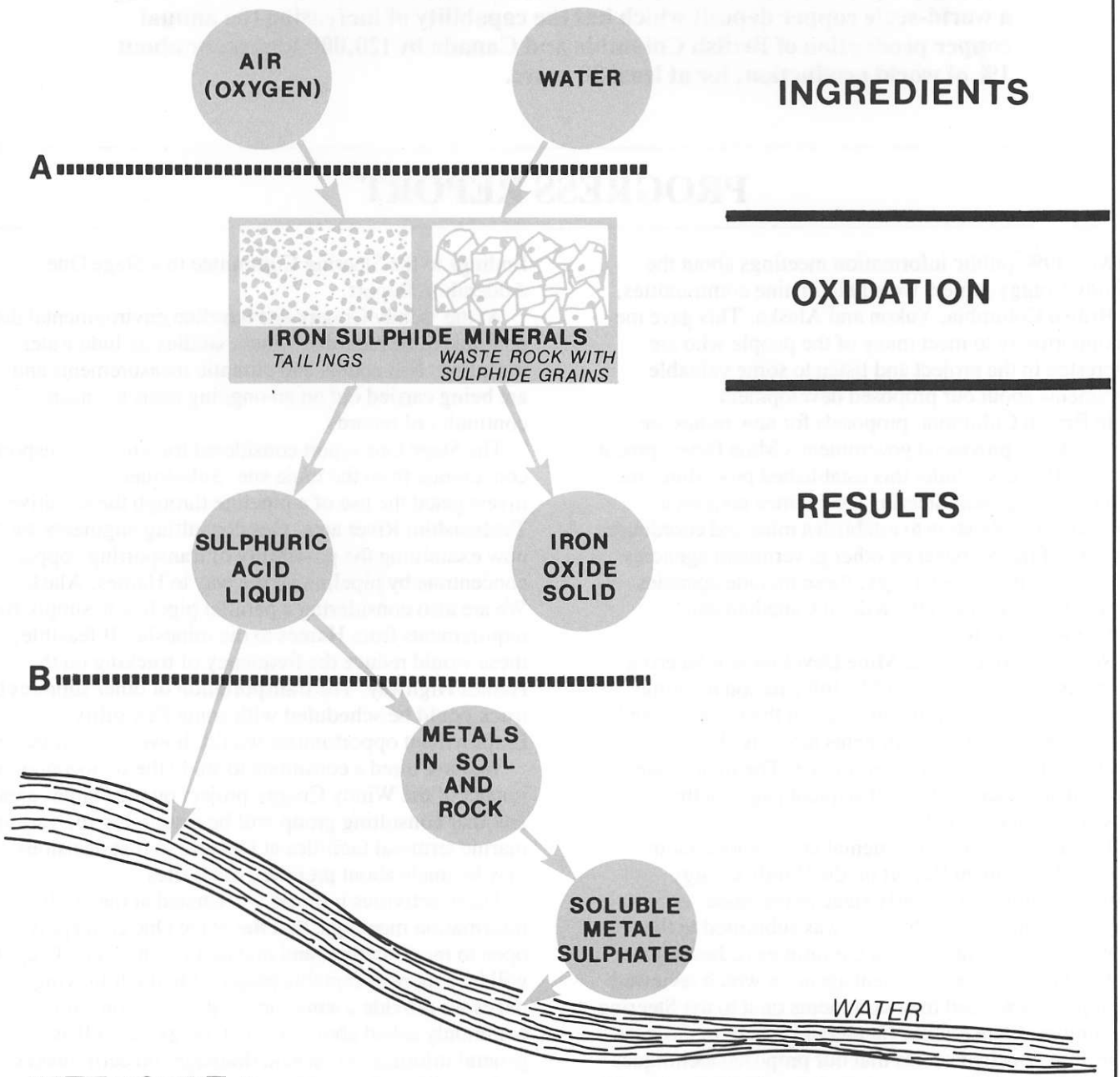
The Stage One report considered trucking to transport concentrate from the mine site. Subsequently, we investigated the use of a pipeline through the sensitive Tatshenshini River area. Our consulting engineers are now examining the possibility of transporting copper concentrate by pipeline all the way to Haines, Alaska. We are also considering a parallel pipeline to supply fuel requirements from Haines to the minesite. If feasible, these would reduce the frequency of trucking on the Haines Highway. The transportation of other supplies by truck could be scheduled with some flexibility. Employment opportunities would, however, be lessened.

We have hired a consultant to study the socioeconomic impact of the Windy Craggy project on the Haines area. Another consulting group will be examining the various marine terminal facilities at Haines, so that decisions may be made about preferred dock sites.

