Curragh Resources Inc.

VANGORDA PLATEAU

DEVELOPEMENT

FACT SHEETS #1 to #10

CURRAGH RESOURCES FACT SHEET #1

CURRAGH AND THE YUKON

What does Curragh contribute to the Yukon economy?

Curragh is proud of its involvement in the Yukon. In 1989, we spent $92 million dollars in the Territory. Over a third of these funds were in payroll to Curragh employees and payroll of the contractors. The rest included taxes, the remainder of payments to exclusive contractors for their services and substantial purchases such as fuel, electrical energy, parts, equipment, office supplies and other services from Yukon businesses. For the purpose of this total a Yukon business was defined as a business having a head office or a branch office in Yukon.

In terms of private sector Yukon employment, 8.2 percent is directly due to the Faro mine. Approximately one out of every eighteen workers in Yukon is directly employed at the Faro mine, the mill, on the concentrate trucks or as contractors who work exclusively for Curragh at the minesite. Because of the highly skilled nature of many of these jobs, the money earned by these workers represents an even greater share of the total Yukon payroll. Total number of those employees is 515 directly employed at the mine site and 222 exclusive contractor employees, or a total of 737 throughout the Territory--this compares with 4,115 employees for all levels of government, approximately 1,000 in the construction industry, 2,000 in wholesale and retail trade and 2,000 in accommodation or other services.

Mining generates most of the wealth created in Yukon and Curragh generates much of that. The 1989 gross value of mineral production was estimated to be $488 million and Curragh's operation probably generated at least 80% of that total. By comparison, the renewable resources sector generated an estimated $10 million in 1989 including contributions from forestry, trapping and fisheries.

Curragh's impact on mineral exploration in Yukon is also significant. While exploration was expected to be at about $20 million for the entire Territory in 1989, Curragh's expenditures on exploration were about $3.3 million on the Hundere and Anvil District projects or 16 percent of the total. This does not include Curragh's significant engineering and environmental expenditures on mine development projects or development drilling at the Faro, Grum or Vangorda mines.

Mining and mining support services continue to be a mainstay of the Yukon economy. The merchant, manufacturer, restaurant owner or their employees may not be on the mining payroll, but they profit from the proceeds in business conducted by workers in the mining industry and their families.

Curragh's expenditures create a ripple effect or multiplier from:

- indirect activity -- the respending of money on goods and services by the businesses that receive money from Curragh
- induced activity -- respending of money on goods and services by the workers who are directly supported by Curragh.

This ripple effect easily doubles Curragh's impact on the Yukon economy.

What is Curragh's role in the Yukon economy?

Curragh takes pride in being a significant part of the success that is today's Yukon. Curragh Resources began in Yukon and plans to remain in Yukon as well as expand into other areas. Our employees live here, work here and have deep personal and professional investments in preserving the quality of life we enjoy in the Territory. We are fully aware that Curragh's past, present and future operations have a great impact on the Yukon and wish to continue to work and prosper in a manner that benefits all Yukoners.

CURRAGH RESOURCES FACT SHEET #2

THE VANGORDA PLATEAU

Where is the Vangorda Plateau?

The Vangorda Plateau is located a few km northeast of the town of Faro and 15 km southeast of the Faro Mine site, and between the alpine country of Mt. Mye and the Pelly River Valley.

What is there today?

Mining exploration over a thirty-eight year period had left many roads, cut lines and drill sites throughout the Plateau. Some work has begun on the mining development such as clearing, road construction and drainage ditching. A water treatment plant and mine dry are partly completed.

What is the environment of the Plateau like today?

The Vangorda Plateau is an area of low topographic relief cut by several small stream valleys, the most important of which is that of Vangorda Creek. The area is heavily soil covered and there is extensive bush and stunted black spruce forest cover.

The Vangorda Plateau is drained by Vangorda Creek and partly by Blind Creek. Vangorda Creek is a small stream about 25 km in total length that, after flowing past the town of Faro, drains directly into the Pelly River. In its lower parts, the stream averages 6 to 12 metres wide.

The Plateau is not an area of exceptional scenic or recreational value although Faro residents have used it for recreation over the years and the Ross River natives have indicated some traditional hunting and trapping activities on the Plateau which continue today. Moose, black and grizzly bear are widespread on the Plateau.

