

# ESQUEL, ARGENTINA

## PREDICTIONS AND PROMISES OF A FLAWED ENVIRONMENTAL IMPACT ASSESSMENT

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For  
**Greenpeace Argentina  
Mineral Policy Center**

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**GREENPEACE**  
ARGENTINA



MINERAL  
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## ABOUT MINERAL POLICY CENTER

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MPC is a non-profit organization dedicated to protecting communities and the environment from the destructive impacts of mineral development in the U.S. and worldwide.

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## ABOUT GREENPEACE ARGENTINA

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Greenpeace Argentina is a non-profit environmental organization supported by individuals around the world. Greenpeace works to end toxic use and releases and environmental destruction from human activities.

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## ABOUT ROBERT MORAN

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Dr. Robert Moran has more than thirty years of domestic and international experience in conducting and managing water quality, geochemical and hydrogeologic work for private investors, industrial clients, tribal and citizens groups, NGO's, law firms, and governmental agencies at all levels. Much of his technical expertise involves the quality and geochemistry of natural and contaminated waters and sediments as related to mining, nuclear fuel cycle sites, industrial development, geothermal resources, hazardous wastes, and water supply development.

In addition, Dr. Moran has significant experience in the application of remote sensing to natural resource issues, development of resource policy, and litigation support. He has often taught courses to technical and general audiences, and has given expert testimony on numerous occasions. Countries worked in include: Australia, Greece, Senegal, Guinea, Gambia, South Africa, Oman, Pakistan, Kyrgyzstan, Argentina, Honduras, Mexico, Peru, Chile, Canada, Great Britain, United States.

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**LARGER COVER PHOTO, BACK PHOTO: DIEGO GUIDICE  
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## BACKGROUND

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Minera El Desquite S.A. (MED), a subsidiary of Meridian Gold, headquartered in the U.S.A., but operating for business purposes as a Canadian corporation, is proposing to operate an open-pit (or possibly partially underground) gold mine using cyanide vat-leach techniques. The site is located in a scenic region of northern Patagonia near the eastern base of the Andes of Argentina. Mining, processing and waste disposal activities would occur on a mountain approximately 700m above and to the east of Esquel. There are conflicting figures for the distance of the mine from the city. MED states the distance is 33 km, while the citizens state that the straight line distance is actually less than 7 km. One or more pits would be excavated to depths of about 180 to 200 meters, with the wastes, tailings and waste rock, to be deposited in a combined repository. (The EIA is unclear whether all of the waste rock will go into this repository, or only the potentially acid-generating materials.) The project is expected to affect an area of approximately 189 hectares, and the anticipated operating life of the mine is between 8 and 9 years.

This region suffers from high unemployment, but unlike many other mining areas, it offers numerous economic opportunities in forestry, tourism, ranching, and other sectors. The Esquel Project is the latest example of a foreign mining company going to a financially-troubled country, initiating project activities without adequately involving the public, thereby inciting and mobilizing environmental opposition—and dividing the community. This conflict is largely between those that want work and those that prefer to emphasize quality-of-life considerations.

What follows are my brief observations made after reviewing significant portions of the Esquel Environmental Impact Assessment (EIA) and making a trip to Buenos Aires and Esquel between February 19 and 28, 2003. During this trip my opinions were formed by a flight over the project area; reconnaissance in the Willimanco Basin; discussions and interactions with local citizens, local and regional non-governmental organizations (NGOs), members of the Esquel water cooperative and other planning officials, local

and provincial political representatives, university faculty, and private technical experts.

These activities were funded by Greenpeace Argentina and the Mineral Policy Center of the U.S.A. Activities were coordinated by Greenpeace Argentina. My participation was intended to provide technical assistance to the general public, so that more informed decisions could be made. The ultimate choices, however, must be made by the citizens and their elected representatives.

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## **PROBLEMS WITH THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)**

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The EIA for the Esquel Project was prepared for Minera El Desquite S.A. by Vector Engineering, Inc (October 2002). Unfortunately, this document fails to answer most of the most important questions that concern the public. Such questions include:

- Which natural resources are most likely to be impacted?
- What are the geochemical characteristics of the rocks to be mined?
- Will local municipal water supplies and springs be impacted?
- What are the most likely pathways for these impacts? What are the hydrogeologic roles of the numerous faults?
- Where is the ground water, specifically, and what are the hydraulic characteristics of the water-bearing zones?
- What are the chemical characteristics of the site waters?
- How much water is present—both surface and ground waters?
- What are the characteristics of the underlying aquifers?
- What will be the specific sources utilized by the company for the mine water supply?
- What criteria will be used to define potentially acid-forming rock?
- What is the pre-mining (Baseline) quality of these surface and ground waters?
- What are the precise mining procedures that will be employed?

