

STANFORD UNIVERSITY
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SYMPOSIUM ON CORPORATE ENVIRONMENTAL DECISION MAKING

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AMAX Inc.

In Central Colorado, 40 miles west of Denver, the continental divide rises over 12,000 feet above sea level. In the summer the alpine landscape is covered with wildflowers and from the crest of the divide the view of the Rocky Mountains demands attention. However, the surface beauty of the area is not the only attraction. Beneath the soil lies the Colorado Mineral Belt, an area about 250 miles long, from 15 to 30 miles wide, and one of the richest mineral belts in the world.

In 1963, AMAX Inc.,¹ a widely diversified natural resource and mineral development company, acquired a molybdenum mine located near the surface of the divide. Geologists at the mine suspected that other deposits might exist nearby and began a systematic exploration of the area. After two years of exploration drilling, a massive molybdenum deposit, named the Henderson orebody, was discovered.

Molybdenum (often called moly) is a gray metal, somewhat heavier than iron and only three times more plentiful than gold. Its unique characteristic

¹AMAX Inc. began in 1887 as The American Metal Company, Ltd. In 1957, it merged with the Climax Molybdenum Company to become American Metal Climax Inc. AMAX Inc. became the legal name in 1974. With operations worldwide, AMAX's sales revenues in 1979 were \$2,865,000,000, of which \$687,600,000 came from molybdenum production from the Colorado moly mines--Climax and Henderson--excluding by-product tungsten production from the Climax Mine.

is that it makes iron, steel, and other metals stronger and more resistant to damaging temperatures while also making them easier to cast and significantly lighter. About 85% of moly produced is used in combination with other metals. Whether reducing the requisite steel in aircraft landing gear by 75%, greatly increasing the lifespan of railroad tracks, or showing up in automobiles, bicycles, and lightbulbs, moly pervades modern industrial society. Moly alloys are playing an increasingly important role in the energy fields. It has become an essential material in nuclear power plants, pipelines used in Arctic regions, and drilling equipment used far below the earth's surface in extreme heat. Moly is also being used in space vehicles and satellites. By reducing the weight of equipment, especially transportation vehicles, moly allows for more efficient use of oil and other energy resources.

THE HENDERSON MINE PROJECT

The Henderson project, which would insure United States self-sufficiency in moly for several years, had considerable potential to damage the environment. Mining the 300 million ton orebody, located 4000 feet beneath the crest of the divide within a National Forest, would involve huge tailings ponds² and their related water problems, road and plant construction, and power lines crossing delicate tundra above timberline. Solving these problems to the mutual satisfaction of environmental groups and the corporate officers of AMAX became the responsibility of Stanley Dempsey, now a Vice President of the company. Dempsey knew that AMAX would run into strong environmental opposition

²Tailings ponds are man-made ponds, created by damming a valley, used to store the slurry-like waste product after the moly has been extracted. For every 2000 lbs. of moly ore mined, there are 1990 lbs. of tailings that must be permanently stored.

so he went to his superiors and said, "This is one time when we really ought to step back and see if there isn't some better way to do it than slugging it out with environmentalists." Dempsey wanted to bring in environmental considerations at the concept stage, 9 or 10 years before mining operations would begin, and make the Henderson mine a model of environmentally sound planning.

With unsure feelings on all sides, a group was formed which consisted of a member of the Colorado Open Space Council, a professor of chemistry, the head of an ecological institute, a mountain guide, and four AMAX officials. The group, named "Experiment in Ecology," examined 36 potential sites for the processing of the ore and placing of the tailings ponds in an effort to minimize environmental damage. They also conducted an environmental inventory to establish quantitatively the nature of the territory that would be affected and helped the utility company determine how to place power lines with minimum deforestation. Helicopters were used to avoid damage from conventional equipment and trees that had to be removed were done so by horses lest tracked vehicles disturb the soil. Built at a cost of \$500 million, the Henderson Mine was the largest investor-financed project in the history of Colorado.

AMAX officials feel that the benefits from the "Experiment in Ecology" far outweighed the costs. Delays, protracted litigation, and governmental intervention were avoided, and the project came on stream as originally planned. Environmentalists feel that many potential problems were lessened and/or avoided due to the "Experiment in Ecology." Many mining executives and environmental groups feel that the Henderson Mine exemplifies how economically sound, environmentally sane solutions can be achieved.