A band of about 80 relatively rare Fannin sheep (a colour phase of Stone sheep) migrate across the Plateau mine site from their winter range on the south flank of Sheep Mountain overlooking the Pelly River Valley to summer range in the Mt. Mye highlands. As a protective measure for the sheep, much of the Plateau is reserved from all hunting.

Due to the high number of mineral deposits and metal rich rocks in the area, the water quality of Vangorda and Blind Creeks, as well as the Pelly River, show high backgrounds of zinc, copper and lead.

There is some fish habitat usage in the lower 2 km of Vangorda Creek but otherwise the creek contains no fish (see Sheet 4 for details on fish).

Will these mines have any effect on the Faro town water supply?

Independent scientific research, commissioned by Curragh, has shown that future mining activities at Vangorda Creek would not have any perceived impact on town wells. The Town of Faro draws its water supply from the wells in the Pelly River Valley near the mouth of Vangorda Creek.

What will the mines affect be on wildlife?

Curragh does not expect the mines to have any significant impact on wildlife. There is a possibility that the current sheep migration route would be changed, however, this would not threaten the well being of those animals. A monitoring program has been undertaken in conjunction with YTG Renewable Resources to check the progress of migration. Alternative trails have been prepared to reroute this migration, if needed.

Will the animals be affected by zinc and lead?

No. Zinc is an essential nutrient to man and animals. It does not magnify in the food chain significantly, therefore, it is unlikely that there could be an impact from zinc. Lead is toxic to mammals at low levels and can bio-accumulate. However, lead will be safely contained and managed at the minesite. Twenty years of mining at the Faro site have demonstrated that lead can be mined without any threat to wildlife.

What recreational and hunting impacts may occur?

The minesite will occupy the entire northwest half of the Plateau. The site will be restricted and closed to hunting or shooting. Access to areas in the My. Mye highlands has been provided across the haulroad connecting the Plateau mines to the mill.

Will the fish in Vangorda Creek be safe to eat?

Yes. Fish will leave the stream before levels of metal become appreciable, thus no metal exposure from this source will occur. More information on the impact of fisheries due to potential water quality changes in Vangorda Creek are discussed on Sheet #4.

What will Vangorda Creek look like at the town road crossing?

There will be no noticeable change in the Creek, other than during runoff periods in the construction phase of the project when muddiness may increase.

Will I be able to hear the mine in Faro?

All available steps will be taken to minimize the impact of the mine on life in Faro. During thermal inversions, it may be possible to hear blasts in the town. There is not likely to be any dusting in the town from the mines.

CURRAGH RESOURCES FACT SHEET #3

THE PROPOSED MINES

What orebodies are there on the Vangorda Plateau?

Three of the known ore deposits of the Anvil District are located on the Plateau. These are Grum, Vangorda and Dy. Mine reserves total approximately 43 million tonnes making these deposits comparable in size to the original Faro orebody.

What kind of mine is planned?

The mining operations will employ a similar number of people as the current Faro Mine and the mining techniques will be the same. Two open pits will be developed, one on the Grum deposit and the other on the Vangorda deposit. Waste dumps will be developed beside each pit. Even most of the trucks and shovels will be the same since they move to the Plateau pits when no longer needed at the Faro Mine.

What will the mines produce?

The new mines will be lead-zinc-silver mines like Faro, but will also begin to produce significant byproduct gold. The new mines will be similar in scale to the Faro operation which is currently the sixth largest zinc mine and second largest lead mine in the Western world. The Faro Mine produces 3 percent of the Western world's zinc concentrate and 5 percent of its lead concentrate.

When does the mining begin?

Curragh has taken every available step to ensure the plans for both mines meet current safety, technological and environmental standards. Once final approval is received, mining is ready to begin anytime. There is already equipment in place carrying out preparatory activity such as road building and dump preparation. If the current schedule is met, the Vangorda mill could be in full production by the Summer of 1991.

Does Vangorda have to be opened before the Grum mine?

Yes, only be having production from Vangorda can Curragh afford the costs involved in stripping at Grum. That is what defines the order of mining the pits.

Why is it necessary to proceed with these developments?

The Faro Mine is now virtually depleted and continuing mining operations require these developments. The new mines must also be developed to ensure that continued resources are available for the closure of the old site through further contribution to the mine closure fund or the TEF (see sheet #8). Each successive mining development in the district will have a lower environmental impact, yet still generate resources to pay back the investment and ensure environmental protection.