These activities indicate we listened at the public information meetings; that the Stage One concept is open to modification; and that as a result Windy Craggy will be a more acceptable project. On the following pages we provide a summary of the questions most commonly asked about Windy Craggy, as well as general information on acid drainage, on earthquakes and on tailings dams. If you would like further information on other topics, please let us know. If you missed our first newsletter, or if you are not on our mailing list and would like to be, please write or call one of the offices listed on the back page.

Gerald Harper
President and Chief Executive Officer
Geddes Resources Limited

OXIDATION OF SULPHIDE MINERALS
(ACID ROCK DRAINAGE)



INTERCEPT A – By protecting iron sulphide minerals from exposure to air (eg underwater storage) or water (eg impervious cover) oxidation is prevented.

INTERCEPT B – Treatment or buffering of sulphuric acid liquid with lime or carbonate minerals neutralizes liquids and minimizes dissolution of metals.

ACID ROCK DRAINAGE

The natural weathering process by which rocks are broken down to form soil includes chemical decomposition of individual mineral grains when they are exposed to air and water. Pyrite is a very common sulphur-containing mineral which can react with air and water to form iron oxide grains and sulphuric acid. Minerals like lime (calcium carbonate) dissolve to form alkaline solutions.

When these reactions occur at the same rate they neutralize each other and no major changes occur to the quality of water draining from a site. However, if the reactions are out of balance, drainage water may be either acidic or alkaline in character and environmental change may result.

In acidic reactions, normal chemical leaching takes place very slowly. However, the process can be accelerated by excavations which greatly increase rock surface areas with exposed sulphide grains. If the alkaline weathering process can no longer keep pace, then acid drainage results. It should be noted that different sulphides react at different rates and some, such as galena, a lead mineral, don't react at all.

The acid drainage once formed is carried by rain and groundwater into streams, rivers and lakes and has the potential to leach out heavy metals such as zinc, lead and cadmium from the underlying rocks. High concentrations of these metals in solution eventually will affect the reproduction and development of fish, marine organisms and aquatic plants. Land animals also can develop high levels of toxicity from drinking this water.

An urban example of acid rock drainage occurs in Halifax, Nova Scotia, where most of the bedrock contains pyrite. When exposed by building foundations, road cuts or other excavations, acid rock drainage may develop.

In British Columbia, six out of 16 operating metal mines currently experience acid drainage to varying degrees. In order to minimize its impact, the mine operators have devised various waste management