This EIA describes the project details in such imprecise terms, with so many undefined elements that it is impossible for the public or the regulators to really know what activities will occur. It is impossible to make realistic judgments about the possible environmental and socioeconomic impacts on the basis of such a nebulous document. Mining projects and environmental documents are notorious for their changeability. It is common for such documents to be revised numerous times in a single year. However, after participating in and reviewing dozens of similar environmental studies, this is the most “undefined” EIA I have reviewed in more than 30 years of hydrogeologic experience. It certainly would not be acceptable to regulators for comparable purposes in western European countries, the U.S.A., or in Canada.

Much of what is presented is filled with half-truths regarding the details of the processes and potential impacts. These include partially complete, and often incorrect statements about the following: the tendency of the local rocks to become acid; how neutralization of acid will proceed; the tendency of only acidic waters to mobilize metals and other contaminants; the proven effectiveness of various waste isolation techniques; the potential toxicity of cyanide degradation products in the environment; the presence and persistence of numerous cyanide degradation products and other process chemicals; and the effectiveness of the INCO cyanide “destruction” process.

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## **EIA PROBLEMS: POSSIBLE IMPACTS**

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In general, the document implies that no major environmental impacts will result from the completion of this mining project. Unfortunately, it is simply not possible to conduct such mining without producing some significant environmental impacts in the long term. Based on this evaluation and my past experience, it seems reasonable to conclude that at a minimum, the public should be concerned about the following likely impacts that might result from the development of the Esquel Project:

- increased competition for water
- possible disruption of spring flows
- possible contamination of surface and ground waters in both the Willimanco and Esquel Basins

- contamination that could result from:
  1. the development of acidic drainage within the excavated pit;
  2. drainage from the waste rock and tailings deposited in the waste repository (escombrero);
  3. from other waste and ore stockpiles;
- from the use of massive quantities of explosives, oils, fuels and other process chemicals, such as cyanide, lime, acids, flotation compounds, etc, that would be used in the mining process
- formation of a lake within the excavated pit that might contain contaminated water

The most obvious, potential impacts from this proposed mine, and from the others that might follow, involve the various local water supplies. The Esquel project site and the surrounding region are quite arid, and project operation will require the consumption of large volumes of water. Despite the EIA statements about the various efforts to conserve and recycle water, it seems likely that the company will have a complicated task in simply providing adequate water to supply the numerous process and other needs of the mine. The stated required water volume of 18 liters per second is considerably lower than the amounts normally used at most other similar sites around the world. Thus, this is probably an underestimate.

The EIA states that water may be taken from Arroyo Esquel Viejo, either directly from the stream, or indirectly via nearby, shallow wells, especially during the dry months. Such extraction will almost certainly occur, but other sources may also be required, in addition to those noted in the EIA.

Consumptive use of this water will greatly increase competition between the various other water users such as ranching, fishing, agriculture, private users, and the municipality of Esquel. In other similar situations, such competition leads to drastic increases in water prices, increases in land prices, and significant changes in land uses. It also leads to disputes.

The most visible and controversial impacts discussed within the community of Esquel relate to possible contamination of local waters by cyanide, metals and other potentially toxic compounds. Such contamination is certainly possible, and occurs to some extent at almost all similar mines. The development of acid drainage is the most common serious consequence. More importantly, it is by far the most costly impact to remediate. Continuous acid

conditions lasting for hundreds or even thousands of years have been documented in certain locations in Greece, Spain, and Sweden.

Long-term water quality contamination normally requires the construction and operation of a water treatment plant, sometimes *in perpetuity* following mine closure. These can easily cost between tens and hundreds of millions of dollars (U.S.), to operate. To make matters more complicated, such water quality problems may not become obvious until years after the mine closes. In the U.S.A., there are presently numerous mine sites with such acid drainage problems, predominantly at sites where the operator has gone bankrupt. Due to a lack of public funds, the problems remain unaddressed.

Numerous other impacts related to noise, dust, increased traffic, socioeconomic changes, impacts to biota, and general quality-of-life issues could also develop.