Each successive development also has a higher development cost. Therefore, only be following the entire sequence will everyone involved receive their dividends.

How long will the mines last?

The Vangorda pit is relatively small, it requires little advance work but will only last two to three years. The Grum pit is much larger. During production from Vangorda pre-production stripping will be underway on Grum and ore production will begin once Vangorda is depleted. Grum will continue to produce ore for eight more years. Stockpiled ore could continue to feed the mill after that so the milling can continue into the next century.

How many people would be employed?

Once approval is received and permits are granted, Curragh will continue to be able to maintain current levels of employment, representing approximately 515 employees in mine and mill. Once stockpiles begin to be fed to the mill, employment levels would decline due to the smaller mining staff needed. However, at that stage, development of the Dy deposit or discovery of a new orebody could provide new employment opportunities.

What types of skills will employees in the new mines require?

Because of the nature of the new mines, employees with exactly the same skills as the workers at Faro will be employed on the Vangorda Plateau. The basic mining techniques are unchanged.

What goods and services will the new mines require?

During the construction stage, there will be employment opportunities for building and heavy construction contractors to complete roads, water treatment plant, power distribution, etc. By 1991, the construction phase will be completed and the requirements for goods and services will be similar to those for the Faro mine in 1988 and 1989.

What about the Dy deposit?

Our immediate objective is to get Grum and Vangorda into production. Once that has occurred, then Curragh's attention will turn to developing the Dy deposit. Ideally, the Dy deposit would run in parallel with the Grum open pit.

Are we going to find another orebody?

The potential for discovery of additional ores in the district is good. Our studies of the area indicate that this ore would be deep and it is unlikely that any additional open pit mineable ore bodies will be discovered.

CURRAGH RESOURCES FACT SHEET #4

FISH AND BENTHIC INVERTEBRATES

What kind of fish are present in Vangorda Creek?

The most abundant fish in the Creek are Chinook salmon fry. However, other species are present, including: Arctic grayling, round Whitefish, burbot, slimy sculpin and suckers.

What kind of habitat is Vangorda Creek and how much is used?

Only the lower 2 km of Vangorda Creek (this is 12 km downstream from the proposed minesite) is utilized fish habitat. A waterfall and highway culvert block fish passage to the upper creek. Each spring young salmon move into Vangorda Creek to spend the summer. Most swim back into the Pelly River in the fall, although some overwinter in the gravel bed of the Creek. The Creek is not a spawning ground.

How many fish are there?

As in any creek, stream or river, the number of fish varies from time to time. In the early Spring there are a few thousand fry in Vangorda Creek, in mid-summer there can be as many as 20,000 fry and in the late Fall the number drops down to a few thousand again as the fish move back out into the Pelly River. Using estimates of survival rates the maximum number of fish spending any part of their lives in Vangorda Creek that would survive to adulthood is 615 of the 20,000 mid-summer fry. This is a maximum number based on counting during a year of great Chinook abundance. Most of these fish would be caught at sea or in Alaska before returning to the upper Pelly River.

Curragh has hired independent technical and scientific experts who have devoted the last two years to extensively studying the Creek, its habitat and the numbers of fish. These studies, along with those of the previous owners of the ore deposits have provided us with information on the Vangorda Creek Fishery. Additionally, studies of the benthic invertebrate community have been conducted.

What are benthic invertebrates?

Benthic invertebrates, commonly called bugs, are small organisms which live on, in or near waterways. They are very sensitive to changes in the aquatic environment. Scientists use benthic invertebrates as a measuring tool to assess environmental impact, given their extreme sensitivity to changes in water composition. Fish use benthic invertebrates as food.

How can one tell if fish will be affected?

There are some established Canadian guidelines for metal levels in water, below these levels there are no known effects on fish or on the health of algae or benthic invertebrates (i.e. the aquatic environment in which the fish live and the source of food they eat). Predicted metal levels in Vangorda Creek can be compared to the guidelines. Currently there are times of the year when Vangorda Creek, the Pelly River and nearby creeks exceed these guidelines as a result of natural processes despite the fact that there is a healthy environment for fish. This indicates that there is more research needed to know exactly at what level of metal Yukon fish in Yukon rivers would be affected. Curragh is preparing to undertake some of this research as part of its commitment to the environment.