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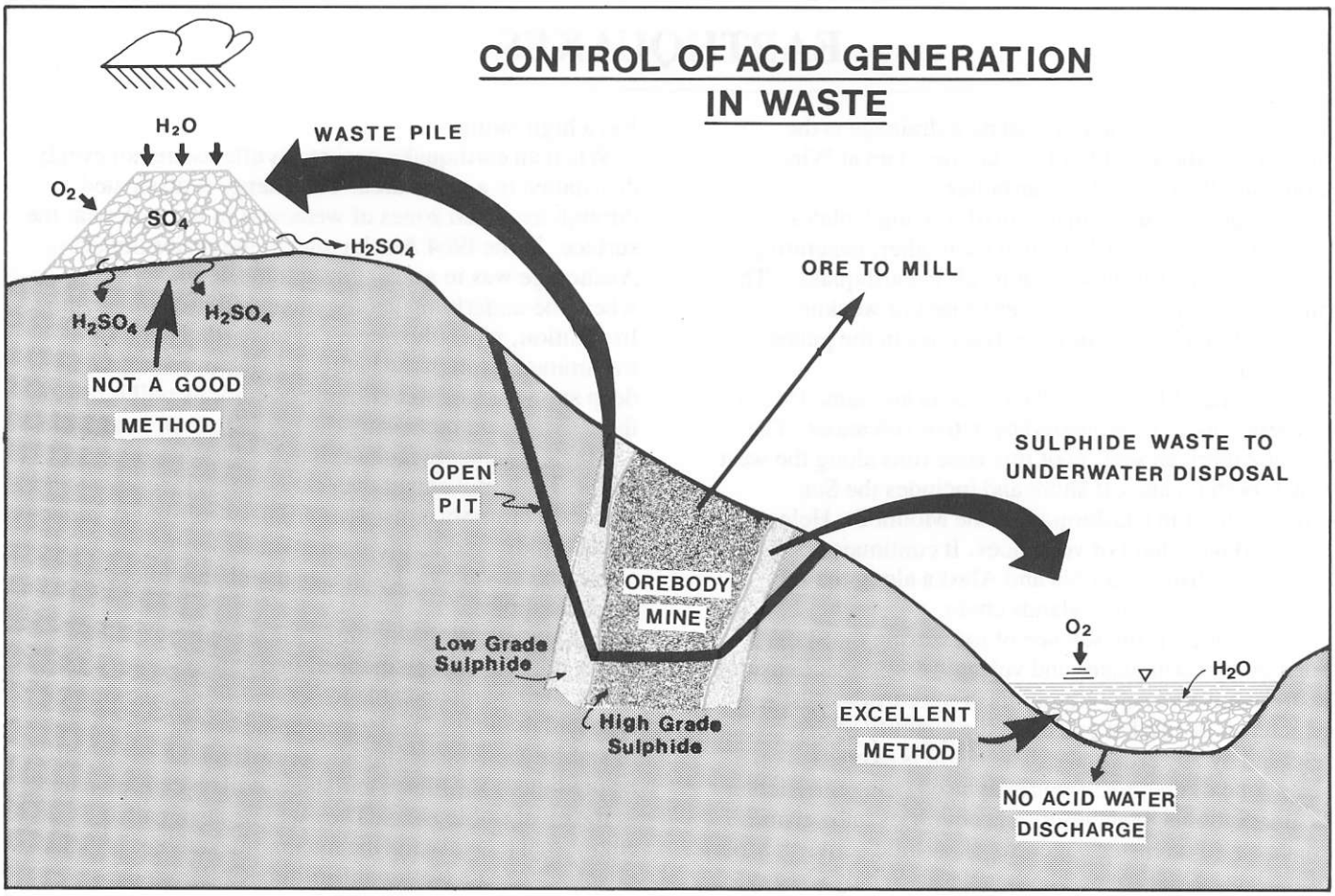
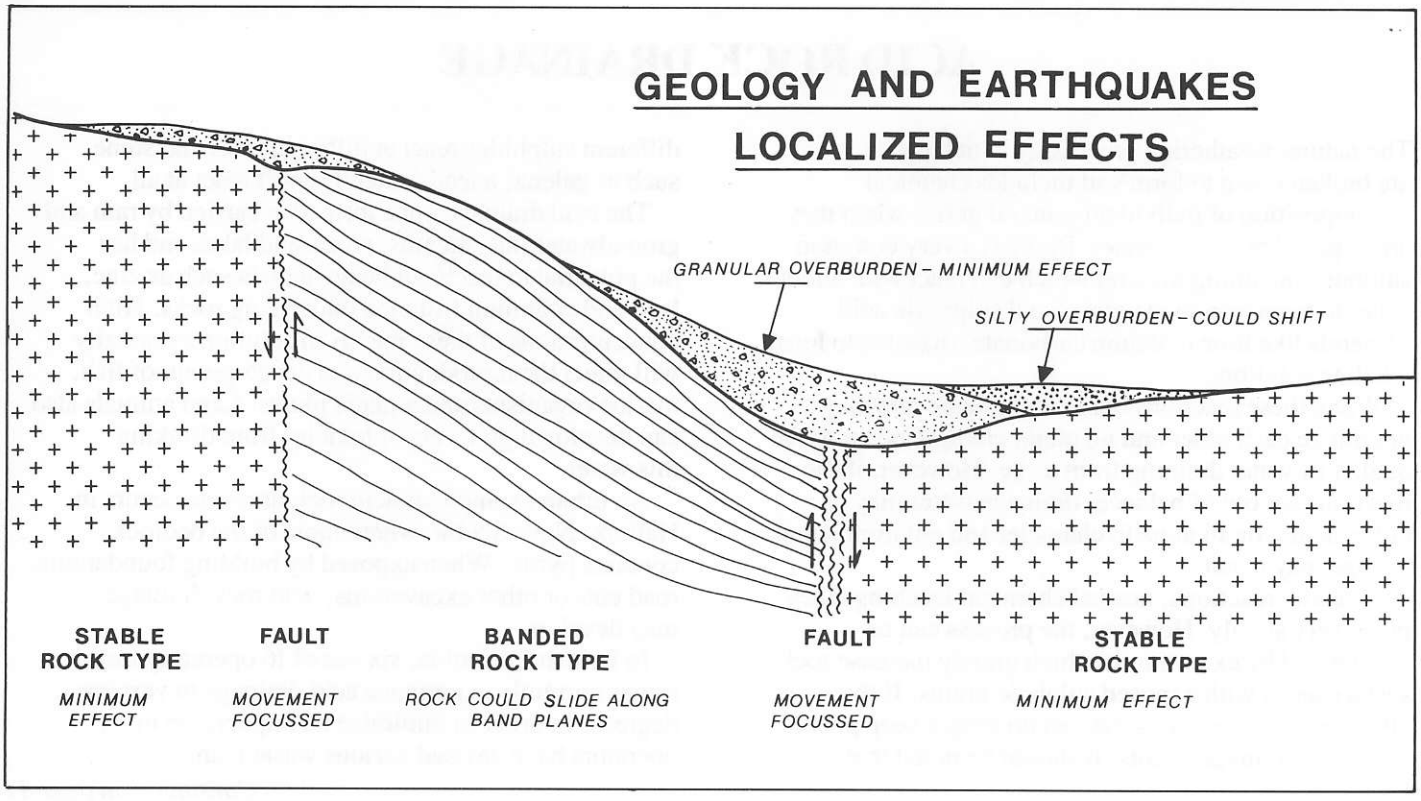




EARTHQUAKES

Tied to the concern about acid rock drainage is the question of the stability of the tailings dam at Windy Craggy in the event of an earthquake.