The positive social and economic feedback resulting from the Henderson project has influenced AMAX's decision making process. Arthur Biddle, an AMAX official, describes the results as follows:

"Stimulated by our experience with the Experiment in Ecology and by our growing awareness that environmental issues were important to industrial growth and production, AMAX appointed Stan Dempsey to head a corporate-wide environmental committee in 1970. Three years later the committee became a corporate staff department. Then, in 1977, we formed a subsidiary firm to deal with all aspects of environmental activity.

That subsidiary, AMAX Environmental Services, Inc., plays a large role in initial project planning. Under this organization, the job of environmental planners is integrated with that of the traditional exploration and development engineers. The ultimate result is a greater coordination of all aspects of the project before commitments are made to a particular site, concept or design, or to government agencies.

In its corporate role, AMAX Environmental Services, Inc. considers the environmental and social factors of a proposed project. It does so by making assessments and by opening the planning to the public and private interest groups. This kind of open involvement is fraught with risks. But when the public sees a corporation such as ours making sincere efforts at integrating all concerns, they will be more willing to play an active, productive role--as opposed to an adversary one."

THE MOUNT EMMONS MINE PROJECT

AMAX Environmental Services, Inc. is now faced with one of its most significant challenges. One hundred miles southwest of the Henderson Mine there is an old glacial cirque near the summit of Mount Emmons in Gunnison County. One wall of the cirque has large red mineral streaks which resemble a woman in a long flowing dress. Ever since the first settlers saw her, she has been called the "Red Lady." From Crested Butte, a small town which lies three horizontal miles and 3300 vertical feet below the cirque, the Red Lady assumes different shapes as the day's lighting changes. The mountain she stands on is named after one of the great mineral geologists, Samuel F. Emmons, who explored and mapped the entire area. The Spanish were searching there for

silver as early as 1500 A.D. and by the 1880s silver and gold miners had combed the entire area. Coal mining took place from 1894 to 1952. After 1952, it seemed as if mining activities in the area were coming to an end. No one suspected that just a few hundred feet under the Red Lady was a moly deposit of approximately 155,000,000 tons, the third largest known deposit in the world.

Free world moly consumption in 1980 (excluding shipments to Eastern Bloc countries) is approximately 20% higher than in 1975. Stockpiles and government reserves have dwindled to minimal levels. According to the Journal of Molybdenum Technology, there is, in fact, no more government moly stockpile, and industrial inventories are at the lowest possible levels necessary to maintain operations. Many people feel that the portion of Mount Emmons underneath the Red Lady must be mined in order to meet the demand for moly.

AMAX had been exploring and test drilling in the Mount Emmons area for a number of years. In 1976, AMAX extended a road into the Red Lady Basin, near an old mine called the Keystone mine, and discovered the Mount Emmons ore body. AMAX purchased the Keystone mine property in 1977 and began mine feasibility studies. Shortly thereafter, the High Country Citizens' Alliance, an environmental group opposing the mine, was formed in response to the AMAX proposal.

The construction and operation of the Mount Emmons mine will have profound impact on the social environment of Gunnison County. The mine will require approximately 1400 miners which, with a multiplier of five for families and service personnel, would mean adding 7000 people to the area. Crested Butte has a permanent population of 1000 residents and Gunnison County about 12,000. Many residents of the county are deeply concerned about

the effect that such an extraordinary population explosion will have on their community, not only in the form of excessive demands for social systems, but also the demands for water and land. The mine project itself will use about 100-150 acres of land at the mine site and another 1000 acres at the mill and tailings ponds site. To operate the mill will require 2000 acre-feet³ of water annually.

The influx of people and mining facilities would create numerous environmental problems:

1) Air quality will deteriorate due to increased usage of the county's unpaved road, smoke and ash from additional wood burning stoves and fireplaces, and emissions from automobiles and trucks that would accompany all the new people and activities. Frequent air inversions, resulting from Crested Butte's being blocked on three sides by mountains, could cause air pollution far surpassing mere unpleasantness and pose a serious health hazard.

2) Water is a limited resource in the area and is needed for basic human use and agriculture. The mine would require a large quantity of water and has the potential to pollute a lot more. For sometime before AMAX purchased the Keystone mine, waters draining from Mount Emmons had washed high concentrations of zinc, lead, cadmium, iron, and copper from the old mine and tailings pond into Coal Creek, which runs through Crested Butte. With completion of a water treatment facility in 1981, these pollutants will no longer harm the fish and the organisms they feed on. However, the increased number of people and tailings ponds necessary for the new mine could be disastrous to the area's water supply.

3) Native plant and animal populations would be disturbed and possibly destroyed. Specific animals and plants of concern are: elk, grouse, deer, trout, sundew, and other species which may be identified as threatened or endangered. The development of the mine and associated facilities for workers could severely affect animal migration, reproduction, daily activity, and general wildlife and habitat diversity.