How will fish be affected by Curragh's development of the Vangorda Plateau?

While Curragh will take every reasonable precaution to ensure the safety of the environment, the development of open pit mines and rock dumps on the Vangorda Plateau may cause Vangorda Creek to receive limited amounts of added metals. Fish are very sensitive to the presence of zinc and will respond by leaving an inhospitable aquatic environment. Thus zinc in small quantities can drive fish away or reduce productivity of the stream.

Other metals in the orebodies such as copper, lead, silver or cadmium can affect fish even more than zinc, however, they are present in very small quantities or are chemically immobile at the Vangorda site.

Should zinc levels in Vangorda Creek become elevated then fish will likely avoid coming up the creek each summer and none will overwinter. It is unlikely that any fish would be harmed and probable that fish may find other habitat nearby.

What precautions has Curragh committed to undertake?

Curragh plans a special dump design (as outlined in Sheet #7) which will slow down or stop acid mine drainage (see Sheet #6). Curragh will monitor the site to assess the effectiveness of the design and, if zinc levels in Vangorda Creek rise, then Curragh will provide water treatment to assure its protection. The need for treatment will be determined by the research noted above.

What are the value of these fish to the Yukon economy?

Curragh has spent and will continue to invest substantial amounts on fish studies in the Creek and on abatement measures. To date, $52,000 has been expended and much more is committed to. While such expenditures far outweigh the commercial value of any fish that may be disturbed by a potential change in habitat, Curragh is determined to maintain water quality in the Creek as compatible as possible for a fish habitat.

CURRAGH RESOURCES FACT SHEET #5

WATER USE

How do mining and milling operations such as Curragh's at Faro use water?

Water is an essential part of the mineral separation process that concentrates the lead and zinc minerals from the ore. It is used to create a slurry of ground ore and is the medium within which the separation occurs. The leftover water joins the leftover slurry of minerals (known as tailings) and flows to the tailings pond. Curragh's mill uses 6,000 gallons of water every minute.

Is any water recycled?

The Faro mill was designed by the previous owners in the mid-1960's when recycling water was considered only if water was in short supply. Curragh has committed to modify the plant to begin recycling water in a few years thus conserving water and reducing the discharge from the tailings pond.

What happens in the tailings pond?

In the tailings pond the tails sink and the water is clarified, metals in the water come out of solution and settle out, thus preventing them from leaving the tailings pond with the pond overflow and reaching the environment. Other chemicals such as cyanide and ammonia are partly destroyed by both sunlight and exposure to air during the retention of the water in the pond.

Some chemicals remain in the water discharged from the tailings pond but they do not exceed acceptable levels which are limited by the water license. Constant sampling and testing insures that these limits are met. Included is a test every two weeks to check if the effluent is toxic to fish. Natural dilution by the stream that accepts the water goes further to reduce the concentration of metal so that a short distance downstream from the mine the effects of the mine are minimal.

How big is the tailings pond?

The tailings pond is 3.3 km long and 0.6 km across. It contains approximately 30 million tonnes of material accumulated from the milling of the Faro orebody from 1969 to 1982 and an additional 13.5 million tonnes since Curragh resumed milling in 1986.

What minerals are in the tailings?

Most is pyrite or pyrrhotite (both made up of iron and sulphur), some quartz (silicon and oxygen), barite (barium, sulphur and oxygen) and other minerals are present.

Is there anything valuable in the tailings?

Some copper (2-3 pounds in each tonne) and silver (1/2 ounce in a tonne) is present but recovery seems unlikely at this time given current technology.

How does water use for the proposed development on the Vangorda Plateau differ from the Faro operation?

The ore from the Vangorda Plateau orebodies will be transported back to the mill at Faro and undergo the process described above. There will be no mill or tailings disposal area on the Vangorda Plateau. There will be no use of water from Vangorda Creek for the project. The Creek must however be diverted to mine the Vangorda orebody.

Water, from rain, snowmelt and groundwater that seeps into the open pits can react with the ore and become enriched in zinc and other metals. Curragh will pump this water to a treatment plant before it is released to the environment. Similarly, water percolating through waste rock dumps beside the pits which becomes enriched in zinc will be collected in ditches and ponds and pumped to the treatment plant. This treatment plant will be in place during the operation of the mines and, if needed to protect the aquatic environment of the Vangorda Creek, a similar plant will be operated after closure.