The earth's crust is made up of moving ''plates'' which sometimes push against each other, generating enormous stresses which can result in earthquakes. The pressure is released along linear zones of weakness characterized by volcanoes or fractures in the plates known as faults.

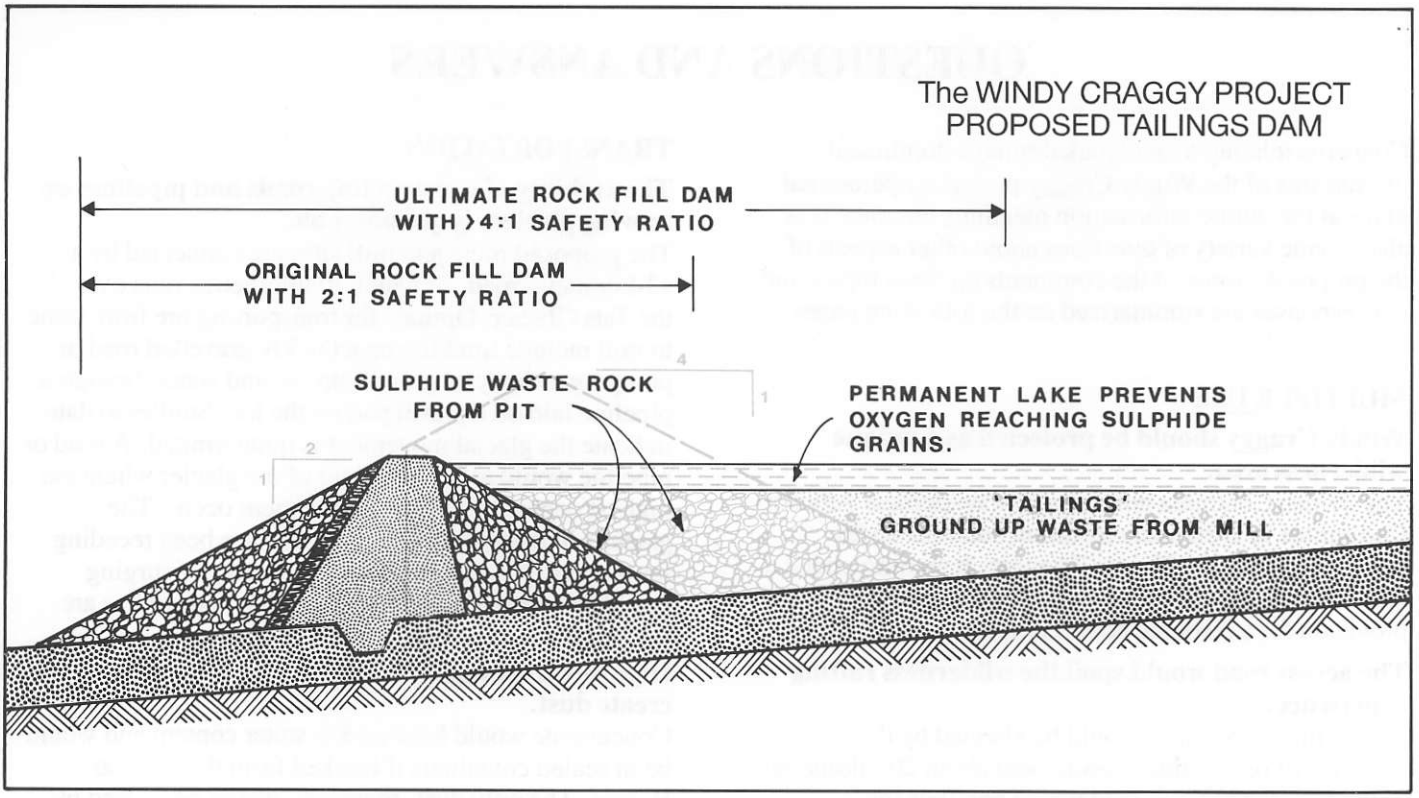
The Ring of Fire in the Pacific is an apt name for one of these zones characterized by active volcanoes. The North American section of this zone runs along the west coast, both on and off shore and includes the San Andreas fault in California and the Mount St. Helens-Mount Baker chain of volcanoes. It continues north through British Columbia and Alaska along the full extent of the Aleutian Islands chain.

