

INVESTMENT IN HARDROCK MINERAL EXPLORATION AND DEVELOPMENT

OVERSIGHT HEARING BEFORE THE SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES OF THE COMMITTEE ON RESOURCES HOUSE OF REPRESENTATIVES ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

ON

DETERMINING IF OUR DOMESTIC INDUSTRY IS
COMPETITIVE IN THE INTERNATIONAL ARENA

JANUARY 31, 1995—WASHINGTON, DC

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INVESTMENT IN HARDROCK MINERAL EXPLORATION AND DEVELOPMENT

TUESDAY, JANUARY 31, 1995

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES,
COMMITTEE ON RESOURCES,
Washington, DC.

The subcommittee met, pursuant to call, at 9:45 a.m. in room 1334, Longworth House Office Building, Hon. Ken Calvert [chairman of the subcommittee] presiding.

Mr. CALVERT. The Subcommittee on Energy and Mineral Resources will come to order.

The subcommittee is meeting today to hear testimony on investment in hardrock mineral exploration and development. Under Rule 6(f) of the committee rules, any oral opening statements at the hearing are limited to the Chairman and the Ranking Minority Member. This will allow us to hear from our witnesses sooner and help members keep their schedules. Therefore, if other members have statements, they can be included in the hearing record

STATEMENT OF HON. KEN CALVERT, A U.S. REPRESENTATIVE FROM CALIFORNIA, AND CHAIRMAN, SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

Mr. CALVERT. Welcome members, witnesses, and the public to the inaugural hearing of the Subcommittee on Energy and Mineral Resources of the Resources Committee for the 104th Congress.

As we look forward to the work of this subcommittee over the next 2 years, we would do well to look back to last fall. The American people sent a message that they wanted change in the way we serve them. They were not happy with our performance, and if we don't change the way we conduct the people's business in the 104th Congress, then some of us won't be here for the 105th.

Fortunately for this subcommittee, 5 of our 14 members are freshmen, new to the House, new to the committee and new to us. I look forward to their full participation as we develop innovative policy for America's energy and mineral industries and workers.

I encourage them to ignore the old advice that freshmen should be seen and not heard. These days, 2 years may be a career—make the most of it.

Likewise, I would like to make the most of my chairmanship. America's basic industrial character is under tremendous strain. The industries we cover here are as basic as they get. The policies under which these industries operate have a ripple effect through our entire economy.

The simple truth is that everything in this room was either mined or farmed, from the aluminum skin of the airplanes that brought our witnesses here today, to the paper on which their testimony is printed, to the wood in this gavel; the Resources Committee holds sway over all the raw materials that make modern American life possible.

So if we want to expand American life and pass on the American dream to our children, we had better be decisive, reasonable, and rational.

In keeping with the theme sounded by Chairman Young of the Full Committee on Resources, we convene the first of what will be many oversight hearings. We will explore investment trends in the mining, oil and gas, and geothermal energy development industries. Our duty is to determine if our domestic industry is competitive in the international arena.

International, environmental, financial and regulatory forces all influence the investment decisions made regarding many energy and mineral commodities.

Before we rush in with a government-knows-best solution, we must determine what, if anything, is broken and how we might fix it.

In the hardrock industry, where explorers seek and miners extract many metals and nonmetallic minerals, the Western United States is the focus of much activity.

We should keep in mind that this activity occurs both on private lands and public domain lands managed by the Bureau of Land Management and the U.S. Forest Service.

Today's hearing is not about legislative provisions in past law or present mining reform bills. It is about starting to change the business climate of this country to attract new investment into the United States and to encourage domestic firms to stay here and create American jobs.

While I envision certain reforms of the act governing disposition of hardrock or locatable minerals from public lands to be part of the solution, at this point I rather doubt that amendments to the 1872 Act alone will quell investors' uncertainty about a U.S. mining project's feasibility.

For example, consider the permitting process under our jumble of environmental laws.

In Idaho, miners are frustrated, but not surprised to find that a Federal judge ruled that the Forest Service is enjoined from all permitting of activities in the watershed of the Snake River and its tributaries.

This is despite the fact that the National Marine Fisheries Service had already decided that at least two of the affected projects would not adversely affect the endangered salmon or sockeye.

Some of Ms. Chenoweth's constituents are rightly upset, and extremely so, about what this does to their livelihoods.

The stay that has been ordered until mid March gives cold comfort to those looking at a spring and summer of litigation.

I have my own stories from my district about the Stephen's kangaroo rat affecting activities on public and private lands. We all seem to have examples of unwarranted delays, bureaucratic inertia, conflicting policy told to us by workers and businesses in our

districts. With industries that must compete internationally, these local stories of legal delay and denial translate into lost jobs and lost opportunity.

That is what today's hearing and future hearings of this subcommittee are about, how our policies in Washington affect decisions across the Nation and in the marketplace.

Before I recognize the distinguished Ranking Minority Member, Mr. Abercrombie from Hawaii, for his opening remarks, I would like to introduce our Majority members. Hopefully, most of them will come in a little while, but I think I will introduce all of them in absentia. Then we will move on to Mr. Abercrombie's opening remarks.

Mr. Duncan, who is not here yet, is from the Second District of Tennessee. He is a veteran member of the full committee. Mr. Hefley from the Fifth District of Colorado is a veteran of the full committee also, and we are happy to have both their experience. The five freshmen members are Mr. Hayworth from the Sixth District of Arizona, Mr. Cremeans is also from the Sixth District, in this case from Ohio. He is one of the subcommittee's three members from east of the Mississippi.

Mrs. Cubin represents the State of Wyoming. She succeeds a dear friend, Craig Thomas, formerly of this committee. Since there are two Senators from Idaho, Senator Thomas has an easier job than the gentlelady.

Ms. Chenoweth represents the First District of Idaho. She follows a strong tradition in this committee for her State, following former Senator Jim McClure and Senator Larry Craig. By virtue of the lottery, I occupy the office which those two former members used to occupy.

Mr. Thornberry from the 13th District of the great State of Texas is also a member of the subcommittee. I look forward to serving with all of you, and now I would like to introduce Mr. Abercrombie. We have talked about the business of this subcommittee, and at his gracious invitation we had lunch a couple of weeks ago, and I look forward to a productive 2 years together working with the distinguished gentleman from the beautiful State of Hawaii.

**STATEMENT OF HON. NEIL ABERCROMBIE, A U.S.
REPRESENTATIVE FROM HAWAII**

Mr. ABERCROMBIE. Thank you very much, Mr. Chairman, mahalo and aloha to you and to all the members on the subcommittee. At the outset let me congratulate you on your selection as Chairman of the subcommittee.

I appreciate the opportunity to work with you and the other subcommittee members on the important energy and mining issues within our jurisdiction, and I applaud your decision, Mr. Chairman, to begin this session of Congress with an oversight hearing on investment trends in the mining industry. Other than Representative Nick Rahall, the former Chairman of this subcommittee and a leader of the effort to reform the mining law of 1872, none of the Democratic members have previously served on this subcommittee. I note that all the members on your side are also new to the subcommittee and five are new to the Congress.

While I may be new to the subcommittee, I am not unfamiliar with the controversy surrounding reform of the mining law of 1872, to which you have alluded. The House has voted overwhelmingly for the Rahall legislation, and I note Mr. Rahall's sense of timing is exquisite as he has just appeared while I am about to laud him for modernizing the laws concerning mining on public lands.

While we have been polarized in the committee in the past on it, the effort on the Floor has been bipartisan, with 60 current Republican Members voting for the mining law reform in the House in the last Congress. Unfortunately, we were not able to reach agreement with the Senate in conference last year.

In my view, the main debate over the mining law has evolved from *whether* to reform the law, to *how* to reform the law, especially at this time when such emphasis is placed on balancing the Federal budget. We can ill afford to transfer public lands for \$2.50 an acre and not charge royalties for the development of valuable minerals which are public property.

The taxpayers want us to run the government more like a business, but no sane business would manage its resources the way the government currently manages hardrock minerals on public lands. I anticipate the majority of the witnesses today will caution us about going too far in reforming the mining law of 1872. We give away public lands for \$2.50 an acre. We don't charge royalties. We grant generous depletion allowances in the tax codes, and yet the industry is investing more and more exploration money in Latin America, even before any changes in the mining laws are made.

I question whether that trend has more to do with new opportunities for private investment in Latin America than an oppressive climate for investment in the United States either today or in the future. Like Willie Sutton who robbed banks because that is where the money was, the multinational minerals industry above all makes its investment where the gold is.

Thank you, Mr. Chairman. I look forward to today's witnesses and even more in perhaps getting some questions and some answers in the context thus established. Thank you.

Mr. CALVERT. Thank you.

Next, I would like to introduce our first panel of witnesses. First, panel one—

Mr. ABERCROMBIE. Mr. Chairman, excuse me. May I ask permission to have some statements by the other members submitted for the record?

Mr. CALVERT. Yes. Without objection, so ordered.

Mr. ABERCROMBIE. Thank you.

[At time of printing, statements had not been submitted.]

Mr. CALVERT. OK. With the first panel, I would like to introduce first Dr. John Dobra with the Natural Resources Industry Institute, at the University of Nevada from Reno, Nevada, who flew out today; next Douglas Silver, President of Balfour Howell International from Englewood, Colorado, and Mr. John E. Young, Research Associate Worldwatch Institute here in Washington, DC.

I would like to remind the witnesses that under our committee rules they must limit their oral statements to 5 minutes, but their entire statements will appear in the record. We will also allow the

entire panel to testify before questioning the witnesses. I now recognize Dr. Dobra for 5 minutes.

**STATEMENT OF DR. JOHN L. DOBRA, NATURAL RESOURCES
INDUSTRY INSTITUTE, UNIVERSITY OF NEVADA**

Dr. DOBRA. Thank you, Mr. Chairman, for the opportunity to come speak. As you said, I am with the Natural Resources Industry Institute at the University of Nevada, Reno. The focus of my testimony will be on the gold industry, but perhaps maybe to begin with I should summarize what I think I am going to say. That is that the mining law controversy and the whole controversy over the Federal lands is really fundamentally no different than many economic policy controversies that we have in this country.

Many industries, from airlines to railroads, steel, and automobiles are trying to use regulations and their legislative process to limit competitors, limit access to markets to competitors and so forth. What we have here is a situation where miners, ranchers, loggers, recreational users of the Federal lands, environmentalists are all potential competitors for the use of that land, and recreational users and environmental users have been successful over the past several years in erecting regulatory barriers and using legislation to drive the mining industry off the Federal lands.

If Congress wants to do something about it, it needs to think about leveling the playing fields in terms of the regulatory process, as well as the legislation that was mentioned just before.

The first thing I would like to point out in talking about the gold industry is the cover of the attachment with the testimony, which is the U.S. gold industry study, and I believe up there on this chart you can see a bar chart which shows the historic production of gold in the United States.

You can see the first spike is the California gold rush in the 1850's, hit a peak of about 3 million ounces, then you see around the turn of the century the Klondike gold rush in Alaska, then in the 1930's there was another boom in gold that was really all over the United States, but primarily focused in the Black Hills of South Dakota. That resulted because of the devaluation of the dollar which increased the price of gold, and then you see in the 1980's the U.S. gold industry.

It is unprecedented, historically, in terms of its magnitude, and the other thing to notice about it, it is a very new industry, really got its roots or start in 1980, and from producing less than a million ounces of gold in 1980 we now produce over 10 million ounces. We are the second largest producer of gold in the world.

Nevada alone, where most of this activity is centered, is the fourth largest producer in the world, so what we have seen develop in the United States in 10 years is a world class competitive industry, and very low cost to produce. Because of its development in the 1980's, what we see is that the gold industry has become a lightning rod for a lot of the attention on the competition for the use of the public lands, and we have seen in the regulatory process where the hurdles that one must get over to get a mine permitted keep going up and up, demands for moratoriums threaten the existence of the mines and so forth.

Then, of course, we have the mining law reform. The result has been the flight of capital. We have another chart here that shows a world map and shows you the extent to which capital is leaving the country. In the 3-year period from 1992 to 1994, \$1.4 billion was spent on exploration and development in the United States. In contrast, \$2.2 billion was spent overseas.

The third chart you see there, the bar chart, shows the year by year, and what you see is that overall these expenditures are rising because gold prices have increased substantially over this period. They went from decade-long lows of \$320 per ounce to close to \$400, so we have seen an increase in exploration expenditures, but they increased primarily overseas, which is shown by the top part of the bar.

As a consequence, it should also be noted that most of the U.S. spending that is going on is at existing mine sites because it is easier to permit an expansion of an existing mine than it is to permit a new mine, and so forth, and plus the existing mine would be on patented land probably, whereas the other new mine would be on unpatented land and be threatened by new law.

Since I see I am about out of time, I would like to thank you again for the opportunity to be here, and I will be happy to answer any questions that I can.

[The prepared statement of Dr. Dobra can be found at the end of the hearing.]

Mr. CALVERT. Thank you. Next Douglas Silver, President of Balfour Howell International.

STATEMENT OF DOUGLAS SILVER, PRESIDENT, BALFOUR HOWELL INTERNATIONAL

Mr. SILVER. Good morning. My name is Douglas Silver. I am President and Chief Operating Officer of Balfour Howell International. We are a well-known publishing and consulting company that specializes in mineral information.

Our principal publication, *The Mining Record*, is 106 years old and is believed to be the oldest mining newspaper in the Western Hemisphere. Last year, we also started a new publication called the *Latin American Mining Record* as a direct reflection of the massive emigration of money.

Our consulting division works in a lot of advisory services; the research of which is the basis for the trends that I am going to talk about today. I would like to point out that in the North American mining industry, which would include Canada and the United States, there are approximately 2,100 companies. Less than a thousand of these companies are busy in the United States, and of the approximately 950 active in the United States, there are really only about 100, give or take a few, that account for the majority of the production, revenues, market capitalization and the profits. Therefore, when you analyze trends in the industry, it is very germane to study the flight or the movement of capital within these big companies.

Our research includes two concurrent trends going on. The first is an uncertainty. It is an uncertainty that the United States has no clear mineral policy, and there is a lot of evidence for this. First of all, we see prospective areas continually being put aside from

mineral exploration. Unfortunately, the same process that creates our beautiful scenic areas is also responsible for forming mineral deposits.

The second trend relates to an unmanageable permitting system which continues to get more complex, and leads to more delays. The third trend is a perceived concern of business; that there is frivolous obstruction of the permitting process, and as a consequence, not only can people not get their mines permitted, even though they are complying with all existing laws and regulations, but more important, there are additional delays which are very costly to the business sector.

Another area in which we are seeing changes is in the direction in the United States Geologic Survey which has become increasingly an environmental remediation study firm rather than a group whose primary objective is to help industry and to help the government develop a mineral policy which includes developing new areas for commercial exploration and development.

The Mining Law change is an issue, but the problem with the Mining Law change is that it is becoming an environmental law. If you look at the precepts of the Mining Law, it was not intended to be an environmental law and that is adding additional confusion. Then, of course, is the final issue of royalties.

Collectively, all these different events are creating an uncertainty. Business can no longer depend on government to provide its guarantees that if the companies comply with your rules, they will be allowed to operate. Why should they invest their money in an environment where you can't operate?

Unfortunately, you can't build mines if you don't discover them. Therefore, the exploration spending is also very important to study.

We have done extensive research which shows there is no evidence that the United States is picked over, that the deposits that are being discovered today are just as powerful, just as large as they were 20, 30 years ago, yet we see a flight of capital. It is the perceived uncertainty and the trust that you can conduct business in the United States that is the basis for this flight.

A second force is also occurring, and this is the attraction of foreign capital. Many emerging democracies around the world realize that natural resource businesses are critical to building their economies, and in the case of gold, serves as a very important underpinning for their currencies. These countries are proactively trying to attract foreign capital.

The way they are doing this is quite varied, and includes everything from changing their foreign investment agreement, changing their mining laws, providing tax holidays, no royalties or reduced royalties, allowing companies to denominate their mines in U.S. dollars, and keep their money in U.S. banks. Just as important, though, is that the foreign governments realize that to attract business investment you have to be responsive to the timing needs, and that when a company comes in and agrees to invest hundreds of millions of dollars in a new project, the government has to be responsive in getting the appropriate permits and regulations approved in a timely manner.

The other thing we have heard are complaints that the reason that the mining industry is going overseas is so that they can skirt

their environmental duties here in the United States. There is simply no truth to this. First of all, public shareholders would not tolerate it; second, it is a bad business practice; and the third is a lot of these countries are immediately adopting any new EPA regulations. This reminds me of the story of a Mexican official I was speaking to who said, "We believe very strongly in the EPA policies except for the silly ones." Many of these countries are adopting policies that are rational.

Finally, another reason companies are going abroad is because the national government is selling their world class deposits, because they need money and they need private investment. Collectively, the issue of uncertainty in the United States and the attractiveness of investing abroad is creating the path of least resistance, and that is the reason why companies are moving their investments overseas. Thank you.

[The prepared statement of Mr. Silver can be found at the end of the hearing.]

Mr. CALVERT. Thank you for your testimony. Next Mr. John E. Young, Research Associate, Worldwatch Institute, Washington, DC.

**STATEMENT OF JOHN E. YOUNG, RESEARCH ASSISTANT,
WORLDWATCH INSTITUTE**

Mr. YOUNG. Thank you, Mr. Chairman, and thank you to the members of the subcommittee for the chance to testify today. My name is John Young. I am a senior researcher with Worldwatch Institute, where I have been since 1988.

Worldwatch is a nonprofit, nonpartisan environment and development policy research center here in Washington. Since 1990, the interrelated issues of resource extraction, waste, and materials policy have been a major focus in my research.

The major conclusion I have drawn from that research is that our problems with waste are only a symptom of a much larger problem—a global economy that is built on the inefficient use of raw materials and energy. I am here today to urge the subcommittee to support strong reform of the laws governing nonfuel mineral extraction in the United States, continuing along the lines of the bills that reached conference committee in the last session.

I share your concern about the competitive position of the U.S. economy, and I believe that one of the best ways to improve that position is to reform our policies on extractive industries, in the context of a broad program to encourage efficient use of materials in the U.S. economy and to reduce the environmental impacts of resource extraction.

I do not believe that the mining industry is rapidly fleeing the United States as implied in some recent press reports. This country remains the world's largest nonfuel mineral economy, producing 13 percent of annual global output by value, and no clear downward trend in the value of U.S. mineral output is yet apparent. Indeed, over the last 15 years the United States has played host to the largest gold rush in world history.

U.S. gold production has increased at least 11-fold since 1980. This trend is quite clear and very dramatic. I also do not believe that reform of the 1872 Act as proposed in last year's bills would have a devastating impact on the U.S. industry. U.S. mining firms

pay royalties and/or substantial other taxes in a number of U.S. jurisdictions and foreign countries, such as Australia and Canada, and they routinely pay much higher prices for the right to mine private lands.

The mining industry is subsidized through the virtual giveaways of public land and minerals that occur under the provisions of the General Mining Act and through the special tax allowances it receives. It is also currently exempted from hazardous waste regulation under the Resource Conservation and Recovery Act and is one of the few industries not required to report to the Federal Toxics Release Inventory, which does cover all the manufacturing industries in the United States.

Subsidizing mining firms and exempting them from environmental regulation will hurt, not help, the United States' overall economic competitiveness. The mining industry has created dozens of large Superfund sites that will collectively cost billions of public dollars to clean up. Weak regulations will create more Summitvilles and more Berkeley Pits.

I understand the industry's frustrations with slow public decisionmaking about mineral projects. However, I believe that these delays occur primarily because this country is a democracy. We believe that it is appropriate for citizens to be involved in decisions about uses of public and private land that may have significant impacts on public resources or on neighboring properties.

The United States is a leader in environmental protection. I do not believe that we should lower our environmental standards to match those of poor, sometimes authoritarian foreign regimes that are desperate to attract any investment, often without regard to the future liabilities that mining projects may create. I would support the development of better integrated, multimedia permitting processes for mineral projects, which may help reduce bureaucratic delays, but such changes should be made only in the context of strengthening, not weakening, protective measures for public health and the environment.

The mining industry has experienced significant job loss in recent decades, primarily as a result of increased mechanization. I understand the difficulties that these employment declines have created in many communities. I believe, however, that the Federal revenue now being lost through fire-sale prices for mineral-bearing public lands and the tax dollars that will have to be spent cleaning up former mineral sites could have stimulated much more economic development if invested in other activities.

The mining industry is now among the least labor-intensive sectors of the U.S. economy. I urge you to look at the big picture as you develop new policies for economic development and regulation of extractive activities in the United States. Thank you again for the opportunity to testify, and I am including some additional material for inclusion in the record.

[The prepared statement of Mr. Young can be found at the end of the hearing.]

Mr. CALVERT. Thank you.

I will now recognize members for questions. We will do this alternating from the Majority side to the Minority side. First, I would like to recognize Mr. Hayworth.

Mr. HAYWORTH. Mr. Chairman, thank you very much for the opportunity and also thank you to the witnesses who have come over today. I listened with great interest to the statement of the Ranking Minority Member, and as much as he decried the apparent polarization, I think implicit in his opening statement was a point upon which many good people can disagree.

Somehow the comparison of legitimate mining industries and interests to bank robbers I personally take issue with, but we will continue as this goes along.

Let me first turn to Mr. Young, and Mr. Young, we thank you for coming out this morning and we thank you for your statement. It is quite voluminous. I believe the gist of your argument is that society undervalues the true cost of minerals, leaving succeeding generations to pay for the damage to the environment wrought by past and present miners. Whether or not I agree with this premise, in the context of today's hearing topic, what do you suppose our society should do about this?

Mr. YOUNG. I think we ought to promote mineral policies and other extractive industry policies that encourage efficient use of the products of those industries. What we are doing at this point is effectively subsidizing the production of primary materials—primary minerals, timber, and other extractive products—and at the same time discouraging the recovery of those materials and their efficient use in other industries.

I believe that the most productive investments we could make in formulating a national materials policy would be to examine where the unpaid costs are, particularly the environmental costs of producing these products, and try to figure out how to make sure those are included in the price of these materials so that we can actually level the playing field between primary and recovered products.

Mr. HAYWORTH. With reference to recovered products, what are the cost impacts of recovery? You seem to imply that it is much more economical to recover products than to have primary resource mining.

Mr. YOUNG. It is considerably more economical, and in particular, it is considerably less environmentally damaging. If you look at the mining industry globally, it is responsible for about 5 to 10 percent of world energy use. This includes smelting as well, 5 to 10 percent of world energy use on an annual basis. It is probably the single largest producer of waste on the planet.

It is responsible for much of the environmental degradation now going on in relatively pristine areas. If you compare that with the impacts of recycling materials, and even more importantly the impact of not having to use materials through better design, I think you will find that those impacts are significantly less.

Mr. HAYWORTH. Let me turn to the other two witnesses with us today and just get their points of view. Mr. Silver, based on what you are hearing from Mr. Young, does he offer an accurate assessment of the situation in your mind?

Mr. SILVER. I think I would disagree with a couple of his conclusions. When he talks about a more efficient use of materials, I think the real question he should be asking is who are using these materials. Maybe we need to create a society that isn't so consump-

tive so that there is less of a need for metal, but so far, as far as I can tell, when I look at my checking account, it doesn't occur in my household and it doesn't occur in a lot of other Americans'.

We are a consumptive society, and as long as we need metals for our cars and our airplanes and our skis and our backpacks and everything else, we are going to continue to have a need to mine them. I agree with his concept that you should become more efficient with the use of materials. I think that recycling does have an important role in the future, but with the possible exception of the aluminum industry, for most of the other industries it is very difficult to recycle at the level that he thinks we should be doing.

Mr. HAYWORTH. Dr. Dobra, of course, you pointed out during the course of your testimony the increased efficiency, in essence, in the ability to mine gold in the United States. Mr. Young made mention of it and was implying that our mineral recovery industries are not in jeopardy here in this country. Why with the increased efficiency are we facing problems now in the mining industry? Is it primarily the increased governmental regulation?

Dr. DOBRA. Yes, sir. You have to distinguish between two things here. One is the existing mines that we currently have. These are, as we say, wasting assets. In other words, they are ore bodies that are being produced and as they produce from them, the amount of reserves decrease.

If we are going to have a sustained industry in this country, then somebody has to go out and find more reserves to replace those that are being produced today. What we see happening in the normal industry cycle is that as mines are depleted, they are reclaimed and then new ones are discovered and opened.

What is happening now is that rather than explore and develop U.S. properties, we are seeing exploration and development going abroad. I would agree with the statement that Mr. Young said, that the proposed changes in the mining law from last session would not have a major catastrophic impact on the current industry. Well, that is because these are existing mines. They are largely patented.

In the gold industry 88 percent of gold produced comes from patented claims, so they will be largely unaffected. They already have permits, so rising standards aren't going to be a problem. The problem with what is being proposed is not today's mines, but the future's mines. And the future's mines, if you look at the trends in exploration spending, will not be in this country. They will be some place else.

Mr. HAYWORTH. Thanks very much. I appreciate the time, Mr. Chairman. Thanks to the witnesses again.

Mr. CALVERT. Thank you. I would like to recognize other members. I would just like to remind everyone that we are on a 5-minute rule, and so I would like to turn it over to Mr. Abercrombie.

Mr. ABERCROMBIE. Thank you very much, Mr. Chairman. I would like to ask Mr. Silver, you made some reference to Mexico, some advice from Mexico. I am not quite sure advice from Mexico is something that is going to strike a chord of credibility here today, but I wasn't clear exactly what that advice was. It had something to do with environmental policy. Could you state what that is?

Mr. SILVER. The point I was making is that there are many foreign governments that are adopting environmental policies along

the line of what the EPA proposes. However, some of these countries believe that some of the policies are silly, and therefore they will only adopt the ones that they think are rational policies.

Mr. ABERCROMBIE. Rational in the context of those countries?

Mr. SILVER. Rational in the context of those countries and in the balance between the environment and business needs.

Mr. ABERCROMBIE. Could you cite one of those or several of those for me where the environmental laws make more sense? Pick a country, maybe we could take Peru and Ecuador, for example.

Mr. SILVER. The comment that I made was given in context to a discussion I held. I would be happy to go back and try to research it and provide you with examples if you would like.

Mr. ABERCROMBIE. Could you do that please?

Mr. SILVER. Yes.

Mr. ABERCROMBIE. Thank you very much.

You said that part of the encouragement of the foreign governments as opposed to what we have under the current mining laws is, for example, to keep U.S. dollars in U.S. banks and a minimum of regulation, yet you were making a claim about environmental laws and other laws being just as strictly enforced.

It seems to me that you are making the exact opposite argument, that the reason that the money is being invested in these foreign areas is that the government essentially is allowing the companies to exercise virtual sovereignty on their own.

Mr. SILVER. No. Denominating a mine in a foreign country in U.S. dollars is a way of hedging your exchange rate risk, so your point is not true. The second point I was referring to is that these foreign governments do have regulations, they have mining laws, they have environmental laws, but they also have the ability to process the applications and process the review system in a way that companies have comfort that there will be light at the end of the tunnel, and they will be allowed to construct and operate the mines.

Mr. ABERCROMBIE. Do they have a way of doing that, did you say?

Mr. SILVER. Yes, the nature of their process on how they permit mines is such that companies can set a time horizon and that if they meet all the letters of the law, they can go ahead and build the mine and operate it. There is not that same sense in the United States right now.

Mr. ABERCROMBIE. What do you mean by sense?

Mr. SILVER. There is a perception by the companies that even if they meet all the letters of the law, they still may not have the ability to build the mine because of injunctions, delays and the complexity of the permitting system.

Mr. ABERCROMBIE. So it is not complex in other countries?

Mr. SILVER. It does not appear to be as complex as it is in the United States

Mr. ABERCROMBIE. I imagine it isn't.

Mr. SILVER. I think you have also the problem here in the United States that the special interest groups have the capacity to delay the projects for so long. We don't see that in the foreign countries.

Mr. ABERCROMBIE. I imagine you don't. Dr. Dobra, you made a statement. I want to make sure I understood you correctly. You

said that mining is being driven away from the Federal land; is that correct?

Dr. DOBRA. Yes, sir, that is what I said.

Mr. ABERCROMBIE. So the mining spike that you showed there, is that principally in private lands?

Dr. DOBRA. No, sir. What is occurring is that, again, that spike in that chart reflects production on land that has already been patented. When we talk about what is being driven away, obviously you can't drive a mine offshore. It is here. What is being driven away is the exploration and development dollars that would create a new mine to replace those when—the current ones we have in the United States—when they close, when they run out of ore, so what is being driven away is the future of mining, not currently.

Mr. ABERCROMBIE. When you say being driven away, in the context of the statement just given from Mr. Silver, isn't it a little more accurate to talk rather about flight of capital given these opportunities, these magical opportunities that exist in other countries not to have to conform to various standards that are required here in the United States? I don't understand exactly what the threat is in the United States as opposed to the opportunity for multinational companies to take advantage of foreign investment.

Dr. DOBRA. Well, the response I would have to that, and I have been asked this many times, is that these foreign investments for the most part have yet to prove successful. We have some of these projects that have started producing and so forth, but what is really occurring, and many of the companies won't say this because they don't like to inform their stockholders that they have just put their money at risk, but much of this investment that we saw on these charts has yet to produce producing mines, and as a result it is not a forgone conclusion.

Mr. ABERCROMBIE. So then stability, political stability among other things, might be a distinct advantage, even if it has to be in a country like the United States, which according to at least some of the testimony, seems to be so arbitrary and difficult?

Dr. DOBRA. Political stability is always important, and I think what we are seeing is that some people are now finding it in places where—or at least thinking they are finding it in places where it didn't used to exist.

Mr. ABERCROMBIE. Thank you very much. Mr. Chairman, I see the time is up and I expect there will be more than one round of questions and I don't want to abuse the privilege. Thank you.

Mr. CALVERT. Thank you. Next, Mrs. Chenoweth.

Mrs. CHENOWETH. Thank you, Mr. Chairman. Before I begin my questioning, I wonder if the Chairman would allow me, with unanimous consent, to submit the statement of FMC Gold Corporation into the record in its entirety. It is an outstanding statement of what is happening here in the United States and why companies are having to move to foreign countries.

Mr. CALVERT. Without objection, so ordered.

[The information can be found at the end of the hearing.]

Mrs. CHENOWETH. Thank you, Mr. Chairman. I will try to stay within my 5-minute limit, but I found the testimony just fascinating. Dr. Dobra, you mentioned that—in fact the Ranking Minority Member had mentioned in his opening statement that this public

land is up for mineral ownership for \$2.50 an acre, and, of course, Sam Donaldson also pushed that very widely in the media. You made a very interesting statement, Dr. Dobra, where you said \$1.4 billion.

Mr. ABERCROMBIE. Excuse me, I take it all back if Sam Donaldson is associated in any way with something I said.

Mrs. CHENOWETH. Well, really, I would think that would be a compliment. Dr. Dobra, you mentioned \$1.4 billion was spent in the United States for exploration. Calibrating that down to per acre, against a patent, how much is it costing United States companies to reach that point where they put the filing fee down of \$2.50?

Dr. DOBRA. The BLM Nevada office has a pamphlet they put out to help people apply for patents on claims, and the Federal Government tells prospective people seeking patent rights that they should be prepared to spend about \$38,000 per claim, which is a 20-acre claim, so it is just under \$2,000 per acre is being spent to patent it.

Now, they spend the \$2,000 per acre to have the right to spend \$2.50 per acre. Frankly, if they raised the patenting fee to fair market value, which in many places in Nevada might only be \$150 to \$250 an acre, I don't think anybody would complain because the value that you get off that land that generates jobs and investments and so forth is so much greater than that, that it is worth paying market value for the land, so currently they are paying far more than market value for the land, for the right to mine, but that money is going to support the regulatory bureaucracy rather than going directly into the Treasury.

Mrs. CHENOWETH. Thank you, Dr. Dobra.

Mr. Silver, my question to you is what is happening in the overall picture of the United States in its ability to produce out of this continent the demands for minerals in this high-tech industry? Is it true that we are becoming dependent on foreign countries for mineral imports to meet the demands of the high-tech society that we live in?

Mr. SILVER. The question is very commodity-sensitive. I think some of the points that we can see are in the copper industry. For instance, although the United States is a very large copper producer, there is probably an overwhelming sense that the Japanese ultimately control the copper industry because they control the smelters where we process them.

Why do they control the smelters? Because we don't build them anymore. In the gold industry, because people are not actively exploring as much in the United States anymore, we don't have as many deposits being discovered, which means we won't have as many new mines, even under favorable metal prices.

The United States, as I mentioned, is a very consumptive country. We consume an awful lot of the world's products. As we continue that behavior, and as we have less mining in our country, we are going to become more dependent on foreign governments and foreign supplies, and the question is are we prepared for that? If the government feels that we have sufficient economic and military options at our disposal that we can always guarantee a raw supply from other countries, then it is very easy to rationalize the current mineral policy.

Mrs. CHENOWETH. Mr. Silver, are we currently able to produce enough molybdenum in this country to meet the demands of our space industry, our military industry and so forth?

Mr. SILVER. I haven't studied molybdenum in awhile. I know the metal prices are high right now and the Climax Mine in Colorado is reopening, and it is probably still the first or second largest molybdenum deposit in the world. If they reopen it, we will have ample supply.

Mrs. CHENOWETH. Thank you, Mr. Silver. Mr. Young, I have a couple questions. I found your testimony fascinating. You indicate that there is a waste or an indifferent use of minerals in the United States. Could you be specific about that?

Mr. YOUNG. I can certainly give you a few examples. Probably the most dramatic example that I can think of, in terms of natural resource damage and waste of both materials and energy would be in aluminum, where, despite the fact that we recycle a very substantial proportion of the aluminum and the aluminum cans in this country, if you look at the electrical energy used to make virgin aluminum, the amount of aluminum thrown away in the United States each year requires enough electrical energy to produce to power the city of Chicago each year.

It is an extraordinary amount of power. We recycle significant amounts of material in this country. I believe, however, we don't recover anywhere near as much as we could were minerals and other primary products priced at their true cost.

In other words, we are going back and paying to clean up Superfund sites, such as the Berkeley Pit and the whole Clark Fork complex in Montana—such as Summitville, which is the most recent disaster we have on our hands—and those costs are not included in the price we are paying for these minerals.

At the same time, what that does is create a major disadvantage for industries that recover secondary materials. They don't receive the same kinds of special tax treatment (depletion allowances) that the industry receives. They don't have any particular help from the Federal Government and very rarely from State governments in terms of their economic development. For more details on this, I would point to the paper I am submitting for the record.

Mr. CALVERT. If I can interrupt for a moment, we are going to have an opportunity to come around to all the members and ask questions, and we will have an opportunity for a second round, so why don't we move to the next member, and then we will be back in a moment. Thank you.

Mr. Rahall.

Mr. RAHALL. Thank you, Mr. Chairman. I want to thank the Ranking Democrat for putting my opening statement in the opening debate as well. You know, I often draw the analogy in this whole exercise on reforming the Mining Law of 1872 with what we experienced in the coal industry in the 1970's up to the final enactment of the Surface Mining Reclamation and Control Act of 1977.

I further draw the analogy with what happened in the coal and utility industries leading up to the 1990 Clean Air Act authorization, and that analogy is that from the industry, from the utilities, from even the unions during those debates, all we heard was gloom and doom over how enactment of such legislation would drive the

industry offshore, would put the nail in the coffin of the coal mining industry, et cetera, et cetera. It went to the point where unions, industry, utilities all were faced with such uncertainty during these whole exercises that they really didn't know what to expect.

They couldn't make sound business decisions because of the uncertainty of public policy that was being debated at the time. Today decades after enactment of SMRCA, we find we are mining more coal than ever. Yes, we still have problems in the coal industry, unemployment, et cetera, but that is not because of SMRCA. We have a more even ball playing field among the different States within the coal industry because of the action we took in 1977, and we find that industry is able to make more decisions about their future now based upon public policy that they know they are going to have to experience.

I guess my question, Professor Dobra, to you is, is there this realization now within the hardrock mining industry, at least some within the hardrock mining industry, that we have got to end this uncertainty over this public policy debate on reform of the Mining Law of 1872 and let's look at a responsible bill with which we can live and work under in the future and make sound business decisions?

Dr. DOBRA. Well, thank you, Mr. Rahall, for the question. Obviously, I do not speak for the gold industry or the mining industry. I work at a university, but my sense of the answer to your question is that I think that view that some resolution to this whole thing would be desirable, it is spreading throughout the industry. That is, again, my view of what I observe people doing. But, again, I think the key word that you said is reasonable reform, and defining exactly what that means has always been the problem, as you are aware.

Mr. RAHALL. I appreciate that response. The whole point of this hearing, that we are driving hardrock mining companies offshore, is certainly nothing new. We have heard it before. We have actually seen the mining industry going offshore for decades now. It is nothing that has happened just because of the advent of debate on reforming the Mining Law of 1872.

The copper industry went to Chile, for example. Their mines got nationalized, now they are back in South America. Who knows, this time around their mines may or may not eventually get nationalized, but the point is, and I would ask the panel, wouldn't you agree that U.S. firms have been going offshore for decades, and what is so new and startling about now hearing that they are continuing to have a flow of capital off our shores?

Mr. SILVER. I would like to respond to that. As I said in my opening remarks, there are really three issues that are working concurrently and somewhat independent. The first is yes, the companies do need larger deposits and there are some fabulous opportunities overseas.

The second is, yes, the foreign governments are opening up to foreign investment again after they nationalized them a few years ago; and the third is that while all those enticements occur, we have this uncertainty, and your comments about uncertainty in the coal experiences are very germane. We are in that period of uncertainty right now.

I think the industry does want to see a response and get on with it. There is a difference, though, in today's market. First of all, if you look at the global economy that all industries are participating in, there has become a rapid intolerance of dictatorships and autocracies around the world, and it is much more difficult for them to come back into power.

When they are being removed, they are being replaced with individuals who have very high educational credentials from some of the best schools in the world. Then, of course, the third piece is that you have the ability now to finance overseas operations using international banking organizations which also help you safeguard against inevitable nationalization and other takings of the properties.

Mr. RAHALL. Since you chose to respond to that question, Mr. Silver, let me ask you further, you are saying that other countries are adopting what they view as sensible EPA guidelines. Who is enforcing that in these other countries? You mentioned a permitting process as being much more short-circuited than our permitting process because you don't have the special interests involved.

Well, you know, I am proud to say we involve special interests. If the public, through the citizen input section, has a right to have their voice heard on these permits, if the working men and women have a right to have their voices heard, if this is special interests, I am proud to stand up and say they have a right to be heard in this whole process.

Mr. SILVER. I agree with you, sir. I think everybody should have a right to provide their input. The problem is that 10 years ago you could permit a mine in the United States in 6 or 8 months. Now, it may take you 3 or 4 years. It may be forever because of the nature of the process.

My only comment is not a doom and gloom one, but as long as business cannot reasonably judge when they can receive a return on their capital investment, they are going to be reluctant to make that investment. I don't have an answer, but it has become a growing problem of the timeframes involved.

Mr. RAHALL. Thank you.

Mr. CALVERT. Thank you, Mr. Rahall.

[The prepared statement of Mr. Rahall follows:]

STATEMENT OF HON. NICK J. RAHALL II, A U.S. REPRESENTATIVE FROM WEST VIRGINIA

Mr. Chairman, I want to commend you for holding this hearing if, in fact, it represents the first in a series of hearings that will lead to action on legislation to reform the Mining Law of 1872.

As you know, I have reintroduced as H.R. 357 the version of mining law reform legislation that passed the House during the last Congress.

This is a bill which enjoyed the support of 70 Republican Members, including now Speaker Newt Gingrich.

In fact, 239 Members who voted for the bill at that time are Members of the 104th Congress.

I would further note that H.R. 357 already has 31 cosponsors, including several Republicans. This is because the issue of mining law reform transcends party lines.

I believe that all of us—conservative, moderate or liberal—have a vested interest in the proper stewardship of the public domain.

And I think that the American people have had just about enough with the corporate welfare system that guides much of how we manage these lands; whether it be mining, grazing, or timber harvesting.

As such, Mr. Chairman, while we may have disagreements with issues such as how much of a royalty should be charged for the production of gold from Federal lands, I hope that we can at least agree that some level of royalty should be imposed and work from there. And I do look forward to working with you, Mr. Abercrombie and others, in that regard.

In conclusion, and with respect to the topic of today's hearing, I am not ready to concede that regulations in this country are driving the hardrock industry offshore. The simple fact of the matter is that you mine where the minerals are located, and, more specifically, where the highest grade ore bodies are located.

Further, I am not ready to concede that this country should treat its environment, and its workers, in the same manner as does some Third World nation. If they want to leave future generations of their citizens a legacy of acidified streams and scarred landscapes, I guess that is their business.

But it should not be the practice here.

Thank you, Mr. Chairman.

Mr. CREMEANS. I wanted to ask Mr. Silver, I hope this panel doesn't appear to be selecting you, Mr. Silver, but you made a comment about the investment climate abroad. Is there any way that you would like to comment on how the investment climate compares here with that abroad on the short term and the long term?

Mr. SILVER. Well, yes. In the short term we still have sizable investment in the United States. Most of it, though, is generally applied to expanding or modifying existing operations. Where we are concerned from the domestic investment picture is that there are less and less new mines being proposed, and that is a consequence, again, of this uncertainty of how can we invest hundreds of millions of dollars when we don't have a sense of when we may get our permits or if we will get them at all, and that uncertainty, it is the reluctance of getting them that is forcing people not to make those commitments and move their money elsewhere in the interim.

Mr. CREMEANS. You know, there has been a great deal of discussion about the Endangered Species Act, and yet we have been asked as a Congress to examine that very carefully. I think you realize that. I think we all realize the goal is one that is widely shared and is laudable, but I think the mining industry has charged us with a process that actually impedes responsible development of these resources. If you had it within your power, how would you address that issue?

Mr. SILVER. If I had it within my power, gee, that is an interesting concept. I think what needs to be done is that you have to define a policy that fulfills your needs, and is a policy that companies can understand and that if they meet the conditions of that policy, then they are allowed to operate without further intrusion.