How does the water treatment plant operate?

The water treatment plant on the Vangorda Plateau will treat mine drainage water by precipitating and reducing the level of metals before any mine water is released to the environment. This is done by adding lime to the water. The plant works because metals dissolve in acidic water, the lime counteracts the acid causing the metals to precipitate. The precipitate settles in a pond beside the plant. The process is similar to what happens in the tailings pond, in fact there is no treatment plant at the Faro Mine because mine water is pumped to the tailings pond. The Vangorda Plateau treatment plant is partly built today and will be completed before Vangorda ore is mined for a bulk sample in July, 1990.

Can you briefly explain the flotation process whereby ores are extracted?

The ore consists of several different minerals in separate grains, each the size of a pinhead or smaller. Two of these minerals, comprising one tenth of the ore, contain lead and zinc while the rest have no value. When ore arrives at the mill from the mine it is crushed, then ground into a pulp to allow the separation of the valuable minerals from other valueless minerals. During grinding, water is added to make a slurry. The slurry is then stirred and air is bubbled through it. Addition of chemicals to the slurry causes the air bubbles to selectively adhere to the lead mineral (galena) so that it floats away from the other minerals as the bubbles rise through the slurry. Bubbles carry the lead mineral grains to the top of the slurry where a froth of bubbles with mineral grains attached is skimmed off the top as a concentration of the lead mineral (the lead concentrate). The concentrate is dewatered and dried, loaded on YAT trucks and shipped to Skagway. The minerals that sank to the bottom of those tanks is treated again to change the tendency of bubbles to adhere. Then the flotation process is repeated in another series of tanks where the bubbles adhere to the zinc mineral (sphalerite) and it floats to the top to be skimmed off as the zinc concentrate. The zinc concentrate is also dewatered and dried then shipped.

CURRAGH RESOURCES FACT SHEET #6

ACID MINE DRAINAGE

What is acid mine drainage?

The Canadian mining industry produces more than 500 million tonnes of waste rock and tailings each year. Most of this is pulled out of the ground in sulphide (minerals composed of a metal combined with sulphur) ore operations. If not managed properly, sulphide-bearing wastes from these mines can present a problem to the surrounding environment. When, exposed to oxygen and water, they oxidize or rust and produce a mild form of sulphuric acid. This process of oxidation is greatly promoted, or catalyzed, by bacterial (*Thiobacillus Ferrooxidans*) metabolism. The acid, in turn, can release certain heavy metals such as lead, copper, zinc and cadmium from the waste rock. The contaminated runoff or seepage from the minesite is called acid mine drainage (AMD).

How long has it been with us?

AMD often occurs naturally where ore deposits break the earth's surface, and has been with us as long as there have been hard rock mines. The earliest reference of AMD is found in *De Re Metallica* first published in 1556.

How long have we been studying it?

In the late 1970's, the presence and impact of AMD began to attract the attention of scientists in the Eastern United States. Since that time, and based on a more thorough understanding of AMD, hard rock mining companies have initiated the bulk of the research into AMD. Canada is one of the world leaders in AMD research although AMD is an environmental challenge in every country where hard rock mining takes place.

How is it different from acid rain?

The effects of surface water can be similar but the two processes are very different. Acid rain effects huge areas but AMD is restricted to the stream with the mine on it. Acid rain is created when sulphur and nitrogen emissions into the atmosphere react with moisture and fall back to earth as acidic solutions. AMD is a surface or groundwater problem created from the piles of waste rock or tailings near sulphide ore mines.

What is being done to stop AMD?

An organization called MEND (Mine Effluent Neutral Drainage) has been formed by industry representatives (including Curragh), experts from provincial and territorial governments, and the federal government.

MEND has a mandate to centralize and coordinate research and development into the acid mine drainage problem in Canada. Information gathered at one site is shared with others. Funds for the ongoing research are contributed by all parties. Improvement in the tests currently used to predict AMD is taking place. New ways to prevent or control AMD are being explored and treatment strategies are being developed and tested for those areas already affected.

Research is required to understand the problem more fully and to identify cost-effective solutions. Since the problem is different from site to site, one solution may not be applicable everywhere. New cost-effective close-out technologies are being developed which will allow the mine operator to rehabilitate waste rock and tailings impoundments, and to leave these sites after the mine is finished with the knowledge that the environment will be protected in the long term.