Seismology is the science of measuring the stress released by earthquakes and volcanic eruptions. Sensitive instruments measure vibrations in the earth's crust which can be used to calculate the quantity of energy released by an earthquake. The result is expressed on a scale, one of the most frequently used being the Richter Scale. National agencies divide countries into seismic zones based on historic records of seismic activity. Most of the west coast zone, which includes Windy Craggy, has a high rating.

When an earthquake occurs, its effects are not evenly distributed in a given area. The energy is dissipated through localized zones of weakness in the rock near the surface. In the 1964 Alaska quake, the major impact in Anchorage was in a strip through the downtown core where the underlying geology featured weak rock zones. In addition, when the impact of an earthquake is transmitted through the bedrock to the overburden, a deep snowpack or wet climatic conditions will lubricate the overburden, increasing the magnitude of landslides.

Major geological faults can extend for hundreds of miles. Their movement over time grinds the rock faces to a crumbly consistency. These soft linear zones erode rapidly and result in most major faults being expressed as valleys. Lynn Canal and Tarr Inlet are good examples.

Before designing structures for the Windy Craggy mine, the area will be mapped in detail to identify active faults, stable and unstable rock conditions, overburden type and thickness, and topographic conditions. Areas of stability and instability under earthquake stress will be predicted. Buildings and dams will be carefully sited in the most stable areas. They will be designed and engineered to withstand the maximum credible earthquake effect. Canada's National Building Code provides



standards for all types of structures in all seismic zones and we will conform to the code.

Environmentally, the tailings dam is the most critical structure. Gravity fill dams are the ideal design for seismic zones. Earthquake vibrations actually consolidate the granular components of gravity fill dams, compacting and tightening the dam. That is why B.C. Hydro chose gravity fill structures for many of its major reservoirs, for example, the 200-metre-high Mica Dam north of Revelstoke.

An earth-filled dam 146 metres high (approximately one and a half times the height of that proposed for Windy Craggy) is located at El Infiernillo, Mexico. In the 1985 earthquakes centred nearby, which registered 7.5 and 8.1 on the Richter Scale, a 0.3-metre slump occurred at one point of the dam and some very shallow cracks on the face, but no significant damage was sustained.

The diagram above illustrates the type of gravity fill structure proposed for the Windy Craggy tailings dam. The concept of filling the impoundment area adjacent to the dam with waste rock from the mine means the dam will become progressively thicker and stronger during the mine life and greatly increase the safety ratio.

THE MILLING PROCESS

At the public information meetings we were asked to identify the reagents likely to be used in the Windy Craggy milling process.

The process of separating the copper, gold and silver minerals from the ore involves crushing, followed by fine grinding and flotation. Ore is crushed to reduce size to less than 10 inches before the grinding stage, in which water is added to facilitate materials handling and to enable the subsequent flotation operation.

In the flotation stage, the slurry of finely ground mineral particles is agitated while air is introduced into the bottom of large tanks called flotation cells. Lime is added prior to flotation, to assist the flotation process in separating the minerals. The frother, collector and depressant are added during the flotation process. The frother acts like a detergent to create bubbles. The collector changes the surface of potentially valuable sulphide minerals to cause them to adhere to the rising bubbles, so that they may be recovered as a frothy product from the top of the flotation cells. The depressant causes the non-valuable minerals to sink to the bottom of the cells from where they are pumped to the tailings impoundment area.

Valuable minerals recovered in the froth product are pumped to a dewatering plant where the flocculant is

Continued on page 11

QUESTIONS AND ANSWERS

Concerns relating to acid rock drainage dominated discussions of the Windy Craggy project's operational plans at the public information meetings but there was also a wide variety of questions about other aspects of the proposal. Some of the comments on these topics and our responses are summarized on the following pages.

MULTIPLE USE

Windy Craggy should be protected as a unique wilderness area.
The British Columbia government's Wilderness Advisory Committee in 1986 made recommendations on 26 areas, including the Haines Triangle. It recommended a recreation corridor along the Tatshenshini River but with provision for a resource access road across it.

The access road would spoil the wilderness rafting experience.
The rafting experience would be affected by the presence of one bridge crossing and about 20 kilometres of the proposed access road which parallels the Tatshenshini River. Much of this road would be hidden behind low-lying hills or screened by the tree growth in the valley. Dust control measures would reduce the visual impact of the trucking operation. If a concentrate pipeline is built to reduce the overall amount of trucking then the remainder of truck hauls could be scheduled to avoid times when rafters are on this section of the river.