How you do that I don't know, but, for instance, the situation in Idaho right now with the salmon, it is a concern that companies have already spent their money and now it appears that the rules are being changed on them. That is a big deterrent. If you don't have any guarantee from the government that if you meet the letter of the law you can't continue to operate, and you are setting the rules under which we operate, so you can't say, well, we are not changing the rules, it appears to be more from the government's side.

On the other hand, I am not an environmental specialist and I really don't care to go into it any more than that. I am out of my area.

Mr. CREMEANS. Dr. Dobra, I have one lingering comment finally. I know in the mountains of West Virginia and in the hills of southern Ohio we have a thing called depletion allowance. Do you have a comment on that as it relates to your particular State, perhaps the Northwest?

Dr. DOBRA. The depletion allowance?

Mr. CREMEANS. The depletion allowance.

Dr. DOBRA. The depletion allowance is a tax law, and it allows the company to deduct for Federal income tax purposes the part of their investment in discovery of the ore body. It generally benefits the mining industry.

As far as I have been aware, it has not been part of this reform or the public lands debate because the focus of this has been more on the barriers or erecting barriers or tearing down barriers in terms of the regulations to get on the land, and the result of those barriers has been that, for example, as Mr. Silver said in 1986 FMC Gold, the company that submitted this statement for the record, permitted a mine in Nevada in less than a year.

It is currently waiting, going into its fourth year of waiting for permits on a mine in Idaho, and it is simply because the rules keep changing in terms of what is required to get permits as you go along.

Mr. CREMEANS. Thank you.

Mr. CALVERT. Thank you. Mr. Dooley.

Mr. DOOLEY. Thank you, Mr. Chairman. Following up on that, Dr. Dobra, I think what a lot of us are struggling with is that we understand there needs to be some regulatory reform so there is a greater certainty than Mr. Rahall talked about so that you can provide a better investment climate for companies who are trying to make those responsible investments, but I guess the other challenge that we face as a body is really as it relates to public lands, and when we have what is in fact assets which are citizens' assets is, how do we appropriately value those to ensure that the taxpayers are getting the return from what are national assets?

When I was looking through your report, you have the industry cost structure on page 16 where you profiled some of the various costs and broke them out. You had the royalties at about \$12 an ounce which figures I guess to about 5 percent roughly of the production of an ounce of gold, I guess, at the 1992 prices. How does that differ or does it differ from public lands mining versus private lands?

Dr. DOBRA. Those royalties that you see in there include both. In fact, most of those royalties are lands that have gone through the process of being transferred via the mining laws from Federal ownership into private ownership. In the survey that we conducted to do that report this year, 88 percent of all gold produced in the United States comes from patented private land.

Mr. DOOLEY. That was 88 percent?

Dr. DOBRA. Eighty-eight percent. That was why earlier I said that you impose a royalty—when the royalty first hit, that figure, 88 percent was not really known. It was because people like myself who did research on the industry hadn't looked very closely at whether or not land was patented or not, and since the issue has come up, we have looked at it, and we have had some large patents

granted and there are a lot of patents in the pipeline, so those were private land, so virtually all of that 3 percent is on private land.

I guess the more general issue about the royalty, whether it is 3 percent or 5 percent is that the royalty is currently paid to the person who discovers the resource in the sense they have a property right, and they have done some work that added wealth to the public land by discovering that resource. If they didn't actually discover it themselves, then they purchased it from somebody to hold it so that it could be developed, but the point is these people have added value to the economy by their activity, by their initiative.

The Federal Government owns a lot of land with undiscovered minerals on it. It makes no effort to—or not much of an effort to discover minerals. The Federal Government simply sits, takes the position of a landlord, sort of disinterested in the land and essentially has consequently never taken a royalty interest because it has been satisfied to collect income taxes from that.

Now, if that changes, what you need to keep in mind, I would suggest, is what is the value of what the Federal Government owns and what it owns in undiscovered minerals, so you need to keep an incentive for people to find minerals so you can have an industry in the future and somehow split that 3 to 5 percent that you see there between the discoverer and the Federal Government.

Mr. DOOLEY. I guess that what I would say, though, is that the question of 3 to 5 percent, I guess, is subject to question. I would agree that there are undiscovered minerals on a lot of Federal lands, but I guess, again, the challenge that we have to face is that there is a lot of interest among the general citizens on how we extract and recover those and what is going to be the return to whether or not we can make the judgment that that is an appropriate exercise.

I guess we are seeing this on timber. We are seeing it on grazing fees. We are seeing it on mining rights where the broader public is really trying to question, is the return that we are getting from the utilization of these public lands and public resources, is that return justifying some of the cost? I guess when I get to some of the points I think Mr. Silver was making, and I am in private business, is when I look at these 3 to 5 percent on royalties whatever, when I look at the cost on the regulatory side, I would say that that would probably almost pale in comparison. It would seem that if we could find a reform that creates greater efficiencies in the permitting process or some of the regulatory side that there ought to be an ability or a willingness to provide greater compensation to, I would say, the taxpayers on the royalty side.

Mr. Silver, would you agree with that?

Mr. SILVER. Yes. What I would like to comment on is we hear about timber and some of these other products where you know exactly what you have that you are selling and receiving a fee for. I would ask the government if they believe that they deserve a greater piece of value from government lands where these mineral deposits are mined, then maybe the government ought to put money aside to drill and discover these because as an acquisition specialist, I can tell you that the greatest value in an asset is between when it is discovered and when it is built.

The problem you are not factoring in is the risk of discovering these deposits. It is a very expensive business. It is very high risk, and this is one of the concerns. I think this is why it is unfair to be comparing them. In response to your question, yes, anything that is a trade-off that enhances the economics of the asset you are going to get support for.

Mr. DOOLEY. So that could be perhaps addressed on when you assess the royalty if it is finished product versus—

Mr. SILVER. As long as you factor in compensation for the risk that has been taken to find that product.

Mr. DOOLEY. Dr. Dobra, you were saying that the adding value, I understand in the State of Nevada that they have taxes on development on Federal lands and that they add a royalty. What added value did the State of Nevada provide in that instance? Why should they be getting a royalty?

Dr. DOBRA. Well, technically, it is not a royalty. It is a tax, but it is essentially the same thing. The rationale historically has been that the government provides the services that support the mine, the roads, and so forth.

Mr. DOOLEY. On the State lands leading to the Federal lands?

Dr. DOBRA. On all lands. It is in charge, it builds roads across Federal lands as well. For that reason, the revenues until very recently all accrued to the local government, which was responsible for providing services, so it was not really an ownership issue, which it is at the Federal level. The Federal Government owns the minerals. This was a fee-for-service issue.

Mr. CALVERT. Thank you, Mr. Dooley. While we are on that, Dr. Dobra, I understand the United Nations has given generic advice and counsel to what we sometimes call LDCs or lesser developed countries that in order to attract foreign investment, they should adopt mining codes eliminating or significantly reducing host country participation requirements and royalty provisions based on gross revenues.

What is the deal here? Is the U.N. fronting for big business? Do they come in to steal a Nation's wealth or have they merely observed how capitalism works and decided to embrace its lessons?

Dr. DOBRA. I was not aware that the U.N. had done that, but I know that the World Bank has developed a set of recommendations for developing countries on mining regulations and laws, and this was a report that came out, I believe, last year and was primarily directed at Asia, the countries, the stans, as we call them, the Uzbekistan, Turkistan, and so forth, and what they were suggesting was not to have gross royalties, that the countries would be better off in the long term if they would adopt or if they would simply take a net profit interest in the company itself, and we see that frequently all over the world, Indonesia—Papua New Guinea in particular follows that practice consistently, taking a 30- to 40-percent net profit interest in the mine.

In other words, the country says OK, we will give you this resource and we will give you the rights to develop it and sell the products overseas so you don't have any currency risk, you can sell that Papua, New Guinea gold in Hong Kong or the United States, but we want 30 percent of the profits, and that type of relationship has turned out to be better for both the company and the host

country than a gross royalty, and that was the judgment of the World Bank.

Mr. CALVERT. So are you saying that net royalties may be a solution to the royalty problems that we are having?

Dr. DOBRA. I would suggest that and also point out when we are talking about a net profit interest, we are talking about after all costs of production have been subtracted from the value of the output, and that would mean extraction costs and then all processing costs, exploration costs, all of that comes out, this would be—and then pay the 30 to 40 percent, the fact is when prices are good you will make more than an 8-percent gross royalty.

When prices are low, you will make considerably less, but that is the key; it allows the company to ride through the bad times as well as the good times.

Mr. CALVERT. Thank you, doctor.

Mr. Young, I was somewhat intrigued on your statement on environmental costs and true mineral costs, mineral value. What would you say an ounce of gold is truly worth in today's world market, a thousand dollars an ounce, two thousand dollars an ounce?

Mr. YOUNG. I think that is an extraordinarily difficult question to answer, especially given that the value of gold has very little to do with its industrial utility. It largely is valued because of its speculative value. People hold gold because they think it is valuable; they think it is valuable because it always has been.

I would say that there are very large environmental costs, however, that are not included in the price of gold at this point. The methods that have been used in this enormous gold rush in the United States over the last 15 years are significantly different from those that have been used in the past, and they involve disturbance of much larger land areas, the use of large quantities of toxic chemicals in uncontained or semicontained situations in a way that was not common until heap leaching became a common practice. I think it is very difficult to quantify those things precisely.

Mr. CALVERT. How would you suggest we resolve the world undervalue question, would you say, as it relates to gold or other minerals? I think gold is about \$380 on today's market.

Mr. YOUNG. I think the question ought to be: How do we set our royalty rates or our compensation for public resources in a way that is comparable to other countries, other countries who we feel we ought to compare ourselves to? If you look at Australia or Canada, for example, their State governments do impose royalty requirements.

If you look even at developing countries, you will find that marginal tax rates for mining (which include both corporate income taxes and royalties) are lower in Chile, Indonesia, Mexico, and Brazil than they are in the United States. I think at the very least we ought to be ensuring that we get a decent return, taxpayers get a decent return for those assets.

I think it is going to be very difficult in the long run to fully include environmental costs, given that we are operating in a market that tends to set prices in a way that doesn't have very much to do with environmental problems. I think probably the best way to do that, though, is to try to ensure that there is adequate environ-

mental protection at every stage of the process, and that we make sure that we don't do projects that have unacceptable impact.

Mr. CALVERT. We have heard testimony on other types of royalties outside of gross royalties. Are you open-minded to the concept of a net royalty versus a gross royalty?

Mr. YOUNG. I am open minded, yes, as to what way the revenue should be recovered. I believe there should, however, be some substantial return to the U.S. Treasury for public assets that are currently being sold for \$2.50 an acre, and I believe that much of the discussion here today about exploration costs is, to some degree, a red herring, in that the same exploration costs are being incurred on private lands, on State lands, and on foreign lands.

The question becomes: after exploration costs what are you paying for the actual resource? It strikes me that the government ought to be able to charge something for a resource that exists in the public trust, ought to get something back for that, and the government shouldn't necessarily have to invest money in exploring and developing those resources. Other countries aren't necessarily investing in exploration, identifying reserves, before deciding to charge a royalty.

Mr. CALVERT. Thank you. I think we have time for one more question, and I will turn that over to Mr. Rahall. Then I think we are going to have a vote at 11:15, and that then we will probably excuse the panel and introduce our second panel.

Mr. RAHALL. Thank you. I want to follow up very quickly, first, with Mr. Silver where I left off in my first round of questioning. You made the point that international investment banks or I guess it was Professor Dobra who said in his testimony that international investment banks require U.S. firms mining in foreign countries to meet our environmental standards as part of their insurance agreement.

Dr. DOBRA. Yes, that is standard practice any time when you are getting financing or seeking insurance, and virtually everybody carries general business insurance.

Mr. RAHALL. It may be standard business practice, but I am not convinced it is standardly done. We can look at the case, for example, with the El Cerrajon Coal Mine that Exxon operates in the country of Colombia in a joint venture with that country's government, a project which received some \$850 million in support from the Export-Import Bank, I might add, and yet I don't think they had any such type of agreement. If, in fact, these companies are required to meet U.S. environmental standards, just exactly what are those standards?

I believe somebody had said EPA's, but are they Nevada's, Montana's, BLM's, Forest Service? Whose standards are they that these companies are being required to meet in foreign countries?

Dr. DOBRA. My understanding—again, I am not an environmental specialist, so I could be corrected on this—is that we have standards set out for clean water, for clean air, for reclamation and so forth, and these are national standards that are administered by the States, so they get administered slightly differently and could be in different States, but we are talking national standards.

The SEC, as another example, requires that companies disclose expenditures held or funds held in reserve for exploration in for-

eign projects. At the institute we just did a survey of annual reports. We found 16 companies, United States, with US-SEC reports that have operations both in the United States and overseas and all but one of them listed some reserve held for reclamation on their foreign properties, so at least the financial resources to do the environmental work are being held in reserve so that that work can be done.

Now, the one that didn't I am not sure what the circumstances are, and it may not be required to by their permits with the country they are in. We haven't had a chance to look into that yet.

Mr. RAHALL. To repeat a question I asked in the first round, who enforces these standards?

Dr. DOBRA. Ultimately, the U.S. courts have the right to enforce them.

Mr. RAHALL. In foreign countries?

Dr. DOBRA. That is what they did in the Bhopal Union Carbide incident. The Union Carbide parent company was held liable in the 2nd circuit for—the figure has been released now, but it was undisclosed for 10 years. It was close to \$500 million.

Mr. RAHALL. But that was a tort damage claim, was it not, as opposed to environmental enforcement, is my question?

Dr. DOBRA. If you had, say, a massive spill of cyanide, which is not likely to happen at all, but suppose there was, that would be a tort damage claim that some foreign country could bring against that country.

Mr. RAHALL. I am still not clear on who would enforce them.

Mr. SILVER. The country in which the deposit was being mined would enforce it. They do have environmental departments that are responsible for these things.

Mr. RAHALL. They do?

Mr. SILVER. Sure.

Mr. RAHALL. OK. Professor Dobra, you mentioned in response to Mr. Dooley's questions that the reason the State of Nevada properly invokes the State royalty or State tax, whichever one you want to call it, is because they enhance the value of the land through the building of roads if I understood your response correctly.

Why a State royalty is all right, but a Federal royalty is not is because the Feds don't enhance the property, the value of the land. We build roads through my other committee up here, the Infrastructure and Transportation Committee, which is also the Federal Government, but be that as it may, the whole point, and I think Congressman Dooley would agree, is everybody has got their hand in the pie and getting something, the States, the local units of government except the true owners of the land, the American taxpayer. The Federal Government is getting zero from this whole exercise, and it is our names that are on the trust of these lands.

They are public lands, and yet everybody under the sun is getting something from this mining except the true owners of the land. That is the point I think that has to be driven home here.

Mr. Silver, you mentioned the costs of doing business, exploration costs, and how that should be taken into account when we are discussing the \$2.50 an acre question. Any company is going to have those up-front costs of doing business, a McDonald's that is going to go out and start a new franchise, there are tremendous

costs involved with exploring first, doing market surveys. That is just part of the cost of doing business, and that is something that industry is certainly going to factor in before they make the decision to actually go for their permit to mine, so I don't buy that, that those costs are a relevant factor when it comes to the alternate buying of the land the American taxpayers ran.

I guess I am going to conclude my line of questioning as I see my time is running out. I am not, of course, ready to concede a lot of the points that this panel has made nor am I ready to concede the regulations in this country are driving the hardrock mining offshore. However, Mr. Chairman, I am ready to concede one particular point that is driven home by this particular bumper sticker, that is "Earth First—We Will Mine Other Planets Later." Thank you.

Mr. CALVERT. Thank you, Mr. Rahall.

Mrs. Chenoweth.

Mrs. CHENOWETH. Thank you, Mr. Chairman. I have a couple of other questions I would like to finish up with. Dr. Dobra, is it true that the United States Government has given \$61 million to foreign countries for the enactment and the creation of environmental programs in foreign countries where mining operations are taking place?

Dr. DOBRA. I am not sure. I don't have any direct knowledge of that.

Mrs. CHENOWETH. If my source is correct, I think that is kind of noble of the United States and the United States taxpayer, but I wanted to continue my questioning with Mr. Young with regard to the inefficient use of minerals with regards to the aluminum industry and aluminum mining. How many mines in the United States mine aluminum, Mr. Young?

Mr. YOUNG. We are not a substantial bauxite producer. We are, however, a substantial smelter of aluminum, smelter of aluminum oxide into aluminum metal, and still one of the world's leading producers in that respect.

Mrs. CHENOWETH. But normally in those producing facilities aren't they generally run in the Northwest anyway on surplus power that is very cheap power? They don't depend on peak or firm power?

Mr. YOUNG. Those facilities have received very low power rates for a long time. They lost their access to the very cheapest rates within the last 15 to 20 years, but they have regained short-term contracts for fairly inexpensive power. The question of whether this power is surplus is, I would say, not decided in that this is the very same region that invested a tremendous amount of money in building nuclear power plants in the 1970's because they foresaw the potential of substantial shortfalls of electricity, and then that led, of course, to the Washington Public Power Supply System bond defaults.

That region has since then managed to meet its electricity needs through heavy investment in energy efficiency and through more logical (higher) pricing of electricity. I think there is little question that the aluminum industry in that corner of the United States, however, is not going to be with us in the way that it is for a tremendously long time.

I also believe that we have not adequately looked at the real cost of those facilities over time. I am from the Pacific Northwest, and we don't have substantial salmon runs left in that region anymore compared to what we did and that has led to the tremendous decline of the fishing industry in our region. That is largely attributable to two things, the dams that were built on the Columbia River and its tributaries since the 1930's and to timber practices that have silted up some of the smaller streams in the region. I don't believe that anyone has ever effectively included that cost in the price of the metal.

Mrs. CHENOWETH. You indicated in your testimony that there is no clear downward trend in the value of U.S. mineral output, which is apparent. Isn't that very trend evident in the price of aluminum with regards to the ability of the country of Russia to massively produce that material?

Mr. YOUNG. Well, Russia has dumped substantial amounts of aluminum on the world market. One of the reasons they are able to do this is massively subsidized coal-fired power plants that are fueling their aluminum facilities. Those power plants are not expected to be in operation for all that much longer, as that country is forced to accommodate itself to the world market, but the point I was trying to make was that the overall value of U.S. mineral production has not shown a long-term decline.

If you look at, say, 1990 through 1993, and you add up the copper and gold industries, for example, you will find that the total value of output was \$7.9, \$7.3, \$7.9, and \$7.4 billion in each of those years. I don't see a well-defined long-term downward trend there. It has gone back and forth, but I don't see the industry in decline yet.

Mrs. CHENOWETH. And, of course, it is true, though, that the Russians not only are subsidized, but they have virtually very little environmental restraints to operate within, but moving on, you also mentioned in your testimony that the mining industry was not subject to the Resource Reclamation and Recovery Act or RCRA, but aren't they indeed subject to the full force and effect of the Comprehensive Environmental Resource Liability Act or CERCLA?

Mr. YOUNG. The mining industry is subject to Superfund, but the point is that since they are not subject right now under the Bevill amendment to the hazardous waste provisions of the Resource Conservation and Recovery Act, I believe the industry is potentially creating more Superfund sites as we go.

In other words, RCRA is the law that governs management of hazardous waste as they are created. Superfund merely addresses cleaning up old messes. I think the danger right now in exempting the industry from regulation that other industries are subject to is that it will create more Superfund sites in the long run, and we will end up liable for them. With the mine operators having moved on, and perhaps having gone bankrupt, the taxpayer may end up with the bill. That is what is happening with Summitville and it is certainly what is happening with Clark Fork and any number of major sites in the West.

Mrs. CHENOWETH. My final question, Mr. Young, is in the case of Summitville and various other Superfund sites. The height of their production was primarily in World War II when the United

States military was making demands for those minerals, and in fact indeed weren't there military people stationed in the mining operations to make sure that around-the-clock operations occurred so we could meet the demands of a wartime need? This is not just a statement. It is a question—don't you think that the liability should be one of a partnership because even today the demands of the government continue with regards to military requirements, and, of course, the demands of society continue, so should these past sins be laid totally on the shoulders of the operators and owners of the sites?

Mr. YOUNG. I would disagree with your premise. I do not believe, in fact, that most of the production from these facilities was to meet U.S. military needs. A relatively small fraction of U.S. mineral consumption is attributable to the U.S. military. Most of our growth in minerals consumption has occurred since World War II.

I don't believe that it would be appropriate for the U.S. Government to bear most of the responsibility for these sites, and I would add that Summitville, in particular, is a very new mine. Summitville is a mine that was developed in recent years and is not like, for example, the Berkeley Pit, a 100-year-old site. This was something that was developed in the 1980's under existing law and has led to an extraordinary environmental disaster where the U.S. Government—the taxpayer—is paying something like \$40,000 per day to keep cyanide out of the local stream. I don't think we can hold the government responsible for that. This was an irresponsible operator who was not adequately regulated.

Mrs. CHENOWETH. Mr. Chairman and Mr. Young, I just wonder. I would like to become more familiar with that particular situation. I wonder could you submit to the committee, or to me if it is proper to ask, a report on that. I would be interested in investigating it.

Mr. YOUNG. I could certainly collect some things.

Mrs. CHENOWETH. Mr. Chairman, Mr. Young, thank you.

Mr. CALVERT. Thank you, Mrs. Chenoweth.

Mr. Dooley.

Mr. DOOLEY. Just real briefly. Again, just on this whole focus of getting the returns to the taxpayers, which are equitable, when I was looking again through the report on world gold production figures and where it demonstrates that both in Australia and Canada that you have had relative increases in production which pretty much parallel what you have seen in the United States, I guess in both of those instances in Australia and Canada how much of that production in terms of gold is occurring on national lands? I don't have any idea.

Dr. DOBRA. I am not really aware of that, either, but I can find out and get you something. I would point out about Australia that the Australian industry flourished under a tax regime where they basically had no income taxes. We are not talking royalties. They paid no royalties, no income taxes at all.

Mr. DOOLEY. Strictly on the mining?

Dr. DOBRA. Strictly on gold mining because it was viewed as a way of promoting the development of western Australia, which was a very sparsely populated and developed area.

Mr. DOOLEY. Taxes would certainly be one way that taxpayers would be compensated for mining activity, royalties would be an-

other. Does anyone know, what are they charging in Australia and Canada for mining gold on national lands? Does anyone know?

Dr. DOBRA. No, I don't have that data with me.

Mr. YOUNG. There is a GAO report that looks at royalties in other countries.

Mr. DOOLEY. And it compares it to other countries? Do you recall what that—

Mr. YOUNG. I don't have the citation, but I could come up with it for you.

Mr. DOOLEY. All right, thank you.

[The following title of the abovementioned GAO report was supplied subsequent to the hearing: GAO/RCED-93-109 "Mineral Royalties: Royalties in Western States and in Major Mineral-Producing Countries"]

Mr. CALVERT. Thank you, Mr. Dooley. I would like to recognize the gentlelady from Wyoming for questions.

Mrs. CUBIN. Mr. Chairman, I have no questions at this time.

Mr. CALVERT. If there are no further questions needing answers, they can be submitted, and with that I would like to thank the testimony and the questions by our panel, and I would like to thank you all for coming out here.

Next, I would like to introduce our second panel. I think we are going to have a vote coming up soon, so we may need to suspend for a moment if in fact that does happen, but we will go ahead and start our second panel.

First, I would like to introduce Walter Lehmann, counsel for the North Central Mineral Ventures of Minneapolis, Minnesota; Stanley Dempsey, Chairman and Chief Executive Officer for Royal Gold Incorporated, Denver, Colorado; and Harry C. Smith, Vice President of Magma Copper Company.

Let me again remind the witnesses that under our committee rules, they must limit their oral statements to 5 minutes, but their entire statement will appear in the record. We will also allow the entire panel to testify before questioning the witnesses. I will now recognize Mr. Lehmann for 5 minutes.

STATEMENT OF WALTER LEHMANN, ESQ., COUNSEL, NORTH CENTRAL MINERAL VENTURES

Mr. LEHMANN. Thank you for this opportunity to address the panel today. My name is Walter Lehmann. I am an attorney practicing in Minneapolis, Minnesota. I have been asked to testify here today on behalf of my father, Ernest K. Lehmann, who is a professional geologist who owns an exploration and development firm based in Minneapolis. I am the legal counsel for that firm.

My father's absence here today is somewhat ironic, considering the issues which you are addressing. He was unable to make it today because he is working overseas in South America. My father has been involved in exploration for his entire 40-year career, and is the former President of the American Institute of Professional Geologists, and yet, as he told me as I took him to the airport the other day, he cannot find any paying work here in America.

Indeed, from my perspective and experience, the only paying work in mining appears to be for lawyers like myself. I want to briefly describe my father's mineral exploration and development

business and then tell you about our efforts to pursue mineral development in an area known as the Sweet Grass Hills in Montana.

Our experience in Montana is, I think, a good example of the kind of delays and policy reversals that are forcing mineral investment overseas. My father provides mineral exploration management and mine valuation services to a variety of clients. As one aspect of this business my father locates areas which he believes warrant exploration and then he prepares an exploration plan and tries to market the whole package to potential investors for further exploration.

Mineral exploration is an extremely high-cost, high-risk, and long-term endeavor. Locating deposits sufficient to sustain a profitable mine is an extremely rare event. My father says to me this is a once-in-a-lifetime chance. Enticing investors to take these risks and to stick to the project is extremely difficult, even in the best of climates, but the unwarranted delays and arbitrary policy reversals in Federal land management decisions which are symptoms, I think, of the anti-mining bias which has taken over the management of our public lands, has made the job of enticing investors to fund these exploration ventures all but impossible.

To illustrate, I want to quickly summarize our experience in the Sweet Grass Hills. One of my clients, the Mount Royal Joint Venture, has been in the center of controversy since it applied for a permit to explore on the public lands in the Sweet Grass Hills in February of 1992. Mount Royal has so far weathered repeated delays, policy reversals, and bureaucratic infighting.

During the 1980's a number of joint ventures explored the area, and Mount Royal staked what appears to be a very large low-grade gold deposit extending over both private minerals and public mineral lands. Also, during the 1980's the Bureau of Land Management thoroughly reviewed the environmental and cultural resources in the area and prepared a resource management plan known as the West High Line RMP.

In January of 1992, BLM adopted the plan and determined that the area should remain open for mineral entry. Indeed, they suggested reopening about 500 additional acres. In February of 1992, that is one month later, Mount Royal filed an exploration plan to do additional drilling in the hills. BLM then conducted the same review process used to approve earlier exploration plans, but this time required a full Environmental Impact Statement on the plan. This is, in our knowledge, the first time BLM has ever required a full EIS on an exploration plan.

Meanwhile, the State Historic Preservation Office, known as SHPO, claimed the area was eligible for listing on the national historic register. Local BLM officials tried to work with SHPO in preparing the EIS, but SHPO refused to delineate the boundaries of their proposed listing or make any effort to apply for an actual listing.

At this stage, Mount Royal lost its principal investor. The draft EIS was published in January of 1993. No new evidence of potential adverse effects were uncovered and the preferred alternative was to approve the plan. As the EIS process was drawing to a close, SHPO suddenly claimed it had not been adequately consulted and threatened to sue.

There was pressure from Washington, a petition to withdraw was filed, and then the regional management plan was then reopened and reconsidered. After 14 months after the RMP which had taken 7 years to complete, the BLM had arbitrarily decided to revisit the question of the environmental and cultural resources in the area, even though there was no evidence of any kind to justify that conclusion.

The environmental and cultural resources of the Sweet Grass Hills have been analyzed and reviewed ad nauseam over the past 10 years, even though those opposed to mining have managed to bend and twist the land management laws in what we believe is a cynical effort to harass legitimate mining interests with valid private property rights. There is just absolutely no finality that we can see in this decisionmaking process.

Faced with this kind of arbitrary management of our public lands, I don't think there is any question why mineral development is moving overseas.

[The prepared statement of Mr. Lehmann can be found at the end of the hearing.]

Mr. CALVERT. Thank you, Mr. Lehmann.

Mr. Dempsey.

STATEMENT OF STANLEY DEMPSEY, CHAIRMAN AND CEO, ROYAL GOLD, INC.

Mr. DEMPSEY. Mr. Chairman, members of the subcommittee, I am Stanley Dempsey. I am Chairman and Chief Executive Officer of Royal Gold Inc. Royal Gold is a Denver-based, publicly-owned gold exploration and development firm. We own a royalty interest in a major new gold mine in Nevada, and have recently announced that we have made a significant gold discovery in California.

Our company has a market capitalization of approximately \$100 million, and has approximately 3,500 shareholders. Royal Gold has 11 employees; 10 of them live in Denver and one lives in Elko, Nevada. Our company explores for gold. We either stake new claims or make deals with prospectors.

Today, the typical prospector is a geologist who formerly worked for a big mining company. Many of them have Ph.D.'s in geology. Another irony is that Mr. Lehmann's father came to me 2 years ago with the Sweet Grass Hills, and we turned it down because we thought it had too many environmental troubles, and Mr. Lehmann is very well thought of in our industry.

Royal Gold's strategy is to take a discovery and to prove it up far enough to attract a major company. The prospector spends tens of thousands of dollars, we put in the next million or so, and then the large company finishes the job, spending perhaps in the tens of millions of dollars to complete the discovery phase of a new mine.

In recent years our company has entered into joint venture or lease agreements with a number of large firms, including Western Mining, Santa Fe Pacific Gold, Battle Mountain Gold, Union Pacific Minerals, and Newmont. Most of Royal Gold's exploration is on public lands. We have staked 528 claims and dropped 259 of them during the last 18 months.

Royal Gold makes direct expenditures of approximately \$2.5 million per year on public lands. Much of this money flows directly into local economies or is paid to the United States for claim maintenance fees. Our direct expenditures go to contract geologists, geophysicists, land men, and drillers mainly in Nevada and Wyoming.

I have included in my testimony some real dollars going to some real people who really live in Nevada and Wyoming and really make their living doing what we spend money on. Also, I want to bring to your attention that our BLM claim fees costs in the last 18 months have been \$172,000. This is all money spent in the United States.

Like most gold mining firms, Royal Gold has also been looking at properties overseas as a hedge against possible changes in the mining law. During the past 3 years, we have reviewed submittals from more than 25 countries and have carried out actual field examinations in Mexico, Peru, Ecuador, Guinea, Kenya, Australia, Greece, Armenia, and Bulgaria.

We intend to continue to look at such opportunities as we remain concerned about mining law and regulatory issues in the United States. Again, with some irony, tonight I leave here from this room to go to Bulgaria on my third trip there, hopefully to complete the signing of an agreement for cooperation on gold research in Bulgaria.

Royal Gold is very concerned about the various proposals for mining law reform that were considered in the last Congress. Several provisions of those bills appeared likely to be enacted, would have damaged Royal Gold's existing situation and would have created inducement for us to move our activities outside the United States.

We accept that it may be appropriate for the government to impose a reasonable royalty and to institute certain changes in land tenure and patenting rules. We support active efforts to reclaim the scars of the past and to assure that new mines are properly conducted and eventually reclaimed, but we believe that proposals to use more government command and control measures to impose environmental quality are counterproductive.

We also believe that the current debate over the uses of land in the western United States is broader than can be effectively addressed in commodity-specific legislation like the mining law. Royal Gold believes land use issues should be dealt with in a broader forum.

On behalf of our shareholders, employees, contractors, and vendors, we ask your support in coming up with satisfactory reform of the United States mining law and the regulatory regime under which we operate. We plan to keep looking for opportunities abroad, but we would prefer to continue putting most of our emphasis in our own country as much as possible. I would say the folks in Elko and Rock Springs hope we can do so as well. Thank you, sir.

[The prepared statement of Mr. Dempsey can be found at the end of the hearing.]

Mr. CALVERT. Thank you. By the way, our Chairman also agrees with trying to keep your exploration here in the United States, so that is why we have our task forces.

Next witness, Mr. Harry Smith of Magma Copper Company.

STATEMENT OF HARRY C. SMITH, VICE PRESIDENT, MAGMA PAPER COMPANY

Mr. SMITH. Good morning, Chairman and members, my name is Harry Smith, and I am here on behalf of Magma Copper Company. Magma is a U.S. copper producer, one of the largest, and we certainly want to continue to do so in the United States. I am sure we will.

Magma produces high quality copper cathode and rod for sale worldwide. We have operations in Nevada, Arizona, and in southern Peru. Our headquarters are in Tucson, Arizona, and I am the vice president that is responsible for the Nevada mining division. I hope I can shed some light on today's subject based on Magma's experience as a new international company, having just acquired a property in Peru.

We have also recently permitted a major project using Federal lands in Nevada, and are looking at new projects in the United States and around the world. These projects deal with a very basic commodity, copper. Its production must be competitive in world terms. Over the past 4 years I have had both the pleasure and frustration of working with a development of the Robinson Project near Ely, Nevada.

I have become far more familiar than I care to admit with the various environmental and public land policy issues. What I have learned is that this Congress and the people of the United States have to clearly look at what they are doing and how they will deal with the mineral development in the future.

Many of the actions that are being contemplated by this Congress will have a profound effect on the future of our industry. I would like to briefly describe the Robinson project. This is a \$300 million project in which I am intimately involved and have direct responsibility to management and stockholders. Production will not start until 1996.

Since 1991 a tremendous effort has been focused on permitting this project. The project includes both private and public lands. In fact, the majority of the project is on private lands, and in an historic mining district that has been mined for over 100 years. I am here today to tell you that contrary to popular belief, a company must go through detailed, painstaking, and time-consuming environmental review to obtain a permit to build and construct a mine. We had to go through two very rigorous environmental process reviews.

We have learned that it is an incredibly long and expensive process to successfully permit a project. We still have an uncertainty as to what effects future environmental requirements will have on the Robinson project. Based on my experience, several key points can be made. If you want to permit a mining project in the United States, it is going to be very expensive. To permit Robinson, we spent in the neighborhood of \$5 million.

There is a morass of regulations, requirements, both Federal and State that currently exist for mining projects. Many of these regulations do not fit into nice, neat packages. It becomes a challenge to know what you have to do to get a project permitted.

The second thing, it is going to take a significant amount of time to accomplish permitting. There will be no guarantees that after you have spent this time and money you will be in a position to have any security or to advise your investors that you can, in fact, build and operate your project.

At the end of the day, after having spent many years and millions of dollars in first acquiring and in attempting to permit your project, you can be standing there literally left with draft permits in hand and be the victim of now a 32 cent appeal, the cost of a postage stamp, that can add many, many months, if not years, to delay your project.

What this committee needs to realize is that risk is a real factor in deciding where a mineral company invests its money. If by experience they see additional cost constraints or new regulatory requirements, then these risks, uncertainties, and potential time delays that exist in the United States but are not as pronounced elsewhere, there is nothing else that can be done but to recommend investment in a location with the least amount of risk and uncertainty.

As a matter of comparison, I can speak directly to a project that Magma has acquired in Peru, Tintaya. Magma was fortunate to be the winning bidder in acquiring this property from the Peruvian Government for \$250 million. What we see in Peru is one set of regulations, one ministry to deal with in terms of getting environmental permits, and we see a commitment from that country to encourage and foster the responsible development of this property.

We have a currently operating project that the government has conveyed to us without uncertainty, with clear rights to develop, and with additional property around it. In fact, our biggest commitment to the government of Peru is to demonstrate our ability and commitment to invest more money to ensure long-term productivity.

The biggest concern, what will Magma do to make this property continue to produce copper and generate revenue, jobs, and opportunity in Peru? I would like to provide one more example.

During the next 3 years, Magma has approximately \$70 million earmarked for exploration. Only \$12 million of that is for exploration in the United States. That, my friends, is the harsh reality of our assessment based on our actual experience. It is testimony to the high level of uncertainty in the United States right now, and until that uncertainty is resolved, the focus of our exploration dollars will be overseas.

Compared to even a year ago, a tremendous amount of capital is now going overseas because of the regulatory climate in the United States and the potential for excessive cost and excessive delays in getting the projects permitted. Any further obligations and costs must seriously be considered by this subcommittee and entire country in terms of what the ultimate effect will be on where our minerals are produced in the future and where the people of the United States will have to go to buy mineral products that they want to support their standard of living. Thank you.

[The prepared statement of Mr. Smith can be found at the end of the hearing.]

Mr. CALVERT. Thank you, Mr. Smith. We will now start our round of questioning. First, Mrs. Chenoweth.

Mrs. CHENOWETH. Thank you, Mr. Chairman. I was just fascinated with the testimony that I heard.

Mr. Lehmann, your testimony really hits home. You know, I wanted to ask you with regards to your attempt to comply under FLPMA, did they require that you or the agency in coordination do an analysis or a biological opinion and a mining plan just for your specific area or what was the result of that?

Mr. LEHMANN. I don't think there was any—this was an exploration plan of operations, which set forth a plan to cut roads into the area and do some additional drilling. There had been two previous exploration plans which had been approved and executed during the 1980's. I am not sure what the trigger was when we filed this most recent plan of operations.

It was right on the heels of the West High Line RMP, which had kept the area open for mineral entry. I guess the increased activity raised concerns about the fact that we might actually be finding something, and I think that is what triggered the events that brought on the full EIS process, the involvement of SHPO into what is called the 106 consultation process, and ultimately the petition to withdraw the land, the review of the RMP, and currently also a review of the validity of our claims, whether they are a valuable claim that is valid under the mining laws.

We haven't gotten to the point of creating an actual mining development plan. Part of the validity claims process actually is akin to having us prove up in court that we will mine the thing, and I think at that point we will have to show a whole range of how we will proceed with the project. We will end up doing that in court, not on the ground.

Mrs. CHENOWETH. I assume you will be representing the company, I hope. Mr. Lehmann, what would it take at this point in time to entice your father back into actively developing the site?

Mr. LEHMANN. Well, he would like to be actively developing the site. I think it is beyond his control. The latest word we have heard is that Secretary Babbitt is going to file for a permanent withdrawal of the area, so we have really sat by and watched the process for 2 years.

We have tried actively to provide as much information as we can and certainly are ready to encourage the process along, but a lot of it has been internal fighting at BLM, fighting between government agencies such as BLM and SHPO. It is mostly an internal process that we just have to stand by and watch.

Mrs. CHENOWETH. Thank you, Mr. Lehmann.

Mr. Dempsey, you know, much discussion has been focused on the need for a royalty on the minerals that are extracted from the public lands of this country. You gave some very interesting testimony where you stated the prospector spends tens of thousands of dollars, and we put in the next million or so of dollars, then the larger company finishes the job, spending the tens of millions of dollars necessary.

In view of that statement, do you think that it would be appropriate that the prospector and the intermediary should be exempt from royalty or what is your thinking on that?

Mr. DEMPSEY. Well, our business depends on being able to take a royalty for our company and the prospector is seeking a royalty, too, because each of us are adding value in the process. I think Dr. Dobra gave some interesting testimony this morning that the government's lands with undiscovered minerals don't have much added value until the prospector comes along.

We really hope that there will be room left for Mr. Lehmann and for me on the way, but if the government puts too big a royalty in there, of course, everybody has to shrink to meet it. The market is already changing in Nevada to meet that in anticipation of a royalty.

Mrs. CHENOWETH. Thank you. Thank you, Mr. Chairman.

Mr. CALVERT. Thank you. Mr. Abercrombie.

Mr. ABERCROMBIE. Yes. Thank you. Mr. Lehmann, I am not sure that you advance your case too much by making statements that the only paying work in mining appears to be for lawyers. We are still the largest nonfuel minerals producer in the world, are we not?

Mr. LEHMANN. It is going to be difficult for me to speak to the economics of the situation.

Mr. ABERCROMBIE. You did speak to the economics of it with a statement like that. I would like to know, in all your testimony—I went through it—does the name, Curly Bear Wagner, mean anything to you?

Mr. LEHMANN. Yes, I am familiar with Mr. Wagner.

Mr. ABERCROMBIE. But not familiar enough to put it in this testimony. You say you know of no basis to justify the sudden arbitrary reversal in policy with reference to Secretary Babbitt. Inasmuch as the Secretary isn't here on that, wouldn't you say that the activities of some of the ranchers and farmers in the Black Feet Nation as represented by Mr. Curly Bear Wagner have something to do with the Secretary's position?

Mr. LEHMANN. There have certainly been activities, but as far as evidence of cultural or environmental concerns in the area, those have been reviewed. There was a 7-year review process. They have also been reviewed for the last 2 years. We are unaware of anything that changes the original determinations of the West High Line RMP.

Mr. ABERCROMBIE. Thank you. Mr. Dempsey, in your testimony you mention on page 3, you reference there that when you sold your interest in a major mining company, you retained the net profits royalty interest. In that context, then, your discussion of royalties, you don't oppose, then, a royalty interest on Federal lands. Can I derive that conclusion correctly?

Mr. DEMPSEY. The current view of the industry, I believe, very broadly, and my company, in particular, would be that we do not oppose the imposition of a royalty in the reform effort that this committee has been about.

Mr. ABERCROMBIE. Thank you. On page 4, and I won't ask it now because I really won't have sufficient time, but what I would like you to expand on, if you will, you have listed some of the issues on page 4 that you think, no pun intended, undermine the advancement of your position, but I would appreciate you sending to the committee some of the things that you think would advance it, if

you could elaborate a little bit on that. We don't have time right now, but I think it would be very useful.

Mr. DEMPSEY. I would be happy to.

Mr. ABERCROMBIE. Thank you.

Mr. Smith, I appreciate your testimony, but, again, to try to put a little bit of perspective on it, you talked about the 32-cent appeal here, and the requirement to move to a full EIS. Wasn't that a requirement that you knew would be in the picture going into the project because of the numbers, the acreage involved?

Mr. SMITH. That is a great question. I would love to answer that one. No, we did not know that going into it. As a matter of fact, the BLM, they were the ones that wanted us to initially do our EA, and that was with concurrence with another major environmental group. We did do our EA, and of course, you know, we talk about risk out there and I would like to talk about political risk, and it is not just elsewhere in the world, it is here in the United States.