What do we know about preventing acid mine drainage, so far?

There are currently four ways to "mitigate" the ongoing process of AMD and prevent it from damaging the environment:

1. not creating the waste in the first place
   Oxidation and acid generation will not occur if the waste is not created at all. This can be accomplished by not mining at all or by using different mining methods.

2. prevent the generation of acid
   This is the most difficult and expensive of the mitigation strategies. Most likely to be effective is permanently submerging the waste in stagnant water. Prevention calls for a complete elimination of contact either by air (oxygen) or water or both. Submerging the waste cuts off the supply of oxygen. Consideration is also being given to slowing down oxidation to the point where it is not appreciable. This can be done by freezing which is particularly effective since iron and sulphur eating bacteria cannot function in the cold. This is a particularly appealing solution in Yukon.

3. prevent the migration of the acid once it is created
   Research into various ways to contain the products of oxidation is being conducted. Strategies include use of glacial till or plastics as a cover. If water does not contact the products of oxidation it does not become acid and the water does not become AMD.

4. collect and treat AMD
   This approach is being widely used to effectively deal with AMD that already is emerging from many waste piles near Yukon and B.C. open pit mines and Eastern Canadian tailings ponds.

CURRAGH RESOURCES FACT SHEET #7

CURRAGH AND ACID MINE DRAINAGE

Does Curragh have an AMD problem?

The rocks at Curragh's mines in the Faro area generate slowly thereby providing an opportunity to monitor and to respond before a potential problem occurs. While some rocks at the Faro mine and the proposed Vangorda Plateau mines generate acid when they oxidize, the acid is neutralized by other rocks nearby. This reduces the metals in solution but zinc still emerges form the dumps in some areas. The new mine is being designed to help eliminate the problems associated with AMD.

What is Curragh doing about the acid mine drainage potential at their various sites?

Curragh is firmly committed to ensuring that the design for the new mines control AMD. Curragh is conducting a multi-million dollar research project into acid mine drainage at the Faro mine. Currently a number of types of covers are being tested at the tailings pond near Faro and investigations are being conducted into the extent of AMD development at the tailings pond as well as to define surface and ground water characteristics at the site. Experts agree that Curragh has the largest single site research and development work going on in Western Canada in the area of acid mine drainage. Expenditures to date are over one million dollars. This project is part of the MEND Program (see Sheet #6).

What are the options?

Curragh believes that the Vangorda Plateau should be developed. As the Faro ore body will become depleted in 1991, the equipment, facilities and personnel currently working at Faro are dependent upon the development of new orebodies to maintain current levels of employment, economic growth, and regional development.

There are 4 basic options for development:

1. <u>Developing underground, rather than open pit, mines on Vangorda Plateau</u>
   Underground mining reduces the AMD problem by keeping most waste underground. However the shallowness of the Vangorda Plateau ore deposits and weakness of the rocks would create a more dangerous working environment for the miners and would be a less efficient use of the available resources.

2. Alter the waste dump design to slow or prevent acid mine drainage
Research on halting or preventing AMD continues (see sheet #6) but will not be developed to ideal levels by 1991. The use of waste piles as currently designed, however, appears to offer promise to substantially limit AMD.

3. Treat water that emerges from the site if AMD cannot be stopped.
This is available as a fall-back contingency if other options do not work. Curragh has made a substantial commitment to provide this fall-back at its new mine as well as the Faro mine.

4. Replace or rebuild the salmon nursery and overwinter environment somewhere else
The existing Vangorda creek nursery could be replaced in an enhanced environment nearby. This would provide a habitat for fish that might avoid lower Vangorda Creek if metal levels were to rise. This option would require approval of the federal fisheries department.

Which option is Curragh favouring?

Based on our knowledge of AMD and Curragh's commitment to ensuring that adverse environmental impacts of this project are reduced, Curragh supports the option of developing a waste dump which is designed to prevent AMD with a contingency of treatment if significant fish habitat could be impacted. The option of an alternative habitat development would be highly cost effective for lesser fisheries impacts, but is not being proposed for this Project.

How will these dumps be built?