More revenue might be generated from wilderness rafting than from mining over the long term.
Unlikely. However, tourism revenues could be enhanced through road access which could provide opportunities for short rafting trips, kayaking, hiking and skiing. A significant portion, perhaps 50%, of existing rafting business is run by U.S. companies so the benefits to Canada are relatively small.

How can other potential recreational users gain access when the company intends to maintain a private, gated road for safety reasons?
Recreational groups could gain access by advance scheduling. Truck traffic can be scheduled to avoid conflict with other users.

Are there alternative routes for the access road which would avoid the Tatshenshini River?
The company considered many routes for the access road including westerly and southerly routes to tidewater. The most practical of these routes is to the east through Scottie Pass. All the easterly routes have a common section of about 20 kilometres paralleling the Tatshenshini River.

TRANSPORTATION

The viability of constructing roads and pipelines on moving glaciers is questionable.
The proposed mine and mill sites are connected by a 13-kilometre road, of which 10 kilometres runs over the Tats Glacier. Options for transporting ore from mine to mill include trucking on a thickly gravelled road or pumping a slurry of ground-up ore and water through a pipeline laid on a gravel pad on the ice. Studies to date indicate the glacial movement is quite limited. A road or pipeline would avoid the snout of the glacier where the highest degree of melt and movement occur. The glaciers in the Windy Craggy area have been receding for the past 30 years and have no history of surging (rapid forward movement). More detailed studies are being done.

Highway trucking and ship loading operations would create dust.
Concentrate would have an 8% water content and would be in sealed containers if trucked from the mine to Haines. The only dust, therefore, would be caused by the truck tires on the gravelled portions of the road. Concentrate would be stored under cover at the mine and port. The shiploading facilities would be covered to minimize loss. As concentrate is valuable, there would be strict control procedures to prevent loss. Operating permits would impose dust control measures.

Effects of long term exposure to concentrate dust.
The concentrate, primarily chalcopyrite mineral, is non-toxic and very inert (it oxidizes much more slowly than iron sulphide minerals). Concentrates will be transported in closed containers and stored under cover. Loading and unloading will be handled in covered areas with dust collection facilities which will incorporate bag houses or scrubbers to filter solid particles from the air. Operating permits will prevent the opportunity for long term exposure.

What is the toxic effect of concentrate spilled into waterways? Doesn't copper sulphate produce acid when mixed with water?
The mineral in the concentrate is copper iron sulphide and is far less soluble in water than copper sulphate. Also, oxygen is required to produce acid and a spill into water would exclude oxygen so no acid would be generated. All trucking companies follow spill contingency plans. Spills from haul trucks would involve relatively small quantities. The concentrate is very valuable so there would be a financial incentive prompting a fast, efficient cleanup. Worst-case scenarios will be developed as part of the Stage Two review to determine potential impacts.

What is the preferred location for a docking/loading facility in Haines?
No decision has been made. Three potential sites are the city-owned Lutak dock, the military tank farm and loading facility, or undeveloped private property located between the city dock and the sawmill. If the Lutak dock was selected, a portion of the dock would be dedicated solely to the project.

Potential for acid generation in concentrate stockpiles at the Haines dock.
The process of acid generation is extremely slow, requiring years. We expect to ship approximately every two weeks. It is unlikely that any portion of the stockpile would be at the shipping facility for longer than four weeks, so acid generation there will not be a concern.

The mine traffic will add to the already congested waterway of the Lynn Canal.
There would be only a small addition to existing ferry and cruise ship traffic — approximately 26 ships per year at regular two weekly intervals so few would arrive during the limited period of heavy cruise ship traffic.

HAINES HIGHWAY

The Haines Highway couldn't stand up to the proposed loads. Who pays for maintenance?
Portions of the Alaska section of the highway would deteriorate rapidly under the proposed volume of traffic. The Alaska transportation department is looking at upgrading those portions. The company notes that the highway is a joint U.S.-Canadian project to provide a transportation route from Haines to mainland Alaska and feels private companies should not be asked to pay to maintain the road to legal standards. However, the company would readily acknowledge responsibility for any extra-legal loading.

Truck traffic on the Haines Highway poses safety problems and aesthetic concerns. Dust, noise, thrown stones and collision potential are cited. Winter weather conditions make trucking particularly hazardous.
Highway upgrading would include the addition of turnouts and viewpoints to accommodate tourist and other traffic. Truck drivers are licensed professionals operating under highway regulations and slower speeds can be mandated if necessary. Good truck washdown procedures and highway maintenance should minimize dust. Potential traffic impacts are being studied.