³Acre-foot--the quantity of water (43,560 cubic feet) that would cover one acre to a depth of one foot.

The questions facing AMAX since 1976 have been how to deal with these social and environmental concerns in their mine feasibility studies and construction plans. They could proceed as quietly as possible, battle with opposing environmental groups, and try to push through the permitting and construction. Although this approach is increasingly more difficult with the environmental regulations created in the 1970s, AMAX could treat the project as top secret, work behind high fences and closed doors, and refuse to communicate with opposing groups. Many people involved with the proposed Mount Emmons development feel that the experience with the Henderson mine and subsequent projects has prepared all sides for an open, non-adversary, communicative procedure for examining the feasibility of constructing the mine. However, there are some non-trivial differences between the Mount Emmons and the Henderson projects. First, the Henderson mine was developed before The National Environmental Protection Act, Earth Day, and the acute public awareness of environmental issues. Second, there was not a small, wealthy town comprised of highly educated people (Crested Butte) within three miles of the mine site.

AMAX officials are cognizant of the particular problems facing the Mount Emmons project and have spent considerable time and money attempting to resolve them. Public meetings have been held in Gunnison and Crested Butte to explain AMAX's presence in the area and its intentions. The Chairman of the Board and the President of AMAX have made themselves available to meet informally with community leaders. Subsequently, town leaders from Crested Butte and Gunnison were invited and flown to AMAX's corporate headquarters in Greenwich, Connecticut, to convey their concerns about the Mount Emmons project. Once these concerns were expressed, AMAX attempted to share the responsibility for constructive action with the communities. An example

of this was the Gunnison County concern about the effects of rapid population growth. AMAX asked a non-profit center for environmental problem solving, named ROMCOE, to organize and manage a tour of communities in Colorado and Wyoming which had experienced rapid population growth. The purpose of the tour was to provide the opportunity for Gunnison County residents to meet with officials and citizens from these communities to learn about their experiences --good and bad--and to discuss ways to reduce adverse impacts of rapid growth. Programs like this are attempts to pinpoint problems before they exist and to minimize them through prior planning. There are obvious risks for AMAX. Encouraging people to study the unpleasanties of other towns allows those opposing the mine to gather ammunition to fire at the Mount Emmons project. AMAX, however, feels that people have to be informed of the problems in order to prepare for them.

AMAX is also involved in a new permit management system--The Colorado Joint Review Process (CJRP). The CJRP began in 1978 when the Colorado Department of Natural Resources (later to be supported by a grant by the U.S. Department of Energy) began a study to develop a "rational, practical management system" that would coordinate federal, state, and local decision-making processes associated with major energy and mineral resource development. AMAS agreed to use its proposed Mount Emmons mine as a test case.

CJRP meetings, which are open to the public, have been held once each month since 1978. Participants identify and discuss the issues and concerns of the project, and encourage considerable public comment by special interest groups. Most people are excited about the potential of the CJRP to make regulatory agencies more efficient by understanding what the public concerns are and coordinating government actions.

CONCLUSIONS

AMAX's handling of the Henderson and Mount Emmons mines has resulted in its emergence as one of the leaders among mineral development companies in dealing with the environment. While the Henderson mine was an ecologically sensitive way of developing an ore deposit, the Mount Emmons mine adds another difficulty factor, that is, people in the area resist the project. There is a plethora of conflicting opinions regarding AMAX's sincere interest in social and environmental quality. Dorothy Johnson, Gunnison County Administrator and Chairperson of the CJRP, says "mining has taken a 180 degree turn for the better due to AMAX's cooperation." The director of ROMCOE claims that AMAX has shown "corporate responsibility at the highest level" and that AMAX "is a leader in the field of creative new ideas." However, many others feel that all the attention being given to "proper mine development" glosses over the issue of whether there should be a mine at all. Susan Cottingham, a member of the High Country Citizens' Alliance legal committee, says, "There are multiple uses of the land and mining is not necessarily the best. Minerals are not the only national priority. Healthy communities and recreation areas are just as important and both are being systematically destroyed." Dorothy Johnson is torn about the issue of whether the mine should be developed. "As a public employee, I feel AMAX could be good for economic reasons (i.e., increased job opportunities and tax revenues); as a private citizen of this beautiful county, I wish the moly was somewhere else."

AMAX has the legal right under the 1872 mining law to develop an ore discovery provided it meets all regulations. The question is: Are AMAX officials truly searching for economically sound solutions which satisfy people concerned with social and environmental quality?