The acid generating waste will be placed behind dump perimeter dykes made of clayey, silty glacial till. When the dump is completed, a cover of this glacial till will be placed over the entire dump and compacted. This is referred to as "cocooning" or "encapsulating" in till. Such dumps are referred to as "cellularized". The till skin on the dump slows access of oxygen to the dump and inhibits water transfer through the dump. This slows down AMD.

CURRAGH RESOURCES FACT SHEET #8

MINE CLOSURE

What happens when the Faro Mine closes?

Curragh is committed to ensuring that once all available resources have been extracted from the Faro site that our plans for closure preserve the integrity of the surrounding environment. At this point in time, Curragh has submitted two closure plans to the Yukon Territory Water Board for the Faro mine and mill site. A third plan concerning tailings is due in March, 1991.

Mine Site

The first plan concerns the flooding of the Faro Pit and management of waste dumps and waters emerging from the dumps. The plan also deals with reclamation of dams, reservoirs, diversions and haul roads. Work would begin on this when the orebody being mined in the Faro open pit is exhausted in 1992.

Mill Site

The second plan concerns the dismantling of the mill and other facilities, the disposal of chemical inventories, general cleanup around the site and provision of a safe site on completion of all operations. None of this would occur until all ore deposits are exhausted well into the next century.

Tailings

The March, 1991 plan is to deal with the tailings area, the dams impounding the tailings and the diversion of Rose Creek around the tailings. Various options to ensure physical and chemical stability of the tailings are being examined. New thinking on future tailings disposal will mean tailings will go into the Faro Pit when it and a small underground mine to the southwest of the pit are completed. This will help ensure water quality in future years and simplify the closure problem for the current tailings area. Research is underway into the best way to do this and recycle water from the pit at the same time. The timing of the tailings closure is not yet worked out but will be staged over many years as the Faro Mine closes and the other orebodies are worked out.

Curragh has provided a fund to help pay for this work when the mine closes - the Trusteed Environmental Fund (TEF).

What is Trusteed Environmental Fund?

The TEF arises from an agreement between Curragh and the Federal and Territorial governments that dates from the 1985 reopening of the Faro mine. The commitments that Curragh has made regarding TEF include a review of the fund upon submission of the last of the three plans for mine closure.

How does the TEF work?

Curragh voluntarily participates in the fund in order to gradually accumulate the funds necessary to offset the costs of closure without placing undue strain on the mine's finances. The financial assessment is based on production. On average, annual contributions range from $125,000 to $150,000.

The Board of Trustees is made up of five members including two representatives from Curragh Resources, one representative from the Territorial government, one representative from the Federal government and a financial manager agreeable to all parties.

A Board of Trustees invests the money in blue chip investments so that the fund will grow to an estimated $7.5 million near the time of site closure. This target figure is an estimated cost of closure based on an engineering assessment several years ago and will be reviewed and adjusted approximately every five years.

This approach, combined with recognition of the historical background of the site and a reasonable priorization of work, is the only feasible approach to providing the future environmental integrity of the mine site and the downstream environment.

What about when the Vangorda Plateau mines close?

The issue of closure is one of the most important questions of mine development and is an integral part of any mine plan. Curragh's plan is to design the mine for closure as well as efficient mining -- that way costs after mining is finished are minimal. The plan calls for separating waste that might generate acid and placing dumps in locations where the control of water that might be contaminated by the waste is simplified.

CURRAGH RESOURCES FACT SHEET #9

LEAD AND ZINC

How do we currently use lead?

Approximately 60% of all lead mined is used in car, truck or other vehicle batteries. Lead batteries are also used in stand-by power units for hospitals and computer systems. Other lead uses are for chemical compounds and x-ray shields for patients at hospitals or dental offices.

How do we currently use zinc?

Zinc is used to galvanize steel to resist rust or corrosion. A car may have anywhere from 15-18 kg (25-40 lbs) of zinc applied to prevent corrosion. Other galvanized surfaces include garbage cans, chain link fences, eavestroughs, nails, screws, metal sheets for roofing, duct-work and underground culverts. Brass contains large amounts of zinc. Zinc is widely used in the chemical industry in paints, tires and many other products. For example, zinc oxide is used on skiers' and swimmers' noses to protect them from the harmful rays of the sun. Zinc oxide also helps heal and prevent diaper rash on infants. Zinc pryithione is an active ingredient in dandruff-fighting shampoos such as Head'n'Shoulders.

Where does lead and zinc from the Curragh operation in Faro go?