Impacts of haul truck traffic in terms of safety and noise in residential areas; impact on tourism.
Alaska Yukon Transport moves 40 trucks a day on State Street through a residential area of Skagway. There have been four accidents, none involving fatalities, after 27 million miles of driving over four years. The truck operator reports most residents on State Street barely notice the truck noise and that most tourism operators do not see any negative impacts. Note that Yukon-bound tourist traffic through Haines has declined by 60,000 per year from 120,000 since the Skagway haul road was constructed, providing an improved road to Skagway.

How many support vehicles will be required to haul fuel, foodstuffs, construction materials and other supplies? What is the potential for a concentrate slurry pipeline from the mine to a dewatering plant and port facility at Haines, using the existing petroleum pipeline right-of-way?
If concentrate is trucked to Haines, most supplies would be backhauled on the concentrate haul trucks in standard containers. Diesel fuel also would be backhauled in special containers. An estimate of needs will be included in the Stage Two report.

If the pipeline options for concentrate and fuel, currently under study, prove viable, truck traffic will be reduced dramatically. It would be limited to that required to transport construction equipment, machinery, foodstuffs and other supplies. Note that the availability of the pipeline right-of-way still has to be clarified.

SOCIOECONOMIC ISSUES

Potential impacts on municipal infrastructure, municipal taxation, employment and rural lifestyle in Haines.
Eric McDowell of Juneau has been contracted to do a socioeconomic study and is expected to conduct research in Haines over the summer. The study will identify potential impacts in terms of new housing, services and facilities and job creation. The project offers the potential for growth.

The mine would generate large profits for the company. What are the benefits to governments and communities?
Employment: 500 construction jobs over 3½ years; 524 long-term jobs at the mine site; 109 permanent jobs in transportation and road maintenance. Payroll: $25 million a year into regional economies. Supplies: $45 million a year in supplies and services. Tax revenues: $200 million in Canadian industrial taxation in the first 10 years of operation, plus employee income, sales and property tax revenues. Tourism/recreation: increased recreational opportunities utilizing mine access road.

Viability of mine in face of Fortune magazine prediction of copper prices declining to US$0.80 per pound by 1991; addition of new production from Chile and elsewhere.
The mine wouldn't be as profitable at US80 cents, but our threshold is significantly below that. The combination of a high ore grade and state-of-the-art production equipment would result in a highly-productive, cost-efficient mine. Note that B.C. mines were operating with US60 cents copper in the early 1980s.

WILDLIFE

The access road would form a barrier to wildlife movements. Haul truck traffic would impact in terms of noise, dust and road kills. Increased access for tourists, hunters and recreational vehicles would have negative impacts.
There is no evidence to suggest wildlife would not cross the road. The Dall sheep range has been identified on both sides of the Haines Highway. The effects of noise, dust and traffic are considered in Volume 2 of the Stage One report and additional studies will be done for Stage Two. The entrance to the access road would be fenced, gated and supervised.

Noise and fumes from haul trucks will disturb eagles. Highway upgrading construction will affect nesting sites.
We have asked Irv Boeker to study the eagle question in the fall of 1990. Heavy trucks will be used to simulate haul truck traffic. Experience at other mining operations is that eagles have not been affected. Previous periods of heavy truck traffic on the highway have had no reported adverse impact on eagles.

Road construction would destroy fish habitat.
The access road would not be constructed immediately adjacent to the Tatshenshini River, but some distance away and higher up the valley. At the bridge crossing over the Tatshenshini River, both the design and construction would be planned to minimize impact on the salmon spawning habitat at that location. Similar precautions will be taken at all other bridge locations.

THE REVIEW PROCESS

Why is the company not doing a U.S. Environmental Impact Statement (EIS)? The project also should be reviewed by the International Joint Commission (IJC).
The company has not been advised that an EIS is required but is prepared to do one if necessary. We are advised that an IJC review should not be required because U.S. interests are being represented in the current review process in the same way Canadian federal requirements are represented. The company's only concern is that all review processes proceed in parallel, rather than sequentially, in order to avoid duplication and save time.

Does the project fall under the Canadian Environmental Assessment and Review Process (EARP)?
Yes, the EARP is being applied because of the potential impact on trans-boundary water quality as it relates to the fishery. Relevant federal agencies are required by law to review the project, and the project must be submitted to a public hearing process. The B.C. Ministry of Mines already has announced there will be a joint federal-provincial public hearing process.

What is the company's response to the criticisms of U.S. agencies such as the National Marine Fisheries Service and Fisheries and Wildlife Service?
The concerns expressed by U.S. agencies are similar to those expressed by Environment Canada and the Mine Development Steering Committee. A revised mine plan under Stage One is being prepared to address those concerns. These concerns also will be addressed in a more detailed Stage Two report.