At the time we completed our permitting, a new administration came in, and a new BLM Director came in. Of course, he is no longer here. And so there were really some changes in the philosophy of how to manage public lands, and I feel we really got caught up in that and I look at that as pure political risk.

Mr. ABERCROMBIE. Is the figure correct about the volume of ore and waste et cetera, that might be expected in the life of this project? I have been given a figure of 850 million tons. Is that a realistic figure?

Mr. SMITH. We move a tremendous amount of material, but, you know, I like to question the connotation waste.

Mr. ABERCROMBIE. OK, I will withdraw that. I didn't mean it in a pejorative sense at all.

Mr. SMITH. OK.

Mr. ABERCROMBIE. Let me say the volume of material.

Mr. SMITH. Right, it is a tremendous amount of material.

Mr. ABERCROMBIE. Wouldn't it be likely that an EIS would be involved when you are dealing with that magnitude?

Mr. SMITH. Well, you know, we got into the public land permitting mode because we required some land for our tailings. All of our mining activity and almost all of our waste dumps are going to take place on private land. We did require some land for our tailings facility, but from the get-go when we started our permitting process with the BLM, the drive was to do an EA, not necessarily just on our part.

Mr. ABERCROMBIE. So your testimony or I should say your answer to me, then, is that that was the best knowledge that you had at the time?

Mr. SMITH. To do an EA, that is correct, and that was standard operating practice at the time we started our permitting process.

Mr. ABERCROMBIE. Just one last point, then. And it is more an observation. If I understood your testimony correctly, you expect to spend some \$70 million on exploration—let me find the right page.

Mr. SMITH. In the next 3 years.

Mr. ABERCROMBIE. In the next 3 years, right. You said \$12 million of that is for overseas exploration.

Mr. SMITH. I am sorry, \$12 million is U.S. exploration. You may have a copy that reads incorrectly.

Mr. ABERCROMBIE. I apparently do.

Mr. SMITH. Sorry about that.

Mr. ABERCROMBIE. So it is the exact opposite?

Mr. SMITH. Just the exact opposite.

Mr. ABERCROMBIE. Are you that thrilled about Peru at this particular stage?

Mr. SMITH. You know I haven't been there yet, but the people that have are very excited about it.

Mr. ABERCROMBIE. Be careful crossing bridges.

Mr. SMITH. Sure.

Mr. ABERCROMBIE. Thank you, Mr. Chairman.

Mr. CALVERT. Thank you, Mr. Abercrombie.

Mr. Dooley.

Mr. DOOLEY. Thank you, Mr. Chairman. I agree wholeheartedly that we need the regulatory reforms that can give the certainty the industry needs, I think, again to make the investment decisions. My focus, again, is going to be on what is the equitable compensation to the taxpayers for the national resource, and Mr. Smith, I was kind of intrigued by your talking about your Robinson project and also about the project you are engaging in in Peru where you talked about your bid on a project there which was \$250 million, I believe, that went to the government of Peru.

That was for the rights to this area. Now, is that their sole compensation to the government there, and the citizens of Peru is that \$250 million, other than one might be generating economic activity, or do they also add a form of a royalty on top of that?

Mr. SMITH. The \$250 million were for the rights to operate an operating property, you know, just a few years old. It was already in production. So instantly when we bought that, we have a cash-flow coming from that property.

In addition to the \$250 million, again, we had to guarantee them that over the next few years we would spend another \$85 million in improvements on that property, again to foster continued productivity and life of the property.

Mr. DOOLEY. How long of a contract, then, do you have for this particular property? Is it indefinite?

Mr. SMITH. Well, right now the life of the property is projected at 15 years, but I am sure it will grow as time goes on.

Mr. DOOLEY. Do you have exclusive rights, though, beyond the 15 years?

Mr. SMITH. Oh, definitely. It is our property, with a tremendous amount of land associated with that property, and with great exploration potential, and that is where we are going to be spending a lot of our money, is on that property in the next few years.

Mr. DOOLEY. I guess, then, when we compare that with a project in Nevada which I guess 80 percent of that is on public lands; is that correct?

Mr. SMITH. No, I would say just the opposite. We actually own 12,000 acres outright, and required a little over 2,000 acres of public land.

Mr. DOOLEY. Public land. What would be on that, on the public lands, then, the compensation to the Federal Government to taxpayers on that? What are we looking at?

Mr. SMITH. Right. Well, with respect to Robinson again I mentioned that all of our mining activity is, you know, from our own private lands, so we are not going to be extracting any mineral value from public lands at Robinson.

Mr. DOOLEY. OK. So, then, you don't have any public lands mining that you are really doing at this time?

Mr. SMITH. In the United States, very, very little.

Mr. DOOLEY. Very little.

Mr. SMITH. But, again, we look at potential, and we want to stay a U.S. company, and, you know if a lot of these lands become less attractive than they have been in the past, we aren't going to spend our dollars and deal with the uncertainty of being able to do a project on public lands. We have been so burnt by our Robinson situation that, you know, we certainly look elsewhere.

Mr. DOOLEY. If this was, say, just for a hypothetical situation, if the Robinson was all on public lands, then obviously from your investment position, the royalty would obviously be much more acceptable if it was a net income royalty where you could then ensure that you could absorb the cost?

Mr. SMITH. Certainly. Sure.

Mr. DOOLEY. I guess, Mr. Dempsey, from your approach and the part that you play in this is that on a net side the activity that you were engaging in really would not necessarily be adversely impacted there because you would, obviously, if you had a project that had value and you were marketing that project to a company, a processor, they would then be able to have the certainty of having to have a net income. Before that they would be subject to any diminishing of returns because of a royalty.

Mr. DEMPSEY. Well, our arrangement generally is to retain a royalty as the price for the big company to take the property from us, and, for example, if I had made a deal with Mr. Lehmann's father, he would have probably kept a 1 percent override, something like that. I just made a deal with Santa Fe where I am satisfied with 2 percent.

Mr. DOOLEY. Is that a net or a gross?

Mr. DEMPSEY. That happens to be a net smelter return, which is somewhere between the two, closer to a gross, but that then leaves some room in there. We have all adjusted our expectations because we expect there probably will be a Federal royalty, so that has already been taken into account in the marketplace and properties in Nevada, and that is about where we are coming out.

Mr. DOOLEY. Thank you.

Mr. CALVERT. Thank you, Mr. Dooley.

Mr. Williams.

STATEMENT OF HON. PAT WILLIAMS, A U.S. REPRESENTATIVE FROM MONTANA

Mr. WILLIAMS. Thank you, Mr. Chairman, and thanks to you and your colleagues for allowing me to sit in on this subcommittee. I would tell the witnesses that although I am a member of the full committee, I am not a member of this subcommittee, but there is a matter before us which is of great interest.

I say to the witnesses and the newer members of the subcommittee that my name is Pat Williams. I represent all of Montana in

the Congress. I believe I am pro mining. I departed from my Democratic colleagues and voted against a mine law reform bill and during the last Congress when mine law reform passed, a bill which I supported eventually, I offered amendments on the Floor on behalf of small miners, so I think I am pro mining, but let me say just because there is gold in them there hills doesn't mean we ought to go get it every time.

Mr. Lehmann, as you know—you and I haven't met, sir, it is nice to see you—but I have been the adversary of you and your father on this issue, and up in Montana we have this area called the hills, the Sweet Grass Hills which are the matter of your testimony. You say at the end of your testimony after you talk about the withdrawal of the Sweet Grass Hills, a matter which I occasioned, you say is it any wonder why investment in mineral exploration is going overseas.

Well, I don't think the Sweet Grass Hills are a good example at all of what might push mining overseas. I understand that you are frustrated and I would be, too, if I was in your or your father's position with regard to trying to develop that mine in the Sweet Grass Hills, but I think that is the fault of not having had mining law reform. I think you need more stability and your father and the other gentlemen and other mining friends of mine, you need more stability than you now have in order to get at this matter of how far do you go before there is a cutoff and you are not going to be allowed to proceed.

I think it is essential that the members of this committee hear from a Montanan about this critical discussion of the Sweet Grass Hills. The Sweet Grass Hills are an island mountain range in Montana surrounded by fertile plains which Montanans refer to as the Golden Triangle.

The Golden Triangle is a few counties in Montana that produce 60 percent of the harvest that comes from the entire State. I have spent a lot of time in that area, and I can tell you that the farmers and ranchers and the Native Americans in the area have a devotion and a respect and a reverence for the hills.

Now, the members of this committee will understand why they have devotion, respect, and reverence in most instances, and the reason is called water, and the members of this committee from the West understand that word, "water." Water flows outward from the hills and is the lifeblood of the Golden Triangle, and protecting that, the quality of that water is absolute paramount in importance for Montanans, and that is why Bruce Babbitt's apparent withdrawal, permanent withdrawal of the Sweet Grass Hills from mining is overwhelmingly popular, not just in that area, but throughout Montana, a mining State with the nickname "The Treasure State," and Bruce Babbitt's actions are wildly popular in my State. Water.

It is also wildly popular because the Great Plains Indians, the gentleman from Hawaii mentioned this, have for a thousand years or more believed that this is a sacred place, and while some of us might go to Jerusalem or Mecca, many Indians, make no mistake about it, go to the Sweet Grass Hills for the same reason that some of you would go to Jerusalem or Mecca.

Montanans are, quite frankly, simply opposed to tearing up the Sweet Grass Hills, and so I asked the BLM and Bruce Babbitt to consider the withdrawal of the public land there for mining. Look, the hard fact—when I worked, I used to be a miner. When I worked in mining, you couldn't get an ounce of gold by turning over a hundred tons of top, but you can today.

The Sweet Grass Hills could be evaporated for a relatively few ounces of gold, and Montanans are unalterably opposed to that, and so the technology which is so beneficial to mining has now brought us to the point where even pro mining folks like myself find that there has to be a stop point at which we can't go forward.

Mr. Chairman, I would suggest that that is why we desperately need mining law reform, because mining technology has now entered a whole new phase, a phase that runs up against extremely important attributes such as water or, yes, sacred sites. Mr. Chairman, I ask permission—when the folks knew that we were going to have this hearing 21 Montanans without encouragement got ahold of me, sent me a letter, they are all short letters, and asked if we would be kind enough to ask for unanimous consent to place their objections to mining in the Sweet Grass Hills in the record, and I ask for unanimous consent for that, and again, thank you and the other members for your courtesy in letting me make this statement on behalf of my fellow Montanans.

Mr. CALVERT. Thank you. Without objection, so ordered. Thank you for your testimony.

[A sample of the abovementioned letters can be found at the end of the hearing.]

[The prepared statement of Mr. Williams follows:]

STATEMENT OF HON. PAT WILLIAMS, A U.S. REPRESENTATIVE FROM MONTANA

Thank you, Mr. Chairman, for holding this hearing today about how we might improve the investment climate in the mining industry. Mining is an important industry in my State and I have worked here in Congress on a variety of projects in support of the industry.

I note, Mr. Chairman, that the committee has chosen Walter Lehmann of Minneapolis to discuss the difficulties his company faces in developing new mining properties. Mr. Lehmann is understandably frustrated about his inability to develop a gold mine in the Sweet Grass Hills of Montana.

I ask the committee's indulgence for several minutes because I am the only Montanan who is able to speak at this hearing in defense of keeping the Sweet Grass Hills as they are. We will hear from a *Minnesotan* who has a concern about his interest in the Sweet Grass Hills, and I believe it is essential that this committee hear about what *Montanans* believe is critical in a discussion about the Sweet Grass Hills.

The Sweet Grass Hills is an island mountain range surrounded by fertile plains which we Montanans refer to as the Golden Triangle. It's golden because roughly 60 percent of our wheat and barley harvest comes from this region. I've spent quite a bit of time in that country, and there is an almost universal concern among these farmers and ranchers about protecting the Sweet Grass Hills. There is a devotion and respect for the place.

And there is a concern. It is one that this committee understands well. It is water, water that flows outward from the hills and is the virtual lifeblood of these ranching families. As the members of this committee know, protecting the quality of a water source is a paramount, non-negotiable concern among the farmers and ranchers of the West.

Just as these hills are significant to generations of ranchers and farmers, they have been among the most sacred of places to Great Plains Indian tribes for thousands of years. As some of us make a pilgrimage to the Vatican, or others to Jerusalem, Native Americans from both the United States and Canada make pilgrimages to the sacred Sweet Grass Hills.

Montanans are opposed to tearing up the Sweet Grass Hills for gold. Mr. Chairman, I moved the BLM to consider a withdrawal of the public lands there from mining. Under our current, archaic mining law it's our only chance to save that country. Our modern technology allows mining companies to extract one ounce of gold from one hundred tons of ore, at a profit. And, for the most part, under the 1872 Mining Law if the miner can make a profit, they can mine.

Montanans support the BLM withdrawal. The BLM tells me that in the public meetings they've had to gather input about a withdrawal, the overwhelming majority of the people who've participated, have been opposed to mining the hills. In fact, they've been able to identify just one or two people willing to speak out in favor of mining.

In conclusion, Mr. Chairman, this committee should make changes in the mining law. The Sweet Grass hills illustrate well the disconnect between an era in which our national policy encouraged mining as the "highest and best use" of the public land, and today when mining, while still vital and still to be encouraged, must take its place among a number of other vital uses of the public land.

I've been asked by 21 Montanans to submit statements for the hearing record, Mr. Chairman. I also submit for the record the statement on behalf of the Montana-Wyoming Tribal Leaders Council a statement by Chairman Mickey Pablo of the Confederated Salish and Kootenai tribes, and Chairman John Sunchild of the Chippewa Cree tribe.

Mr. CALVERT. OK. Mr. Smith, there was some questioning earlier about income regarding mines, and I would have a question regarding that. What is the magnitude of corporate income taxes Magma Nevada will likely pay over the lifetime of the mine? Do you have any ballpark figure, something that would approximate?

Mr. SMITH. As far as taxes go, maybe on an annual basis we look at just sales tax associated with our construction of around \$11 million, average sales tax each year around \$1.5 million, net proceeds tax about \$2.2 million, and property tax of about \$1.6 million.

Mr. CALVERT. A significant amount of money. How many people do you employ?

Mr. SMITH. We will employ approximately 450 people and have a payroll of around \$18 million a year.

Mr. CALVERT. I suspect you are very important to the areas in which you mine, to the communities in that area?

Mr. SMITH. Definitely. It is a very isolated community. I would refer to it as 4 hours from anywhere, that mining really hasn't been prominent there since the 1970's. In the past there has been a lot of double-digit unemployment, so, yes, we are very important to that community.

Mr. CALVERT. Thank you. Mr. Dempsey, Mr. Dooley left, but I am wondering where in California did you find gold?

Mr. DEMPSEY. It is on the Inyo National Forest just east of Mammoth Lakes, California, on the east side of the Sierras.

Mr. CALVERT. A significant find?

Mr. DEMPSEY. Yes, in the hundreds of thousands of ounces.

Mr. CALVERT. How is your permitting process going in California?

Mr. DEMPSEY. We have actually had a relatively good run with permitting there. We have talked a lot with people in the community. At the local level, the Forest Service has worked with us. They have been very prompt in their activities. They have asked us to slow down at certain times for deer migration and things like that, but I would have to say that it has worked pretty well.

Mr. CALVERT. California, as you know, has a reclamation law, and you mentioned in your testimony earlier the scars of the past and present mining operations certainly need to have some type of

reclamation plan. Is it not the case that every State now has a reclamation law that provides guidelines for reclamation of mining operations and, in your opinion, how well do these State reclamation laws work?

Mr. DEMPSEY. It is correct that all the States now have hardrock reclamation requirements. I think most of them are quite effective. The hardrock industry has always been by and large regulated under more of a management by exception rather than a man in control approach, and I think that has allowed most of us to try to innovate and to bring in the best technology we can.

I think in some cases the States probably need to have more opportunity to use outside consultants and things like that that we have had difficulties in Colorado. I am aware of Colorado because I have served on committees with the mine land reclamation authority there. The industry has tried to cooperate to make sure they have the funding that is required to do a good job. I think by and large the States have done a pretty good job with their reclamation authorities and that it works pretty well.

Mr. CALVERT. Another issue in mining reform is the concept of suitability. It often comes up at discussions about mining law reform. Could you explain to the committee in a little more detail of what this means and how you think that should be applied if it was incorporated in a mining reform bill?

Mr. DEMPSEY. Well, I don't think it should be put in a mining reform bill. My testimony is that issues like suitability and the Endangered Species Act, things like that, a lot of them are being used as indirect land use controls. We have a big debate in this country, particularly in the western States, about how growth is going to be managed.

A big summit was held in the State of Colorado recently on that issue, led by our Governor. Those are issues that are broader than a commodity-specific piece of legislation like the mining law. The Leasing Act, the mining law, things like that are not the place to be trying to deal with suitability, and suitability is really another word for land use control, and I accept that the public are very interested in the quality of life, particularly in our western States.

All of us are interested in land use decisions. We don't have a very good mechanism in this country for land use adjustments. I think one of the principal reasons is that our Federal lands have not been very readily available to local communities. The exchange process has been cumbersome.

Again, it has been impacted by the overlay of Federal regulation, and I would urge the committee to leave it alone. In commodity legislation, you end up fighting with all the economic interests over something that is more appropriately dealt with in broader approaches. I would also ask the committee to look at some of the other nations.

We are not the only country in the world that is interested in the quality of its environment or the beauty of its landscape. Take the United Kingdom, for example. They dealt with the on-shore impacts of offshore oil and gas leasing 20 years ago. The Town and Country Planning Act that they have that deals with their land use issues accommodated that big industrial development. Even the

conservation foundation in this city wrote a glowing report about how well they did it.

There are other political institutions that could be utilized to get our growth management and our land use issues taken care of in the West. Trying to do it through commodity-specific legislation is really the hard way, and I would commend to your attention the British experience.

Mr. CALVERT. Thank you. I have one more question for Mr. Smith. You made numerous references to the permitting process at the Magma site in Ely, Nevada. I wonder if you could be more specific in telling the members of this committee how that process could have been improved on both reducing the amount of time and the amount of money while producing basically the same result.

Mr. SMITH. Well, you know, one of the things, one of my big points that I see is that we have both a Federal Government and the State focusing in on the same areas, whether it be reclamation, archaeology, water, I don't know if I mentioned reclamation or not, but there are a number of different areas where both the Federal Government and the States believe that they have regulatory authority, and for instance what happens in the archaeological area, for instance, is that the BLM certainly has their own staff of people and their own points of views, and that is great.

We have got to deal with them, but then it goes to SHPO, the State, and they have their other points of views and particulars that they want, and, for instance, a company has got to walk a tightrope between the two and at the end of the day what we want to do is to get clearance so that we can proceed with doing something on the ground.

The same thing with respect to reclamation standards you see out there. The State has a very good reclamation plan and yet the BLM thinks they have the greatest, plan, too, so you get caught up between the two. Time is another major issue there that is really affected by the resources that both entities have to devote to a project. There are only so many experts with respect to water quality issues, with respect to wildlife issues, and just getting their attention and their time to spend on your part of the project is sometimes a real effort, and all these things have to be timed, and it just doesn't seem like it is very efficient. It is just that this process drags on and on and on, and being an operator, you know, we work and we try—we are going to do whatever it takes to get something done and throw all the resources at it, and to me it is really tough when you are dealing sometimes with people that only put in 8 hours a day, which is fine. They only get paid for 8 hours a day, but there is no real incentive for them to do anything any faster than just the pace of whatever it is going to take to get done, so those are some of the areas that I see—resources and the fact that we do have to deal with both sides, both the Federal and the State, and sometimes, you know, again I tried to imply that there may be some contradictions in how they view the permitting process, and the one area that I didn't mention was wildlife.

Of course, the State has their wildlife department and we have our U.S. Fish and Wildlife Department, too. They are at odds sometimes as to how they want to go about the permitting process.

Mr. CALVERT. Thank you. I would like to thank all of you for your testimony and the committee, I think it was a very good meeting this morning. It is the first step toward understanding the legislation that is before us. I can see from the industry side that it is at some point frustrating sometimes, the time that it takes.

I think we kept hearing time of permitting, the costs in which to operate here in the United States, and that we are hearing that some of your industry is moving off shore and investing off shore. It is the intention to have further meetings and to try to understand this problem in more detail, and, again, I would like to thank you for coming out here, and I look forward to further testimony in the future.

Yes, Mr. Abercrombie?

Mr. ABERCROMBIE. Mr. Chairman, with your permission, I may have already asked. If I haven't done so formally, I will now, ask permission to submit questions for written answers for the record.

Mr. CALVERT. The hearing will be held open for these responses. In addition, I will hold the record open for 2 weeks to allow the submission of any other material for the record.

Mr. ABERCROMBIE. Thank you, I have a couple other articles I would like to submit.

[The abovementioned material had not been received by the committee at time of printing.]

Mr. ABERCROMBIE. Thank you. May I also thank our witnesses and guests here this morning and from Hawaii say mahalo, which is thank you and aloha and hope that you have a chance to visit us and mine the depths of relaxation.

Mr. CALVERT. If there is no further business, I thank, again, the members and thank the witnesses. The subcommittee stands adjourned.

[Whereupon, at 12:15 p.m., the subcommittee was adjourned, and the following was submitted for the record:]



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Testimony

of

*John L. Dobra, Ph.D.
Director, Natural Resource Industry Institute
Associate Professor of Economics
University of Nevada, Reno*

on

*The U.S. Gold Industry:
Its Growth and its Future*

before

*The United States House of Representatives
House Committee on Resources
Subcommittee on Energy and Mineral Resources*

January 31, 1995

INTRODUCTION

Members of the Committee, my name is John L. Dobra. I am an Associate Professor of Economics at the University of Nevada, Reno where I also serve as Director of the Natural Resource Industry Institute. The Institute is involved in a number of studies concerning the U.S. gold industry's operations in the U.S. and around the world and is part of the Congressionally authorized Great Basin Policy Studies Center at the University of Nevada.

The focus of my testimony today is on the U.S. Gold industry and, specifically, its growth and its prospects for the future. To start with an historic perspective, I would like to direct your attention to the cover of an attachment provided with my testimony entitled *The U.S. Gold Industry, 1992*. The bar chart on the cover shows U.S. gold production from the first gold rush in North and South Carolina in the 1830's through 1992.

On the chart you can see the output of the California gold rush, which peaked in the early 1850's at just over 3 million ounces per year and declined rapidly. Next, the graph shows the Alaska or Klondike gold rush of the turn of the century which peaked at just over 5 million ounces. The spike in production in the 1930's occurred throughout the west but was largely centered in the Black Hills of South Dakota, and was the result of the devaluation of the dollar during the Great Depression. This relatively short-lived boom ended with the cessation of gold mining during World War II. Finally, the chart shows the modern gold industry which, in 1993, produced 10.6 million ounces of gold, more than twice the historic highs of previous gold booms.

We emphasize this graph by putting it on the cover of our study because it makes several important points. First, as the graph clearly shows, the U.S. gold industry has grown rapidly into a world class, highly competitive industry with production at historically unprecedented levels. In 1980, the U.S. produced less than 1 million ounces of gold. Current levels of production are more than ten times that level and two times historic highs. The gold industry generates tens of thousands of high paying jobs for Americans and generates hundreds of millions of dollars in tax revenues for the federal, state and local governments. Some of the details on the economic impact of the industry are contained in the attached study.

Current levels of production make the U.S. the world's second largest producer and a significant portion of this production is exported, which reduces our trade deficit. It should also be noted that this industry operates in complete compliance with all of the same environmental laws that all other U.S. industries comply with and it provides workers with some of the highest paying industrial jobs in the country. I would offer the observation that if someone were to offer to bring such an industry into this country, Congressmen, Governors and state and local politicians would engage in intense competition to bring it to their districts.

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The second point that this graph illustrates very well is that the U.S. gold industry is a relatively new industry for this country. Gold production prior to 1980 was primarily by-product production from copper mines. After world events required the U.S. to go off the gold standard in 1974 with gold at \$35 per ounce and the oil crisis pushed the price of gold over \$800 per ounce in 1980, the market worked as predicted. Exploration geologists in the U.S. began identifying exploration targets in the U.S. that could be developed at these higher prices. The result was the gold boom of the 1980's which was centered in Nevada, but directly affected almost all western states and indirectly affected all other states.

However, it is important not to lose sight of the fact that this boom and this industry are the result of over \$8 billion in estimated capital investment by primarily U.S. companies, but also by companies from Canada and other nations. It is equally important to not lose sight of the fact that the future of the industry depends critically upon the continued investment of billions of dollars to find and develop new mines in the U.S.

THE GOLD INDUSTRY: A LIGHTENING ROD

Because it came of age in the 1980's, the U.S. gold industry has become the lightning rod environmentalist's attack on the mining industry. To understand why the multi-million dollar environmental lobby has put up millions to sponsor groups like the Mineral Policy Center to focus public attention on the gold industry one needs to look at the hardrock minerals industry prior to the development of this relatively new industry in the 1980's.

Prior to 1980, the nation's largest hardrock mineral industry was the copper industry. The copper industry operated a relatively small number of large mines on land that had been patented long ago. Hence, these mines had secure property rights and operating permits in place. In addition, more mines were closing during the 1970's and 1980's than were opening for a variety of reasons. As a consequence, there was little that the environmental movement could do to hardrock mining and it seemed to be fading away. Whatever real or imagined problems there were with the mining laws were simply not important enough or, more accurately, high enough on environmentalists' agendas, to attack.

The growth of the gold industry in the 1980's changed all of this. New mines were being permitted and opening at a rate unprecedented for decades. Environmentalists viewed this as an encroachment on the federal lands which many of them had come to regard as being for their private recreational use. You will notice that the philosophy and the term "*multiple use*," has all but disappeared from the lexicons of groups like the Mineral Policy Center.

In fact, mining activities affect very little federal land compared to grazing, timber and recreational users. In Nevada, for example, which is one of the most sparsely populated and most heavily mined states, more land has been paved over for streets and highways and reserved for wilderness and

Page 3

recreational areas than has been impacted by mining in the state's entire history.

Nonetheless, the new competition for the use of the federal lands from the gold mining industry resulted in advocacy for reform on several fronts. One of these fronts is the regulatory process which issues permits for mines to explore, develop and operate mines. Another front is here in Congress: the reform of the nation's mining laws. Any objective analysis would have to conclude that despite the failure to pass a new mining law in the 103rd Congress, the reformers are winning.

On the regulatory front, an illustration will help make the point. In 1986 one U.S. company decided to pursue a gold/silver project in Nevada and had it permitted, developed and poured its first dore¹ in less than one year. In 1995, the same company is going into its *fourth* year of trying to acquire permits to begin development of a mine in Idaho. And, it should be pointed out, this case is typical.

Regulatory gridlock is the result of several factors. The first of these, as noted, is the advocacy of groups that have pressed both federal and state regulatory agencies to increase their oversight of mining activities and increase impact thresholds. This, of course, is their right. The resulting problems for prospective operators on federal lands are compounded by unmanageable nature of the split estate on the western federal lands. Under the split estate different federal and state agencies have responsibility for managing different attributes of the same piece of land.

For example, if grazing permits exist for the land, the Bureau of Land Management (BLM) has regulatory oversight. If there is a stream bed on the land, it could be an ephemeral tributary of a navigable river - even if there is water in the stream bed only a few months out of the year and if the so called navigable river runs into a desert valley and dries up. In this event, the U.S. Army Corp of Engineers has jurisdiction and possibly the state department of environmental protection and the U.S. Fish and Wildlife Service, depending upon the degree of proposed disturbance. If the site contains a seasonal wetlands, the state department of environmental protection and the U.S. Fish and Wildlife Service would be involved.

In many cases new mines are being developed on sites where mining occurred at the turn of the century or during the 1930's. In this event, there is likely to be abandoned ruins of buildings or equipment on the site. In this case, the mine could be considered an archeological site which falls under the jurisdiction of the BLM and a state historic preservation office which is mandated under federal law.

These abandoned sites will also typically have a portal to underground works which may very well be habitat for bats or other species. If these are listed as threatened or endangered species or candidates for listing, this requires additional regulatory actions by the U.S. Fish and Wildlife Service.

This is not to imply that any of the values that have been described above are not worth protecting. However, there are cases where this regulatory authority has been applied zealously, in the opinion of many, with little real benefit to the values that are supposed to be protected. In any event, the

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net result of these actions has been to make operating in the U.S. on federal lands an extremely costly proposition.

The second front where the industry has been under attack has been in Congress where debate has focused on mining law reform. Before turning to this issue directly and in greater detail below, however, it should first be noted that although mining law reform did not pass in the 103rd Congress, reformers are, nonetheless, achieving their objective of slowing down the industry. This has been accomplished both through erecting regulatory barriers described above and threatened onerous reforms.

THE FLIGHT OF CAPITAL

The result of erecting higher regulatory barriers and threatened reforms can be seen in Figures 1 and 2. Figure 1 is based on a survey of the major North American precious metals producers conducted by the Natural Resource Industry Institute and shows where these companies have spent their exploration and development capital over the past three years. Note from the bottom of the figure that these companies spent \$1.41 billion in the U.S. during this period and \$2.23 billion, or 61 percent of total expenditures, outside of the U.S. This is in stark contrast to the late 1980's when, for example in 1988, approximately 80 percent of these same companies' exploration dollars were being spent in the U.S.

Figure 1
North American Gold Producers'
Exploration and Development
Expenditures Outside of the U.S.
1992 - 1994



Expenditures in the U.S.: \$1.41 Billion

Expenditures outside the U.S.: \$2.23 Billion

Figure 2

North American Gold Producers' U.S. and International
Exploration and Development Expenditures, 1992-4

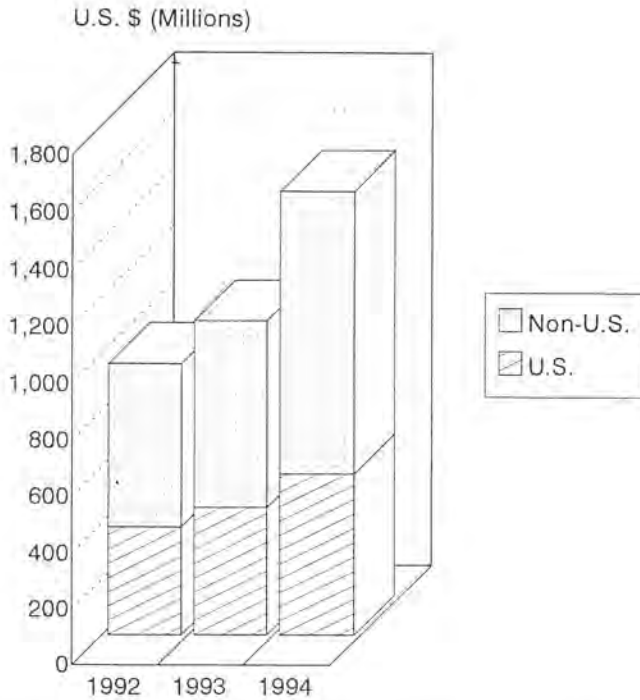


Figure 2 shows the same data by year broken down for U.S. and non-U.S. and illustrates the trend in expenditures. Note that overall expenditures have increased each year. This has largely been the result of improved gold prices. However, note that these expenditures have increased much more rapidly outside of the U.S. than inside the U.S.

It should also be noted that much of the U.S. exploration expenditures represented on the two figures is either on the site or near existing mines. On one hand, this is to be expected but not to the extremes that we are seeing in our survey of firms. There is simply very little "green fields" exploration activity going on in the U.S. and this is largely because of the regulatory barriers and mining law reform mentioned above.

The Committee will hear from some witnesses that statements such as the above are alarmist, that the companies are simply going to where the minerals are and, to some extent, they have a point. However, it is still true

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that in the present climate it is much easier to obtain permits for the expansion of an existing mine than a new one, and orebodies discovered through "green fields" exploration are likely to be unpatented and subject to royalties proposed in legislation last session than near-mine orebodies. Hence, increased regulatory barriers threats to the industry through reform are working.

The Committee is also likely to hear witnesses say that U.S. companies are fleeing the U.S. to avoid U.S. environmental standards and are going to wreak environmental havoc in foreign countries. However, to one who follows the finances and developments in this industry closely, such claims ring hollow. Many of these international investments are joint ventures with foreign governments and some of them receive some funding from sources like the Eastern European Bank of Reconstruction and Development, investment and bullion banks.

These banks, like other banks that may finance all or part of U.S. companies' overseas mineral development projects require insurance for general business risks and, in some cases, political risks. These insurance carriers, by in large, require that companies' mining plans meet U.S. environmental standards. Even if this were not the case, every company understands that the surest way to have their assets expropriated is allow an environmental incident to occur. In another study that is currently underway at the Natural Resource Industry Institute we have surveyed U.S. companies' annual reports and found that all but one of the sixteen companies with operations in the U.S. and overseas state that they meet the same environmental and reclamation standards in their overseas operations that they meet in the U.S.

Companies also understand their long term environmental liabilities. The Union Carbide/Bhopal case showed U.S. parent companies that U.S. courts will hold them liable for the actions of their foreign subsidiaries even when their joint venture partners are host governments that are actively engaged in regulating the subsidiary. In addition, the Union Carbide/Bhopal case indicates that the U.S. parent can be liable in the U.S. for damages set in a foreign court and these damages can exceed the assets of the subsidiary. Hence, every U.S. company, and even foreign corporations with assets in the U.S., should realize that U.S. environmental laws are the standard and that they ignore them when operating overseas at their own risk. (For more details on the Union Carbide/Bhopal case see J. H. Armstead, NRII Research Reports, V.1, no. 4, pp. 1-7)

More importantly, the members of this Committee need to understand that it is not the cost of meeting U.S. environmental standards that is forcing U.S. companies out of the U.S. They must meet these standards wherever they go. What is driving these companies out of the U.S. is the cost of dealing with the multiple levels of bureaucracy managing U.S. federal lands. Simply put, it is significantly cheaper to meet U.S. environmental standards to the satisfaction of the international banking and insurance communities outside of the U.S. than inside the U.S.

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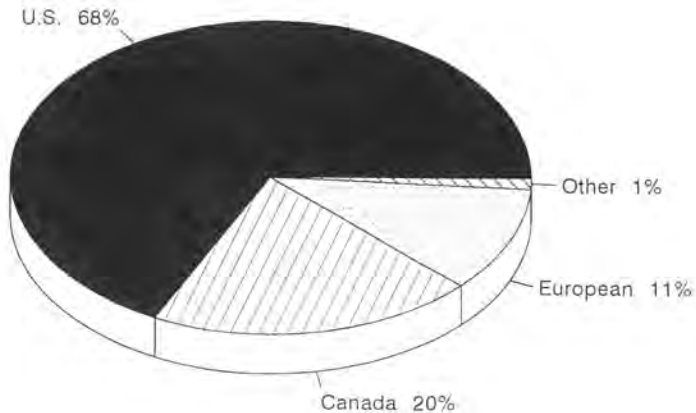
CONCLUSIONS

The mining law debate in the last Congress saw many claims that were exaggerated and uninformed. In a chapter in *Multiple Conflicts over Multiple Uses*, Terry Anderson, ed., which has been provided to Committee staff, I have tried to put the issues in the mining law debate in perspective. Authors of other chapters in the book do the same for the federal oil and gas leasing system, the timber industry, grazing and recreational uses of the federal lands. The fundamental policy issue in all of these debates is who should have the right to use the federal lands for what purposes?

Unfortunately, in this debate this fundamental policy question frequently takes a back seat to side issues like royalties and foreign ownership that are either trivial in comparison or simply nonsensical. For example, on the issue of foreign ownership, a closer look at the facts shows that in spite of the fact that some of the companies operating in the U.S. are headquartered in foreign countries which generally means Canada, U.S. shareholders own significant percentages of these companies. In the case of one major U.S. producer, Echo Bay Mines, this Canadian company is even majority owned by U.S. shareholders. Figure 3 aggregates the ownership of U.S. gold reserves "in-situ," or in the ground, based on the underlying shareholdings in the companies and shows that over two-thirds of U.S. reserves are ultimately owned by U.S. shareholders and North Americans own 88 percent.

Figure 3

"In-situ" gold reserves weighted by stock ownership

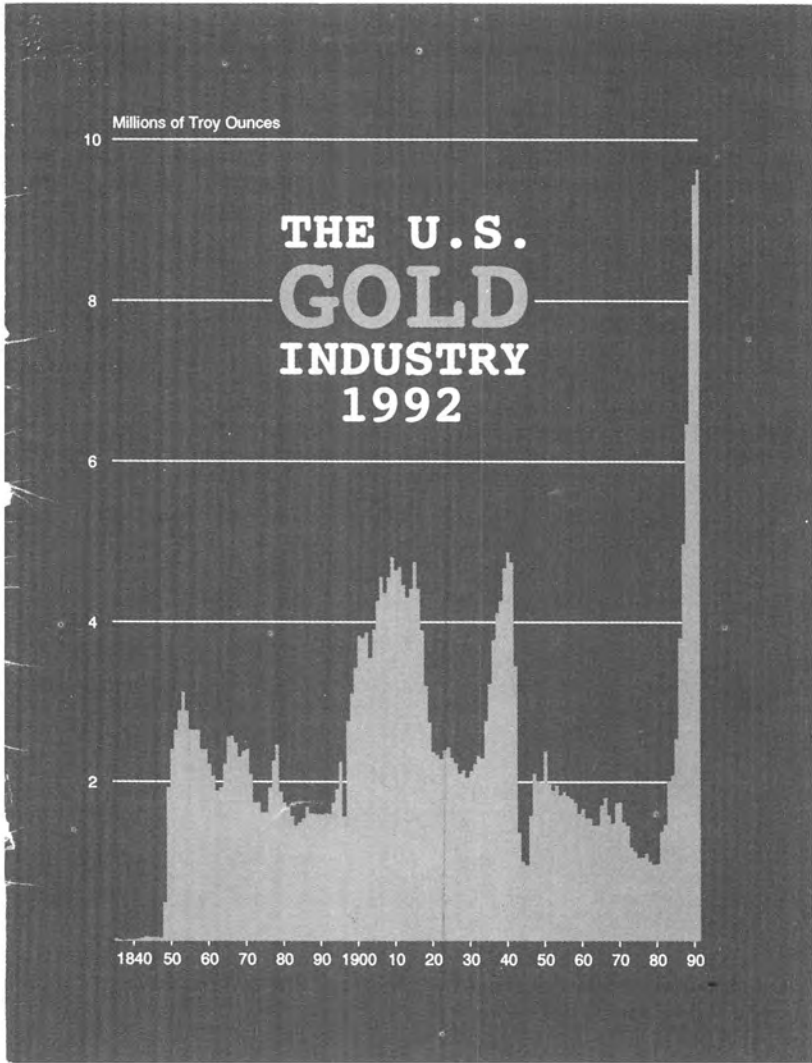


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Hence, the data shows that the U.S. gold industry is largely U.S. owned and predominantly North American owned. Moreover, as a student of economics, I was always taught that foreign investment in the U.S. was a good thing. Foreign investment built this country. If there is any problem with foreign ownership in the gold industry it is that the issue diverts the attention of the press, the public and Congress from the fundamental policy issue at stake: who should have the right to use the federal lands for what purposes?

The mining law controversy is really fundamentally no different than other controversies in economic policy. In many industries, from airlines, to railroads, steel, automobiles and telecommunications, we see industries and firms seek to use regulatory and legislative means to limit competition by erecting regulatory and legislative barriers to their competitors. In this case, miners like ranchers and loggers are competitors with recreational users for access to the federal lands. Thus far, recreational users have succeeded very well in erecting entry barriers to commodity producers in general and the mining industry in particular. If this Congress is interested in keeping the industry in the U.S. and benefiting from the taxes it pays and the jobs it creates, it needs to find ways to reverse the trends of the past ten years and begin leveling the playing field.

I would like to thank the Committee and Chairman Calvert for the opportunity to speak and am prepared to answer any questions that you may have.



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THE U.S. GOLD INDUSTRY 1992

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SUMMARY

In spite of low commodity prices over the past two years the U.S. gold industry has continued to produce at record levels during 1991, producing a total of 9.6 million ounces. Although less than 30,000 workers are directly employed in the industry in the U.S., when indirect impacts are included, approximately 80,000 jobs depend upon the industry in both producing and nonproducing states.

Low prices have resulted in lower earnings for many producers and, because of write-downs of certain investments made during periods of higher prices in the 1980s, the industry as a whole lost money in 1991. In spite of lower earnings, however, the industry's contribution to employment and state, local, and federal tax bases remain at record levels. Low prices have

resulted in a reduction in the gold reserve base, a slowdown in exploration and development activities, and alterations in some long range mining plans.

Major concerns facing the industry in the future include the possible reform of the General Mining Law, the growth of regulatory compliance costs, and taxation initiatives involving a federal royalty. Some of the major changes in these areas that have been proposed would lead to a deterioration in the business environment and to a reduction in investment in developing the U.S. industry. The tax and regulatory changes are coming at a time when the industry is beginning to deal with technical challenges affecting the costs of mining and processing more complex gold ores.

INDUSTRY PROFILE

Introduction and Methodological Overview

This study updates a previous study published in early 1991 that focused on the growth, economic impacts, and economic viability of the U.S. precious metals producing industry (Dobra and Thomas, 1991). Because of the rapid growth of this industry in the late 1980s from an insignificant producer, which it had been during the post-World War II period, to the second largest producer in the world, the purpose of the first study was largely to document the fact that the industry existed. This report updates the information presented in the previous publication and expands the analysis and discussion of the structure, conduct, and performance of the U.S. industry. This involves

a greater focus on profitability, public policy issues, and the long-run viability of the industry.

As in the previous study, this edition relies primarily on publicly available data sources. This includes federal and state sources for production and employment information, company annual reports and Form 10K's for some financial information, and other publicly available information. Information on production costs, reserves, future plans, and some financial information was obtained from a confidential survey of U.S. producers. The confidential materials have been aggregated into a form that prevents identification of individual respondents and have been combined with publicly available information to provide a comprehensive overview of the industry.