About 60 percent of the lead mined at Faro is shipped to Europe. Forty percent is shipped to Japan, India and Australia. Soon Korea will be receiving the product. None is sold in Canada. About 60 percent of the zinc concentrates shipped are destined for Japan and Korea. The remaining 40 percent is exported to Europe.

What is the future market for zinc?

Japanese auto manufacturers are currently working on a totally corrosion-proof vehicle. If successful, similar developments are bound to take place in North American and European auto industries. Demand for zinc will rise, especially as solid, long lasting, substantial metal replaces plastics in the esteem of consumers.

What is the future market for lead?

At the present time, the lead battery is the most economical for electric cars under development. The same principle of radiation shielding which protects patients from x-rays may be utilized in the design and construction of containers to store radioactive waste. Such containers prevent leakage of radioactivity into the environment. Large storage batteries may provide surge capacity for urban electric systems in the future.

Several countries, including Canada and the United States, are experimenting with using lead to make pavement more malleable and less vulnerable to the extremes in temperature which cause roadways to melt, sag or buckle.

Can lead be recycled?

Yes, 50 percent of the lead consumed today is recycled. However, there will continue to be a market for new resources of lead. This means there will always be a market for lead concentrates from primary mining.

Can zinc by recycled?

While it is not yet possible to recycle large amounts of zinc the metal plays a major role in conservation of other metals, especially steel, as well as energy that would be needed to manufacture replacements for the items zinc protects. The limitation on recycling is due to the fact that zinc is coated or combined with the metals it protects. Its uses are thus dispersive and not conducive to recycling.

CURRAGH RESOURCES FACT SHEET #10

APPROVALS

What is the procedure for permitting a mine in the Yukon?

The major environmental permit required in the Yukon is a Water License. Surface leases or mineral leases may also contain provisions relating to environmental matters, especially closure and reclamation.

A proponent makes application for a water license and, after review of the completeness of the data submitted, a Public Hearing is scheduled. During the Public Hearing the environmental impact of the mine is discussed in great detail. Once the project is judged acceptable, a license is issued with provisions attached to regulate and monitor the mines impact and protect the environment.

Where is Curragh in this process?

Curragh applied for a Water License for its Vangorda Plateau operation in December, 1989. A hearing has been scheduled for May 23, 1990.

What about the Environmental Assessment and Review Process?

The project was informally presented to the Environmental Assessment and Review Process (EARP) in March, 1987 and an Initial Environmental Evaluation (IEE) was requested. A Stage One IEE concerning clearing and drainage of the sites was prepared in September, 1987. A draft Stage Two IEE was presented in March, 1989 and, following discussion, was revised and submitted in final form in July, 1989. The Stage Two IEE is a three volume report which describes the total project, the baseline environmental conditions and the projected environmental impacts. In October, 1989 more information was requested of Curragh in relation to the Stage Two IEE. Most of this information was presented in February, 1990 in two follow-up reports on; options for mitigation of acid mine drainage and water quality modelling and, fisheries impacts. Further detailed information has been provided recently on the socio-economic impacts of the mines, as well as contingency plans for wildlife and water quality impact mitigation, in an Addendum of the IEE.

Why is this taking so long?

Many thorough and original studies have been undertaken by Curragh to ensure the project has been carefully prepared. In addition, the environmental review process has become more complex due to recent court decisions in Saskatchewan and Alberta.

What is Curragh's view of the application of the EARP Guidelines?

Curragh has fully participated in the Federal Environmental Review Process and recognizes the importance of adhering to these guidelines to ensure safe environmental practices and to minimize short and long term environmental impacts. The EARP Guidelines were devised to ensure public input and review of environmentally significant projects. Curragh fully supports the public review of its proposed projects and is complying with requests for information as well as it can.

How much has it cost to prepare these reports?

Curragh has incurred total environmental costs of $6.5 million since 1986, including all mine site monitoring, Vangorda Plateau water treatment plant construction, tailings research costs and all consultants reports but not staff salaries. We estimate that report preparation for the IEE and related reports is on the order of $150,000 and total baseline and impact study costs for the Vangorda Plateau is over $300,000.

Where do we go from here?

Curragh expects that is will receive approval under the EARP process from the Federal Government and proceed to hearings before the Water Board on May 23. We believe this timetable is crucial if the mine is to continue to operate at its potential.