There is a frequent tendency for EIAs and other environmental studies to be less-than-revealing to the public, for several reasons. First, the studies are almost always conducted by companies or individuals contracted, directed and paid by the mining companies. Most of these companies make the majority of their income from such clients, and are understandably reluctant to present unpleasant or controversial findings. For example, when one investigates the website for Vector Engineering, it is clear that a very large part of their international income comes from the mining industry. A related source of mistrust comes from the fact that such mines are self-monitoring. Government agencies seldom collect and analyze their own samples for routine purposes, even in highly-developed countries.

Secondly, during the permitting stage when an EIA is being prepared, the specific, local operating company has no cash flow because mining has not commenced. Thus, they prefer to minimize all expenditures, especially those related to environmental efforts. Hence, they do not really know the detailed answers to the basic questions that concern the public. Instead, they substitute predictions and promises for expensive testing and data collection.

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## **EIA PROBLEMS: BASELINE DATA**

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The present EIA reports no appropriate aquifer testing, and the baseline water quality data set is totally inadequate. The EIA does contain baseline water quality data collected as part of several largely separate phases of sampling performed by staff of the National University of Patagonia, San Juan Bosco. Unfortunately, these activities were not performed consistently at the same stations, they did not employ the same analytical techniques and detection limits, and the analyses did not include consistent or adequate chemical constituents. Most importantly, the data set does not contain sufficient numbers of high quality data to allow any statistically-meaningful interpretation.

It is important to gather accurate baseline data because if water quality contamination were to be detected after mine closure, there would be no way to adequately determine the actual extent of the changes, or to conclude which source or activity was responsible. It is particularly ironic that, because the majority of the Baseline water quality data was collected by members of the National University, the company could argue that they were not responsible for any inadequacies.

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## **EIA PROBLEMS: CYANIDE RISKS**

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The EIA gives the impression that the use of cyanide will pose no problems or risks. It asserts that the cyanide will decompose into harmless compounds through natural processes as well as the mine's proposed use of the INCO "destruction" process. It fails to mention that many of the compounds that result from cyanide degradation are persistent and toxic to aquatic organisms, such as cyanate, thiocyanate, metal-cyanide complexes, cyanogen chloride, nitrates, ammonia, chloramines—many of which are not detected in routine water quality monitoring.

More misleading is the message that the INCO process is totally efficient at producing non-toxic effluents. Clearly the process, when correctly applied, does greatly reduce the concentrations of free cyanide. However, following

treatment of effluents using the INCO process, it is common to detect residual concentrations of the following constituents that are still potentially toxic to various forms of aquatic life: cyanates, thiocyanates, some free cyanide, sulfate, ammonia, nitrate, copper, and some metals.

It is interesting to note that the EIA states that, in the event of a spill of liquid cyanide, sodium hypochlorite, or bleach, shall be applied to the spilled contents. They fail to mention that one of the intermediate compounds formed from the reaction of cyanide with hypochlorite is cyanogen chloride, a compound that was used in the First World War as a chemical warfare agent. The EIA mentions the recent industry-sponsored Cyanide Code, a document intended to promote improved industry practices for the handling of cyanide. However, the EIA fails to mention that this Code specifically suggests that hypochlorite should not be used in such emergencies. In fact, the Code fails to mention any emergency response that is suitable once a spill of cyanide has occurred into rivers or lakes. All approaches produce significant environmental impacts—as was shown from the effects of the gold-cyanide waste spill in Romania and Hungary in 2000—where hypochlorite was applied.

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## **EIA PROBLEMS: ACID DRAINAGE**

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The EIA, unlike most comparable documents, fails to report the specific sulfide/ sulfur content of the rocks to be mined. It fails to report the specific acid base accounting data (ABA), or any geochemical testing, such as kinetic tests, that are typically presented to indicate the tendency of rocks to produce acid drainage. The EIA does make the general statement that between 3 and 10 percent of the rock to be mined contains sulfides, but no concentrations are specified.

During the overflight of the site, I observed natural acid drainage flowing down some small ravines on the side of the mountain. Clearly, many of these rock types have the propensity to form acid and mobilize numerous metals and metalloids in the future.

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## **EIA PROBLEMS: FINANCIAL ASSURANCE**

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The EIA does not mention of any form of financial assurance. As a result, if problems are noted after the mine closes, or after some unforeseen closure of the mine---such as bankruptcy---no funds would be available to remediate these impacts. Essentially all modern hardrock mines in the U.S.A. and Canada are now required to provide some form of financial assurance---as was Meridian's Beartrack Mine in Idaho, U.S.A.