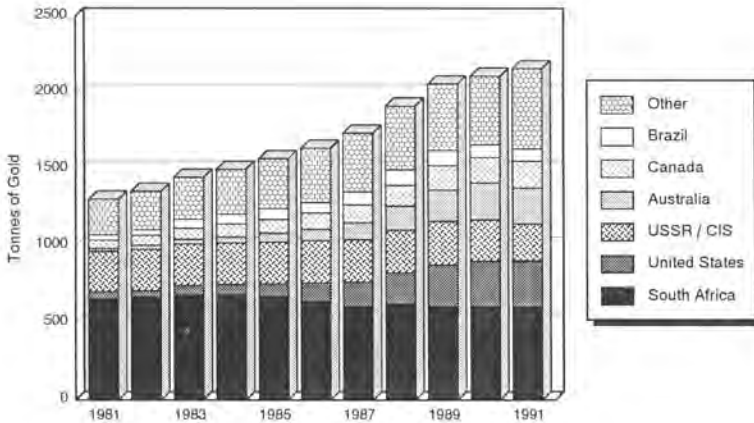


Figure 1. World gold production, 1981–1991 (data from Murray and others, 1992).

World Industry Issues

The performance of the U.S. precious metals industry in 1991 and 1992 mirrors that of the industry worldwide in two important respects: (1) U.S. production leveled off after six years of very rapid growth; and (2) low commodity prices have dramatically reduced industry profitability.

U.S. gold mine production rose slightly in 1991 over 1990, from 9.46 million to 9.65 million troy ounces (294.2 to 300 tonnes), an increase of just under 2%. In comparison, world mine production rose from 68.5 million ounces (2,132.1 tonnes) to 69.3 million troy ounces (2,156.6 tonnes) over the same period, an increase of just over 1% (Murray and others, 1992, p. 21).

Figure 1 shows the trends in world and major producing nations' mine production over the last decade. As illustrated by the figure, although South Africa remains the most significant producer, its production has fallen slightly over the decade. This decline, however, has been more than offset by increases in production by the U.S., Australia, Canada, and "other" producers.

The trends observed among the latter producing nations are the result of investments in exploration and mine development in the early and middle 1980s which were spurred by historically high levels of precious metals prices. The results of the survey of major U.S. gold producers conducted in the course of this study showed that capital expenditures for plant, equipment, and property development totaled over \$2.8 billion from 1989 to 1992. When exploration expenditures are included, a total of \$3.4 billion has been spent in the U.S. by mining companies over this same period.

As a result of these investments, the U.S., Australia, and Canada have become the second, fourth, and fifth largest producers in the world, respectively, with combined production exceeding that of South Africa. Figure 2 shows the leading producing nations and respective percentages of world mine production. Also as a result of these investments and increases in production, the U.S. has gone from a net importer of gold to a net exporter.

The weak commodity prices noted above are clearly the most serious threat to the industry's profitability and long-run viability both world-

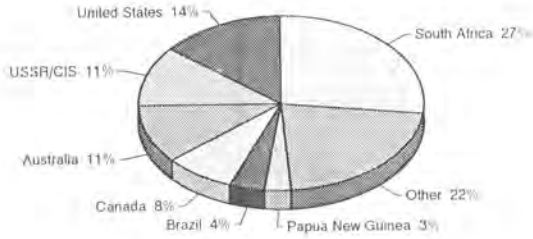


Figure 2. World gold mine production (data from Murray and others, 1992).

wide and in the U.S. As shown by figure 3, average annual gold prices have fallen fairly steadily over the past five years from a high of \$446 per ounce in 1987 to \$362 in 1991, a 19% decline. Because of this trend, exploration expenditures and industry profits are down substantially compared to previous years.

While gold prices have performed poorly over the past several years, reaching a six-year low of \$334 in mid-August 1992, the fundamentals

for gold were better at that time than at any other time in the previous decade. As shown in figure 3, demand for physical gold has exceeded supply in each of the last four years. Physical gold excludes forward sales but includes gold loans that take physical gold from existing above-ground stocks and make it available to the market along with mine production, scrap, and bullion sales by central banks and identifiable private holders. The excess

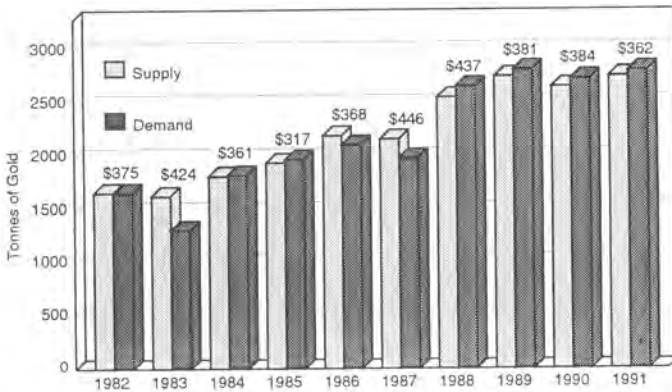


Figure 3. Physical supply and demand for gold, 1982-1991 (data from Murray and others, 1992). Annual average gold prices at tops of bars.

demand for gold over the past four years has been met by unidentifiable private holders selling bullion bars, coin, and jewelry.

Low prices, most experts will agree, have slowed the rate of growth in supply from all sources. In fact, supply from all sources peaked in 1990 (Murray and others, 1992, p. 17) and is likely to continue to decline slowly until prices move up from their current low levels. The major questions concerning the relationship between supply and demand are on the demand side.

Many analysts focus on investment demand for gold as a key cause of price changes. Traditionally, this has been the case and, certainly, gold holdings in investors' portfolios have an important impact on the market at the margin. On the other hand, fabrication of gold into carat jewelry in 1991 accounted for over 76% of physical supply, up from less than 40% in 1980 (Murray and others, 1990, p. 7, 39). Hence, the fundamentals of the gold market have changed dramatically over the last decade, making gold look much more like a consumer good and less like an investment good. Although gold remains an important investment good in some cultures, the change in the mix of final demand for gold suggests the emerging importance of the consumer market.

With these fundamental market changes in mind, we have argued that the important factors affecting gold prices are consumer confidence, growth in personal disposable income, and, in short, factors that affect other consumer luxury durable products. From this perspective, the prescription for higher gold prices is a stronger world economy. A stronger world economy would also spur purchases of investment carat jewelry in the Middle East and Asia where such purchases have been traditional means of private savings.

Notwithstanding these changes on the demand side of the market, investment demand should not be completely discounted and overlooked. If 1991 mine production of 69.3 million ounces is valued at \$350 per ounce, its total value of under \$25 billion is a very small fraction of worldwide investors' portfolios. Hence, a very small change in the composition

of these portfolios to gold because of a currency crisis, for example, could have a tremendous impact on the physical market for gold.

U.S. Industry Profitability

The effects of low gold and silver prices on precious metals producers' profitability and the effects of the general economic slowdown in the 1989 to 1991 period are illustrated by figure 4. Data for U.S. precious metals producers used in figure 4 are from the annual reports of 21 publicly held producers with U.S. operations and from communications with two private companies for a total of 23 companies with U.S. operations. Using annual report information does not always permit differentiating between U.S. and offshore operations since annual reports do not differentiate assets, earnings, and owners equity by country. Consequently, the return on equity shown in figure 4 includes some earnings from non-U.S. operations. Nonetheless, we estimate that over 75% of the production reflected in the figure is from U.S. operations and that the information accurately reflects the financial health of companies operating in the U.S.

Price, shown along the top of the figure 4, is clearly the most significant factor influencing industry performance. Return on equity peaked in 1987 at 14.5% when gold prices peaked at an average annual price of \$446 per ounce.

Return on equity for other industries is shown on figure 4 for comparison purposes. Even casual inspection reveals that most industries' earnings have suffered in the late 1980s and early 1990s because of the general slowdown in the U.S. economy.

As a first approximation, since the U.S. produces just under 10 million ounces of gold, every dollar change in the price increases or decreases industry revenues by nearly \$10 million, other things, such as hedging strategies being equal. Coincidentally, the 23-producer group in our survey produces 10.1 million ounces, including non-U.S. production. Further, since production costs are about the same in the short run regardless of price, this \$10

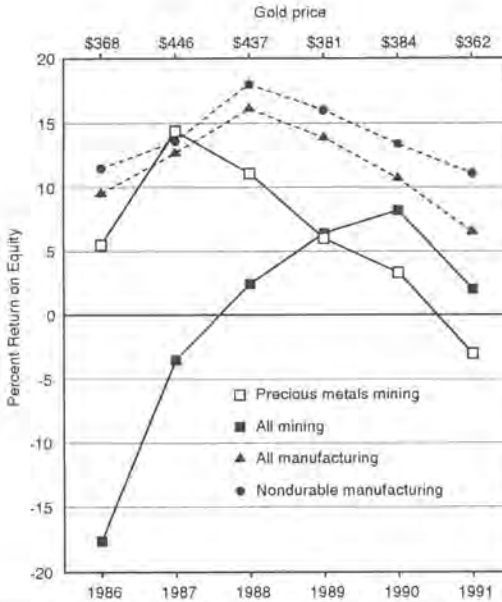


Figure 4. Return on equity of the precious metals industry in comparison with all mining and with manufacturing, 1986-1991. Financial data for precious metals producers are from companies' annual reports. Financial information for other industries is from the U.S. Bureau of the Census (1991). Annual average gold prices are shown along the top of the chart.

million basically goes to the bottom line, changing pre-tax net income. The result is that industry earnings are highly leveraged against gold. Our calculations based on consolidated earnings puts the leverage at around 25 to 1 for marginal (1%) changes in gold prices. This leverage diminishes as price changes get larger and over time because firms do, in fact, modify their costs as prices change, primarily in non-core areas such as exploration and support services.

As a consequence of this leverage, earnings have suffered tremendously as prices have fallen. In spite of these disappointing results, there are a number of positive things that can be said. First, the situation looks worse than it really is because of the number of significant write-downs of assets. Write-downs totalling

\$353 million were taken by the industry in 1991, mostly by one company. These write-downs have clearly had a significant impact on the figures. Without these write-downs, consolidated industry net earnings probably would have been in the positive \$225 million range. This would still only represent a 3.5% return on equity.

Nonetheless, there are good reasons for taking write-downs, and the reasoning that you might as well take them in a bad year rather than spoil a good one seems to have been popular. Further, the implication of taking the write-downs is that when things do turn around, resulting earnings will be even better.

Another positive point to be made about precious metals industry performance is that industry leaders have used various strategies in

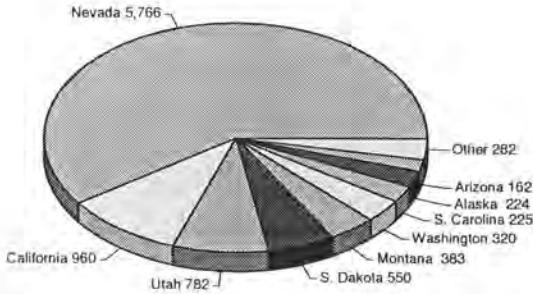


Figure 5. U.S. gold mines production (thousands of troy ounces), 1991.

financial and commodities markets to soften the blow of falling prices. Many producers have adopted aggressive hedging strategies to take advantage of temporary surges in commodity prices and contangos, or premiums paid to sellers in futures transactions in gold markets. First Boston Canada, Ltd., which conducts a "Global Gold Hedge Survey" reported in June 1992 that as of the end of the first quarter of 1992, 42% of 1992 North American production had been hedged at \$404 per ounce, a significant premium over the spot price available to producers (Reeve, 1992). Hence, in spite of poor market conditions, producers have found ways to partially protect themselves from these market risks.

U.S. Gold and Silver Production

As in previous years Nevada led the U.S. with gold production of 5.766 million ounces, approximately 60% of total U.S. production. Nevada was followed by California, Utah, South Dakota, Montana, Washington, South Carolina, Alaska, and Arizona as major producing states as shown by figure 5 and table 1.

In Utah and Arizona gold is primarily a by-product of copper production and these states combine for approximately 10% of U.S. production. Nationwide gold is produced at several hundred primary mines. However, as examined

in greater detail below, production is highly concentrated in a relatively small number of operations. During 1992, survey data indicate that the five largest U.S. operations will produce 37% and the ten largest will produce approximately 50% of U.S. production. The fact that a majority of these largest mines are in Nevada accounts for the state's leadership in production.

Survey data collected for this study showed that approximately 50 mines accounted for 8.3 million ounces of 1992 production, 86% of total U.S. production and 96% of primary production. Hence, the several hundred remaining small lode and placer mines and reprocessed mine dumps scattered across the producing states account for just 4% of U.S. primary production.

In contrast to the gold industry and largely because of weak silver prices, most silver produced is as a by-product of gold, copper, lead, or zinc production. Consequently, silver production tends to be located in gold or copper producing states (figure 6 and table 1). As with gold, silver production in Utah and Arizona tends to be a by-product of copper production. Alaskan silver production is primarily a by-product of lead and zinc production. Idaho is an exception to this generalization, producing very little gold but 10.7 million ounces of silver, 15% of total U.S. production.

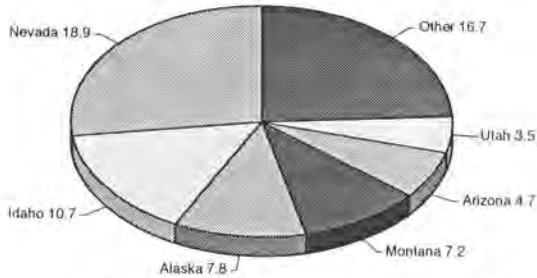


Figure 6. U.S. silver mines production (millions of troy ounces), 1991.

This large degree of by-product supply, estimated by the Silver Institute to be approximately 60% of world production, and 75% of U.S. production, results in supply being fairly insensitive to price. In fact, 1991 silver production has increased in spite of declining prices. For example, silver may be mined with copper,

removed like any other impurity, and supplied to the market at any price above the refining and transportation costs, which are relatively small. As a consequence, silver supply continues to grow with gold and base metals production while prices fall, squeezing primary silver producers.

Table 1. U.S. gold and silver production, 1991.

State	Gold (oz)	Value of gold (thousands)	Silver (thousand oz)	Value of silver (thousands)	Total value (thousands)
Alaska	224,285	\$80,967	7,779	\$31,350	\$112,317
Arizona	162,202	58,555	4,726	19,046	77,601
California	959,566	346,403	772	3,110	349,513
Colorado	65,000	23,465	579	2,332	25,797
Idaho	90,000	32,490	10,674	43,015	75,505
Missouri			1,222	4,923	4,923
Montana	383,309	138,375	7,234	29,152	167,527
Nevada	5,766,000	2,081,526	18,909	76,203	2,157,729
New Mexico	27,000	9,747			9,747
South Carolina	225,000	81,225	63	253	81,479
South Dakota	550,000	198,550			198,550
Utah	782,000	282,302	3,500	14,105	296,407
Washington	320,000	115,520			115,520
Other	46,352	16,733	14,089	56,780	78,437
TOTAL	9,600,715	3,465,858	69,546	280,271	3,746,129

Data for Alaska, Idaho, Nevada, South Carolina, and Utah are based on authors' estimates; data for the other states are based on reports from the U.S. Bureau of Mines. Average price used for gold \$361/oz, silver \$4.03/oz.

Economic Impacts of Gold and Silver Production

Table 2 shows the value of precious metals output in each of the producing states and the corresponding impacts on state and local economies induced by production. The estimates of economic impacts are based on the value of output and the applicable state multipliers for employment, output, and earnings impacts. The U.S. Department of Commerce, Bureau of Economic Analysis RIMS II multipliers provided consistent estimates across states (U.S. Bureau of Economic Analysis, 1992).

It is important to recognize that the impacts shown in table 2 include the initial or direct impacts of precious metals production itself plus indirect impacts on employment, output, and household income. For example, in Nevada there are approximately 13,000 workers directly employed in the precious metals industry. However, because of spending by companies in the local economy for development, construction, supplies and services, and because of the spending of mining payrolls in the local

economy, just under 40,000 jobs are created in Nevada's economy because of the precious metals mining industry.

The estimates of employment output impacts for Nevada are probably conservative. Based on an IMPLAN regional input-output model for Nevada, T. R. Harris and R. Fletcher (Dept. of Agricultural Economics, University of Nevada, Reno, personal commun., 1992) have estimated that each job in mining generates an additional 2.9 jobs in the state economy, which would make the total employment impact of the precious metals industry in Nevada over 50,000. Similarly, their output multiplier indicates that precious metals mining in Nevada increases gross state product by \$4.7 billion compared to the estimate of \$3.3 billion derived from the RIMS multiplier system.

It should also be noted that multipliers vary substantially from state to state because of the degree of local economic development. In a state like Alaska or Montana, where many of the needed supplies and services must be purchased out of state, the economic impacts of precious metals production are lower than in

Table 2. Economic impacts of U.S. gold and silver production, 1991.

State	Total value (thousands)	Jobs	Output (thousands)	Earnings (thousands)
Alaska	\$112,317	1,426	\$170,059	\$42,512
Arizona	77,601	1,917	140,046	41,897
California	349,513	8,353	668,758	180,454
Colorado	25,797	598	50,570	13,391
Idaho	75,505	1,525	122,009	31,297
Missouri	4,923	128	9,673	2,531
Montana	167,527	4,138	282,969	76,107
Nevada	2,157,729	39,918	3,336,713	849,066
New Mexico	9,747	206	17,562	4,326
South Carolina	81,479	2,558	146,589	42,084
South Dakota	198,550	4,845	323,239	89,963
Utah	296,407	7,914	605,974	167,470
Washington	115,520	3,350	209,184	61,029
Other	78,437	1,937	141,555	42,348
TOTAL	3,746,129	78,814	6,224,900	1,644,475

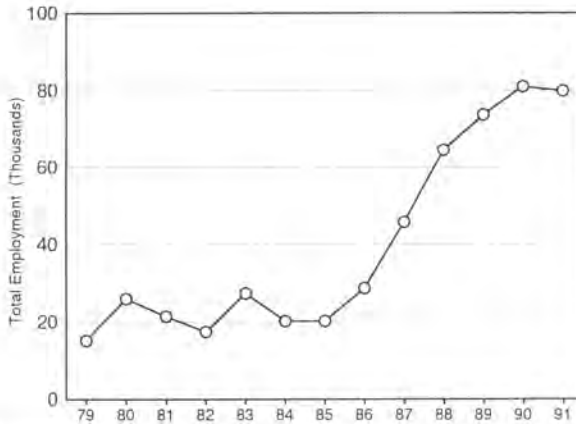


Figure 7. Total U.S. precious metals industry employment impact, 1979-1991.

states like California or Arizona with more developed economic infrastructures.

For reasons also related to the degree of state and local economic development, a comparison of multipliers from the 1986 RIMS model with those published in 1992 indicate that, in the case of Nevada, the values of the multipliers have increased for precious metals mining. The U.S. Bureau of Economic Analysis (1986) estimated that precious metals mining generated 18.5 jobs per \$1 million of output. The more recent estimates show an impact of approximately 19 jobs per \$1 million of output. Although that change in the multiplier itself might appear to be small (only 2.7%) when a state like Nevada produces \$2.2 billion in precious metals, that change reflects a relatively large number of new jobs (over 1,000) and indicates that the state has developed a much larger and more diverse industrial infrastructure to serve the precious metals mining industry.

In spite of low commodity prices and the resulting lower profitability in the industry in 1991 and 1992, the industry continues to have a significant economic impact in regional economies where it is located as well as in other parts of the country where supplies are manufactured and services like refining are provided.

Figure 7 shows the sum of employment impacts related to production during the period 1979 through 1991. Although the figure shows a slight decline in 1991 because of lower prices and profitability and the resulting tightening of company budgets, the general level of economic impacts of the industry remains substantially above the levels of a decade ago.

Two additional points need to be made about figure 7. First, because the employment impacts shown in the figure are based strictly on production, the impacts of the industry in the early and middle 1980s are significantly understated. During this period there were substantial investments in exploration, plant, equipment, and project development which had significant impacts on employment, output, and earnings. As an example, figure 8 shows expenditures for gold exploration by North American companies in the U.S., Canada, and other nations over the past 12 years. These expenditures exceeded \$200 million per year in the early 1980s when gold prices were at high levels. This level of expenditure would generate between 3,000 and 4,000 jobs in the context of the RIMS model. We are unable to make this estimation, however, because the data do not

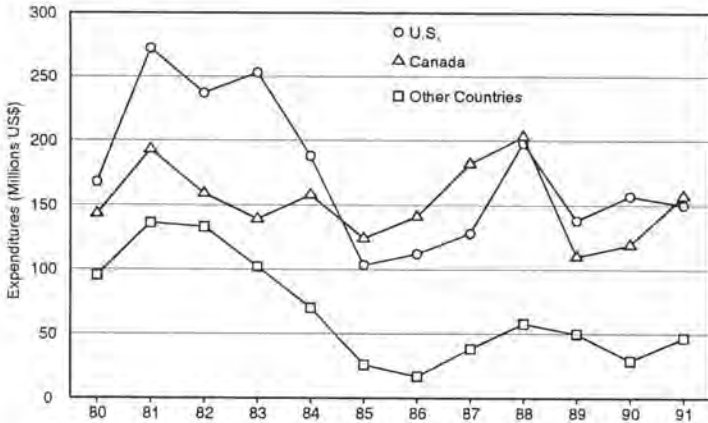


Figure 8. Exploration expenditures by North American companies in the U.S., Canada, and other countries, 1980-1991 (data from *Economic Geology*, volumes 79-87).

indicate the states where the expenditures were made. Nonetheless, because there was relatively little production during this period and data on these investment expenditures are not available, the RIMS model significantly underestimates impacts in this period.

A second source of underestimation of the economic impacts of the U.S. precious metals industry comes from the fact that table 2 and figure 7 only include impacts in producing states. The most obvious example of where production-based estimates fall short of estimating industry impacts is in the case of Colorado. Based on production of \$25.8 million in precious metals in 1991, table 2 shows a direct plus induced impact of 598 jobs in Colorado. On the other hand, numerous producers maintain international and regional headquarters in Denver and there are many other firms based in the Denver area providing a wide array of technical support services for the industry's operations in producing states. In surveying the producers alone, a total of 570 employees was reported in Colorado by the 23 companies responding to that portion of the questionnaire, almost as much as the estimate in table 2 of direct and indirect employment.

Clearly, the production based estimates of the precious metals economic impacts grossly understate these impacts in the Colorado economy. This is also true of other nonproduction related activities in other states not represented in tables 1 and 2. For example, Battle Mountain Gold, formerly a subsidiary of an oil company, is headquartered in Houston, Texas where it has an economic impact. Another major producer, Santa Fe Pacific Minerals, is headquartered in Albuquerque, New Mexico.

Other examples of impacts in nonproducing states come from the purchase of supplies and services are difficult to deal with in a systematic framework like the RIMS model. Nonetheless, the examples are significant. For example, heavy trucks used in mining are a major expense for operators. An informal survey of Nevada dealers revealed that almost \$160 million worth of heavy trucks from two manufacturers have been sold in Nevada alone since 1989. The two manufacturers in question are located in Peoria, Illinois. Consequently, based on the appropriate RIMS multiplier for Illinois, the Nevada precious metals mining industry has created over a thousand jobs during this period in Peoria.

In addition, over the next decade as U.S. miners go deeper after higher grade ores, underground extraction techniques will be increasingly utilized. As a consequence, the technical expertise and services of firms from eastern states where underground operations are common, such as West Virginia and Pennsylvania, will become more important to the precious metals industry.

Another visible indicator of the economic impacts of the precious metals mining industry is the refining industry. The U.S. has eight major domestic refining companies, five of which are primarily U.S. corporations although some maintain operations in other countries. The U.S. operations of these companies are primarily found in nonprecious metals producing states and areas such as Arizona, urban southern California, Connecticut, New Jersey, New York, Massachusetts, Pennsylvania, South Dakota, and Texas. Jobs, incomes earned, and output produced in these states are part of the economic impact induced by precious metals production. In addition to refining newly mined dore, most of these companies are also involved in producing products used in jewelry manufacturing and the electronics industry.

In addition to a survey of producers in the course of this study, we conducted a brief survey of U.S. refiners. The questionnaire was answered by six companies including four major U.S. refiners, representing 75% of the U.S. refining capacity. These six refiners processed over 14 million ounces of gold and 54 million ounces of silver. These six companies employed over 340 people in 1991 at an average salary of \$35,900 and paid over \$390,000 in state and local taxes.

Taxation of the U.S. Gold and Silver Industry

A final area where the industry has a significant economic impact is in the payment of state, local, and federal taxes. Most states assess a mining-specific tax in addition to other general business taxes, such as a corporate income tax that all businesses pay. Generally, this

will take the form of a severance tax based on the gross value of minerals removed (as in Montana), or the value of minerals net of certain allowable deductions (as in Nevada), or some combination of the two (as in Colorado).

Since most state taxes paid by the industry are based on profitability, such as Nevada's Net Proceeds of Mines Tax or other states' corporate income taxes, estimated state and local taxes paid are down from \$124 million in 1990 to approximately \$90 million in 1991. Survey data indicate that approximately \$75 million of this total was paid in Nevada through the Net Proceeds Tax, general sales and use taxes, and property taxes on property, plant, and equipment.

In addition to state and local taxes, the 23 firms in our survey reported paying approximately \$130 million in U.S. federal income taxes on U.S. operations. The combined federal, state, and local tax burden of approximately \$220 million is about 8.4% of total revenues and 100% of net earnings before write-downs and extraordinary expenses reported by the firms responding to the survey.

Gold Resources

The long-run viability of the U.S. gold mining industry over the next decade and into the twenty-first century will ultimately depend upon sustaining current rates of production, the delineation of additional gold resources, and the development of new mines. These prospects are dependent upon profitability at prevailing gold prices, and the geologic, technical, and economic infrastructure supporting the industry.

U.S. gold resources are contained in over 600 mines and deposits in 19 states. Resource data by state are summarized in figure 9 and table 3. The 171.6 million ounces total of demonstrated resources is a conservative estimate: for the purposes of this study, it includes only those gold deposits at producing or developing operations or for which the estimates are credible to a high degree of certainty.

The inferred category, by contrast, is a very broad definition that includes some speculative

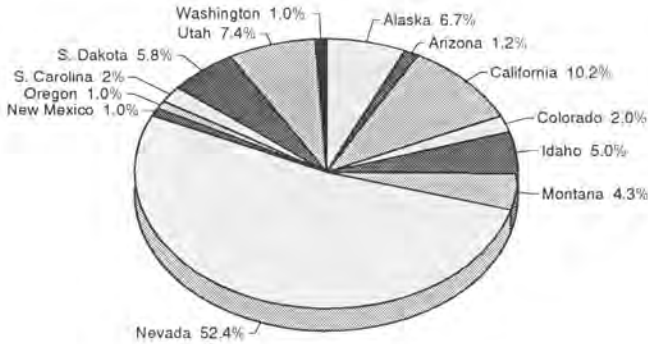


Figure 9. U.S. gold resources (percentage by state).

resource data and one should interpret the estimated 113.8 million ounce total with caution. Inferred resource data in states such as Alaska are particularly suspect since that state's resources are largely contained in placer deposits where accurate resource estimation is especially difficult.

The implications of these estimates of gold resources are that the U.S. has sufficient demonstrated resources to maintain current levels of output for over 17 years. Including resources in the inferred category raises this estimate to just under 30 years. These estimates, however, ignore costs of production and price issues, which, as discussed below, can significantly modify these estimates.

Distribution of Demonstrated Resources

The vast majority of demonstrated gold resources is contained in surface deposits. During the 1990s, however, several major producers will approach or exceed the economic limit to surface mining. A significant percentage of demonstrated gold resources are at depths that require underground mining. As surface orebodies are depleted, underground resources will be increasingly developed at higher extraction costs. In addition to increasing depth, the resource base through time will increasingly

shift from oxide to higher-grade sulfide ore which is more costly to process.

In the short term, it is expected that average grades will fall as increasingly lower-grade oxide material is mined. However, as total oxide resources are depleted and sulfide resources are added to the total resource base, average grades will begin to rise. Thus, it is expected that over the long term the resource base will increase in depth of occurrence and average grade, shift from predominantly oxide to sulfide material and cost more to extract and process.

Nevada contains over 50% of all of demonstrated gold resources as of January 1992, accounting for around 60% of all gold produced in the U.S. during 1991. In Nevada, 90 million ounces of demonstrated resources are contained in over 200 individual mines or deposits. The Carlin trend alone has the potential to contain more than 50 million ounces of demonstrated and inferred gold resources, which is 17% of the U.S. total. In California, which has the nation's second largest mineral inventory, approximately 17.6 million ounces are contained in over 100 mines and deposits.

But despite the large number of individual mines and deposits, a significant characteristic of the U.S. gold industry is that most of the nation's gold is contained in only a few dozen mines and deposits that are owned by a dozen or so companies. The industry's resource and

associated production base are thus highly concentrated.

Over 75% of demonstrated gold resources in Nevada are contained in ten producing mines owned entirely or collectively by eight companies. In California, over two-thirds of the resource is contained in just five producing mines. Approximately 85% of the gold resource in Utah is a by-product at Kennecott's Bingham Canyon copper mine. Roughly 80% of the resource in South Dakota is contained in Homestake Mining Company's Homestake mine. In South Carolina, Washington and Montana, just two mines in each state account for most of the resource. Five properties in Idaho account for most of that state's total, and most of the gold resource in Alaska is contained in only four properties.

In all, only 20 producing mines account for over 52% of all U.S. demonstrated gold resources. Mines in the Carlin trend, which are owned by several companies, contain 25% of

total U.S. demonstrated gold resources. This is a remarkable degree of resource concentration, given that hundreds of gold mines are known to be in production, over 600 mines and deposits are identified as containing demonstrated resources and thousands of exploration targets have been reported.

Growth and Quality of Demonstrated Resources

The growth in U.S. gold resources over the last decade has been large, rapid, and without historical precedent. Because gold resource estimates differ significantly across sources and through time, order-of-magnitude comparisons are reliable but absolute growth comparisons from year to year are questionable.

With an estimated total of 171.6 million ounces, U.S. demonstrated gold resources are

Table 3. U.S. gold resources.

State	Demonstrated resources (million oz)	Weighted average grade (oz/ton)	Percent of total	Inferred resources (million oz)
Alaska	11.5	.05	6.7	18.6
Arizona	2.0	.05	1.2	8.1
California	17.6	.05	10.2	16.1
Colorado	3.5	.05	2.0	3.7
Idaho	8.6	.04	5.0	6.1
Montana	7.4	.03	4.3	14.4
Nevada	90.0	.05	52.4	26.9
New Mexico	1.7	.04	1.0	1.5
Oregon	1.6	.07	1.0	7.7
South Carolina	3.3	.04	2.0	3.2
South Dakota	10.0	.08	5.8	2.8
Utah	12.8	.05 ¹	7.4	.8
Washington	1.6	.20	1.0	1.5
Others ²	0	.00	0.0	2.4
TOTAL/AVERAGE	171.6	0.05	100.0	113.8

¹Excludes by-product gold

²Includes Georgia, Maine, Michigan, North Carolina, Wisconsin, Wyoming

vastly larger today than they were a few years ago. The U.S. Bureau of Mines' 1984 estimate for total U.S. gold resources was approximately 55 million ounces, using a relatively strict definition of demonstrated resources, or as high as 100 million ounces under a more liberal definition (Thomas and Boyle, 1986, p. 35). The estimate in this study represents an increase from 150 to 300%. This increase has occurred along with record levels of production over the last six years. However, in the absence of major new discoveries, the resource base will

steadily decline as production outpaces new discoveries.

Gold resources in the U.S. are typically low grade and mined by large-scale surface methods. Total U.S. demonstrated gold resources average 0.05 ounces per ton on a weighted average basis. This is equivalent to only 1.5 parts per million. Gold mining in South Dakota and Washington is predominantly by underground methods with correspondingly higher ore grades that justify the economics of higher cost extraction methods.

INDUSTRY COST STRUCTURE

Cash Costs of Production

U.S. gold production remains highly concentrated in a small number of large-scale operations. Approximately 37% of production during 1992 was accounted for by the five largest producers, 50% by the top ten producers, and approximately 75% of production came from just 30 mines.

Fifty mines were included for analysis. These mines produced 8.315 million ounces of gold during 1992; this is 86% of total production from all sources in that year or 96% of primary gold production.

About 10% of the gold produced in 1992 was by-product (mostly from copper mines). As pointed out above, the remaining production, about 4% of the U.S. total, came from several hundred remaining small-scale lode and placer mines and reclaimed mine dumps, most of which produce only a few thousand ounces per year.

Although industry output exhibits a high degree of concentration, it does not have the high barriers to entry one would expect from such an industry structure. Several factors explain this phenomenon. Small heap leach operations, for example, have relatively low capital costs and use a relatively simple technology which produces a high value product at a low cost. Such operations, however, may only produce ten or twenty thousand ounces per year.

Cash operating costs in 1992 (defined as extraction, processing, administration, and royalties) for the 50 mines analyzed are shown in figure 10. Average industry cost data are summarized in table 4. Mining operations selected for the determination of industry cost

Table 4. Cash costs at U.S. gold mines 1991 and 1992.

	Weighted average -- \$/oz	
	1991	1992
Extraction	123	118
Processing	92	90
Administration	29	26
Royalties	12	12
Subtotal	256	246
Change		-3.9%
Taxes:		
Property	3	3
Mining specific	5	5
Subtotal	8	8
Grand total	264	254
Change		-3.8%

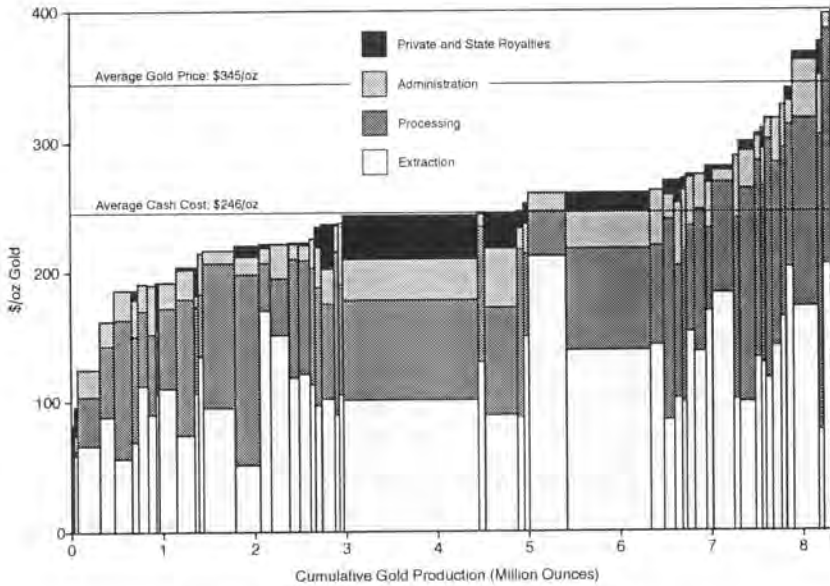


Figure 10. Cash cost of production at U.S. gold mines, 1992.

parameters range from relatively small producers (less than 50,000 ounces per year) to Newmont's mines on the Carlin trend (1.5 million ounces per year).

A majority of producing mines are economically viable in the short run at current price and cash cost levels. Forty-one mines in the survey had cash operating costs below \$300 per ounce, and ten mines had cash costs below \$200 per ounce.

The industry-weighted average cash operating cost (excluding taxes) during 1992 was \$246 per ounce of gold or \$254 per ounce when property taxes and mining-specific taxes are included. Average cash costs were \$91 per ounce less than the average sales price of gold that year. This difference, the gross operating margin, is what remains to cover all additional production costs: federal and state income taxes, capital recovery costs for plant,

equipment, development and in-mine exploration, interest on borrowed funds, and a minimum rate of return sufficient to attract new capital to the industry and maintain its viability over time. It is also the company's internal source of capital to fund exploration activities to find and delineate new reserves.

The continued decline of gold prices to their lowest levels in real terms since the mid-1970s has significantly reduced operating margins and profitability. During 1991, the average operating margin was \$98 per ounce, and in 1990 it was \$147 per ounce. For companies that have developed new mines in recent years, this ongoing profitability squeeze is particularly worrisome since it greatly reduces their ability to recover initial capital costs (including debt repayment) and absorb higher cash operating costs during the start-up phases of production.

The increased use of forward sales and hedging programs mentioned above has helped support revenue at some major producing companies. The use of gold loans throughout the western world has slowed since 1990-91 because decade low prices make it likely that a gold borrower would monetize a loan at low prices and have to repay it at higher prices. In addition, the ability to secure higher revenue through forward sales and hedging activities has eroded the attractiveness of gold loans. Although many companies have been careful to cover downside losses through the use of hedging schemes, only rising prices can ensure upside gains sufficient to maintain profitability over the long term.

1992 Operating Budgets and Cash Cost of Production

The 1992 operating budgets for many companies reflected continued concerns over declining gold prices and increasing costs. Many companies instituted cost cutting measures at operating properties and corporate offices during the year to improve operating margins. Other companies reduced operating costs through increased scale economies at operations that have been undergoing substantial expansion. Chief among these is American Barrick's Goldstrike operations, which increased output by two-thirds during 1992 and now account for close to 10% of total U.S. gold production. Two large new mines, Lone Tree and Rabbit Creek, belonging to Santa Fe Pacific Minerals, also reduced costs through scale economies. But more companies than not were forced to reduce administrative and staff costs, alter mining plans to exploit lower-cost material, or temporarily increase average grades of mined ore.

It is important to stress that these adjustments are an expected response to deteriorating financial conditions but are limited in scope and are essentially short-term remedies to the fundamental problem of low gold prices. Indeed, increasing the level of production by expanding capacity or increasing average mined grades will eventually shorten mine life and hasten the

decline in U.S. production expected later in the decade.

On a weighted average basis, cash operating costs before taxes are estimated to have declined by \$10 per ounce of gold during 1992, a 3.9% decrease from 1991. Figure 11 illustrates the industry-wide change in cash costs from 1991 to 1992. Although the industry survey showed an increase in production of 780,000 ounces from 1991 to 1992, all of this increase is attributable to capacity expansion at American Barrick's Goldstrike mine in Nevada, plus an increase in production at the Homestake mine (which has shown significant variation in output in recent years), as well as production from five new mines that came into production during 1992 or that achieved design capacity during that year. For the remaining 43 mines in the survey, production decreases at some were roughly offset by increases at others.

During 1992, cash operating cost components declined in proportion to the ability of companies to alter them. Administrative costs have a high labor component and were cut the most, as many companies initiated staff reductions. On average, administrative costs declined by \$3 (10%) per ounce of production. Adding to this trend is that of industry consolidation. The acquisition, for example, of International Corona Corporation by Homestake Mining Company is expected to further reduce administrative costs at Homestake by \$25 million during 1993 (The Mining Record, August 19, 1992, p. 5). Many companies have reduced their exploration staffs as well, as companies have slowed down or scaled back their exploration programs until prices improve. If continued, this trend will also accelerate the expected decline in U.S. production. It may take up to 10 years to bring discovered resources into production and discovery cannot be predicted.

Mining plans and associated extraction costs are more variable in the short term than costs of processing using either heap-leach or milling methods. Compared to 1991, average extraction costs in 1992 were reduced by \$5 per ounce (4%) and average processing costs were reduced by \$2 per ounce (2%).

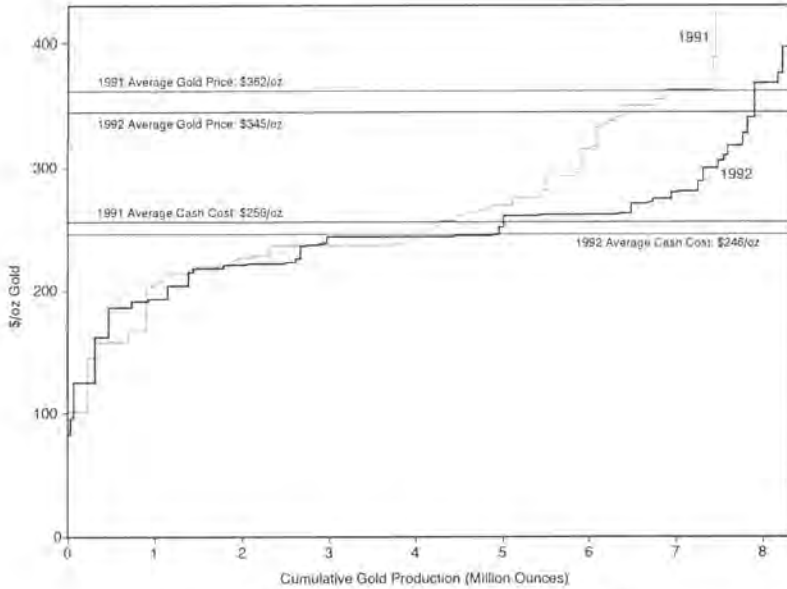


Figure 11. U.S. cash cost of gold production, 1991 and 1992.

Owing to a variety of economic and technical factors, royalty payments remained at an average level of \$12 per ounce. Tax payments specific to the mining industry, such as Nevada's Net Proceeds of Mines Tax, are expected to remain at essentially the same level during 1992 as they were in 1991. Mining-specific tax payments have declined on a per ounce basis since 1989 as production has risen and industry profitability has declined. This decline merely reflects the decline in operating margins since these taxes are often tied to net income, which for most operations has declined over the last few years. Property tax payments were about \$3 per ounce in 1991 and are expected to remain the same for 1992. Property tax payments have increased as capacity expansions and new mines have raised the taxable base of the industry.

Throughout this decade, technical expertise will play an increasingly important role. Near

surface orebodies will be depleted and deeper deposits and more complex sulfide ore will place continuing upward pressure on extraction and processing costs. The operating cost changes of 1992 clearly indicate that the industry has the ability to respond to changing economic conditions, and the resurgence of the U.S. gold industry over the last decade demonstrates a high degree of technical expertise. There is little doubt that the industry can prosper despite increased extraction and processing challenges, given an adequate gold price and a conducive regulatory and fiscal policy environment. In recent years, however, these costs have risen and manifested themselves not only in higher costs of production owing to increased environmental restrictions, but also indirectly in the form of permitting delays that have significantly added to project development time.