A financial bond is needed to provide a fund for long term monitoring and remediation if required.
B.C. mining legislation allows the government to set reclamation bonds and a bond is expected to be established for this project.

The company should have communicated its plans with Haines prior to submitting the Stage One report.
The first priority was to develop a mine plan, study various transportation options, and produce a Stage One report in order to provide all interested parties with a basis for discussion. The selection of Haines as the preferred port could not have been made without doing the Stage One studies. The review process is still in the very early stages and there will be ample opportunities for input from all parties.

The public needs to have access to background studies and to more technical details.
The company plans to hold a series of public seminars on some of the technical issues with participation by relevant experts. Likely subjects include acid rock drainage, impacts on glaciers and earthquake potential. We will also publish newsletters which will deal with individual topics in more detail.

What is the timetable for the review process?
The company is preparing a revised mine plan as part of the Stage One review and expects to have this completed in the fall of 1990. It has also scheduled additional environmental and socioeconomic studies. Following review of Stage One, the Mine Development Steering Committee is expected to establish criteria for a Stage Two report. If the Stage Two report is acceptable to the review agencies, public hearings will be scheduled. A successful conclusion would result in Approval-in-Principal and the project would proceed to Stage Three, the permitting stage.

No road or other construction should be permitted before the project is approved.
Under B.C.'s Mine Development Review Process, no construction permits may be issued before the project receives Approval-in-Principle. There will be no construction until all appropriate Canadian and U.S. federal, state and provincial permits are in hand. The government does not consider line cutting for surveys to be "construction".

ACID ROCK DRAINAGE *Continued from page 5*

procedures, each depending on the materials involved and the mine's location.

Generally, acid drainage from a mine operation is collected, then treated to neutralize the acidity and remove heavy metals. Treatment consists of adding lime which precipitates the metals, then separating out the solid waste in settling ponds or by filtering.

Solid wastes are disposed of in different ways depending on local circumstances. In arid areas such as the B.C. Interior, for example, waste material may be dumped at a land fill site which has an impermeable clay barrier or a synthetic liner. Or, waste may be disposed of in tailings ponds where the water cover prevents oxidation from occurring.

The revised mine plan for Windy Craggy to be submitted as a Stage One Addendum report will provide for all possible sources of acid rock drainage to be permanently controlled. Waste rock from the open pit will be separated into two categories. Sulphide waste rock which is potentially acid generating will be disposed of under water in an enclosed area. This method of disposal, which prevents oxygen reaching the sulphide minerals, permanently prevents acid generation. Only the waste rock which has no significant potential for acid generation will be disposed of in piles at the mine site. The tailings from the milling operation will be disposed of under water in the same enclosed pond as the sulphide waste rock.

THE MILLING PROCESS *Continued from page 7*

added. The flocculant binds many fine particles together, accelerating their tendency to settle and aiding the removal of water from the concentrate prior to shipment.

In the Stage One report the reagent list included sodium cyanide. More recent test work has demonstrated that it will not be necessary, thus eliminating the most hazardous chemical. Further changes in reagents may be made as testwork continues. Safety in handling and storage of all reagents will be a prime concern and will be addressed in the Stage Two report.

Lime is the only reagent which will be used in large quantities (40,000-50,000 tonnes per year). It will be produced locally from the abundant limestone reserves which lie between the mine and mill sites.

For the other chemicals listed, the annual requirements will be:

Reagent	Consumption Per Tonne of Ore
Lime	6 kg
Frother:	
Methyl isobutyl carbanol	30-40 grams
Collector:	
Potassium amylxanthate/ Aerophine 3418A	90-130 grams
Depressant:	
Ammonium chloride/Oxalic acid	350-499 grams
Flocculant:	
Specific chemical not determined yet	

Consumption rate	Tonnes per year
30 grams/tonne	210
400 grams/tonne	2,800

The daily consumption of all reagents other than lime required to process 20,000 tonnes of ore will likely be in the range of 10-15 tonnes. These will be transported into the site in sealed containers at the rate of one truck-load every second or third day.

THE WINDY CRAGGY PROJECT

Copper:	6.9 billion pounds
Gold:	1 million ounces
Silver:	20 million ounces
Cobalt:	290 million pounds

Contained in proven,
probable and possible reserves
at a cut-off grade of 1% copper.

For further information
contact:
Geddes Resources Limited
Attention: Public Affairs
(Note new address for
Vancouver office)

at: Suite 1400,
700 West Pender Street
Vancouver, British Columbia
V6C 1G8
Telephone: (604) 682-2392
Telecopier: (604) 682-7047

or: Suite 2701, PO Box 143
1 First Canadian Place
Toronto, Ontario
M5X 1C7
Telephone: (416) 363-1135
Telecopier: (416) 363-8078

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