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## **SUMMARY**

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The Esquel mine is proposed to operate for only 8 to 9 years. However, the wastes that will result from this operation will remain on the top of this mountain forever. Esquel is the classic example, which is all too common in Latin America, where an EIA describes short-term benefits and solutions, but fails to even begin to consider long-term consequences.

Clearly, if the mine were to operate, some segments of the Esquel population would receive relatively short-term economic benefits. Numerous questions have been raised as to how much actual tax or other revenue the various levels of government would receive.

A significant segment of the Esquel population presently opposes this mine, and has called for a public referendum on these issues. Such a vote will not have legal weight, but will certainly influence public and official opinion.

Opposition to this project makes obvious the tremendous lack of trust many citizens of Esquel have in this mining company and their technical claims. Much of this mistrust results from the fact that essentially all of the information being made public about the project is provided by and controlled by MED. There have been no "independent" studies.

Citizens in Esquel and in numerous other communities, such as Tambogrande in northern Peru, believe that they have a right to decide whether to welcome or exclude large projects with potentially negative impacts on their families, communities, environment, and basic quality-of-life.

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## **APPENDIX: MERIDIAN HISTORY AT BEARTRACK**

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Meridian Gold operates or has operated several other mines: three in the U.S.A., one in Chile, and Esquel. One of these is the Beartrack Mine in Idaho, U.S.A.

Beartrack is an open-pit, heap leach gold site that was actively mined between 1995 and 2000. Mining has ceased, but the cyanide leach solutions continue to be circulated and additional gold will be extracted for several years.

During 1989 –1990 I served as the geochemical/water quality consultant to the U.S. Forest Service in Salmon, Idaho, which managed the federal land on which Beartrack was developed. My responsibilities involved providing independent advice to the Forest Service regarding issues of well location and construction, ground and surface water sampling, analysis, and interpretation of geochemical and water quality data. These activities were paid for by Meridian and were intended to provide environmental information, including pre-mining (Baseline) water data, to be used in preparing an Environmental Impact Study (EIS), similar to an EIA. I was the author or co-author of the relevant portions of the Draft EIS, which was made public in 1990, and other reports. All such reports were initially presented to the U.S. Forest Service and Meridian Gold.

The Baseline water quality data presented in the Draft EIA was extremely extensive. For example, the summary table for surface water sites included 172 separate determinations of Total Dissolved Solids from numerous sites, collected between October 1989 and March 1990. Prior to excavation of the open pits, the general surface water was of extremely high quality, despite the past alluvial mining that had occurred. For example, the median Total Dissolved Solids concentration of the surface waters prior to excavation of the pit was 38 mg/ L, similar to that of distilled water used in laboratories. The median field pH (out of 131 measurements) for surface waters was 7.1. The median sulfate concentration (out of 172 samples) was 1.0 mg/L.

Because I had not worked at the Beartrack site in 13 years, I made inquiries with both the U.S. Environmental Protection Agency (EPA) and with some citizens' groups in Idaho regarding the present project environmental status prior to reviewing the Esquel situation. The EPA reported that reclamation

of the land surfaces has progressed well, but that they have concerns regarding the future water quality of the lake forming in the South Pit, as ground water quality has degraded since mining was initiated. The North Pit is mostly filled, partially with potentially acid generating materials, and has some water seeps with measured pHs of 3.0.

Evidence that the rocks in the lower portions of the South Pit are becoming acid is presented in an article in *Diario El Chubut*, February 26, 2003, where one of the photos clearly shows the distinctive reddish-orange color. Apparently MED paid to send several Argentine journalists to the Beartrack site, and their reported observations were extremely positive. Unfortunately, it is doubtful that any of the reporters have experience interpreting water quality or geochemical data, or even looked at any technical data.

Meridian presently operates a water treatment plant at the site to settle suspended solids. The EPA stated that the majority of the financial bond of \$10,300,000 U.S. has not been returned to the company because of concerns that future water quality problems may develop, and may require operation of a more complicated and expensive water treatment plant.

In addition, the EPA sent me a statistical summary of the official monitoring data for the Beartrack site. Of interest to the citizens of Esquel, this set contains no reported data from 1999 to the present. This may be partly due to the fact that the water previously discharged to surface waters was now being diverted into the South Pit. Most likely the pit walls and neighboring ground water had begun to go acid, and Meridian wished to submerge the reactive sulfide-rich rocks under water, to slow the acid-formation processes. However, the net result for the public is that they cannot readily verify to what extent mining activities may have degraded water quality, because no recent monitoring data have been made public for the surface waters (or ground waters) immediately downstream of the site. These can only be obtained through legal procedures.

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