Annual Capital Investment

The U.S. gold industry has developed a large, efficient, and economically viable capital base (plant, equipment, and reserves) that is fundamentally sound and sustainable at least over this decade at historically high levels of production.

Total estimated expenditures during 1991 and 1992 for plant, equipment, and development exceeded \$1.4 billion and were roughly equivalent to expenditures during 1989-90. On average, expenditures since 1989 were about \$712 million per year. As shown in table 5, expenditures have demonstrated significant variation on an annual basis. Expenditures during the last three years have remained below those of 1989, indicating a definite slowing of development activity from the peak achieved at the end of the 1980s gold boom.

The top ten gold producing companies—Newmont Gold, Homestake Mining, Echo Bay Mines, American Barrick, Independence Mining, Pegasus Gold, Gold Fields, FMC Gold, AMAX Gold, and Santa Fe Pacific Minerals—have accounted for the large majority of total expenditures on plant, equipment and development over the last four years.

Since the survey included only major companies and properties, it is certain that total industry capital expenditures for plant, equipment, and development during 1991 and 1992 exceeded the \$1.4 billion identified in this study. Although industry investment has greatly benefitted local and regional economies, many companies have reached the limit of their

ability to service existing debt and raise additional capital through debt or equity. After several years of rapid expansion, many companies will need at least several more years to amortize these large investments. In addition, declining operating margins, the need to curtail costs and meet gold loan repayment requirements, and the expectation of continuing low prices have all contributed to a contraction in near-term development activity.

During the next few years, many companies, especially smaller producers, will find new debt or equity very hard to raise, especially if prices remain below \$350 per ounce. Capital budgets for 1993 are expected to show a significant decline from the levels of recent years because price and profitability performance during 1992 were relatively weak. Of course, if the price of gold should increase, this situation would begin to reverse itself.

Exploration Expenditures

Exploration expenditures are driven by short-term profitability and expectations of future prices and are a clear indicator of the industry's growth potential. Recent levels of exploration spending reflect a fundamentally sound industrial base. Exploration expenditures by major companies participating in the survey conducted for this study have been especially strong in recent years, exceeding \$100 million nationwide during each of the last four years. However, since 1992 gold prices were lower than expected and the near-term outlook for

Table 5. Annual capital expenditures at the 23 surveyed U.S. mines 1989-92: millions of dollars.

	1989	1990	1991	1992
Property, plant, equipment and development	870	532	505	551
Exploration	135	115	136	129

Table 6. Capital costs for selected new mines, and development projects, 1989 through 1993.

Development cost category	Number	Total cost (millions)	Initial reserves (thousand oz)	Cost of new reserves ¹ (\$/oz)
New producing mines (1989-90)				
Surface	8	\$369.7	7,465	\$50
Underground	2	87.4	1,136	77
New producing mines (1991-92)	5	262.0	5,594	47
TOTAL (1989-92)	15	719.1	14,195	51
Surface mine development projects (1992-93) ²	8	741	13,891	44

¹Weighted averages

²Cumulative cost incurred and reserves identified as of January 1, 1992

prices appears pessimistic, it is expected that final data for 1992 exploration expenditures will be below the estimate reported here. More important, it is expected that exploration expenditures for 1993 will show a further decline. As a cost cutting measure, companies are expected to target exploration expenditures to extend reserves at existing operations rather than toward the discovery of new deposits or adding to resource inventories at recently discovered deposits.

New Mine Development

Cost and reserve data for mines brought into production during the last four years and for ongoing projects planned for development and production within the next three years are shown in table 6. Capital costs for new mines include all expenditures for plant, equipment, infrastructure, and related development costs (e.g., removal of overburden) required to initiate production.

Over 14 million ounces of reserves were brought into production at 15 mines during 1989-92 at an average cost of \$51 per ounce of reserves. The pace of mine development steadily slowed over this period and it is expected that the trend of declining capital expenditure for new mine development will continue during the next few years. It is generally expected that U.S. production will peak in 1993-94 and decline thereafter. The decline will accelerate if prices remain low. Although the decline would certainly be arrested somewhat by rising prices, a new peak later in the decade or early in the next century is not foreseen at this time unless some major new discoveries are made.

In addition to new mine development, expansion at existing operations over the last four years added over 3.0 million ounces of annual production capacity at a cost of over \$1.5 billion. Most notable were the historically large increases at Newmont's Carlin operations and American Barrick's Goldstrike property, both located along the Carlin trend in Nevada. By

1990, Newmont had increased its annual production capacity to approximately 1.5 million ounces, while at Goldstrike, an expansion completed in 1992 raised production capacity to 900,000 ounces and will exceed 1 million ounces per year for the rest of the decade. These developments ensure that Newmont and Goldstrike will remain the two largest producers well into the next century.

Capital costs for gold properties currently under development or at an advanced stage of permitting or financing indicate that the cost of new mine development over the next few years should rise as companies confront increasingly difficult technical and economic conditions. Cumulative expenditures through 1991 on eight major development projects that are yet to come on line have exceeded \$741 million. Pre-production expenditures, which total \$44 per ounce of reserves, have gone mostly toward funding exploration, acquisition, and pre-production development work. The ultimate cost to bring these properties into production (including plant, equipment, and financing costs) can be expected to significantly exceed this figure and surpass recent new mine development costs per ounce of contained gold reserves. It should be noted that reserves currently identified in these properties may actually prove to be uneconomic resources rather than reserves if current price and profitability conditions in the industry continue.

It is also expected that increasing environmental regulation by all levels of government will continue to exert a significant effect on the economics of mining operations. Federal, state, and local regulations and actions taken to address community concerns add significantly to the costs of developing and operating mines. Regulatory requirements are highly variable among states, and the costs that must be incurred to mitigate public concerns are so highly variable as to be impossible to predict. These factors all work to increase the risk premium associated with mining ventures.

Capital and operating cost increases, plus the cost of up to several years of delay as a result of permitting and other compliance activities, have negatively affected profitability over the last decade. Minimum environmental compliance

costs for a typical surface mine in Nevada have been estimated to increase capital costs by at least 9% and operating costs by at least 5% (Stebbins, 1990). Over the life of a typical mine, minimum environmental regulatory compliance costs can be expected to raise average total production costs by \$20 per ounce.

The posting of reclamation bonds rather than (or in addition to) accruing annual reclamation expenses, is an additional expense that not only reduces profitability but may also act as a financial barrier to entering the industry.

Long-run Total Production Costs

Long-run average total production costs for 38 operations, as defined by current and expected future production and demonstrated resources, are shown in figure 12. The figure shows the cumulative life of mine production for the 38 operations for which we have survey data. In addition to cash operating costs, the measure of average total cost includes recovery of capital investment for property, plant and equipment, on-site exploration and development, and a 9% minimum rate of return. The choice of a 9% rate of return is somewhat arbitrary and probably low given the risks involved in precious metals mining. However, it is considered a minimum rate of return necessary to attract new capital into the industry. The average total cost estimates should be interpreted as representing the minimum required sales price of gold necessary to break even on production over the life of each mine's current level of reserves. State and federal (including foreign country) income taxes are not included in the estimates of average total cost because these costs are assessed against corporations, not projects, and are subject to significant modification by factors unrelated to gold mining income. Hedging gains are also not included in the calculation of the minimum sales price required to break even.

The 38 mines included in the total cost curve are expected to produce more than 65 million ounces of gold during the 1992-2000 period. However, unless prices rise significantly over

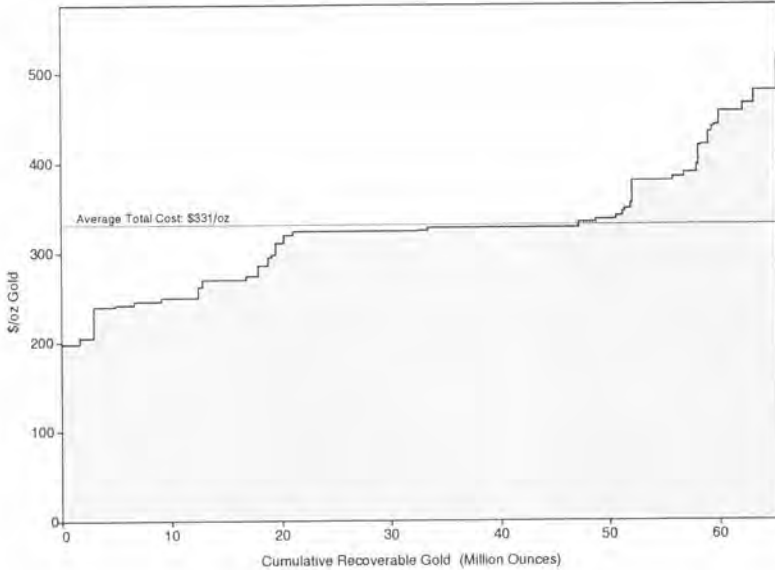


Figure 12. Long-run average total cost for selected properties.

the next few years, premature closures will undoubtedly result. At an average total cost level of \$331 per ounce, the asset base of the U.S. gold industry is viable over the long term at high levels of production, but current gold prices have rendered many mines marginally economic. Fourteen mines, for example, have average total costs that are higher than recent spot gold prices.

Although the asset base of the U.S. gold industry is economically viable, some of the companies that currently own these assets are in fundamentally weak positions owing to high debt servicing requirements, low prices, and declining prospects for raising new debt or equity capital. The authors therefore expect to see an increase in the rate at which the industry

continues to consolidate production and resource ownership into a few very large companies.

In recent years, several major companies have added greatly to their reserve and output positions, these include Amax Gold, Echo Bay, Pegasus, Santa Fe Pacific, Gold Fields, American Barrick, Newmont, Homestake, FMC Gold, and Independence. These ten companies collectively represent more than 54 million ounces of recoverable gold, or 83% of the total in figure 12. In addition, Echo Bay, Amax Gold, and Gold Fields are investing heavily in one or more major development projects. Newmont and American Barrick have reserves much greater than those included in figure 12 and are expected to remain by far the largest producers well into the next century.

PUBLIC POLICY ISSUES

The growth of the precious metals industry in the past decade has been accompanied by the growth of challenges to the industry in the public policy area. Many of these challenges have centered around environmental issues and resulted in changes in existing regulations and the adoption of new ones to mitigate the environmental impacts of precious metals mining. The more moderate environmental interests recognize the economic and strategic interests served by the U.S. mining industry, and focus on ways to mitigate the impacts of mining on environmental values.

In addition to dealing with mitigating environmental impacts the industry has found itself the target of groups seeking to fundamentally change the economic structure of the industry. Much of this debate has centered around attempts to amend or replace the General Mining Law, also known as the 1872 Mining Law, which provides the basic structure of property rights in hardrock mineral resources on U.S. public lands. The following discussion focuses on: 1) the cost of complying with various environmental regulations, and two of the issues raised in the context of that Mining Law debate that could be raised again; 2) foreign ownership; and 3) the impact of a federal royalty on gross mining revenues.

Environmental Regulation

In many cases, mitigation of environmental impacts has simply involved modifying operating plans to avoid problems that have arisen. A case in point is the adverse impact on wildlife of the use of cyanide in processing ores, which has been widely publicized because of a number

of bird kills. The solution to this problem has been to restrict wildlife access to hazards and, in some cases, to remove the hazard completely by neutralizing the cyanide solutions. These modifications increase costs, but if they can be handled in the design phase of operations, as they will be in the future, modifications are less costly and easier to deal with. The industry has moved quickly to adopt the changes.

Another case in point involves reclamation of lands disturbed by mining. As mining activity increased in the late 1980s public concern over permanent environmental impacts has led to the passage of state reclamation acts by all but two of the producing states. An amendment to the General Mining Law recently passed by the U.S. Senate (the Reid-Domanici-DeConcini-Bryan amendment to H.R. 5503) would require operators in states without reclamation laws to meet federal standards. Congress failed to enact this particular amendment before adjournment but this issue is very likely to come up again.

Compliance with these and other environmental regulations, of course, raises costs and, at the margin, reduces mineable resources. It was noted above that these environmental regulation compliance costs average approximately \$20 per ounce based on the experience of typical surface mines operating in Nevada. Extrapolation from this figure indicates that the cost of regulatory compliance for the industry nationwide would approach \$200 million annually. More concrete evidence on regulatory compliance costs comes from the survey of operators; the 23 companies reporting spent \$14.3 million on reclamation alone in 1991. This figure is likely to rise substantially in the future as orebodies that are currently being mined are exhausted.

Foreign Ownership of the U.S. Precious Metals Industry

International trade and investment are generally viewed as wealth enhancing activities and are generally accepted as beneficial. Nonetheless, foreign investment in developing U.S. gold resources has been one criticism of the industry. It is, indeed, true that non-U.S. citizens and corporations own stock and, in some cases, own outright U.S. precious metals producers. Figure 13 shows a breakdown of U.S. production weighted by stock ownership in producing companies that responded to our survey. This approach to analyzing ownership avoids the trap that many of the critics fall into of assuming, because a company is headquartered in Canada, for example, that it is Canadian owned. One major Canadian-headquartered producer, Echo Bay Mines, has substantially more U.S. ownership than Canadian. Another Canadian producer that is frequently mentioned in this context, American Barrick Resources, is mostly owned and controlled by Canadian stockholders but it still has over 30% U.S. ownership.

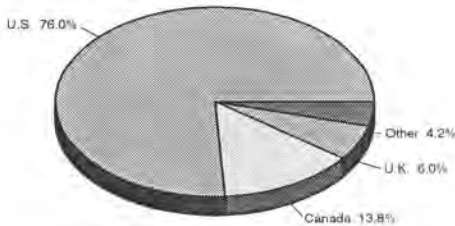


Figure 14. U.S. precious metals production weighted by controlling interest.

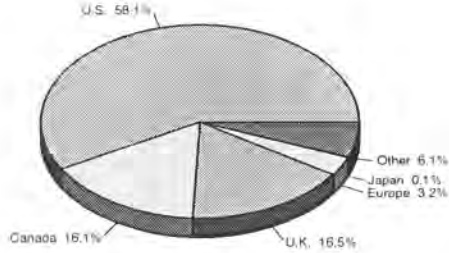


Figure 13. U.S. precious metals production weighted by stock ownership.

When all minority interests are recognized, as indicated by figure 13, over 58% of the production of the firms in the sample is owned by U.S. residents and institutions. Canadian and British ownership are about equal at approximately 16%, with the balance of ownership spread over the rest of the world.

Apart from simple stock ownership, however, it is also important to recognize who controls the producers by virtue of majority or controlling interests. If we allocate production by the nationality of the controlling owners, which gives no weight to minority ownership, the distribution of corporate control is reflected by figure 14. When viewed in terms of the nationality of corporate control, 76% of 1991 U.S. production was controlled by U.S. citizens and institutions compared to 13.8% Canadians, 6.0% British, and 4.2% "other."

Figures 15 and 16 present a similar view of the ownership and control of "in-situ" gold reserves. The resources represented in the chart are 118 million ounces of reserves reported by the 23 companies responding to our survey,

plus two smaller companies whose ownership could be determined from their annual reports. These reserves are approximately 69% of total U.S. resources but when we recognize that not all *resources* are recoverable and, therefore, are not considered *reserves*, and that many of the larger Canadian producers are in our sample, it is reasonable to conclude that the figures represent the vast majority of U.S. reserves and that these reserves are largely U.S. owned and controlled.

The ownership and control patterns reflected by figures 15 and 16 are very similar to those reflected by the figures based on production. The facts are that while there are some significant foreign holdings in the industry, the industry is majority owned by U.S. citizens and institutions and overwhelmingly controlled by U.S. citizens and institutions.

In reviewing this information it is also important to ask the question: "Compared to what?" This situation compares closely to the U.S. automobile industry where approximately 30% of new cars sold in the U.S. in 1991 were produced by foreign controlled companies.

We can also compare ownership in the U.S. precious metals industry to U.S. ownership in foreign industries. The Canadian petroleum industry provides a very comparable example because it involves extraction of natural resources by foreigners, i.e., U.S. companies. In this case, U.S. companies control 47% of Canadian production (Energy, Mines and Resources, Canada, 1992), significantly more than Canadian ownership of the U.S. gold industry.

The petroleum industry is far larger than the precious metals industry and has great strategic importance to the U.S. Consequently, the U.S. has far more to lose by erecting barriers to

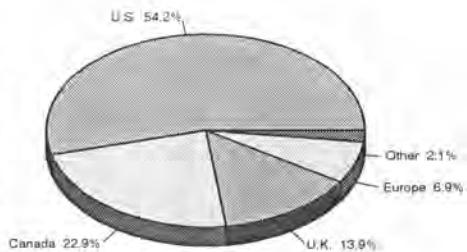


Figure 15. U.S. "in-situ" gold reserves weighted by stock ownership.

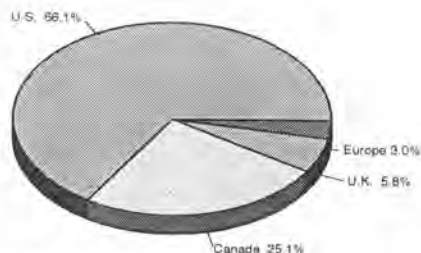


Figure 16. U.S. "in-situ" gold reserves weighted by controlling interest.

investment and resource ownership with Canada than does Canada.

Figure 17 shows precious metals exploration expenditures by U.S. and Canadian companies in their own and each other's countries. Companies tend to spend much more of their exploration budgets in their own countries. Note, however, that U.S. companies' expenditures in Canada generally exceeded Canadian companies' expenditures in the U.S. during the early 1980s, which would certainly be a cause for alarm if Canadians were as concerned about foreign ownership as certain critics of the Mining Law in the United States.

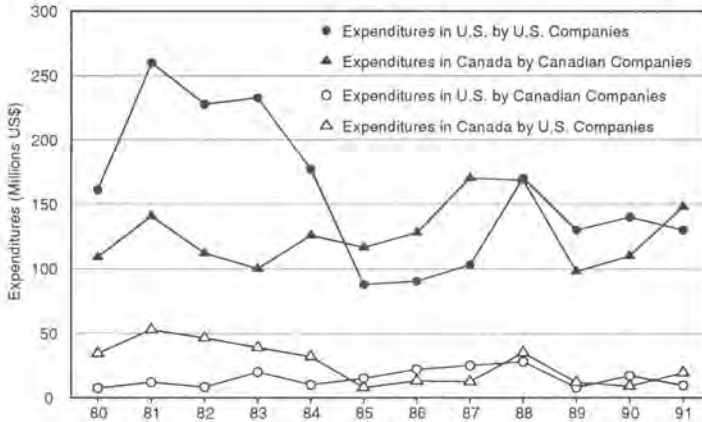


Figure 17. Exploration expenditures by U.S. and Canadian companies, 1980-1991.

The criticism of foreign ownership of the U.S. precious metals industry is difficult to counter because it is apparently based on an irrational fear that foreigners are taking over the nation's mineral wealth. However, the generally accepted wisdom is that foreign investments in developing U.S. resources are basically beneficial, providing thousands of jobs for Americans.

Even if some profits eventually do cross the border, which, on net, has not occurred yet, many U.S. citizens will benefit in the process by virtue of jobs and stock ownership in Canadian producers. Further, the claims about foreign control of U.S. gold resources are simply inaccurate or, at least, grossly exaggerated. Finally, looking at the broader picture, it is clear that if the U.S. begins erecting trade and investment barriers, U.S. economic interests are much more likely to be harmed than helped because of the costs of potential Canadian retaliation. The erection of trade and investment barriers also runs counter to recent trends around the world.

Countries such as Mexico, for example, have recently initiated reforms to attract foreign investment. More to the point, we presently have a U.S.-Canadian free trade agreement.

The Impacts of a Federal Gross Royalty

Attempts at mining law reform during the last two sessions of the U.S. Congress have included proposals for the imposition of a federal gross royalty on mineral production from public lands. Since most of the precious metals production discussed here is on public lands, a royalty of this type would have a significant impact on the cost structure of the industry.

One such proposal, originally introduced as S. 1126 during the 1990 session of Congress by Senator Bumpers of Arkansas, specifically proposes an 8% gross proceeds royalty charge. More recently, Senator Bumpers introduced S. 433 in February 1991 in which section 105

called for the imposition of a royalty on the production of mining claims of not less than 5% of gross mineral income derived from the property. We have used the 8% royalty for illustrative purposes because of its use in the 1990 proposal.

A royalty has been proposed in spite of the fact that both academic and federally sponsored research over the last decade has clearly demonstrated that a gross proceeds royalty (or tax) is economically inefficient and inequitable (e.g., Schenck, 1984). Such a tax would impact marginal or small scale producers much more than more profitable and larger scale producers. A principal effect of the royalty would be to promote the concentration of the industry into fewer and larger companies. Somewhat ironically, because many advocates of a royalty are also critics of foreign ownership, this in-

creased concentration would likely result in greater foreign ownership because U.S. operators based in the U.S. would be hit harder than foreign-based U.S. operators who, presumably, have operations in other countries.

Figures 18 and 19 show, respectively, the effects of an 8% gross proceeds royalty on industry-wide cash operating costs and long-run total production costs. In the case of the impacts of the royalty on cash operating costs, because cash costs are a short-run cash flow measure, the royalty is simply added on top of other operating costs. For 1992, the royalty would have raised cash costs by \$30 to \$276 per ounce if all gold had been sold at an average price of \$375 per ounce.

The minimum impact of the royalty would be to raise cash operating costs to levels that

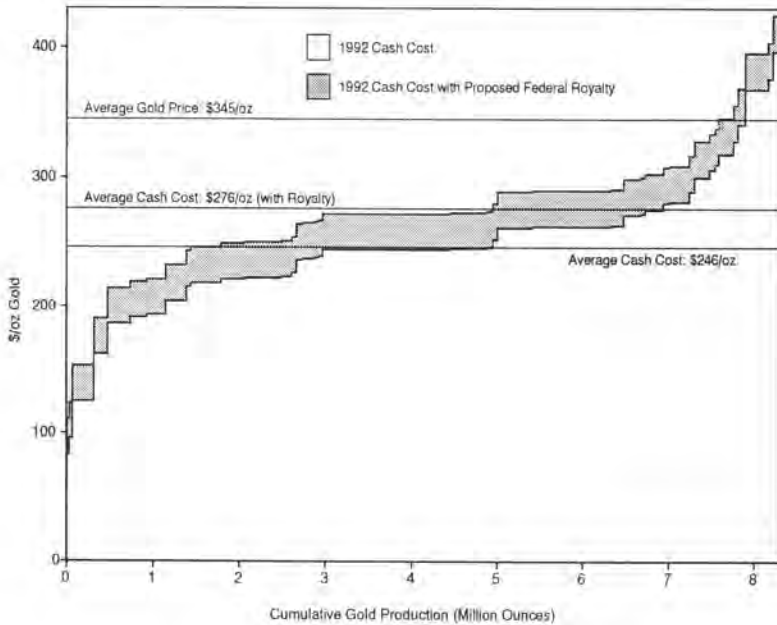


Figure 18. Effect of 8% gross revenue royalty on 1992 cash costs.

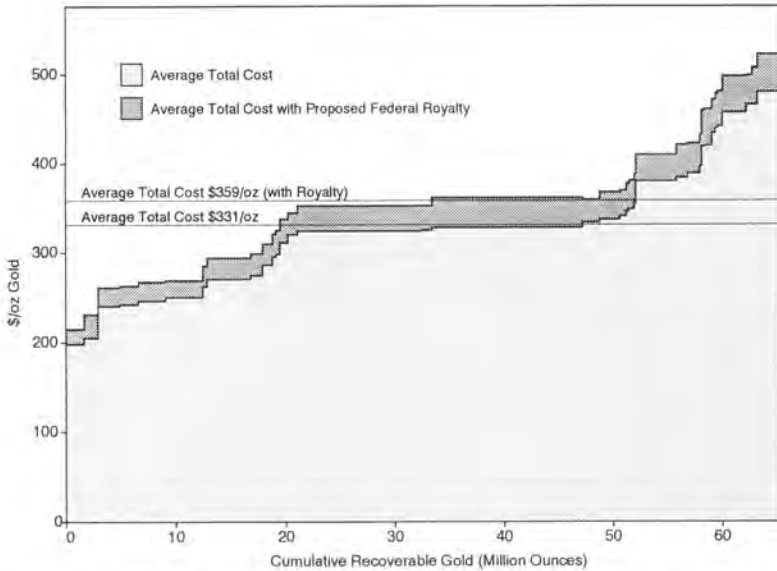


Figure 19. Long-run average total cost for selected properties with and without 8% royalty.

would threaten the economic viability of at least 20% of U.S. gold mines. The impact of this royalty on cash costs would vary considerably from mine to mine and the negative effect shown here should be interpreted as a minimum for the industry as a whole. However, on a cash operating cost basis, the royalty would not be the difference between profit and loss at current prices for any of the mines represented in figure 18. The royalty could, however, force the shutdown of several mines that are already in a negative cash flow situation because of low prices.

The implications of the imposition of the royalty on long-run average total production costs are somewhat more complicated. Clearly, the 38 largest mines would be negatively affected (fig. 19). The group's average long-run total costs would increase by \$28 to \$359 per ounce, which may be too high to sustain economic viability for some operations given

that current gold prices have been below this level. The royalty would raise long-run total costs for 22 of these mines above \$359 per ounce. These mines would very likely be rendered uneconomic by the imposition of such a tax, in the absence of a significant price increase.

A comparison of figures 20 and 21 illustrate the situations graphically. Figure 20 shows that at a price of \$350 per ounce, approximately 52 million ounces can be produced at a profit without the royalty. Figure 21, on the other hand, shows that with the royalty only about 21 million ounces can be produced at a profit as the cost curve is shifted upward by the royalty. This represents a loss of 31 million ounces that can be produced at a minimal 9% profit.

This does not imply that these 31 million ounces will not be produced. They still may be produced but at a lower level of profit or at a loss. What is clear, however, is that the flow of

capital into the U.S. and into the development of the industry creating jobs and income will virtually come to a halt.

The situation posed by the royalty is even somewhat more uncertain than the above would indicate. Note that the upward shift in the long run average cost curve in figures 20 and 21 is not a uniform amount as it was on the cash cost curve. This is because, in the long run, the likely impact of such a tax would be to transfer royalty income from state and private royalty owners to the federal government. This is because some state mining taxes (such as Nevada's Net Proceeds of Mines Tax) and some private royalty payments are assessed against net income.

By reducing gross income by 8%, this tax would reduce net income as well. As a result, payments to some private and state royalty owners would fall and those to the federal government would rise. In addition, state and federal income tax payments would likely decline, thus partially offsetting the effect of the tax. The net effect of this royalty provision, however, would be to significantly increase the average total cost at the property level. And if the net result is merely to reduce one form of tax in favor of another, or to transfer tax revenue from one taxing authority to another, the efficacy of the tax itself is seriously in question.

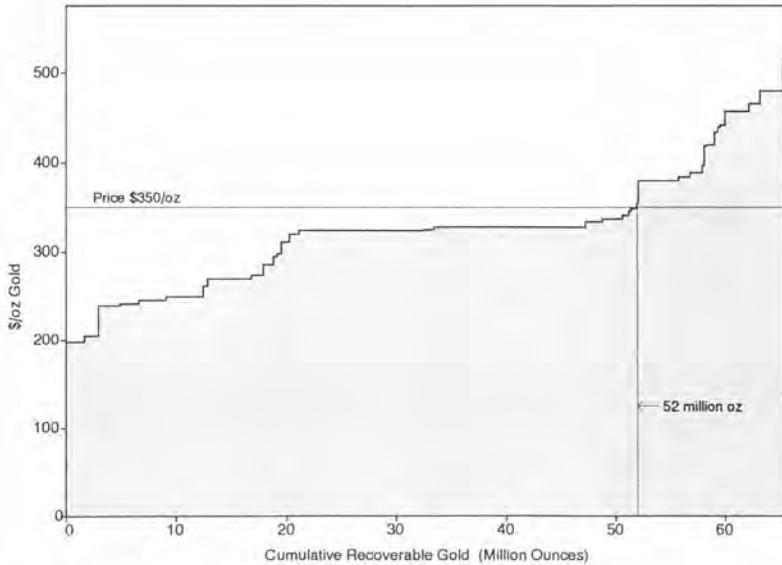


Figure 20. Reserves recoverable at \$350/oz gold price.

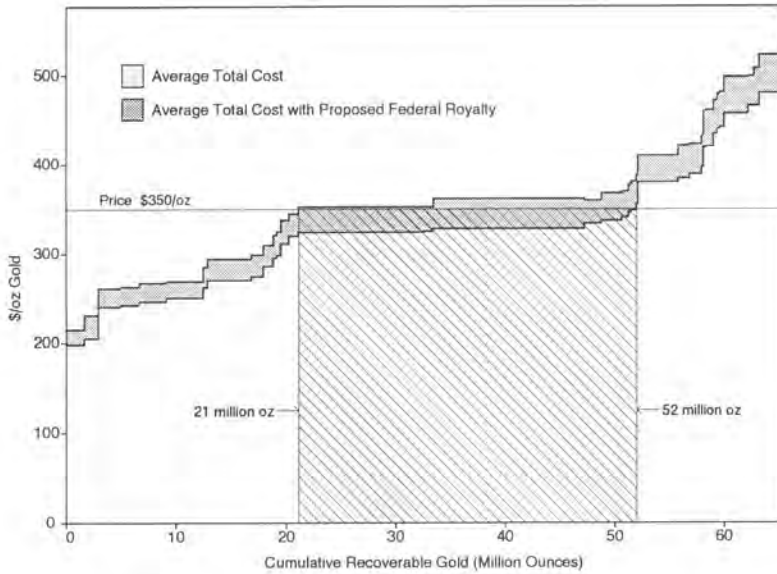


Figure 21. Reserves recoverable at \$350/oz gold price with an 8% royalty.

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Front cover: U.S. gold production, 1835-1991.

UNIVERSITY
OF NEVADA
RENO

TESTIMONY OF
DOUGLAS B. SILVER
PRESIDENT AND CHIEF OPERATING OFFICER
BALFOUR HOWELL INTERNATIONAL, LLC.
BEFORE THE
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

January 31, 1995

Good morning. My name is Douglas Silver and I am President and Chief Operating Officer of Balfour Howell International, LLC., a publishing and consulting company specializing in hardrock mineral information. Balfour Howell owns the 106 year-old weekly newspaper, The Mining Record, which we believe is the oldest mining newspaper in the Western Hemisphere. Last summer we launched a new publication called the Latin American Mining Record, as a direct response to the massive emigration and interest of North American mineral companies in Latin American mineral opportunities.

Our consulting division is best known for its acquisition and merger advisory research and analysis, as well as for our quantitative research into trends directly effecting the mineral industry.

I would also like to mention that Balfour Howell International is headquartered near Denver, Colorado, the largest mining center in the United States. Denver has long been viewed as the "Gold Capitol of the United States". However, with the global move underway, it is rapidly being transformed into the home of many international mining, exploration and service companies.

I was invited to speak to you today about the state of the U.S. hardrock minerals industry. Because my background is strongly based in the areas of exploration, acquisitions and finance, I will restrict my comments on trends within these topics. However, if you wish to broaden your questions to explore other areas of the minerals industry, please do so.

First of all, I would like to remind everyone that the natural resources industry is unlike any other industry in the world. Our success is strongly dependent on our intellectual abilities to outwit Nature and find her elusive concentrations of metals. We then must engineer and mine these deposits in a manner which creates the maximum profit for our investors while also being a responsible land steward and with a sensitivity towards local communities and worker safety. Unlike other industries which receive subsidies or have control over their product sales prices, we are at the mercy of an international pricing market which is influenced by a variety of agendas from other companies, governments, and banks.

Our greatest risks are at the ends of our work spectrum. There are no guarantees that spending tens of millions of dollars on exploration will find an economic ore body. Similarly, there is no guarantee that even if we do discover and build a mine, that metal prices will cooperate in a manner which will allow us to repay our capital investment plus post a profit.

SUMMARY DEMOGRAPHICS **OF THE NORTH AMERICAN** **HARDROCK MINERALS INDUSTRY**

The North American (United States and Canada) hardrock minerals industry is composed of approximately 2,100 companies, divided into two distinct classes. Approximately 130 companies produce base (copper, lead, zinc) and/or precious (gold, silver, platinum) metals, with a lesser number producing other metals including, but not limited to, tungsten, molybdenum, nickel, and aluminum.

The remaining companies are small organizations, typically composed of less than ten people focussed on exploration, rather than production activities.

A select few companies, numbering no more than 50, account for the vast (80%+) majority of the metal produced, revenues and profits. These companies typically report revenues in excess of \$50 million per year and host market capitalizations ranging in the hundreds of millions to billion of dollars.

The smaller companies provide a diversity of market capitalizations, typically ranging from one-half to ten million dollars. Because they have no sustainable sources of revenue, the smaller companies' existence is highly dependent on the available of equity investments.

The equity markets vacillate with respect to their interest levels in the minerals industry. Normally, rapid increases in metal prices are the best lure for investors. However, over the past several years, the globalization of the international markets has attracted the investment community because of their understanding that emerging democracies will need natural resource development to bolster their fledgling economies and support their currencies.

Based upon preliminary projections, Balfour Howell estimates that the North American minerals industry has attracted approximately seven and one-half billion per year in new investments each of the last two years. These funds (both debt and equity) are distributed fairly equally between American and Canadian companies. Among U.S. recipients, however, the vast majority of monies are obtained by a handful of large companies. In Canada, the funds are distributed principally to the smaller and intermediate-size companies.

EXPLORATION TRENDS

The U.S. mineral exploration industry is at a crossroads. The rapid growth in corporate production levels over the past fifteen years has created an appetite for large deposits which is no longer being provided by domestic efforts. This does not mean that all of the large deposits have been discovered in the United States; in fact, Balfour Howell has demonstrated that there is no scientific evidence that the United States is "picked-over". Our research has demonstrated that discoveries, especially for gold, are related to elevated exploration spending levels and that U.S.-incorporated companies are spending less funds each year in the United States.

A sampling of the more active exploration companies is presented in the table titled "U.S. Hardrock Mineral Companies - Exploration Expenditures". The aggregate spending of these companies has been fairly static over the past three years, although on an individual basis, spending habits have been quite extreme.

assets. With ten years of data compiled, the databases also assist us in determining market trends.

If a company does not explore for new deposits, then it must acquire them. Because the United States has traditionally been viewed as the most politically-stable region of the world and one which hosts open markets, knowing the fair market values of U.S. mineral deposits provides a benchmark for analyzing trends for the rest of the world.

Over the past four years, we have noticed that the number of transactions involving gold assets and their median acquisition cost has dropped. (Graphs titled "U.S. Gold Resources Transactions - Number of Transactions" and "Median Acquisition Cost/Ounce") American companies have decreased their domestic acquisition activity and become net sellers of U.S. gold reserves and resources. (Graph titled "U.S. Gold Resources Transactions: Buyers-Sellers Nationalities")

This trend indicates that U.S. companies intend to leave the development of these assets to other nationalities and that they are willing to sell these assets at a substantial discount to prior market prices, despite constant gold prices. Even more alarming is the fact that the 1994 median cost of \$9.00 per ounce is almost one-half of the median cost per ounce paid in Mexico, a country considered highly unstable and risky for investment.

As shown in the table titled "Gold Acquisition Markets", the Latin American gold acquisition market has not yet experienced a large surge in U.S. investment. Currently, it appears that exploration in Latin America is the preferred route for finding gold opportunities south of the border.

The copper industry is quite different. During the period 1993 through 1994, U.S.-incorporated companies acquired four major copper deposits at a cost of \$642 million dollars and have committed an additional \$1.08 billion in capital investments over the next several years. These amount overshadow the paltry \$10 million spent on one U.S. copper acquisition during the same period. This one transaction was terminated shortly after it was announced.

A detailed review of these exploration figures also indicates that the last three years has seen a disproportionate shift of funding away from the United States, as noted in the "Comment" field.

The older mining companies, such as Homestake Mining and ASARCO have executed successful exploration programs for years. It is the newer companies, however, which illustrate future trends. Domestic gold producers, such as Pegasus Gold and FMC Gold both have made deliberate switches to a more international focus. In FMC Gold's case, they increased their foreign exploration spending from \$4.5 million in 1993 to approximately \$7.5 million in 1994. Pegasus Gold announced their intention to dedicate 70% of their 1994 budget to overseas activities. From the perspective of the U.S. economy, both of these companies were founded on U.S. assets but are now looking elsewhere for their future.

Of greater concern are the small exploration companies. Despite their limited financial resources and the increased expense of international exploration, many of these explorers have also made a conscious decision to shift their efforts into the global arena. Crown Resources Corporation is an excellent example. The Company boasts one of the best discovery track records among American companies. They attribute this success, in part, to their strict focus on U.S. opportunities. Yet two years ago, Crown Resources redirected their exploration activities into Argentina and Peru and mothballed or sold many of their domestic prospects.

These examples are representative of the pervasive attitudes among the exploration community. They highlight the move abroad and should concern Washington that the United States is losing its competitive edge for attracting exploration funds, especially from its indigenous companies.

ACQUISITIONS

Balfour Howell International has maintained comprehensive databases which analyze transactions involving U.S. gold, copper and polymetallic deposits. These databases are used as one of our tools for determining the fair market value of

CAPITAL INVESTMENTS

Another indication of where U.S. mineral companies see their future can be measured by examining their capital spending programs. Many continue to invest in existing and developing operations in the United States. However, these companies are also investing large sums of money abroad, as summarized in the attached tables labelled "Recent examples of foreign investments by U.S. companies." These three pages offer a simplified overview of approximately \$3.5 billion earmarked for foreign investment.

WHY IS THERE SO MUCH INTEREST ABROAD AND SO LITTLE IN THE UNITED STATES?

The U.S. hardrock minerals industry is undergoing a transformation away from the United States. This shift is attributed to two concurrent and seemingly unrelated trends: The growing uncertainties associated with operating in the United States and the substantial pro-business efforts by foreign governments to attract foreign capital.

Human nature has shown that people follow paths of least resistance. The continuous and frivolous obstruction to business in the United States is forcing U.S. mining companies to go elsewhere to survive. Fortunately, there are many emerging democracies which appreciate the role of natural resources in building their economies. Their overt efforts are being rewarded handsomely.

The reduction in spending in the United States is attributed to several factors:

1. Gold has been the predominant metal of choice for most U.S. hardrock minerals companies over the past fifteen years. Copper is dominated by a half-dozen large copper-producing companies.

2. Exploration spending since 1980 has decreased due to market conditions. Reduced spending creates fewer discoveries. (Graph titled "Gold

Prices Vs. U.S. Gold Discoveries"). Fewer discoveries lead to fewer new mines (Graph titled "Gold Prices Vs New Mines Commissions").

3. Since the Stock Market Crash of 1987, many mineral companies reduced their exploration efforts in favor of acquisition programs in order to grow, preserve and replace their production levels. Unfortunately, there are few new deposits coming into the acquisition pipeline due to reduced exploration;

4. The continual removal of prospective geological terrains within the United States to exploration has reduced the amount of area available for exploration. Unfortunately, the geological processes responsible for building many of the U.S.'s most scenic areas are also responsible for creating mineral deposits.

5. The regulatory process for obtaining permits to explore, develop and operating metal mines has become unmanageable. Due to concerns by all levels of government (e.g. Federal, state, county and city) and within multiple jurisdictional agencies at each level, the number of permits has grown as has their restrictions.

6. Anti-business, special-interest groups are using this complex and inefficient permitting system to their own advantage. Frivolous and obstructive injunctions are now commonplace and government regulators have not sufficiently demonstrated to business that they have the authority, fortitude or ability to prevent the interests of a few from blocking the interest of many.

These injunctions have created an environment whereby government requirements are becoming increasingly complex, resulting in a longer-time horizon being required.

7. The change in the mandate of the U.S.G.S., from an organization dedicated to assisting the government and industry in developing a resource policy and defining new mineral districts to one which is strongly focussed on remediation issues, is viewed by business as another example of government's decision to no longer support the commercial aspects of exploration.

The U.S. Geological Survey was instrumental in developing the science which led to the discovery of the Carlin gold trend in Nevada. Their work formed

the basis for many discoveries which followed, the production from which elevated the United States to becoming one of the largest gold producing countries in the world and created thousands of jobs, billions in revenues and privately-financed infrastructure.

Conclusions: Mineral companies are faced with increasing uncertainty with respect to their abilities to conduct business in the United States. Anti-business groups have demonstrated their abilities to stall, block and obstruct business despite the company's compliance to all existing laws and regulations. The government's apparent acquiescence to the demands of these groups confuses industry and provides little incentive to mining executives that their sizable capital investments will be honored or safeguarded.

As a consequence of these attitudes and perceptions, a growing number of companies have decided that the U.S. business climate is no longer favorable for their investments or the survival of their companies.

The mining industry accepts the fact that its cost structure is changing within the United States and has proposed economic compromises which will permit it to survive as an industry. It is the uncertainty and questionable trust in the government which are deterring future investments.

Example: Within the minerals industry it is no longer uncommon to hear that the political risk of operating within Chile or Mexico is no greater than the special-interest risk of operating in the United States.

Balfour Howell conducted a study which investigated future gold production levels in the United States over the next decade. As shown in the table titled "Future National Gold Production Levels", peak production levels will occur around 1997, after which a rapid decline in production is projected. (A more detailed analysis is attached to this testimony).

WHY FOREIGN GOVERNMENTS ARE OVERTLY ATTRACTING U.S. MINING COMPANIES

1. The emergence of new democracies, especially in Latin America, is opening vast lands with substantial mineral endowments. Due to the growth production profile sought by mining companies, these foreign lands offer excellent opportunities for obtaining and developing world-class mineral deposits.

2. Many of the Latin American countries are headed by individuals with sophisticated economic training from some of the best, western business schools. They are directly applying this knowledge to building their economies. These leaders realize that natural resources development provides jobs, infrastructure, tax revenues and, in the case of gold, underpinning collateral for their currencies.

3. The emerging democracies acknowledge the exploration, development and operating expertise of foreign companies. They also realize that foreign companies will provide sizable private investments to their countries.

4. In order to attract foreign investments, many of the emerging democracies have recently overhauled their mining laws, especially with respect to ownership rights, taxes and governmental royalties. These favorable economics have caused a sudden and swift migration of foreign capital.

5. Despite the adoption of many EPA environmental regulations into their own national environmental plans, foreign governments are able to respond to the timing needs of their foreign mining investors, because they realize the positive relationship this creates between the company and government.

Example: One expert on Latin American environmental policy commented that "Mexico closes watches and adopts the regulations created by the EPA, except for the silly ones."

6. Foreign governments frequently attend and speak at U.S. mining trade shows and overtly promote their country. This aggressive marketing tactic is

paying off handsomely, especially when the host government is not perceived as supportive of the mining industry.

Conclusions: Foreign governments are successfully enticing U.S. mining companies to shift their investment funds overseas.

SUMMARY

The U.S. government must decide whether it believes that a domestic hardrock minerals industry is warranted. If it decides that there are economic or military avenues available which can always supply these raw materials to the manufacturing sector, then its current attitudes towards mining can be rationalized. However, should the government decide that basic industries, such as mining, contribute to the vitality of the U.S. economy, then the government should become highly critical of today's anti-business groups and seriously investigate the economic ramifications of its current attitudes towards this industry.

SUGGESTED SOLUTIONS

1. Gain a greater understanding about the role of minerals on the economy. Decide whether the U.S. economy truly requires a hardrock mining industry.
2. Streamline the permitting process. This does not preclude additional regulation; it only suggests that today's complex maze needs to be simplified.
3. Scrutinize the science of lobbying organizations. Additional regulation should be based on formal science not on political agendas. The minerals industry funds research in response to the needs of regulators. Incorporate their findings into your scientific investigations.
4. In the event that the government cannot decide on the role of minerals for the economy, take steps to create a fund now which will be used to compensate

companies for any "takings" which result from future governmental decisions which counteract current policy and regulation.

ADDENDUM: WHY NATIONALITIES SHOULD BE IGNORED.

Most North American mineral companies are incorporated in Canada due to several factors:

1. The Canadian populace understands and appreciates the role of natural resource development on their economy and, therefore, are tolerant of others pursuing careers in the minerals industry. This has permitted Canada to develop and sustain a large mining industry.

2. The regulations governing the Canadian stock exchanges are more permissive for speculative investments than are those governing securities in the United States. Metal exploration, development and mining are highly speculative activities. Therefore, individuals interested in pursuing mineral ventures naturally gravitate toward the Canadian exchanges when in search of investment capital.

The publicly-stated objection to foreigners owning or investing in U.S. metal deposits is unfounded because the size of investments required to place a deposit into production typically involve many millions of dollars and often require investment funding from a variety of sources, many of which are international. To specifically challenge the nationality of the operating company as an issue in the debate over the Mining Law of 1872 is unfair unless opponents can prove that all other capital investments in the United States are provided solely from domestic sources.

The position that foreign (especially Canadian) companies are somehow skirting their responsibility when operating in the United States is naive because:

1. It assumes that foreign companies only have foreign investors, when in fact, many Canadian companies active in the United States also maintain public

listings on U.S. stock exchanges, and are, therefore, obligated to following the same laws governing all companies on these exchanges, and

2. Because of the inability of many mineral companies to raise funding in the United States, they are forced to resort to foreign exchanges when in search of funding.

3. The United States does not apply special operating rules to foreign companies. They must adhere to the same regulations imposed on American companies.

Example: Dakota Mining Corporation, headquartered for many years in Denver, Colorado, owns four gold mines - all located in the United States and staffed principally with Americans. The company maintains a British Columbian incorporation and is listed on the Toronto and AMEX exchanges. Is this company really Canadian?

Example: Barrick Gold Corporation, owner of the controversial Goldstrike mine in Nevada, has a Canadian incorporation. Approximately 40% of the company's shareholders are estimated to be American. With a market capitalization of US\$ 7.8 billion, Barrick's efforts in Nevada have created US\$ 3.1 billion of value. This value is derived principally from a high-risk investment on Federal ground. This fact has apparently been ignored when discussing "the greatest gold heist in American history".

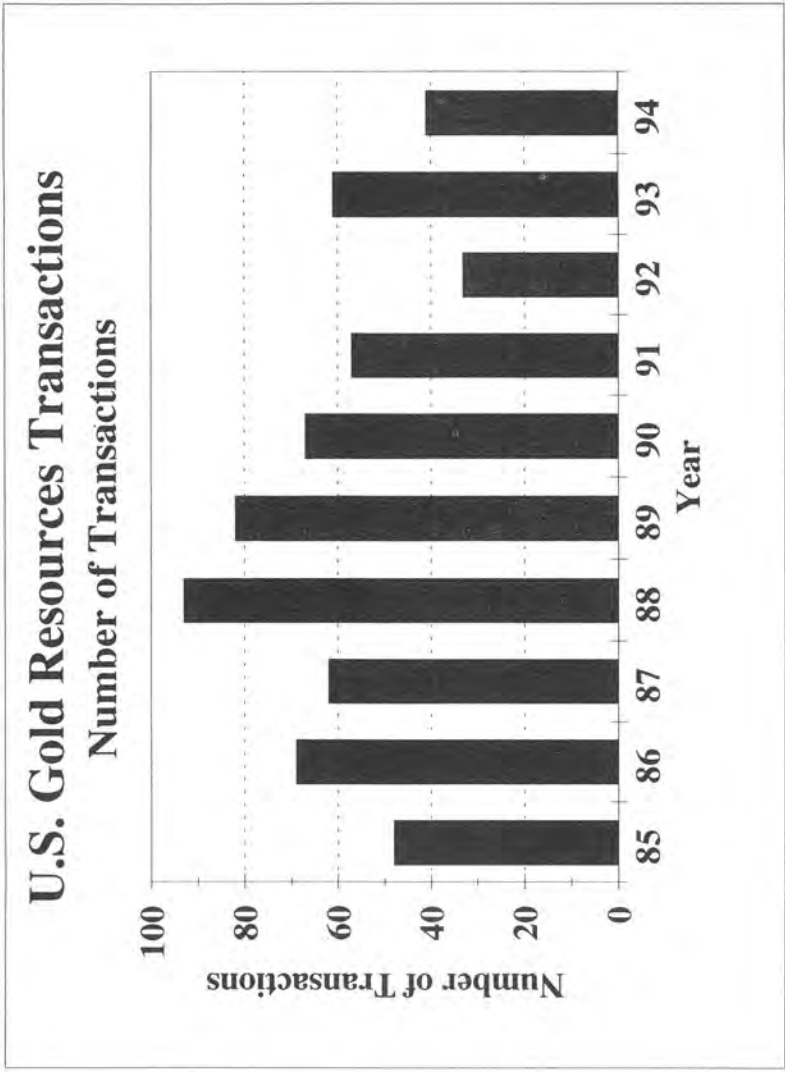
4. Anti-foreigner sentiment directly contradicts the U.S. government's publicly-stated intention to create more, not less, free-trade zones. One has to question how American citizens can demand open borders from others yet remain provincial when others which to operate within the United States.

Thank you.

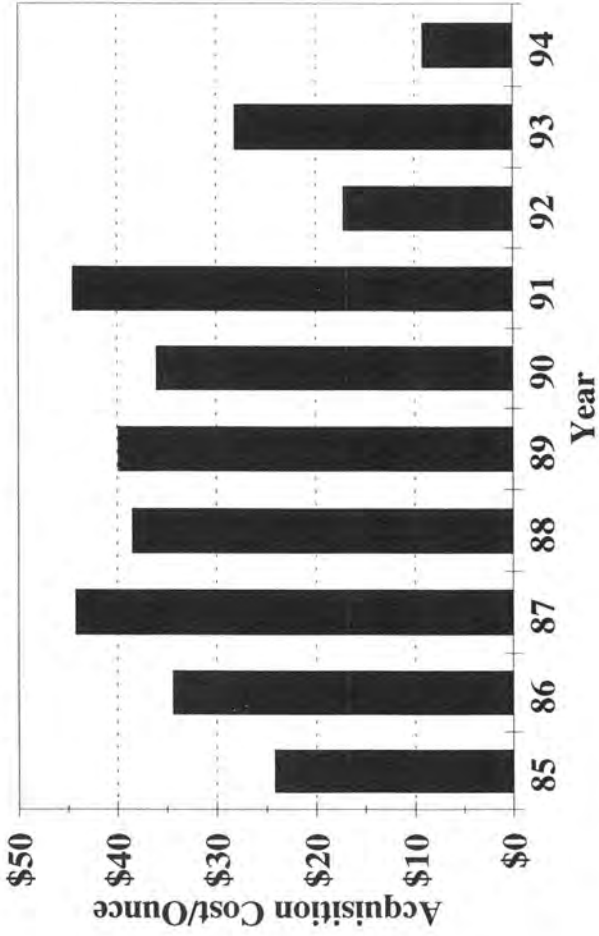
U.S. Hardrock Mineral Companies - Exploration Expenditures

Company	Exploration Spending (US\$ millions)		Comments
	1991	1992	
ASARCO	\$27.00	\$21.00	Maintained international exploration presence for decades.
Amax Gold	\$14.00	(\$2.20)	Cyprus-Amax Minerals (see) conduct exploration on behalf of Amax-Gold.
Atlas Corporation	\$2.52	\$2.32	The Company's focus continues to be on the United States.
Battle Mountain Gold Co.	\$27.39	\$17.13	1993 Annual report: "Company expands its international exploration program."
Canyon Resources Corp.	\$0.04	\$0.30	1994: Company expands its international search into Latin America and Africa.
Coeur d'Alene Mines	\$3.74	\$2.30	Active in the United States, New Zealand, Mexico and Chile
Cyprus Amax Minerals	\$20.79	\$19.16	Currently in 11 countries. 85% of 1993 and 1994 budget went international.
FMC Gold Company	\$12.58	\$12.17	Targeting 50% of 1994 \$15 million budget internationally.
FirstMiss Gold	\$1.35	\$1.14	The Company's focus continues to be on the United States.
Fresport McMoran	\$6.50	\$12.19	Company's principal asset is located in Indonesia.
Hecla Mining Company	\$5.69	\$7.66	Principally spent on Republic, Grouse Creek and La Choya
Homestake Mining Co.	\$47.44	\$27.80	Has an international presence for more than 50 years.
Magnum Copper Co.	\$0.90	\$2.70	The company is not known for its exploration efforts.
Newmont Mining Co.	\$47.23	\$51.99	Company strongly supports both international and domestic exploration.
Pegasus Gold	\$5.84	\$9.13	1994: 70% of exploration budget to be spent internationally.
Phelps Dodge	\$50.57	\$49.92	One-half of exploration budget spent internationally: Chile, Canada, Zambia, Mexico
Royal Gold, Inc.	\$0.04	\$0.09	Actively reviewed international exploration prospects during 1994.
Santa Fe Pacific Gold	\$15.51	\$17.82	Expanded international exploration efforts after IPO completed in 1994.
Stillwater Mining Co.	\$0.64	\$0.50	The Company's focus continues to be on the United States.
Total:	\$289.75	\$252.95	\$290.98

Balfour Howell International 1-1995

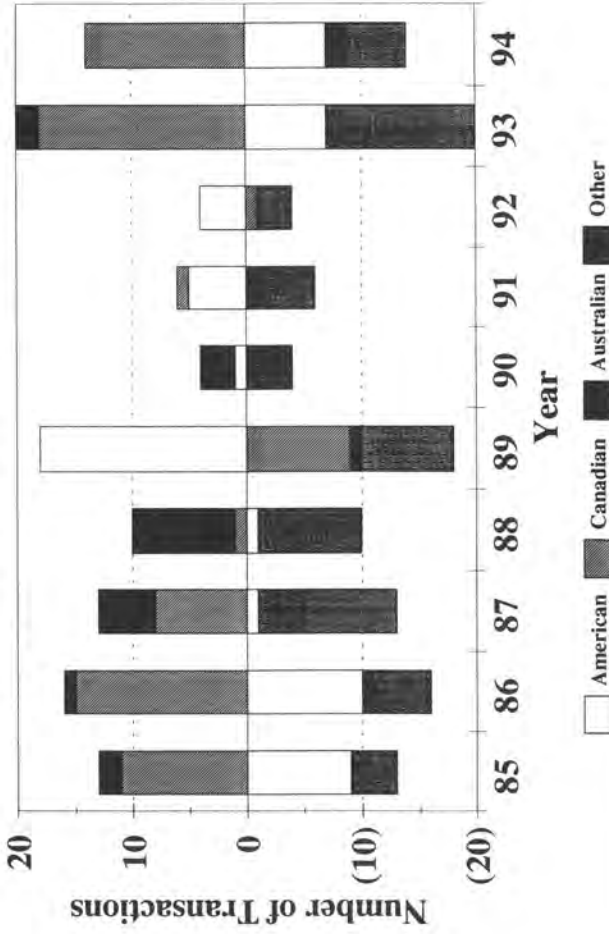


U.S. Gold Resources Transactions Median Acquisition Cost/Ounce



U.S. Gold Resources Transactions

Buyers - Sellers Nationalities



GOLD ACQUISITION MARKETS

(1993 - 1994)

	<u>United States</u>	<u>Latin America</u>
Entire Database		
Number of Transactions:	102	104
Total Acquisition Value:	\$2,064	\$1,047
Attributable Gold (Million Ounces):	23.5	82.6
<hr/>		
Transactions Involving Large U.S. Companies		
Number of Transactions:	9	1
Total Acquisition Value:	\$1,038.7	\$22.2
1994:	\$15.5	\$0.0
1993:	\$1,023.2	\$22.2
Attributable Gold (Million Ounces):	8.6	2.1
1994:	8.1	0.0
1993:	0.5	2.1

 Testimony of Douglas B. Silver 1-31-95

COPPER ACQUISITION MARKETS

(1993 - 1994)

	<u>United States</u>	<u>Latin America</u>
Entire Database		
Number of Transactions:	23	58
Total Acquisition Value:	\$149	\$1,394
Contained Copper (Billions of Pounds):	20.0	86.4
<hr/>		
Transactions Involving Large U.S. Companies		
Number of Transactions:	1	4
Total Acquisition Value:	\$10	\$642
Total Investment Value:	\$0	\$1,080
Contained Copper (Billions of Pounds):	0.2	15.5

 Testimony of Douglas B. Silver 1-31-95

RECENT EXAMPLES OF FOREIGN INVESTMENTS BY U.S. COMPANIES

(US\$ Millions)

<u>Company Name</u>	<u>Asset Name</u>	<u>Metal</u>	<u>Acquisition Cost</u>	<u>Capital Investment</u>	<u>Comments</u>
Cyprus-Amax	Kubaka, Siberia El Abra, Chile Cerro Verde, Peru	Gold Copper Copper	N/A \$330 \$31	\$100 \$1,000 \$475	
Freeport McMoRan Copper & Gold	Ertzberg, Indonesia	Copper	N/M	\$634+	1994: Raised \$634 million for expansions.
Magma Copper	Tintaya, Peru	Copper	\$247	\$85	Acquired 10-1993
P Phelps Dodge	Candelaria, Chile	Copper	Discovered 1987	\$550	\$550 million in capital. \$328 million spent between 1993 and 1994. 1994 Start-up.

RECENT EXAMPLES OF FOREIGN INVESTMENTS BY U.S. COMPANIES

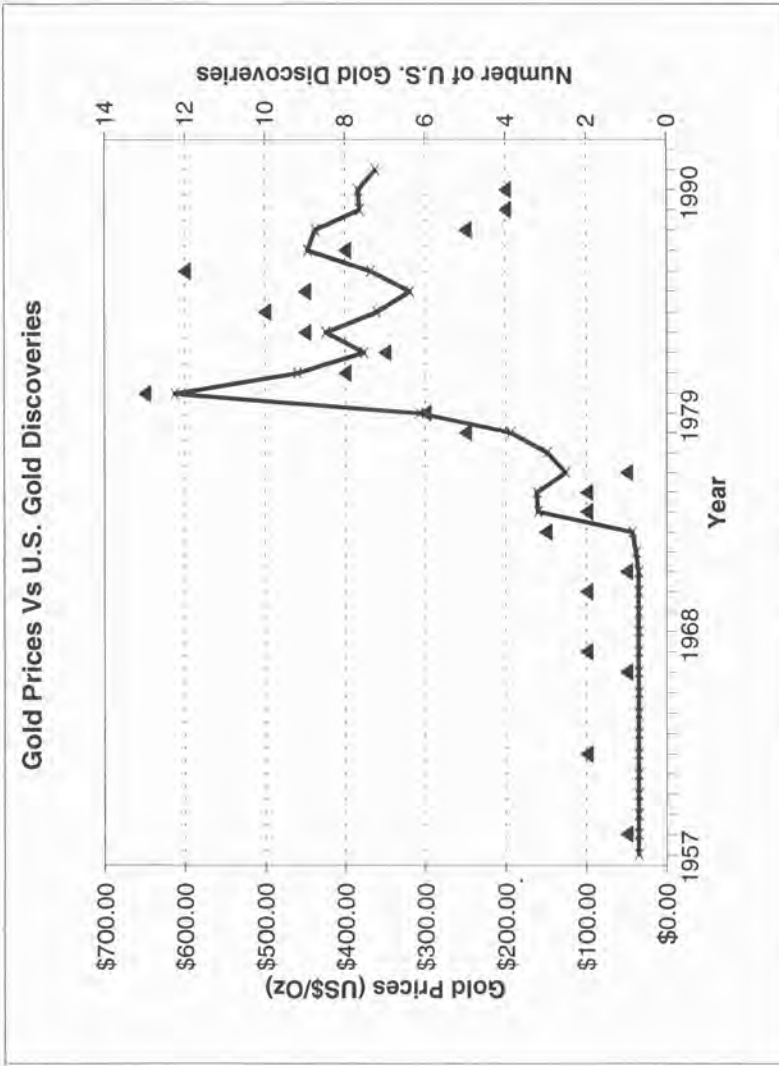
(US\$ Millions)

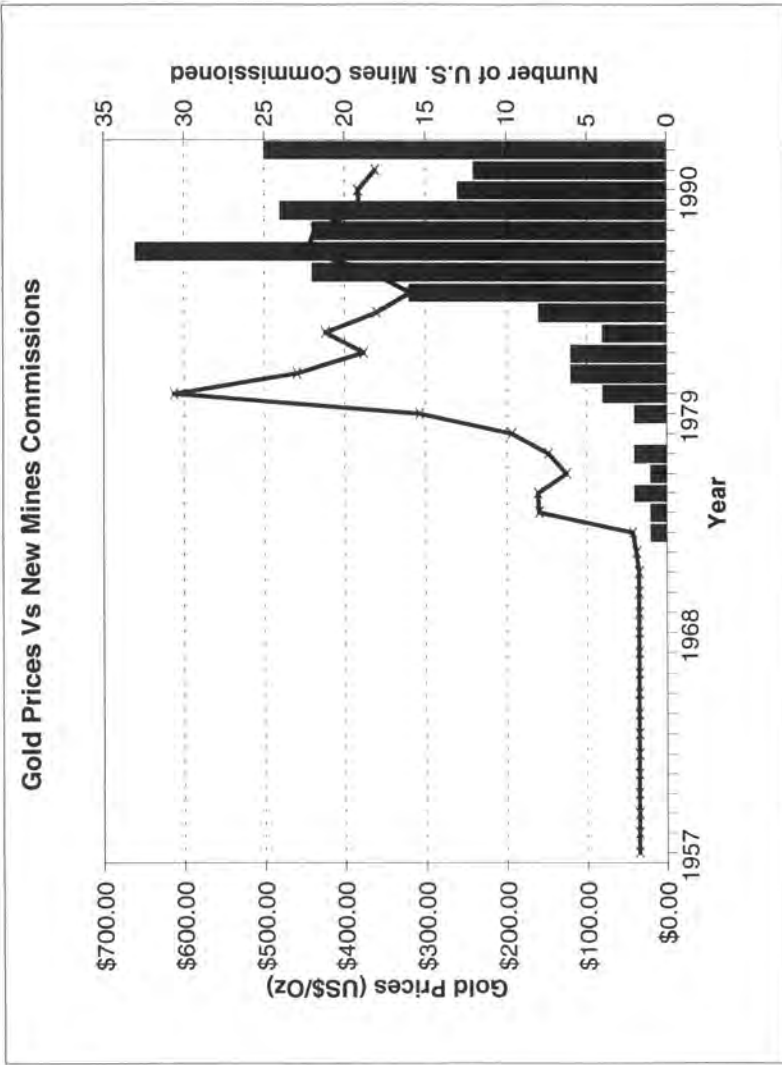
<u>Company Name</u>	<u>Asset Name</u>	<u>Metal</u>	<u>Acquisition Cost</u>	<u>Future Investment</u>	<u>Comments</u>
Amax Gold	Guanaco, Chile	Gold	\$37	\$27	1993: Mine commissioned.
	Refugio, Chile	Gold	\$23	\$70	1996: Anticipated start-up.
	Cerro Quema, Panama	Gold	N/A	N/A	Development work.
Newmont Mining	Muruntau, Uzbekistan	Gold		\$150+	Construction underway.
	Yanacocha, Peru	Gold	N/A	Undefined	1993 Start-up.
	Minahasa, Indonesia	Gold	Discovery?	\$100	Large capital expenditures expected.
	Batu Hijau, Indonesia	Copper-gold	Discovery?	N/A	
FMC Gold	N/A	Gold	N/A	?	Shift to Latin America (Mexico, Chile) occurred in 1993.
MK Gold Company	Jerroy, Kyrgyzstan	Gold	N/A	\$100	

RECENT EXAMPLES OF FOREIGN INVESTMENTS BY SMALLER U.S. COMPANIES

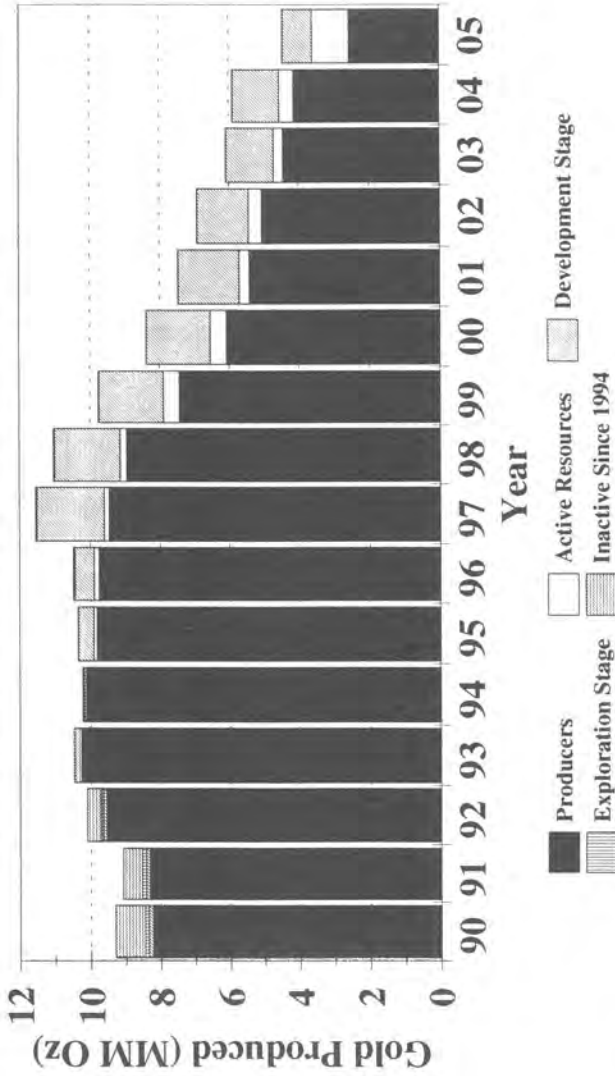
(U.S\$ Millions)

<u>Company Name</u>	<u>Asset Name</u>	<u>Metal</u>	<u>Project Status</u>	<u>Comments</u>
Crown Resources	Yanacocha region, Peru	Gold	Exploration	160,000 acres. Deliberate shift in 1993.
	Bongara, Peru	Zinc	Exploration	25,000 acres.
	Argentina	Gold	Exploration	325,000 acres.
	Cerro Amarillo, Argentina	Copper-gold	Exploration	12,000 acres - Arizona style porphyry copper target.
	Gualfian, Argentina	Gold	Exploration	25,000 acres - Carlin style gold target.
Canyon Resources	Argentina	Gold	Exploration	Established 1994
	Chile	Gold	Exploration	Established 1994
	Panama	Gold	Exploration	Established 1994
	Dominicar, Republic	Gold	Exploration	Established 1992?
	Africa	Gold	Exploration	Established 1994
Royal Gold	Bulgaria	Gold	Exploration	Established 1993-1994
	Peru	Gold	Exploration	Established 1993-1994
	Kenyon	Gold	Exploration	Established 1993-1994



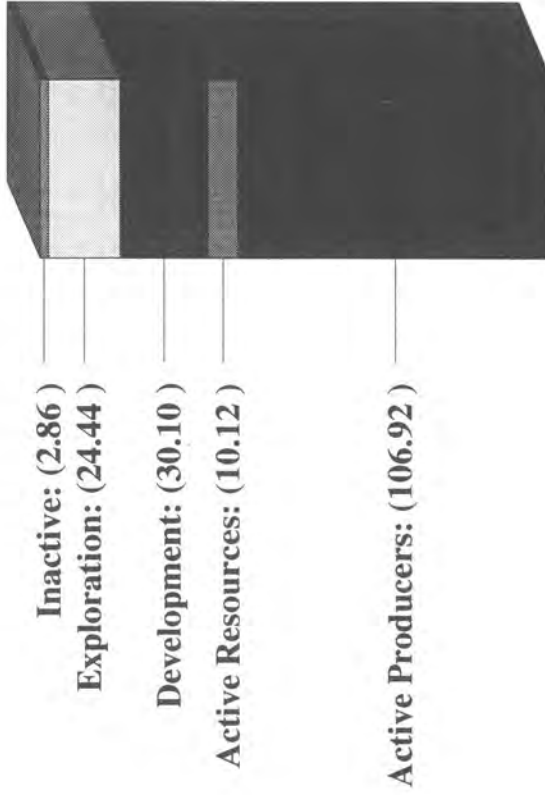


United States Gold Production Future National Production Levels

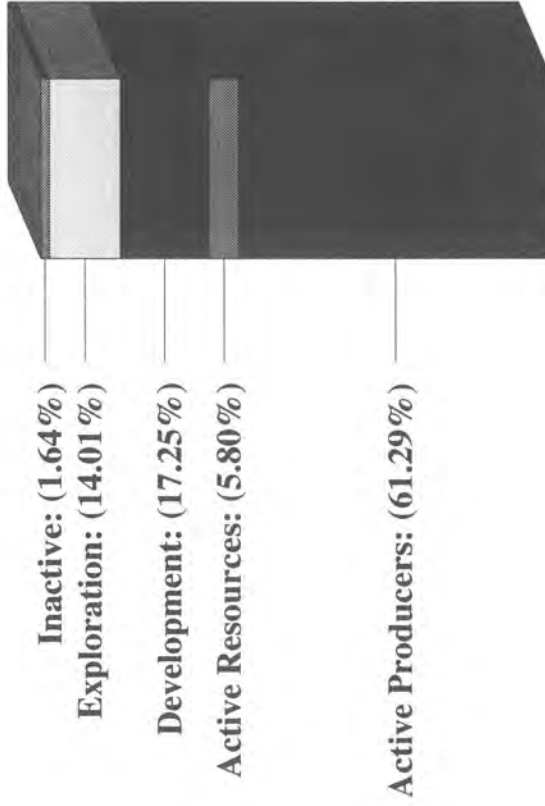


Balfour Howell International 12-1994

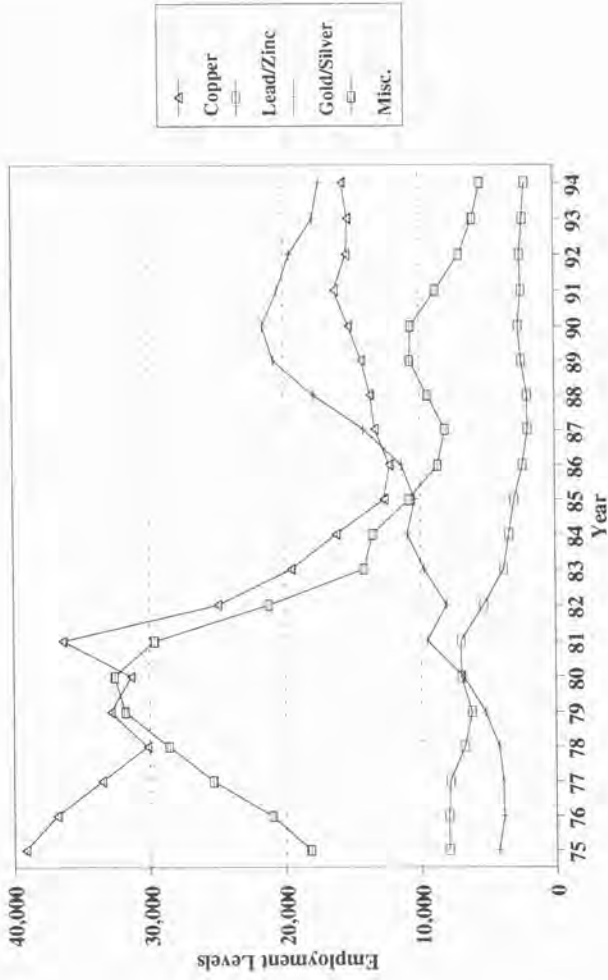
U.S. Recoverable Gold Ounces (MM) As Of January 1994



U.S. Recoverable Gold Ounces As Of January 1994



Hard Rock Mining Employment Statistics U.S. Department of Labor



THE MINING RECORD



INTERNATIONAL MINING NEWS™
THE INDUSTRY'S LEADING WEEKLY MINING NEWSPAPER SINCE 1889

Wednesday, December 7, 1994

Vol. 105 No. 49

Denver, Colorado, USA

U.S. Gold Production To Reach 11.5 Million Ounces

By Douglas B. Silver
Balfour Beatty International, LLC

Denver, CO — U.S. gold production is expected to rise over the next three years, peaking in 1997 at an estimated annual rate of 11.5 million ounces. Much of this increased production will be derived from new mines currently being constructed, or from expansion of existing operations. With over 175 million ounces of gold reserves delineated, the future of U.S. gold production remains healthy over the near term.

During the next several years, the number of operating gold mines in the United States is expected to drop substantially. Current projections indicate a 20% decrease over the next three years, followed by a further reduction of 50% by the year 2000.

This decline is quite dramatic, as noted by the fact that there were 116 operating gold mines in the United States in 1990, and that there may be less than 50 by the year 2005.

The apparent conflict between rising levels of gold production during a time of massive mine closings reflects the fact that smaller gold mines are depleting their reserves at the same time that the largest U.S. mines are expanding. For example, American Barrick Resources' Goldstrike mine in Nevada is expected to reach peak capacity (1.8 million ounces) in 1996, at which point this one mine could account for approximately 20% of U.S. gold production.

Over the next five years, production from the median U.S. gold mine will increase from 70,000 to over 100,000 ounces per year. Balfour Beatty International ("BHI") estimates that total annual U.S. gold production will continue to be in excess of ten million ounces through 1999, at which point a rapid decline to under five million ounces could occur by the year 2005.

These projections are based on a recent study of 680 U.S. gold deposits prepared by BHI's consulting division.

For each deposit, the current reserves and resources were identified and their production scheduled out to the year 2030 at a rate stipulated by their owners in public documents. Unless otherwise specified, it was assumed that the active mines were operating at design capacity in 1993 and would continue at these production levels for the balance of the mine life.

Production of the 107 million recoverable ounces were then scheduled until such time as the proven and probable ore

reserves were depleted. As shown in the accompanying graph, the aggregate production profile for these ounces is listed as "Active Resources".

Canadian mining companies often report "Possible Reserves" or "Mineral Inventories" that are additional gold resources do not

influence on maintaining the national production level of 10 million ounces per year through the year 2000.

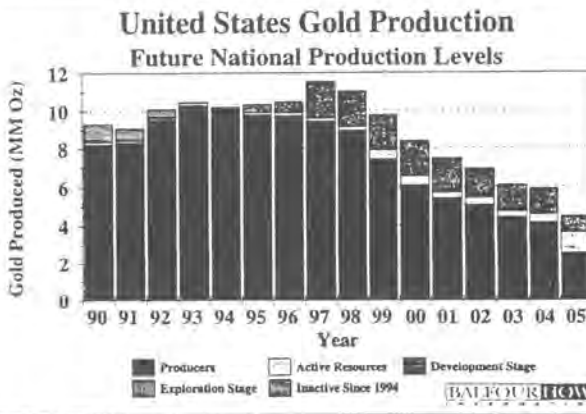
Two other categories of deposits are also displayed on the graph.

"Inactive since 1994" refers to closed mines with residual

project could not be ascertained. In this instance, BHI assumed that the resources still exist and that the project is in a state of dormancy. Inactive projects include at least three million recoverable ounces.

Exploration-stage projects are classified by BHI as being

ing could assist in replenishing the U.S. gold reserves. Currently, the longest-life mines are either porphyry copper deposits producing gold as a byproduct (such as Kennecott's Bingham Canyon mine), or world-class operations within the Carlin Trend (such as



meet the definition standards of the U.S. Securities and Exchange Commission. As these are known ounces, BHI assumed that this material would eventually be advanced to the Proven and Probable ore reserve category, and assist the mine in maintaining its design capacity (e.g., extending the operating life of active gold mines). For both "Active" categories, BHI assumed that no additional ore will be found beyond those already defined (however, past experience has demonstrated that this is rarely the case for epithermal gold deposits). In most cases, they have discovered more ore than was originally postulated, and continue to replenish their production with new reserves.

BHI's analysis defined an additional 30 million recoverable ounces among development-stage gold projects. These deposits are either currently being constructed, or are sufficiently advanced in their permitting and financing to believe that the owners will achieve their targeted production dates. Beginning in 1997, the influence of these new projects becomes quite pronounced, and becomes a major

reserves (or production), as well as properties in which the reserves and resources are known, but the current ownership of the

currently active but do not have a sufficient amount of work completed to conduct a feasibility study. Therefore, the timing of their proposed commissioning is both premature and not assured. Exploration-stage deposits comprise approximately 24 million recoverable ounces.

Overall, it appears that the U.S. gold industry has ample opportunities to replace and augment current production levels.

Granted, many mines will close over the short and long term, but the replacement candidates are plentiful. Many of these non-producing gold assets require substantially better economics before these can proceed. Economic enhancements such as higher gold prices (e.g., US\$450/oz) or a breakthrough in technology (for refractory ores) could add significantly to U.S. gold production levels.

Furthermore, the high probability of extending existing mine lives through the discovery of additional reserves makes these projections minimal in scope. A short-term rally in gold prices could greatly assist the United States in breaking the 12 million ounce annual production level.

Increased exploration spend-

ing could assist in replenishing the U.S. gold reserves. Currently, the longest-life mines are either porphyry copper deposits producing gold as a byproduct (such as Kennecott's Bingham Canyon mine), or world-class operations within the Carlin Trend (such as

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DATED IN DENVER BY THE PRESS

THE MINING RECORD



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Vol. 106 No. 1

Denver, Colorado, USA

North American Mining Industry Continues To Flourish

By Douglas B. Silver
Balfour Howell International, LLC

The North American minerals industry continues its come-back from the devastating Stock Market Crash of 1987. As shown in the graph, the gap between the number of companies disappearing and those being created closed significantly in 1994. More than 80 new companies were created in Canada and the United States, while only 109 died.

Most of the difference between the companies mortality rate in 1993 and 1994 is related to the number of companies dying. By contrast, in 1993, 265 companies disappeared due to bankruptcies, charters being cancelled or dissolved, amalgamations, mergers, liquidations, takeovers and name changes (related to recapitalizations), while 128 new companies were formed.

Many factors contribute to the changing demographics. In 1985, the industry has witnessed a consolidation resulting from a general lack of investor funding during a time of flat metal prices and growing environmental regulation. This led to a mortality rate which peaked in 1989 with more than 470 companies disappearing. Each successive year has seen less casualties, reflecting both the completion of the winnowing out of financially weaker companies, as well as the increased value in shell companies.

Shell companies are small companies with essentially no assets except for their public listing status. Acquiring a shell company generally takes less time and money than going through an initial public offering. When "easy" money is available from investors, such as has been the case during the past 18 months, there is an increased demand for shell companies as they provide an expeditious mechanism for taking advantage of this market. Conversely, when the markets turn sour, many of these shell companies are abandoned.

Over the past two years, Balfour Howell has measured a significant increase in financing activity for North American mineral companies. Preliminary figures for 1994 indicate that this activity (debt plus equity) could surpass US\$ 70 billion. Organizations seeking to become public are scrambling to acquire shell companies in order to participate in this upswing in financing activity.

Other factors which influence the decreased death rate during 1994 included a decline in amalgamations (tax-free instruments employed when pooling assets of multiple companies). In the post-Crash pen-

od, companies amalgamated with each other as a survival tool. Each company would

a change in the controlling shareholders. Over the past two years, approximately 110 com-

panies were restructured, are not entertaining offers for change in control (presumably because

found that could bring destruction to its ranks.

Many pundits are already whining about the financial markets and how they are disrupting for speculative investments. The facts do not support this contention; however, the markets can be very fickle and turn off the funding spigot for no apparent reason. This is the nature of speculation. Therefore, one must be cautious, especially during these times of investment euphoria, to not become complacent and accept the ease at which money is flowing into the industry. Should a major correction in the stock markets or metal prices occur, the vast improvements over the past six years could evaporate overnight.

There are many positive factors which should provide solace to the Doubting Thomases. The Republican coup at the recent United States' mid-term elections will provide business with a friend. The ongoing emergence of new democracies throughout the world are opening vast areas of mineral wealth for foreign investment. Humans, by nature, are consumers and as the planet continues its philosophical, political and economic alignments, the demand for raw materials can only grow. Therefore, the mineral companies should be optimistic about 1995 and strive to take advantage of the expanding international playground. Removing the domestic borders literally creates an unlimited number of opportunities. Successfully capitalizing on these opportunities will assist greatly in defining 1995 as the first year in the last eight when the North American mineral industry truly is in an expansionary cycle.



ning to the new entry its best assets (cash, properties, and/or public listings) in exchange for owning an interest in the new company. Over the past two years, amalgamations have stabilized at approximately 20 per year, down significantly from a high of 58 in 1989.

Mergers are similar to amalgamations except that rather than combining two or more companies to create a new company (frequently with a different name), one of the companies "swallows" the other, often in exchange for shares. Merger activity has also dropped from a high of 118 in 1990 to a low of 70 in 1994.

Companies with weak balance sheets are not dissolving, delisting, liquidating or entering in bankruptcy as rapidly as in earlier years for the same reasons that shell companies are in demand. These financially-troubled companies appear to be able to find sufficient financing to remain afloat, and in many cases become shell companies which are recapitalized.

Another indicator of the financial health of the industry lies in the number of companies which leave the minerals business. Last year, more than 120 companies switched their corporate focus away from minerals. This year, only fourteen are known to have changed their corporate direction.

Finally, there are many companies which change names during the course of a financial restructuring. These restructurings vary from a company receiving a major cash infusion related to a project financing, to

companies change their names annually, most of which are associated with companies listed on Canadian exchanges (particularly Vancouver). In 1994, only 70 companies are known to have changed their names, down 30% from the prior year.

The low level of name changes indicates that companies are either sufficiently well-financed that they do not

their current owners are content with the financial state of the company and its corporate direction, or are not changing the corporate focus enough to warrant a name change. In short, many of these companies have achieved financial and corporate stability - another sign of health.

Balfour Howell sees several interesting trends for 1995. Assuming that the high level of external financing continues, then 1995 may be the first year since 1987 when more companies form than die. With the continued globalization of the exploration and mining industry, each new world-class mineral discovery will, no doubt, provide the fuel needed to create new players for this boom area. Additionally, any sustained growth in metal prices will also serve as an important underpinning to a continued rally.

Alternatively, during 1994, the Canadian diamond companies took a severe beating in their share prices and abilities to obtain future financings when Kennecott announced that their diamond play was not economic. Despite efforts by a choice few to continue the Canadian diamond boom, it is highly likely that the 400s companies involved in this activity will have numerous fatalities in 1995. One only has to review the current slurry of press releases to see a noticeable deficiency in diamond news. Given that the diamond companies represents an estimated 20% of the number of known North American mineral companies, the end of the dia-

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Statement of John E. Young
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Washington, D.C.

before the

Subcommittee on Energy & Mineral Resources
Committee on Resources
U.S. House of Representatives
January 31, 1995

Thank you, Mr. Chairman, and members of the subcommittee, for the opportunity to testify today. My name is John Young, and I am a senior researcher with the Worldwatch Institute, where I have worked since 1988. Worldwatch is a non-profit, non-partisan environment and development policy research center in Washington, D.C.

Since 1990, the interrelated issues of resource extraction, waste, and materials policy have been a major focus of my research. The major conclusion I have drawn from that research is that our problems with waste are only a symptom of a much larger problem: a global economy built on the inefficient use of raw materials and energy.

I am here today to urge the subcommittee to support strong reform of the laws governing non-fuel mineral extraction in the United States, continuing along the lines of the bills that reached conference committee in the last session. I share your concern about the competitive position of the U.S. economy, and I believe that one of the best ways to improve it is to reform our policies on extractive industries in the context of a broad program to encourage efficient use of materials in the U.S. economy and reduce the environmental impacts of resource extraction.

I do not believe that the mining industry is rapidly fleeing the United

States, as implied in some recent press reports. This country remains the world's largest non-fuel mineral economy, producing 13 percent of annual global output (by value), and no clear downward trend in the value of U.S. mineral output is apparent. Indeed, over the last 15 years, the U.S. has played host to the greatest gold rush in history. Since 1980, U.S. gold production has increased at least elevenfold. I am including with my testimony a graph of U.S. gold output since 1921. The trend is quite clear, and dramatic.

I also do not believe that reform of the 1872 Mining Law as proposed in last year's bills would have a devastating impact on the U.S. industry. U.S. mining firms pay royalties and/or substantial other taxes in a number of U.S. jurisdictions and foreign countries (such as Australia and Canada), and they routinely pay much higher prices for the right to mine private lands.

The mining industry is subsidized through the virtual giveaways of public land and minerals that occur under the provisions of the General Mining Act, and through the special tax allowances it receives. It is also currently exempted from hazardous-waste regulation under the Resource Conservation and Recovery Act, and is one of the few industries not required to report to the federal Toxics Release Inventory.

Subsidizing mining firms and exempting them from environmental regulation will hurt, not help, the United States' overall economic competitiveness. The mining industry has created dozens of large Superfund sites that will collectively cost billions of public dollars to clean up. Weak regulations will create more Summitvilles and Berkeley Pits.

I understand the industry's frustrations with slow public decisionmaking about mineral projects. However, these delays occur primarily because this country is a democracy. We believe that it is appropriate for citizens to be

involved in decisions about uses of public and private land that may have significant impacts on public resources or neighboring properties. The United States is a leader in environmental protection. I do not believe that we should not lower our environmental standards to match those of poor, sometimes authoritarian foreign regimes that are desperate to attract any investment (often without regard to the future liabilities that mining projects may create). I would support the development of better-integrated, multimedia permitting processes for mineral projects--which may help reduce bureaucratic delays for mineral projects--but such changes should be made only in the context of strengthening, not weakening, protective measures for public health and the environment.

The mining industry has experienced significant job loss in recent decades, primarily as a result of increased mechanization. I understand the difficulties that these employment declines have created in many communities. I believe, however, that the federal revenue now being lost through fire-sale prices of mineral-bearing public lands, and the tax dollars that will have to be spent cleaning up former mineral sites, could have been stimulated much economic development if invested in other activities. The mining industry is now among the least labor-intensive sectors of the U.S. economy. I urge you to look at the big picture as you develop new policies for economic development and regulation of extractive activities in the United States.

Thank you again for the opportunity to testify. I am including the following additional material for the record:

- (1) John E. Young, Mining the Earth, Worldwatch Paper 109 (Washington, D.C.: Worldwatch Institute, July 1992).
- (2) John E. Young, "For the Love of Gold," World Watch, May/June 1993.

Mining the Earth

John E. Young

Ed Ayres, Editor

Worldwatch Paper 109
July 1992

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Substances extracted from the earth—stone, iron, bronze—have been so critical to human development that historians name the ages of our past after them. But while scholars have carefully tracked human use of minerals, they have never accounted for the vast environmental damage incurred in mineral production.

Few people would guess that a copper mining operation has removed a piece of Utah seven times the weight of all the material dug for the Panama Canal. Few would dream that mines and smelters take up a tenth of all the energy used each year, or that the waste left by mining measures in the billions of tons—dwarfing the world's total accumulation of more familiar kinds of waste, such as municipal garbage. Indeed, more material is now stripped from the earth by mining than by all the natural erosion of the earth's rivers.

Scouring the planet for its minerals has damaged large areas of land, often in remote, ecologically pristine areas. Mining projects now threaten 4 of every 10 national parks in tropical countries. The smelting of ores pumps millions of tons of sulfur dioxide and other pollutants into the atmosphere each year. Smelter pollution has created biological wastelands as large as 10,000 hectares, and accounts for a significant portion of the world's acid rain. The mineral industry's profligate use of energy makes it a substantial contributor to climate change as well as to more localized environmental problems.

Yet in most discussions of threats to the global environment, mining is conspicuous only by its absence. The damage from mineral extraction is usually considered a local problem, and accepted—or imposed on local inhabitants—as an inevitable cost of economic development. It is also rarely tracked. For instance, the U.S. mining industry—though it is

I would like to thank Alyson Wainwright, Brian Skinner, and my colleagues at Worldwatch for comments on drafts of this paper.

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diversity. Mineral projects are among the largest causes of disturbance in such areas.

But while much of the damage is concentrated in the developing world, responsibility for most of it ultimately lies with those who use the most minerals—the fourth of humanity who live in industrial nations, enjoying material comforts others only dream of. The rich nations thus bear a special responsibility to help clean up the messes created to satisfy their needs, and to ensure that new damage is kept to a minimum.

In the long run, the most effective strategy for minimizing new damage is not merely to make mineral extraction cleaner, but to reduce the rich nations' needs for virgin (non-recycled) minerals. Hope for success lies in the economic maturity of today's most prosperous countries. Large quantities of minerals were required to build up their infrastructures—to make the concrete, steel, brick, and other materials needed for buildings and transportation systems. But once a society's basic structures are built, the quantities of additional materials it uses need not determine its quality of life. After a certain point, people's welfare may depend more on the caliber of a relatively small number of silicon microchips than on the quantities of copper, steel, or aluminum they use.

The sooner the whole world reaches such a point, the better. At the end of the minerals- and energy-intensive development path taken by today's industrial nations lies ecological ruin. Mining enough to supply a world expected to double in population during the next half century, with everyone using minerals at rates that now prevail in rich countries, would have staggering environmental consequences. Only by adopting a new development strategy—one that focuses on improving human welfare in ways that minimize the need for new supplies of minerals—can such consequences be averted.

Minerals in the Global Economy

Large-scale use of minerals began with the Industrial Revolution and grew rapidly for over two centuries. From 1750 to 1900, the world's overall use of minerals increased tenfold while population doubled.

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clearly among the largest polluters—is not required to report its toxic emissions to state and federal regulators, as are most manufacturing industries. Cognizant that a country's overall prosperity usually correlates closely with its per capita use of mineral products, industrial nations have focused instead on the question of mineral supplies.

In the United States, for example, periodic waves of concern over future mineral supplies have led to the appointment of at least a half-dozen blue-ribbon panels on the subject since the twenties. Experts have assiduously questioned whether the country is going to have enough copper, iron, uranium, and other "nonrenewable resources." In 1978, a U.S. congressional committee requested a study whose title expressed the central question of virtually all these inquiries: *Are we running out?*

Recent trends in price and availability suggest that for most minerals we are a long way from running out. Regular improvements in exploitive technology have allowed the production of growing amounts at declining prices, despite the exhaustion of many of the world's richest ones. For many minerals, much of the world has yet to be thoroughly explored.

In retrospect, however, the question of scarcity may never have been the most important one. Far more urgent is: Can the world afford the human and ecological price of satisfying its present appetite for minerals? If the answer is that it cannot, the challenge will be to find ways to continue developing and improving the quality of human life without constant growth in mineral extraction.

In turn, the question of what the world can afford depends on a true accounting of the costs of taking materials from the earth. Today's low mineral prices reflect only the immediate economics of extraction and distribution; they fail to consider the full costs of denuded forests, eroded land, dammed or polluted rivers, and the uprooting or decimation of indigenous peoples unlucky enough to live atop mineral deposits.

The environmental impacts of mineral extraction are particularly severe in developing countries, which produce a large portion of the world's mineral supplies but use a relatively small share. These nations also harbor some of the globe's greatest remaining concentrations of biological

Table 1. Estimated World Production of Selected Minerals, 1991

Mineral	Production ¹ (thousand tons)
Metals	
Pig Iron	531,000
Aluminum	18,500
Copper	9,100
Manganese	6,700
Zinc	7,400
Chromium	3,800
Lead	3,370
Nickel	953
Tin	210
Molybdenum	110
Titanium	82
Tungsten	39
Cobalt	34
Cadmium	20
Silver	14
Mercury	6
Gold	2
Platinum-Group Metals	0.3
Nonmetals	
Stone	11,000,000
Sand and Gravel	9,000,000
Clays	500,000
Salt	186,000
Phosphate Rock	160,000
Potash	135,000
Lime	98,000
Gypsum	83,000
Soda Ash	33,000

¹All data exclude recycling; figures for metals are smelter production or metal content of ore; figures for nonmetals are ore mined.

Source: U.S. Bureau of Mines (USBM), *Mineral Commodity Summaries 1992* (Washington, D.C.: 1992); Donald C. Rogich, "Trends in Material Use: Implications for Sustainable Development," unpublished paper, Division of Mineral Commodities, USBM, April 1992; figures for stone, sand and gravel, and clays are Worldwatch estimates based on USBM, *Mineral Commodity Summaries*.

Since 1900, it has jumped by at least thirteen-fold again.⁸

For some individual minerals, the growth has been even more extraordinary. Annual production of pig iron (the crude metal used to make steel) now stands at more than 500 million tons—or 22,000 times what it was in 1700. Outputs of copper and zinc are now 570 and 7,400 times greater than they were in 1800. Although aluminum was not commercially available until 1845, and was far too expensive for large-scale production until the modern electrolytic process was invented in 1886, smelters currently turn out 18 million tons of new metal each year.⁹

The term "minerals" encompasses a wide variety of substances taken from the earth. They are generally divided into four groups: metals, such as aluminum, copper, and iron; industrial minerals—such as lime and soda ash—that are valued for special qualities; construction materials, such as sand and gravel; and energy minerals, such as uranium, coal, oil, and natural gas (which, while they are extracted in large quantities at substantial cost to the environment, are outside the scope of this paper).¹⁰

Of the non-fuel minerals, stone, sand, and gravel are produced most widely and in the largest quantities. (See Table 1.) The principal use of the estimated 20 billion tons of such materials taken from the ground in 1991 was in construction, most often as ingredients of concrete. Ubiquitous in the earth's crust, they are generally used near the site where they are found.

Other nonmetals are more valuable and typically travel farther from mine to user. These include phosphates and potash (important ingredients in chemical fertilizers), lime (a major component of the cement that binds concrete), soda ash (an alkaline material used in many chemical processes), clays such as kaolin (an important ingredient in ceramics), and salt (most of which is used in the chemical industry, not in food).¹¹

The most valuable minerals extracted are metals—of which the most important is iron. About thirty times as much iron is produced as the next most common metal, steel—the cheap, strong material into which most iron is converted—costs one third to one half as much by weight as

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and electronics industries, for example, are among the fastest-growing sectors in industrial economies, and are far less materials- and energy-intensive than traditional extractive and manufacturing industries.¹⁰

Third, recycling has reduced demand for metals (though not for other minerals, which are not easily recycled). In the United States, for instance, recycling provides a substantial share of consumption for many metals. (See Table 2.) Lead is recycled at a very high rate, largely because the metal is so toxic that its use is now tightly regulated. Seventy-three percent of 1990 U.S. lead consumption was supplied through recycling. Fifty-six percent of iron and steel consumption in the

Table 2. U.S. Metal Consumption and Recycling, 1990

Metal	Consumption (thousand tons)	Share of Consumption Provided by Recycling (percent)
Lead	1,297	73
Copper	2,168	60
Iron & Steel ¹	99,900	56
Gold	0.2	47
Aluminum	5,263	45
Aluminum Group	0.1	45
Zinc ²	1,060	43
Tin	45	38
Tungsten	8	29
Nickel	148	23
Cobalt ³	7	22
Chromium	423	21
Silver ⁴	5	14
Molybdenum	21	5

¹ 1989 figures

Source: Donald C. Rapich, "Trends in Material Use: Implications For Sustainable Development," unpublished paper, U.S. Bureau of Mines, Division of Mineral Commodities, April 1992.

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aluminum, its most common substitute. The estimated value of the steel sold each year is about five times the total for all other metals; and four of the nine metals immediately below iron on the production list—manganese, chromium, nickel, and molybdenum—are primarily used in steel-making.⁷

Aluminum is second to iron both in quantity and value of production. It is extremely important in aircraft construction because of its light weight, though in the United States, which leads all nations in aluminum consumption, the largest share of the metal is used to make beverage cans. Copper, the third-ranked metal in total tonnage, is primarily used as an electrical conductor. Zinc provides corrosion-resistant coatings for other metals; lead is used in electrical batteries and as an octane-boosting gasoline additive; and tin serves as a coating for steel cans.

The use of minerals is heavily concentrated in rich nations, and the disparities in use are most dramatic for metals. In 1990, the top eight industrial-nation users of aluminum, copper, and lead accounted for two-thirds of world consumption. Eight or fewer wealthy countries took over half the iron ore and three-fifths of zinc, tin, and steel supplies. A few decades earlier, these disparities were even greater; throughout the sixties, the industrial nations absorbed more than 80 percent of world steel production and at least 90 percent of other metals.⁸

Steady increases in demand fueled rapid expansion in minerals output until the seventies, when growth rates dropped substantially. From 1950 to 1974, use of eight economically important minerals grew between 2 and 9 percent each year, on average. By 1974-87, average growth rates for the same eight all fell under 2 percent. In the case of tin, use actually shrank.⁹

Five factors appear to underlie the slackening demand for minerals, and for metals in particular. Most involve basic changes in the economies of the chief users. First, industrial economies have grown more slowly since the oil crisis of 1973, so new construction has waned. Second, these economies are shifting away from heavy industry and toward services and high technology, so the amounts of physical materials needed are much smaller even when the economies do boom. The pharmaceutical

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their high-grade mineral reserves and now rely mostly on imports. Japan imports virtually all the minerals it uses. The United States is still an important producer of many minerals, but gets nearly all of its bauxite and alumina (the refined bauxite used by aluminum smelters), three fourths or more of its nickel, chromium, and tin, and about a third of its zinc from foreign sources.¹³

Despite a long history of mining, the republics of the former Soviet Union still produce large amounts of minerals. Australia and South Africa are major mineral sources, and the list of important producers also includes such developing nations as Brazil, Chile, China, and Zaire. (See Table 3.)

Each major industrial region looks to a corresponding part of the Third World for most of its mineral imports: the United States to Latin America, Western Europe to Africa, and Japan to Asia and Oceania. Mineral trade relationships also often reflect old colonial ties. For instance, Zaire supplies Belgium, its former ruler, with about two thirds of its imported copper, and Zambia supplies Britain with a third of its imports of the same metal.¹⁴

Mineral "reserves"—an often misunderstood concept—have been a subject of abiding interest for the world's great mineral-using nations. Reserves consist of deposits whose existence has been documented by detailed surveying and that are judged to be minable at a cost no higher than current market prices. At current use rates, global reserves of economically important minerals range from 20-30 years of supply (lead, tin, and zinc) to 200 years (bauxite). Although 20 years may seem alarmingly short, there is little danger of the world soon running out. Mineral resources—deposits whose presence is indicated by preliminary surveys or other geologic evidence but that are not yet economically viable—are far greater than reserves, and exploration constantly moves deposits from the resources to the reserves category. In recent decades, mineral reserves have generally grown at least as fast as production.¹⁵

Many of the best reserves now lie in developing countries, since industrial nations have a much longer history of mining. The Commonwealth of Independent States and the other former members of the Warsaw Pact

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United States now derives from scrap rather than fresh ore. Aluminum recycling is particularly widespread because its manufacture from scrap takes about one twentieth as much energy as its production from ore. Worldwide, nearly a third of the aluminum used each year is recycled.¹⁶

The fourth reason the demand for minerals, and especially for metals, has slackened is that new materials such as plastics, ceramics, and high-technology composites are now competing with metals—and are increasingly substituted for them—in many applications, from airplanes to construction. Glass fiber, for example, is supplanting copper in communications uses, and substitution of polyvinyl chloride pipes for copper ones effectively reduced yearly U.S. copper consumption by 13 percent in 1988.¹⁷

Fifth, and perhaps most important, the industrial nations have largely completed the building of their basic infrastructure of roads and buildings, and now need mineral products primarily to maintain or replace worn-out equipment and structures, not for massive new construction.

For all these reasons, minerals use is now growing faster in developing countries than in wealthier nations. Between 1977 and 1987, for example, the Third World's share of aluminum and copper use grew from 10 to 18 percent, and that of zinc from 16 to 24 percent. The increases are heavily concentrated in Mexico, Brazil, India, and the newly industrializing countries (NICs) of East Asia. Many products of traditional heavy industries, such as automobiles, are increasingly imported into industrialized nations from NICs—such as South Korea and Malaysia—so the mineral demand of those industries is partially shifting outside the major consumer nations.¹⁸

Production of minerals is more widely distributed through the world than consumption, although for some individual minerals there are exceptions. For instance, known deposits of cobalt, chromium, and the platinum-group metals are concentrated in a few countries, making supplies vulnerable to local political developments.¹⁹

Production is declining, however, in many of the countries that are major minerals users. West European countries, for instance, have depleted

Table 3. Major Mineral-Producing Countries, 1991

Mineral	Countries	Share in World Production (percent)		Mineral	Countries	Share in World Production (percent)	
		14	15			14	15
Bauxite	Australia	38		Nickel	Soviet Union/CIS	27	
	Guinea	16			Canada	21	
Chromium	South Africa	35		Phosphate Rock	United States	29	
	Soviet Union/CIS ¹	30			Soviet Union/CIS	23	
Cobalt	Zaire	50		Platinum Group	South Africa	48	
	Zambia	21			Soviet Union/CIS	44	
Copper	Chile	20		Potash	Soviet Union/CIS	32	
	United States	18			Canada	28	
Gold	South Africa	29		Silver	Mexico	15	
	United States	15			Peru	13	
Iron Ore	Soviet Union/CIS	24		Tin	China	19	
	Brazil	17			Brazil	15	
Lead	Australia	16		Tungsten	China	52	
	United States	14			Soviet Union/CIS	21	
Manganese	Soviet Union/CIS	38		Zinc	Canada	16	
	China	14			Australia	14	
Molybdenum	United States	54					
	Chile	13					

¹ Commonwealth of Independent States (successor to the Soviet Union in 1991)

Source: U.S. Bureau of Mines, *Mineral Commodity Summaries 1992* (Washington, D.C., 1992).

Table 4. Environmental Impacts of Selected Mineral Projects

Location/Mineral	Observation
Ilo-Ilocos area, Peru copper mining and smelting	The Ilo smelter emits 600,000 tons of sulfur compounds each year; nearly 40 million cubic meters per year of tailings containing copper, zinc, lead, aluminum, and traces of cyanides are dumped into the sea each year, affecting marine life in a 20,000-hectare area; nearly 800,000 tons of slag are also dumped each year.
Nauru, South Pacific phosphate mining	When mining is completed—in 5-15 years—four fifths of the 2,100-hectare South Pacific island will be uninhabitable.
Pará state, Brazil Carajás iron ore project	The project's wood requirements (for smelting of iron ore) will require the cutting of enough native wood to deforest 50,000 hectares of tropical forest each year during the mine's expected 250-year life.
Russia, Severonikel smelters	Two nickel smelters in the extreme northwest corner of the republic, near the Norwegian and Finnish borders, pump 300,000 tons of sulfur dioxide into the atmosphere each year, along with lesser amounts of heavy metals. Over 200,000 hectares of local forests are dying, and the emissions appear to be affecting the health of local residents.
Sabah Province, Malaysia Mamul Copper Mine	Local rivers are contaminated with high levels of chromium, copper, iron, lead, manganese, and nickel. Samples of local fish have been found unfit for human consumption, and rice grown in the area is contaminated.
Amazon Basin, Brazil gold mining	Hundreds of thousands of miners have flooded the area in search of gold, clogging rivers with sediment and releasing an estimated 100 tons of mercury into the ecosystem each year. Fish in some rivers contain high levels of mercury.

Source: Worldwatch Institute, based on sources documented in note 21.

also possess large reserves of many important minerals, including iron ore, manganese, chromium, and nickel, and their potential resources are enormous. However, economic and political turmoil in the former socialist countries makes them unlikely sites for new mineral projects, which usually require large capital investments and long lead times before production can begin.¹⁶

Overall, scarcity of mineral deposits does not appear likely to constrain the production of most important minerals in the foreseeable future. Much more probable, however, are reductions in output due to environmental concerns.

Laying Waste

Mining is the original dirty industry. As the German scholar Georgius Agricola put it in his 1550 treatise on mining, "The fields are devastated by mining operations... the woods and groves are cut down, for there is need of an endless amount of wood for timbers, machines, and the smelting of metals. And when the woods and groves are felled, then are exterminated the beasts and birds.... Further, when the ores are washed, the water which has been used poisons the brooks and streams, and either destroys the fish or drives them away."¹⁷

Four centuries later, mining's environmental effects remain much the same, but on a vastly greater scale. Modern machinery can do in hours what it took men and draft animals years to do in Agricola's time. Larger equipment reflects the growing scale of the industry. A typical truck used in hard-rock mining in 1960 weighed 20-40 tons, for example; in 1970 it weighed in at 80-200 tons. The size of the shovels used to move ore increased from 2 to 18 cubic meters over the same period. Such technological advances allowed world mineral production to grow rapidly—and proportionately increased the harm to the environment.¹⁸

Mining and smelting have created large environmental disaster areas in many nations. (See Table 4.) In the United States, which has a long history of mining, at least 48 of the 1,189 sites on the Superfund hazardous-waste cleanup list are former mineral operations. The largest Superfund site stretches across the state of Montana, along a 220-kilometer stretch of

Table 5. Environmental Impacts of Minerals Extraction

Activity	Potential Impacts
Excavation and Ore Removal	<ul style="list-style-type: none"> • Destruction of plant and animal habitat, human settlements, and other surface features (surface mining) • Land subsidence (underground mining) • Increased erosion; silting of lakes and streams • Waste generation (overburden) • Acid drainage (if ore or overburden contain sulfur compounds) and metal contamination of lakes, streams and groundwater
Ore Concentration	<ul style="list-style-type: none"> • Waste generation (tailings) • Organic chemical contamination (tailings often contain residues of chemicals used in concentrators) • Acid drainage (if ore contains sulfur compounds) and metal contamination of lakes, streams, and groundwater
Smelting/Refining	<ul style="list-style-type: none"> • Air pollution (substances emitted can include sulfur dioxide, arsenic, lead, indium and other toxic substances) • Waste generation (slag) • Impacts of producing energy (most of the energy used in extracting minerals goes into smelting and refining)

Source: Worldwatch, compiled from various sources.

Most of today's mines are surface excavations rather than underground complexes of tunnels and shafts, so the miner's first task is to remove whatever lies over a mineral deposit—be it a mountain, a forest, a farmer's field, or a town. For any given mineral, surface mining pro-

Silver Bow Creek and the Clark Fork River. Water and sediments in the river and a downstream reservoir are contaminated with arsenic, lead, zinc, cadmium, and other metals, which have also spread to nearby drinking-water aquifers. Soils throughout the local valley are contaminated with smaller emissions.¹⁷

The Clark Fork Basin was the site of more than 100 years of mining and smelting, including what was at one time the largest open pit in the world, the Berkeley Pit copper mine. The pit and a network of underground mine workings contain more than 40 billion liters of acid mine water that rises a little higher each year, threatening local aquifers and already-tainted streams with contamination. The Clark Fork Coalition, a local environmental group, estimates that cleaning up the pit and other sites in the area could cost over \$1 billion. A proposed large new copper mine in the Cabinet Mountains area of northwest Montana now endangers another section of the Clark Fork's drainage.¹⁸

The environmental damage done in producing a particular mineral is determined by such factors as the ecological character of the mining site, the quantity of material moved, the depth of the deposit, the chemical composition of the ore and the surrounding rocks and soils, and the nature of the processes used to extract purified minerals from ore. (See Table 5.) Damage varies dramatically with the type of mineral being mined. For example, stone ranks first in production, but its extraction probably causes less overall harm than that of several metals. Since stone and other construction materials are usually taken from shallow or naturally exposed deposits and used with little or no processing, the environmental impacts are mostly limited to land disturbance at the quarry or gravel pit, and relatively few wastes are generated.

At the other end of the damage spectrum, metals are produced through a long chain of processes, each of which involves pollution and the generation of waste. Copper production, for instance, typically involves five stages. First, soil and rock (called overburden) that lie above the ore must be removed. The ore is then mined, after which it is crushed and run through a concentrator, which physically removes impurities. The concentrated ore is reduced to crude metal at high temperatures in a smelter, and the metal is later purified, through remelting, in a refinery.

"Up to 90 percent of metal ore ends up as tailings, which are commonly dumped in large piles or ponds."

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quantities of air pollutants. Worldwide, smelting of copper and other nonferrous (non-iron) metals releases an estimated 6 million tons of sulfur dioxide into the atmosphere each year—8 percent of total emissions of the sulfur compound that is a primary cause of acid rain. Nonferrous smelters can also pump out large quantities of arsenic, lead, cadmium, and other heavy metals. If they lack pollution control equipment, aluminum smelters emit tons of fluoride, which can concentrate in vegetation and kill not only the plants but, in some cases, animals that eat them.³⁸

Uncontrolled smelters have produced some of the world's best-known environmental disaster areas—"dead zones" where little or no vegetation survives. Such an area around the Sudbury, Ontario, nickel smelter in Canada measures 10,400 hectares; acid fallout from the smelter has destroyed fish populations in lakes 65 kilometers away. Between 1896 and 1936, a smelter at Trail, British Columbia killed virtually all conifers within 19 kilometers and retarded tree growth up to 63 kilometers away. In the United States, a dead zone surrounding the Copper Hill smelter in Tennessee covers 7,000 hectares. In the United Kingdom, 400,000 hectares of agricultural land have been lost to metal smelting since Roman times; and in Japan, about 6,700 hectares of cropland are too contaminated for rice production.³⁹

New dead zones, such as the area surrounding the Severonikel nickel smelter in Russia, are still being created. Smelters in industrial countries are now often required by law to have pollution control equipment, but few in developing countries or the formerly socialist nations have any such controls. For each kilogram of copper produced, 12.5 times more sulfur dioxide is released to the air from Chilean smelters than from those in the United States.⁴⁰

The grade of an ore—its metal content in percentage terms—is a critical factor in determining the overall impact of metal mining. The average grade of copper ores, for example, is lower than that for any of the other major metals. Four centuries ago, copper ores typically contained about 8 percent metal; the average grade of ore mined now is under 1 percent. One consequence of the drop in grade is that more than eight times as much ore now must be processed to obtain the same amount of copper.

duces more waste than working underground. In 1989, U.S. surface mines produced 8 times as much waste per ton of ore as underground mines did. That same year, overburden accounted for more than a third of the 3.4 billion tons of material handled at non-fuel mines. Such material, while it may be chemically inert, can clog streams and cloud the air over large areas. If the overburden contains sulfur compounds—common in rock containing metal ores—it can react with rainwater to form sulfuric acid, which then may contaminate local soils and watercourses.⁴¹

Similar but more severe effects often stem from extraction of the ore itself and from the disposal of tailings, the residue from ore concentration. Up to 90 percent of metal ore ends up as tailings, which are commonly dumped in large piles or ponds near the mine. The finely ground material makes contaminants that were formerly bound up in solid rock (such as arsenic, cadmium, copper, lead, and zinc) accessible to water. Acid drainage, which exacerbates metal contamination, is often a problem, since sulfur makes up more than a third of the commonly mined ores of many metals, including copper, gold, lead, mercury, nickel, and zinc. Tailings also usually contain residues of organic chemicals—such as toluene, a solvent damaging to human skin and to the respiratory, circulatory, and nervous systems—that are used in ore concentrators. Ponds full of tailings cover at least 3,500 hectares in the Clark Fork area and 2,100 hectares at the Bingham Canyon copper mine in Utah.⁴²

A particularly dramatic example of the impact of tailings disposal is the Panguna copper mine on Bougainville, an island in Papua New Guinea that since mid-1989 has been controlled by secessionist rebels. Before it was closed, the mining operation dumped 600 million tons of metal-contaminated tailings—130,000 tons each day—into the Kawerong River. The wastes cover 1,800 hectares in the Kawerong/Jaba river system, including a 700-hectare delta at its mouth, 30 kilometers from the mine. Environmental writer Don Hinrichsen described the Jaba River as "so full of sediments from the Bougainville Copper Mine that its slate-grey waters are completely dead.... Wading into the river to take samples is like inching through moving mud." Local anger at the destruction of the area by mining was a major cause of the civil war.⁴³

Smelting, the next stage of the extraction process, can produce enormous

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Another distinction in 1987 when its operator, Kennecott Copper, inadvertently reported its toxic chemical releases to the Environmental Protection Agency's Toxic Release Inventory (a national toxic-chemicals reporting system from which the mining industry is exempt). Out of the 18,000 industrial facilities reporting, the Bingham Canyon mine ranked fourth in total toxic releases and first in metals. The company discontinued reporting the following year, but the scale of its releases spurred legislative efforts in 1991 and 1992 to include the mining industry in the inventory in the future.²³

Gold mining also requires the processing of large amounts of material, since the metal occurs in concentrations best measured in parts per million. An estimated 620 million tons of waste are produced in gold mining each year—even more than is produced in iron mining, which yields 26,000 times as much metal by weight. The operators of the Goldstrike mine in Nevada—the largest in the United States—each day move 325,000 tons of ore and waste to produce under 50 kilograms of gold. In Brazil's Amazon Basin, thousands of small-scale gold miners are using a technique called hydraulic mining to extract as much as 120 tons of gold per year. This involves blasting gold-bearing hillside with high-pressure streams of water, and then guiding the water and sediment through sluices that separate tiny amounts of gold, which is heavier, from tons of non-valuable material, which then pollutes local rivers. The technique is so environmentally destructive that its use was halted over 100 years ago in California, where it did widespread damage during the state's legendary gold rush.²⁴

Since 1979, when the price of gold soared to an all-time high of \$850 per ounce, a gold rush has swept the world. Waves of gold seekers have invaded remote areas in Brazil, other Amazonian countries, Indonesia, the Philippines, and Zimbabwe. Dramatic environmental damage has resulted. Hydraulic mining has silted rivers and lakes, and the use of mercury—an extremely toxic metal that accumulates in the food chain and causes neurological problems and birth defects—to capture gold from sediment has contaminated wide areas. Miners release an estimated 100 tons of mercury into the Amazon ecosystem each year. An estimated 32 tons are released each year in the watershed of the Madeira River (a major Amazon tributary) alone. Mercury levels in most carni-

vation districts in 1991.²⁵ (See Table 6.)

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Even this figure understates the total amount of material moved, since it does not include overburden. The scale of the industry is apparent, however, in the size of the holes it creates. Some 3.3 billion tons of material—seven times the amount moved for the Panama Canal—have been taken from Utah's Bingham Canyon copper mine. Now 774 meters deep, this mine is the largest human excavation in the world. It gained

Table 6. Estimated Ore Production, Average Grade, and Waste Generation, Major Minerals, 1991

Mineral	Ore (million tons)	Average Grade (percent)	Waste (million tons)
Copper	1,000	0.91	990
Gold	620	0.00033	620
Iron	906	40.0	540
Phosphate	160	9.3	140
Potash	160	17.0	130
Lead	135	2.5	130
Aluminum/Bauxite	109	23.0	84
Nickel	38	2.5	37
Tin	21	1.0	21
Manganese	22	30.0	16
Tungsten	15	0.25	15
Chromium/Chromite	13	30.0	9
Total	3,200		2,700

Waste figures do not include overburden. Totals do not add due to rounding.

Sources: Worldwatch Institute, based on production estimates in U.S. Bureau of Mines, *Mineral Commodity Summaries 1992* (Washington, D.C., 1992), and grade estimates in U.S. Bureau of Mines, *Mineral Resources and Reserves: Trends in Mineral Use: Implications for Sustainable Development*, unpublished paper, Division of Mineral Commodities, U.S. Bureau of Mines, April 1992.

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"An estimated 24 billion tons of non-fuel minerals are taken from the earth each year, of which about 2.7 billion are waste."

age to local ecosystems. Ever since Agricola's time, for example, wood-fired smelters have threatened nearby forests. In southern England, the Sussex iron industry was effectively wiped out when it destroyed the local woods that provided its fuel supply. In the late nineteenth century, more than 2 million cords of wood were used as smelter fuel in Nevada's Comstock Lode—described by one observer as "the tomb of the forests of the Sierras."⁵⁶

Today, demand for energy to extract and process minerals is playing a major role in the deforestation and inundation of large parts of the Amazon Basin. A huge iron ore mining and smelting project at Carajás, in the Brazilian state of Pará, threatens a large area of tropical forest. The project's 20 planned pig-iron smelters will need an estimated 2.4 million tons of charcoal each year, which if produced from native trees will require an estimated 50,000 hectares of forest to be logged annually. According to ecologist Philip Fearnside, high costs make it unlikely that plantations will supply much of the wood, and the state enterprise that owns the project has thus far done little to develop plantation production. The mine is expected to operate for 250 years.⁵⁷

The iron ore facilities are only one piece of Brazil's colossal Grande Carajás Project, a vast state-run development scheme that also includes bauxite, copper, chromium, nickel, tungsten, tin, and gold mines; mineral processing plants; hydroelectric dams; deep-water ports; and other enterprises. Aluminum smelters, including the 330,000-ton-per-year Albrás plant (another element of the Carajás project) now take most of the electricity output of the enormous—and enormously destructive—Tucuruí hydroelectric station. Albrás, a major justification for the dam's construction, receives power at one fourth the cost of generation (and one third the average cost of Brazilian electricity). Aluminum smelting took 12 percent of Brazilian electricity in 1988, and the industry's power requirements more than doubled between 1982 and 1988.⁵⁸

Aluminum production is particularly energy-intensive. Unlike most other metals, which can be obtained by simply heating the ore, aluminum forms such tight chemical bonds that it can only be economically extracted through a process involving the direct application of electrical

orous and some omnivorous fish in the Madeira exceed the maximum safe levels for human consumption set by many nations.⁴

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In North America, heap leaching, a new technology that allows gold extraction from very low-grade ores, is now in wide use. Miners spray cyanide solution, which dissolves gold, on piles of crushed ore or old tailings. After repeated circulation through the ore, the liquid is collected and gold is extracted from it. Both cyanide-solution collection reservoirs and the contaminated tailings left behind after leaching pose hazards to wildlife and groundwater. In October 1980, for instance, 38 million liters of cyanide solution spilled from a reservoir at the Brewer Gold Mine, near Jefferson, South Carolina, into a tributary of the Lynchies River. The spill, caused by a dam break after a heavy rain, killed as many as 10,000 fish. Thousands of birds also die each year when they mistake cyanide impoundments for lakes.⁵

Fossil-fuel-powered machinery has allowed mining to expand to such a degree that its effects now rival the natural processes of erosion. An estimated 24 billion tons of non-fuel minerals are taken from the earth each year, of which about 2.7 billion tons are waste (not including overburden). Taking overburden into account, the total amount of material moved is probably at least 28 billion tons—about 1.7 times the estimated amount of sediment carried each year by the world's rivers.⁶

An estimated half-million hectares of land—including mines, waste disposal sites, and areas of subsidence over underground mines—are directly disturbed by non-fuel mining each year. Most of this land will bear the scars indefinitely. Historian Elizabeth Dore, describing the effects of 500 years of mining on the Bolivian landscape, writes: "Silver and tin are gone; in their place rise mountains of rock, slag, and tailings.... Saturated with mercury, arsenic, and sulfuric acid, the iridescence of these rubbish heaps provides a psychedelic reminder of the past." The damage is not limited to the mine site. As Dore puts it, mining initiates "a chain of soil, water, and air contamination" that can alter the ecosystems of large areas.⁷

Moving billions of tons of material and crushing and melting rock requires large amounts of energy, and supplying it can cause major dam-

The rush to produce more minerals has had devastating consequences for those whose homelands lie over mineral deposits.

whose homelands lie over mineral deposits. Developers and funders of large mining projects have rarely considered the future of local people during project planning—or when deciding whether to proceed with a project in the first place. The Panguna copper mine in Papua New Guinea, where massive local environmental damage led to a civil war, is a particularly dramatic example. Local people received little compensation for the confiscation or destruction of their land. But the mine was a huge source of income for the national government; before the rebels succeeded in closing it in 1989, it was yielding 17 percent of the country's operating revenue and 40 percent of its export income.²⁷

Indigenous people, in particular, are often simply pushed aside in the rush to mine valuable deposits. In the Amazon, for example, the Yanomami, an interior tribe who avoided contact with the outside world until recent decades, are only the most recent case of a people decimated for the rocks beneath their feet. Thousands of miners crowded their homeland in the northern Brazilian states of Roraima and Amazonas during the eighties, polluting local rivers with sediment and mercury and bringing unfamiliar diseases to the indigenous population. It is estimated that at least 15 percent of the Yanomami have died from malaria.²⁸

The Brazilian government was for many years unwilling to do anything substantial to save the Yanomami, and local and state officials have long been active supporters of the area's mining operations. As the then-governor of Roraima put it in 1975, "an area as rich as this cannot afford the luxury of conserving half a dozen Indian tribes who are holding back the development of Brazil." Fortunately, in 1990 and 1991, under heavy pressure from human rights organizations and other governments, President Fernando Collor de Mello sent in federal police to expel miners from Yanomami lands, and late in 1991, he signed an executive decree establishing a 9 million hectare reserve (in which mining was to be banned) for the tribe.²⁹

At What Cost?

While mineral prices have fluctuated dramatically, the overriding trend in recent decades has been downward, with most of the plunge occurring during the dozen years following the 1973 oil crisis. After adjusting

current. Modern aluminum smelters require 13-18 kilowatt-hours of electricity to produce a kilogram of metal. The world aluminum industry uses an estimated 290 billion kilowatt-hours of electricity each year—more than is used for all purposes on the entire African continent. Additional energy is used in mining bauxite, and in processing it into the alumina that is smelted. All told, aluminum production requires an estimated 3.8 billion gigajoules (GJ) of energy each year—around 1 percent of world energy use. Much of it is purchased at unusually low rates—subsidized by governments at heavy human and environmental expense.³⁰

Though figures are sparse, the mineral industry as a whole is clearly among the world's largest users of energy and thus a major contributor to the impacts of energy use, including climate change. While aluminum is the most energy-intensive of the metals, steel and copper are also large energy-users. Steelmaking, in fact—because of its sheer volume—is probably the largest energy user of all mineral industries in the United States, which produces only 10 percent of the world's supply; steelmaking required 2.2 billion GJ in 1988. Worldwide, copper production takes about 1 GJ. All told, the minerals industry probably accounts for 5 to 10 percent of world energy use.³¹

The efficiency of energy use in smelting and refining metals has improved over time. Today's U.S. aluminum smelters, for example, use between half and two thirds as much electricity as those built in the late forties. Some new copper smelting technologies use only about 60 percent as much energy as traditional methods. But while smelting has improved, long-term trends in ore grades and accessibility of deposits tend to increase the energy used per unit of metal mined. Declining ore grades increase energy needs, because more ore must be mined, greater quantities of waste material must be handled, and more effort is required to concentrate and smelt the ore. And as more remote, deeper deposits are mined to replace those more easily reached, more energy is required in order to dig bigger holes and transport the ore longer distances.³²

Another, often forgotten side of the mining industry is its effects on local people and their environment. The rush to produce more minerals and gain export revenue—especially in countries which have few other major sources of income—has had devastating consequences for those

for inflation, the International Monetary Fund (IMF) index of nonfuel mineral prices declined by half between 1974 and 1986. (See Figure 7-1.) Real prices recovered somewhat in the late eighties, but have never returned to the levels of the fifties, sixties, and early seventies. They were again in decline in 1990, 1991, and early 1992.

Why are mineral prices so low? One reason is that many nations subsidize development of their domestic mineral resources. Since the twenties, for example, the United States has offered mining companies generous tax exemptions or "depletion allowances." Miners can deduct from 3 to 22 percent of their gross income, depending on the mineral. Unlike conventional depreciation, depletion allowances are not based on capital investments made by the company. In fact, the allowances may be taken for as long as the mine operates—even after the company's

investment is fully recovered. In addition, mining companies may also deduct much of the cost of exploring for and developing mineral deposits.⁶

The lost taxes added up to a \$5 billion subsidy to the U.S. mining industry over the last decade. The President's budget projects that the 1992 subsidy will be \$560 million. According to the Joint Committee on Taxation of the U.S. Congress, the Treasury could gain \$2 billion over the next five years if the mineral industry were taxed on the same basis as others.⁷

The U.S. mining industry receives another large but uncalculated subsidy through virtual giveaways of federal land under the General Mining Act of 1872. This legal relic of the frontier era allows those who find hard-rock minerals (such as gold, silver, lead, iron, and copper) in public territory to buy the land for \$12 per hectare or less. Since the government retains no rights to the land, the Treasury does not receive royalties on minerals taken from it, as it does from oil, gas, and coal found on public land. Even very low royalty levels would yield large sums, since miners took \$4 billion worth of hard-rock minerals from former federal lands in 1988.⁸

Japan offers loans, subsidies, and tax incentives for exploration and development of domestic mineral deposits. Similarly, the French government offers financial assistance for minerals exploration, and also makes direct investments in mineral projects through the Bureau de Recherches Géologiques et Minières (BRGM), a state-owned enterprise. Germany is considerably less generous, but does offer direct support for exploration. Most industrial nations must now look abroad for new mineral supplies, however. Japan's domestic mineral resources are, by the geological luck of the draw, quite limited. Western Europe was once quite rich in minerals, but demand during two centuries of industrial development has depleted most major deposits.⁹

Industrial nations have thus also tried to ensure continued access to cheap minerals supplies through their international trade and aid policies. The Japanese government subsidizes foreign mineral projects of Japanese companies through low-interest loans, loan guarantees, and

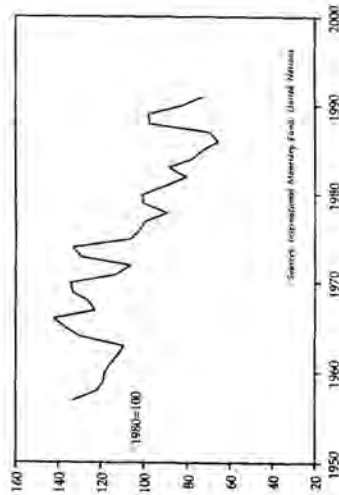


Figure 1. Index of real non-fuel mineral prices, 1957-91

"Many developing nations seem to have been dragged down economically by their dependence on revenue from mineral exports."

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if it knows it at all, as a mining country.... [It] is a member of a small group of African and Latin American countries for whom mining is the cornerstone of their economies; no other country of this group... has been so dependent on mining over such a long period as has Bolivia. But... great mining wealth has brought only poverty to the average Bolivian; in no other country in South America is the standard of living so low." Bolivia is not alone. Indeed, many developing nations seem to have been dragged down economically by their dependence on revenue from mineral exports.³¹

At least fourteen developing countries get a third or more of their export revenues from minerals. (See Table 7.) For these nations, the effect of nearly two decades of falling prices has been less foreign exchange with which to purchase the manufactured goods—from tractors to televisions to pharmaceuticals—they import. Reduced foreign exchange earnings have also made it difficult or impossible for many minerals producers to repay their international debts. They are among the world's most indebted nations. On average, the developing countries listed in the table bear external debts 1.4 times greater than their gross national product (GNP). By comparison, the average ratio of debt to GNP among the nations the World Bank classifies as severely indebted is 0.6.³²

Zambia provides a dramatic example of what can happen when a nation gets trapped between heavy debt and falling prices for its main export. The country went into an economic tailspin when the price of copper, which provides 86 percent of its export revenue, dropped sharply in the early eighties. The results were calamitous: twice as many Zambian children died from malnutrition in 1984 as in 1980. A series of IMF-prescribed recovery plans—which cut domestic spending and devalued the national currency in an attempt to boost mineral exports and reduce the external debt—have failed to rescue Zambia from its economic slide. As of 1989, Zambia's debt was 1.4 times as great as its GNP.³³

The current plight of Third World minerals exporters is the product of a collision between economic development strategies and unforeseen trends in the mining industry and minerals use. Unfortunately, the projected positive trends in minerals demand and prices that were the four-

direct government investments. The BRGM helps French companies with funding for exploration and development of overseas projects. Germany offers investment guarantees, minimum rate-of-return guarantees, and favorable loans for foreign mineral investments by its companies. These nations have often joined the United States in supporting efforts by development institutions, including the World Bank, to finance mineral projects in developing countries—at times with the explicit intention of securing future minerals sources.³⁴

Historically, nations have justified subsidies for minerals extraction on national security grounds. Minerals are critical to arms production, and supplies have often been equated with military power. Progress in the arms race between the United Kingdom and Germany prior to World War I was measured in steel production. The aluminum industry would not be what it is today were it not for the many forms of special support—especially cheap electric power—given by national governments that during World War I came to understand the metal's importance in modern warfare. The role of aluminum in World War II was summed up by a U.S. analyst in 1942 with the following equation: "Electric power → aluminum → bombers → victory."³⁵

Today, powerful political and economic interests support continued subsidies for domestic mineral production. While the mining industry and manufacturers who purchase mineral products benefit from this practice, taxpayers end up with the bill—and markets are skewed toward use of virgin rather than recycled materials. One analyst estimated in 1977 that U.S. tax subsidies for virgin materials—including wood products as well as minerals—made such items about 10 percent cheaper than they would be otherwise. The actual impact of subsidies on virgin materials prices is probably much greater, since other, unquantified subsidies were not taken into account.³⁶

Given the growing dependence of rich nations on foreign mineral supplies and their willingness to assist with the development of these resources, developing nations would seem well positioned to benefit from their mineral wealth. But the people of most mineral-exporting developing countries have gained little from mining. Take the case of Bolivia, as described by writer David J. Fox: "The world knows Bolivia,

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slumps in the major consumer nations, and anticipated economic upturns with investments in new capacity. The power of private firms made it very difficult for Third World governments to impose substantial local taxation or royalty requirements on foreign-owned mineral firms. If they did, the mining companies—which often owned not only mines but also smelting and refining facilities—could keep local tax bills to a minimum by selling their ores to their own processing subsidiaries at low prices, a practice known as transfer pricing.⁶

But in the tide of nationalism of the sixties and seventies, many governments—including newly independent nations and some long-independent ones just learning to flex their muscles—tried to increase their share of the profits from mining through higher taxes, new royalty requirements, and measures against transfer pricing. Some of them, including Bolivia, Chile, Guinea, Guyana, and Zaire, imposed minimum local ownership requirements or nationalized foreign-owned mines. Inspired by the example of the Organization of Petroleum-Exporting Countries, producers of some commodities, including bauxite, copper, and iron ore, banded together in attempts to increase prices.⁷

At the same time, the World Bank and other international development institutions promoted an economic strategy that emphasized the use of mining revenue as working capital for industrialization and overall economic growth. Optimistic mineral price projections fueled a rush of investment in mining projects. An increasing number were undertaken by state-owned enterprises rather than private firms, so national governments ended up bearing the debt. Although World Bank investments in mineral projects were not exceptionally large compared with other economic sectors, its contributions leveraged considerable funding from other sources. For example, the bank contributed only \$60 million of the \$501 million required for the Cuellos Iron Ore Project in Mauritania, with the balance coming from European, Arab, and Japanese institutions. Private banks, a wash in billions of dollars amassed by the newly wealthy oil-exporting countries, also plowed newfound capital into mineral projects.⁸

Minerals projects are expensive. They are also often connected more closely to the outside world than to the host country. For instance, the

Table 7. Share of Minerals in Value of Total Exports, Selected Countries, Recent Years^a

Country	Mineral(s) ^b	Share (percent)
Bolivia	diamonds, copper, nickel	87
Zambia	copper	86
Zaire	copper, diamonds	71
Suriname	bauxite/alumina, aluminum	69
Papua New Guinea	copper	62
Liberia	iron ore, diamonds	60
Jamaica	bauxite/alumina	58
Togo	phosphates	50
Central African Republic	diamonds	46
Mauritania	iron ore	41
Chile	copper, zinc, iron ore,	39
Peru	lead, silver	
Bolivia	zinc, tin, silver, antimony,	35
	tungsten	
Dominican Republic	ferromanganese	33
Guyana	bauxite	31
South Africa	gold	29

^aFigures are for most recent year available; most are 1990 or 1991.

^bMinerals are listed in order of total export value.

Source: International Monetary Fund, *International Financial Statistics*, May 1992.

dation of the economic plans of many exporters during the sixties and seventies have vanished in the last decade.

Throughout the fifties, privately owned companies essentially controlled—through loose oligopolies—the prices of most major minerals, owned most major projects, and garnered the bulk of the profits. Although cyclical swings were not eliminated, prices were maintained at profitable levels by the combination of steadily increasing demand and industry control. Companies cut production during economic

"From 1980 to 1985, the IMF index of non-fuel mineral prices fell nearly 30 percent."

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 Guelbs project—which consists of an iron mine and ure concentrator, a port, and a railroad to connect them—has virtually no links with the rest of Mauritania's economy, which it dwarfs. When financing was arranged in 1979, the investment required for the first phase of the project topped the nation's gross domestic product, which then stood at \$470 million.³⁴

As long as future demand appeared strong, however, and prices remained fairly high, such projects seemed viable. Mineral export revenues grew during the seventies. But in the early eighties, the bubble burst. Softening minerals demand collided with rapid production expansion to create an unprecedented, sustained drop in mineral prices. From 1980 to 1985, the IMF index of non-fuel mineral prices fell nearly 30 percent. The decline was exacerbated by the tendency of nationalized mines to continue producing in large quantities despite falling prices. While private producers cut back their output, some nations, such as Zaire, Peru, and Zambia, had become too dependent on mineral revenue to reduce production; a few, such as Chile, even expanded production in an attempt to make up for lost revenues, and prices were driven even lower. Chilean copper output grew by nearly 30 percent between 1981 and 1985, while the price of the metal plunged by more than 20 percent.³⁵

The overall result of these developments was a dramatic transformation of the world mineral industry—from a relatively stable, lucrative oligopoly to an unpredictable, intensely competitive business. This change undermined overnight the development strategy followed by many Third World minerals producers. No longer, as the authors of a 1990 study put it, can mineral resources "be regarded as buried treasure." In other words, if mineral projects are hard pressed to pay for themselves, they cannot be expected to provide much help in economic development beyond the mine.³⁶

The traditional response to this dilemma, followed by the United States and other industrialized nations with long mining histories, is to move into mineral processing and fabrication, which add more value to minerals than earlier stages of production. Unfortunately, developing countries have found it difficult to do so. Trade barriers (tariffs are generally higher on refined or fabricated metals than on ores or concen-

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 trates), the reluctance of many private firms to assist in activities that may affect the markets for their own products, and other factors have kept Third World mineral producers from moving heavily into the higher-value steps of the production process.³⁵

It may be time, instead, for developing countries to turn—as a growing grassroots development movement now suggests—to an alternative economic strategy, focused less on generation of export revenue and more on activities that directly reduce poverty and its human costs. These include promotion of grassroots, rural development and local agricultural production, education, health care, and other basic human needs. The outlines of such an approach are still vague, but it is clear that, for many Third World countries, and particularly those in Africa and Latin America, the current strategy of export-led development has failed.

Cleaning Up

Since the time of Agricola, the destruction from mineral production has been justified in the name of human progress. The sixteenth century scholar was quite conscious of mining's effects on the environment, yet argued that, without metals, "men would pass a horrible and wretched existence in the midst of wild beasts." In an absolute sense, Agricola was right: civilizations have always depended heavily on minerals for survival—and still do.³⁶

But as Lewis Mumford put it in his classic *Technics and Civilization*, "One must admit the devastation of mining, even if one is prepared to justify the end....What was only an incidental and local damage in [Agricola's] time became a widespread characteristic of Western Civilization just as soon as it started in the eighteenth century to rest directly upon the mine and its products." Mining's effects on the earth, far from being merely local as often depicted, are now on the same scale as such hugely destructive natural forces as erosion.³⁷

Cleaning up the mineral industry and its legacies will not be easy. Perhaps the hardest task will be to clean up abandoned mineral projects, because doing so often requires moving, treating, and containing

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assistance, it is unlikely that many developing countries will be able to afford cleanups of their old mineral sites, which in most cases were developed for export to richer nations.

New technologies may help reduce the costs of cleanup. The high metal content of some tailings—which can pose the threat of contamination—can be turned to advantage in mine cleanups if methods are available for extracting the remaining metals. Thus, reprocessing old tailings can sometimes not only help reduce environmental hazards at a site, but also yield a salable product to help pay for cleanup.

Such methods are not only useful at abandoned sites, but also may help in reducing pollution at operating mines. Biological leaching—in which bacteria are used to extract metal from ore—is a promising new method.

At the Los Bronces copper mine in Chile, a biological extraction project now being put into place is designed to avoid pollution in the Mantano River, the source of Santiago's drinking water, by extracting copper from water repeatedly circulated through waste, overburden, and marginal ore dumps. The project's designers believe it will eventually recover more than a half-million tons of pure copper. An even more ambitious project at La Escondida, another giant Chilean copper mine, will recover pure metal from ore without smelting. Instead, copper will be extracted from concentrates by an ammonia solution, and then precipitated by electrolysis. In addition to avoiding the pollution and expense of a smelter, the project will have the advantage of producing pure copper rather than less-valuable concentrates.⁵⁷

A variety of other practices can help reduce environmental impacts at every stage of the mineral extraction process. While destruction of surface features—be they forests or villages—is usually inevitable with surface mining, a variety of techniques can help cut down air, water, and soil pollution, and sometimes can return mined land to stable (if not its original) condition. In the initial excavation and mining process, careful storage of topsoil can ensure its availability for reclamation after mining is finished. If soil and rock are stored in well-designed impoundments, runoff and sedimentation problems can be kept to a minimum. Similarly, more careful storage and disposal of tailings can minimize the opportunity for them to contaminate their surroundings. Air pollution

extraordinarily large amounts of material spread over large areas. For example, about 7 million tons of tailings are present at the Eagle Mine Superfund site in Gilman, Colorado, and more than 200 million cubic meters of materials are stored in the 3,500 hectares of tailings ponds in the Clark Fork area of Montana. The latter contain an estimated 200 tons apiece of cadmium and silver, 9,000 tons of arsenic, 20,000 tons of lead, 90,000 tons of copper, and 50,000 tons of zinc.⁵⁸

The consequences of not cleaning up such abandoned operations can be severe and long-lasting. The very reason these sites will be difficult to clean up is the most compelling reason to do so, since such huge volumes of material can cause abandoned mines to continue paying negative dividends—in such forms as sediment-choked streams, acid drainage, and metal contamination—for centuries.⁵⁹

Aside from technical challenges, however, the chief problem in cleaning up old mines is that the mine operators are gone—and with them, the money for cleanup. Hence, governments often end up with the bill, which can be huge. The price tag for the Clark Fork cleanup, for example, is estimated to be \$1 billion. Furthermore, the number of sites to be evaluated for cleanup is quite large: EPA estimates that between 800 and 1,500 mining sites need assessment, and that 70-100 will require remedial action. Nations with similar mining histories are likely to have similar cleanup needs.

The United States has chosen to fund mine cleanups through its Superfund program, which covers all types of abandoned industrial facilities. The program is primarily funded by a tax on chemical feedstocks. Progress on mineral sites has been sluggish, however. The special scale and characteristics of such sites may merit establishment of a separate program for former mineral facilities. One possible approach would be to fund mine cleanups through taxes on virgin mineral consumption. A similar program already exists for abandoned coal mines.⁶⁰

Such taxes would serve another purpose as well, since they would also help create incentives for more efficient use of minerals, reducing the need for new mines. Some of these funds could be directed to Third World countries for cleanup of their abandoned mines. Without outside

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controls can substantially reduce emissions from smelters. Advanced methods—especially biological techniques—for extracting metals from ore could also offer substantial energy savings if they replace thermal (smelting) or mechanical methods.

Such careful attention by mine operators to minimizing environmental damage is unlikely, however, unless governments have the resources—and political will—to require it. While the mineral sector is currently subject to a broad range of environmental rules in most industrial and some developing countries, legal loopholes, lack of government funds, and weak enforcement are still allowing the creation of new environmental disaster areas.

For example, in the United States, which is widely regarded as a leader in such regulation, smelter emissions are regulated under the Clean Air Act and mining-caused water pollution under the Clean Water Act. Unfortunately, federal regulation of mining wastes, despite their status as the single largest category of waste produced. In the 1980 Bevil Amendment to the Resource Conservation and Recovery Act of 1976, Congress exempted most mining wastes from regulation as hazardous waste, pending an EPA determination of their status. EPA has since decided to retain the exemption for most types of mineral industry waste, though final rules are still in process. In general, however, the states play a more important role in mining regulation, and the level of attention and enforcement varies dramatically.³⁸

Nonetheless, industrial nations have available to them the funding and government personnel to put in place and more effectively enforce environmental laws for mineral producers—if the political will exists to do so. In the United States—by far the largest mineral producer among the industrial market nations—lawmakers now have a chance to strengthen environmental provisions in several laws affecting the impacts of mining, including the Resource Conservation and Recovery Act, the Clean Water Act, and the General Mining Act. Amendments to the Emergency Planning and Community Right-to-Know Act now pending would require the mining industry to report its toxic emissions to state and federal regulators.³⁹

For developing countries, the challenge is much greater. While many of them have broad environmental protection laws, specific regulation of the minerals industries is rare. Where environmental laws do exist, funding and staff for enforcement are usually scarce. Chile, for example, has comprehensive and stringent environmental rules for mining, but they are virtually unenforced. The Chilean government has been particularly loath to force state-owned mineral operations to comply with the laws. Other countries with large state mining companies face similar conflicts of national interest between state mining companies and regulators, with local people and the environment most often the losers.⁴⁰

At times, the prospect of major revenue from projects leads government officials to simply ignore environmental rules or studies. At the Ok Tedi copper and gold mine in Papua New Guinea, the government allowed the project's operators—an international consortium of private firms—to dump up to 150,000 tons of tailings a day into the nearby Fly River rather than contain them at the mine site, despite studies showing the potential for major damage to the river system.⁴¹

The pressure to neglect environmental concerns in favor of continued mineral output will continue to be strong unless broad changes occur in development policies and international debt service requirements. A legislative foundation already exists in some developing countries, however, for improved regulation of mineral industries. Several major mineral producers, including Chile, Brazil, and Peru, have recently started looking at mineral production's impacts on the environment and are attempting to improve the regulation of such activities.⁴²

Additional pressure for environmental improvements could be created through substantial international assistance for environmental regulation and enforcement, as well as through the attachment of environmental conditions to mineral development funding. A portion of virgin mineral taxes levied in industrial countries could be allocated to improving the capacity of mineral-exporting developing countries to regulate their industries. Loans from development banks and their affiliates could include substantial components earmarked specifically for environmental protection, as non-governmental organizations in both industrialized and developing countries have urged in recent years. Some

"It is the extraction and processing of minerals, not their use, that poses the greatest threat."

progress is already being made in this direction. The International Finance Corporation (the World Bank affiliate that lends to private-sector projects) has begun insisting on environmental impact assessments for mineral projects it funds. Not until environmental concerns play a major role in the decisions on whether and how to fund projects, however, will the situation improve dramatically.

In the short run, better regulation of the environmental impacts of mining is the most obvious way to reduce the damage done in supplying the world with minerals. There is considerable room for improvement of current mining practices—in increased attention to environmental safeguards, more sensitivity to local people and their concerns, and better planning for the indirect impacts of mineral development. More attention and new approaches to reducing the environmental impacts of currently operating mineral facilities could help to prevent the creation of more abandoned sites in the future. Operations can be made even more benign if they are designed with environmental concerns in mind from the outset. Additional research, such as that of the Mining and Environment Research Network—a far-flung group of independent researchers investigating the impacts of mineral extraction in developing countries—should ease the task of cleaning up the mineral industries.⁹

In the long run, however, the benefits to be gained through mining regulation, while critically important, are not enough. Even well-managed mines are often enormously destructive. Careful reclamation may reduce erosion and pollution problems at mine sites, but ecological complexity and high costs usually preclude restoring the land to its previous condition. High energy use in mining and smelting makes reuse and recycling of metal-containing products almost always preferable to virgin production. To dramatically reduce the impacts of the minerals industry, attention must be paid not only to the extraction process, but to how mineral products are used.

Digging Out

The ultimate solution to the problem of mining's environmental destruction will require profound changes in both minerals use and in the global economy. No country has yet developed and put into place comprehen-

sive policies on the use of minerals and other raw materials. The assumption that prosperity is synonymous with the quantities of minerals taken from the earth has shaped the industrial development strategies of both capitalist and socialist nations. But that assumption is open to question. The environmental damage from nonstop growth in mineral production will eventually outweigh the benefits of increased materials supplies—if it does not already.

The way out of the trap lies in a simple distinction: it is the extraction and processing of minerals, not their use, that poses the greatest threat. The de facto materials policies of industrial nations have always been to champion the production of virgin minerals. Although such an approach has effectively promoted mining, it has also helped make minerals artificially cheap. This has led to widespread waste of mineral products, and has diverted funds that might have been used more productively to serve other needs.

A far less destructive policy would be to maximize conservation of mineral stocks already circulating in the global economy, thereby reducing both the demand for new materials and the environmental damage done to produce them. The world's industrial nations, the leading users of minerals, offer the most obvious opportunities for cutting demand. Minerals use in those nations is still rising, but increases have been slower in the last two decades than before. A growing body of evidence suggests that per capita needs for virgin minerals have already peaked there, and that major shifts are underway in the mix of minerals needed.⁷

National governments could accelerate the transition to more materials-efficient economies through basic changes in policies that govern the exploitation and use of raw materials. Tax policy offers the most obvious tool with which to start. Taxing, rather than subsidizing, production of virgin minerals would create stronger incentives to use them more efficiently. It could also provide governments with a way of paying for mine cleanups, as well as augmenting general revenues.

Many technical possibilities exist for using minerals more efficiently. The most obvious is recycling, as there is ample room to increase recycling rates for many metals. A 1992 U.S. Bureau of Mines study found

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where its light weight does not compensate by saving even greater amounts of energy than its production requires. The energy taxes now proposed as measures to reduce carbon emissions would speed shifts to less energy-intensive materials.

More difficult than shifting industrial nations to a minerals-efficient economy will be the search for a path to a sustainable future for developing countries. For those now heavily dependent on mineral exports, a rapid decline in demand could have dire consequences. Development planners need to recognize that mineral projects have generally failed to deliver long-term national economic success, and that current trends in minerals markets and use make mining an unpromising sector for future investment. More attention—and funding—needs to be devoted to diversifying the economies of mineral-producing nations and regions. Industrial nations will need to consider devoting a substantial share of any taxes levied on virgin minerals to development assistance to producing nations. One prerequisite for successfully rehabilitating those economies is relief from the crushing burden of international debt.

The greatest challenge, however, lies in the search for a Third World development strategy that allows poor countries to improve human welfare dramatically without using and discarding hundreds of thousands of metals and other minerals per person each year. Roughly three-fourths of the world's people now live in countries that generally have yet to build the railways, roads, bridges, buildings, and other basic infrastructure so essential to rich nations' economies. These countries will inevitably need more minerals as their development proceeds.

But basic choices in development plans—in the location, scale, density, and character of urban development, for example, or in the types of transportation systems emphasized—could have dramatic impacts on the amount and mix of materials needed, and on the environmental costs of producing them. It is critical that development planners take minerals use into account in the same way that they consider energy use, water use, and the production of food. The urgency of this issue cannot be overestimated: If more countries follow the development path of the rich industrial nations, world demand for minerals will continue to rise for many years. Given current geographical trends in production, it is

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that 10.6 million tons of iron and steel, 800,000 tons of zinc, and 250,000 tons of copper are discarded in U.S. solid waste each year. Though they recycle 45 percent of the aluminum they use, U.S. residents still throw away so much of the metal each year—2.3 million tons—that the energy saved by recycling it could meet the annual electricity needs of a city the size of Chicago.³

Beyond recycling, however, even more opportunity lies in making mineral-containing products more durable and repairable. More than a decade ago, a study by the U.S. Office of Technology Assessment concluded that reuse, repair, and remanufacturing of metal-containing products were the most promising methods of conserving metals. Governments could promote such practices by requiring manufacturers to offer longer warranties or to take products back at the end of their useful lives. Deposit/refund systems, for items as diverse as beverage containers and automobiles, can encourage consumers to return products for reuse instead of throwing them away.⁴

A particularly promising initiative has been undertaken by several European auto manufacturers, including BMW, Mercedes-Benz, Peugeot, Renault, Volkswagen/Audi, and Volvo, to make their vehicles entirely and easily recyclable. Engineers at the firms are designing cars with an eye toward easy disassembly, reuse, and recycling of various parts, and are attempting to minimize the use of nonrecyclable or hazardous materials. The approach could easily be adopted for other products.⁵

Another option is to substitute more benign materials for those whose production is judged to be the most environmentally damaging. Such judgments are inherently difficult, since comparison of the environmental impacts of different materials is an inexact science. But some minerals stand out from the crowd. Production of copper, for example, is exceptionally destructive. The use of optical fibers made of glass, in place of copper wires used in communications, is an encouraging example of a shift to a less-damaging substitute. Fiber optics also offer a much greater information-carrying capacity than copper wire. Similarly, the large amounts of energy required for aluminum production make it a logical candidate for replacement with other materials in applications

the Third World itself that will suffer most of the environmental damage from meeting the demand.

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In the past decade, concerns about the declining quality of the environment have brought anguished reexaminations of virtually all the major economic activities on which civilization depends. Nearly all—from energy production to transportation, from forestry to agriculture—have been called upon to reduce their toll on the natural systems that underpin the global economy. Despite this, mineral production—perhaps because of its remoteness or because of its growing concentration in countries that depend on it so heavily—has been relatively free of scrutiny. Yet this sector, on which so many others depend, is one of the largest users of energy, despoilers of air, water, and land, and producers of industrial waste, and therefore one of the most desperately in need of reform.

With analysis of the environmental impacts of other industries has come a growing realization that prevention is better than cure—that the greatest environmental benefits are usually yielded by basic alterations in production processes and consumption patterns, rather than through "pollution control."² Mining's devastating environmental effects make the ultimate case for a strategy emphasizing pollution prevention, and not just control. As an inherently destructive industry that supplies raw materials throughout the economy, its impacts are best reduced by basic changes in *other* industries, and in the societies that eventually use mineral products.

While mining companies and the governments of nations heavily dependent on mining exports may feel the costs of such a strategy are unacceptable, we have now passed the point where we can continue to live with anything less than a full accounting for today's policies. Reducing the global appetite for minerals, and the environmental toll of the huge industries that satisfy it, will not be easy. But allowing the devastation to grow unchecked could prove to be an even more difficult—and costly—course for humanity.

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FOR THE LOVE OF GOLD

The world is in the midst of the biggest gold rush ever, and prospectors are literally moving mountains to get at the precious metal.

BY JOHN E. YOUNG

Almost every conceivable crime has been committed in the name of gold. The lustrous metal of kings has been synonymous with wealth—and power—since the dawn of civilization. Gold is so rare, beautiful, and malleable that wars have been waged for it, empires toppled, and uncounted lives lost. But in all the tales about the lust for gold, one side of the story is usually left out: the metal's prodigious environmental cost.

Gold occurs in such minute quantities in the Earth's crust that miners must sift through small mountains of soil and rock to obtain even a few ounces. Only the metal's high price—more than \$300 an ounce—makes the search pay off.

Not included in miners' balance sheets, however, is the damage gold mining inflicts upon ecosystems and people. The waste generated each year by gold mining operations could fill enough 240-ton dump trucks to form a bumper-to-bumper convoy around the equator. On a more personal scale, the material removed by U.S. miners to produce enough gold for an average pair of wedding bands could make a 6-foot wide, 6-foot deep, 10-foot long pile in the happy couple's backyard.

Gold mining has a long history of environmental destruction. An epic series of lawsuits—perhaps the first environmental court

cases in the United States—were fought in the 1870s and 1880s over gold miners' devastating impacts on California rivers. In dozens of countries, mercury-laced tailings, eroded land, and acid mine drainage remain as visible, toxic legacies of gold rushes that occurred generations ago.

But gold rushes are not just the stuff of history. In recent years, the world has been gripped by a new epidemic of gold fever, and production has expanded sharply—from 1,219 tons in 1980 to an estimated 2,170 tons in 1992. With this increase has come an unprecedented worsening of the industry's impacts on the environment.

In North America and Australia, a new technology called "cyanide heap leaching" has made it economically attractive for large mining companies to level entire mountains of low-grade ore in the search for gold—often poisoning soil, water, and wildlife in the process.

At the same time, millions of small-scale miners have flooded distant corners of the planet in their quest for gold. The effects have been horrific. In the Amazon basin, site of the largest gold rush, mining is rapidly eroding soils, clogging streams with silt, and contaminating ecosystems and people with mercury. In their reckless pursuit of gold, miners have ravaged indigenous peoples in remote areas from Brazil to the Philippines

by introducing new diseases and damaging ecosystems crucial to the tribes' survival.

And what are the rewards of all this devastation? Dividends for the shareholders of gold mining companies; riches for a tiny fraction of the world's small-scale miners and a meager—often impoverished—living for most of the rest; and gold jewelry for the small portion of the world's population wealthy enough to afford it.

Moving Mountains

Among the major metals, gold is exceptional for its scarcity. Iron, aluminum, and copper ores typically contain about 40, 23, and 1 percent metal, respectively. Gold ores average about 0.00033 percent metal—about one tenth of an ounce per ton.

Gold is found in two types of deposits: lode and placer. Lode deposits occur in solid rock, most often in well-defined veins. Placer deposits are gold-bearing gravels or sediments most often found in watercourses. Their gold content often can be traced to weathered lode deposits uphill or upstream. Gold prospectors often search for lode deposits by working up rivers whose sediments are known to contain gold. Substantial amounts of gold are also recovered as by-products of copper and silver mining.

Lode deposits can be worked from the surface—as can placer deposits on dry land—or by following veins deep underground. Some of South Africa's mines go down two miles. Placer deposits in rivers or deltas are usually worked by dredging or vacuuming underwater sediments.

For sheer destructive power, few human activities compare to gold mining. In both placer and lode mining, huge amounts of waste materials are generated. Miners produce, on average, nine tons of waste for every ounce of gold. To produce 2,170 tons of gold in 1992, they generated an estimated 650 million tons of waste. In fact, gold mining produces more waste each year than does iron mining, even though the world digs up 200,000 times more iron.

In placer mining, most waste ends up choking rivers downstream from miners' operations. The waste from lode mines is usually deposited in enormous piles or ponds. Much of it is contaminated with

other metals, acid-forming chemicals, and solvents—most often cyanide—used to extract gold from ore. Mining wastes can cause acid drainage, heavy metal contamination, and other problems for centuries if not carefully stored.

Baubles, Bangles, and Beads

Beyond its scarcity, what accounts for the enduring demand for gold? One answer is that it possesses a range of qualities found in no other material. It is extremely malleable and ductile—skilled artisans can hammer it paper-thin or draw it into wire finer than hair. It does not rust or tarnish, and it is almost completely invulnerable to chemical reactions.

But the full explanation of gold's allure is more complex. Its worth is as much a matter of folklore and myth as it is practical: gold is valuable because value has always been measured in gold. Gold was used as money in virtually all ancient societies—Egypt, China, Persia, Babylon—and gold coins were remarkably standardized in weight and purity. These coins were seen as the most secure form of exchange, because gold was durable and hard to debase, counterfeit, or rapidly expand in supply.

Economists have been trying to break the link between gold and money for many years. In 1923, John Maynard Keynes called the gold standard a "barbarous relic." Though many countries stopped specifying the value of their money by weight in gold many decades ago, the United States—in whose currency most international business is transacted—only abandoned the system in 1973. Until then, the value of a dollar was defined by gold, which was officially priced at \$35 per ounce. After the change, the price of gold shot up above \$100. Gold was no longer money—or so the government said—but people still believed it was valuable.

They still do. Annual demand for gold, which was 2,815 tons in 1991, according to Gold Fields Mineral Services, publisher of an influential annual survey of the industry, is now greater than annual production. Gold being a tradable commodity, the gap between demand and what mines supply is met by investors and governments selling a portion of their holdings.



Huge amounts of gold are held by state banks and private citizens. According to the U.S. Bureau of Mines, an estimated 95,000 tons of gold—85 percent of all the gold ever mined—are circulating in the world economy. Of this, about 36,000 tons are held by governments and about 59,000 tons by companies and private citizens.

About 15 percent of the gold used each year goes to industry, with about 5 percent going to electronics alone. Gold is unsurpassed as an electrical contact and conductor, though cheaper substitutes—including silver alloys and copper—will do for all but the most critical applications. Other leading uses of gold include decorative coatings for a variety of products and for dental fillings. Other materials are good substitutes for gold fillings, which are particularly popular in Japan and Germany, but many people view a glint of gold in their smile as a status symbol.

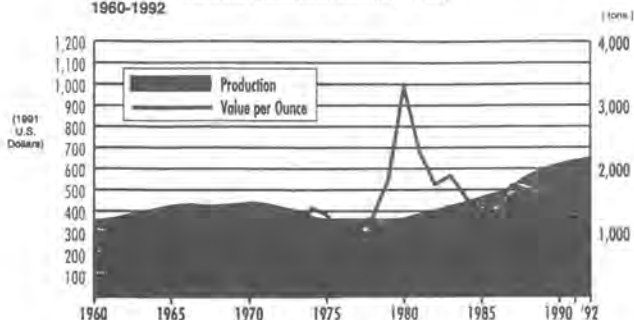
Jewelry, however, is the dominant use of

gold, comprising about 85 percent of the market. In the United States, Japan, and Western Europe, where most of what is sold is made from lower-grade alloys ranging from 33 to 75 percent (8 to 18 karat) gold, jewelry is primarily viewed as an adornment. Investors in those countries usually buy gold in the form of bars and coins, though there are fewer people sinking their money in gold today than in the 1970s, when inflation rates were much higher. In Asia and the Middle East, jewelry is the most common way to invest in gold. Gold jewelry in these regions is commonly 88 to 96 percent (21 to 23 karat) gold.

In both markets, however, gold jewelry has sharply increased in popularity. The amount of gold going into jewelry soared from 513 tons in 1980 to an estimated 2,300 tons in 1992. Gold has become a fashion trend. In the United States, for instance, it's not uncommon for teenage boys to wear

heavy gold chains as a status symbol. And rising incomes in Asian countries—where savings rates are high and gold is a popular investment—have also driven up the demand for jewelry.

Figure 1: World Gold Production and Real Price, 1960-1992



Source: International Monetary Fund (gold price), U.S. Bureau of Mines (production).

The Rush Is On

The gold rush of the 1980s was not spurred by a sudden discovery—as were many of the most celebrated bouts of gold fever in the past—but by a sharp rise in the metal's price. In January 1980, the price of gold briefly soared to an all-time high of \$850 per ounce. While the price did not remain there, it has stayed well above previous levels ever since (see Figure 1).

The price increase transformed the gold market. World production grew 78 percent between 1980 and 1992. U.S. gold production increased elevenfold, Australian output grew eight times over, and Canada's tripled (see Figure 2). Virtually all of the increase in production occurred outside of South Africa and the Soviet Union, the two historically dominant gold-producing countries. In the Soviet Union and its successor states, political turmoil and inefficient operations limited output. In South Africa, low ore grades and rising labor costs—a result of increasingly successful battles by miners' unions for higher wages and better working conditions—had a similar effect.

In 1980, South Africa and the Soviet Union produced three-fourths of the world's gold (55 and 21 percent, respectively), while

the United States, Canada, and Australia together accounted for only 7 percent of the total. But by 1992, South Africa only held 28 percent of the market, and the share of the former Soviet states was down to 11 percent.

Australia and North America, meanwhile, were producing a third of all gold. Third World countries accounted for much of the remaining quarter of the market.

A very large share of the recent production increase in the United States, Canada, and Australia has come from the use of the new, very cheap cyanide heap leaching technique. Heap leaching predominates in Nevada, the leading U.S. gold-producing state, where 177 tons of the metal are mined each year.

Heaps of Trouble

In 1969, the U.S. Bureau of Mines published an obscure paper entitled *Recovering Gold From Stripping Waste and Ore by Percolation Cyanide Leaching*—and spawned a revolution in the way gold is mined. This new gold extraction technique—heap leaching—was to become the primary method used by U.S. and Canadian miners, and it soon spread outside North America.

Heap leaching is an adaptation of a century-old gold extraction technology, called vat leaching, in which gold is obtained by soaking crushed ores with sodium cyanide solution in huge containers. The new method is different in one major respect: the process is accomplished out in the open, eliminating the need to build a central processing facility and carry ores to it.

In heap leaching, miners spray a cyanide solution on huge piles of crushed ore. After repeated circulation through the ore, the liquid is collected and processed to remove any gold. The technique has redefined what is a workable grade of ore, making it profitable to mine ores—or even some old mine wastes—that contain as little as 1/50th of an ounce of gold per ton.

Thanks to heap leaching, many sites that might have been underground mines in a

previous era are now surface operations. The result has been an enormous expansion in the amount of material handled by miners. Where U.S. miners handled 990,000 pounds of soil and rock in 1980 to obtain each pound of gold, a decade later the waste output per pound of gold had tripled—to about 3 million pounds.

Heap leaching can cause several types of environmental problems. An underlying problem is the high toxicity of its active agent. A teaspoon of 2 percent cyanide solution can kill a human in seconds. Although lower concentrations—.015 to .25 percent—are used in heap leaching, reservoirs used to collect cyanide solution often attract and kill waterfowl. For example, more than 1,000 birds were killed in the first year of operations at the McCoy/Cove gold mine near Battle Mountain, Nevada, where the operators unsuccessfully used loud cannons, remote-controlled boats, and other devices to frighten away birds.

Leaching operations and collection ponds also tend to leak, which poses a threat to underground drinking water supplies, lakes, and streams. Although cyanide can break down rapidly outdoors—particularly if soils or waters are acidic—it can remain at toxic levels for long periods in groundwater.

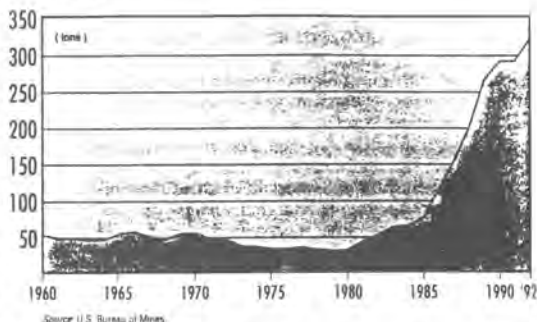
Leaching operations and collection ponds also tend to leak, which poses a threat to underground drinking water supplies, lakes, and streams. Although cyanide can break down rapidly outdoors—particularly if soils or waters are acidic—it can remain at toxic levels for long periods in groundwater.

Fish are particularly sensitive to cyanide contamination. In October 1990, heavy rain caused a dam break at a leaching reservoir at the Brewer Gold Mine, near Jefferson, South Carolina. Ten million gallons of cyanide solution spilled into a tributary of the Lynchies River, killing as many as 10,000 fish. And near Del Norte, Colorado, persistent leaks from the Summitville gold mine have wiped out aquatic life in a 17-mile stretch of the nearby Alamosa River. The Environmental Protection Agency is now spending

\$800,000 per month to prevent additional leaks from the mine—whose owner has declared bankruptcy—and expects a full cleanup to cost \$20 million.

Heap leaching technology is much more

Figure 2: U.S. Gold Production, 1960-1992



common in the United States, Canada, and Australia than in developing countries. Most large mining operations in the Third World make use of high-grade ores that are worth processing by contained methods, which are both more expensive and more efficient. However, much of the increase in developing countries' gold production has come from smaller-scale mining operations.

Mud and Mercury

After the price of gold skyrocketed in 1980, floods of people in developing countries joined the search for gold. Millions of small-time miners—called in various languages *garimpeiros*, *galampsey*, *pailliers*, or *artisans*—fanned out into remote areas of the Third World.

Major gold rushes have broken out since 1980 in Bolivia, Brazil, China, Colombia, Ecuador, Guyana, Indonesia, the Philippines, Venezuela, and various African countries. The best-known—and probably the largest—of all these is in Brazil, where as many as a million miners have invaded the Amazon basin. With them have come up to 4 million other people who depend on mining proceeds for their living, including miners' families, shopkeepers, boat operators,

pilots, and prostitutes.

In Brazil, as in other countries, the miners and their followers streamed into the jungle because of the lure of riches and the lack of economic opportunity elsewhere. Many were small farmers or wage laborers, usually without their own land, who suffered from the increasing displacement of small Brazilian farms by large, mechanized operations. Most were illiterate or lacking in formal education.

This army of miners has had a tremendous impact on Brazilian gold production—and on social, economic, and environmental conditions in the Amazon area, as anthropologist David Cleary recounts in his 1990 book *Anatomy of the Amazon Gold Rush*. The official data on gold output by *garimpeiros* are not reliable, since most miners sell their gold on the black market to avoid paying taxes to government agents. Nonetheless, most analysts who have examined the question closely put small-scale production during the height of the rush, in the late 1980s, at more than 100 tons a year—which would have placed Brazil sixth on the world production list even before adding the output of the nation's large mines.

The methods used by small-scale miners are quite different from those in large, industrial mining operations, but they are equally destructive in their own right. Third World prospectors primarily rely on river dredging and hydraulic mining, as well as large open pits excavated manually.

In hydraulic mining, which is perhaps the most destructive of these operations, high-pressure water jets wash entire hillsides into sluice boxes, where the heavier gold is separated from other sediments. The process wreaked havoc in 19th-century California, as historian Robert Kelley recounts in his book *Gold vs. Grain*: "Huge hydraulic mining operations in the mountains disgorged enormous quantities of mining debris—mud, sand, and gravel—into the river canyons of the Sierra. In the spring floods this debris washed downstream to spread out over the flatlands of the Sacramento Valley, burying farms, halting river navigation, and causing disastrous floods. Marysville, Sacramento, and other river towns had to build miles of costly levees, property values dropped, river

boats could no longer call at city docks. [and] the flow from city hydrants became a turbid gruel of mud and water."

Downstream farmers and townspeople sued the miners and, after years of court and legislative battles, eventually prevailed. Although a California judge effectively outlawed hydraulic mining in 1884, the method is now widely used in Brazil and other countries.

Other types of placer mining, in which large quantities of sediments are sluiced and screened for gold, also cause tremendous damage. In Guyana, for example, new, more efficient dredges introduced into the Upper Mazaruni region in recent years produce so much silt as to make water undrinkable as far as 40 miles downstream, according to a 1990 report in *New Scientist* magazine. Such high levels of sediment can dramatically increase erosion and flooding, clog the gills of fish species adapted to cleaner water, and kill aquatic plants by blocking sunlight.

Perhaps the gravest long-term consequence of small-scale mining activities in Brazil, however, is the contamination of the Amazon ecosystem with mercury, which is used to capture gold in sluice boxes. Mercury is an extremely toxic metal that accumulates in the food chain and causes neurological problems and birth defects in animals and people who ingest it. Though the metal's effects can take years to surface, reported cases of mercury poisoning in the Amazon have been increasing in the past few years. Miners blend mercury with sediments dredged from river bottoms, then boil the mercury and gold amalgam with a torch, leaving the gold behind. In the process, much of the mercury is lost, either directly into watercourses or through evaporation.

Miners release an estimated 100 tons of mercury into the Amazon ecosystem each year. According to a 1992 article in *Nature*, an estimated 32 tons are released into the watershed of the Madeira River (a major Amazon tributary) alone. Mercury levels in many fish species in the Madeira now exceed the maximum safe levels for human consumption set by many nations.

The Human Cost of Gold

Fernando Branches, a doctor in the Brazilian city of Santarém, has examined dozens of

people with mercury levels above those considered safe by the World Health Organization. Significantly, few of his patients were miners—most were residents of riverside communities who eat a lot of fish. Doctors have also found elevated mercury levels in residents of mining towns.

Miners and fish-eaters in the Amazon basin are, therefore, unwitting subjects in a huge experiment on the accumulation of mercury in a large ecosystem. Though mercury poisoning can be a slow, subtle process, its long-term effects are likely to be devastating. In the world's most infamous mercury poisoning case, severe birth defects and brain damage first appeared more than a decade after mercury pollution of Japan's Minamata Bay began.

The gold rush has had other human costs as well. Conditions in the Brazilian mining camps—and those in many other countries—are similar to, if not worse than, those in the gold rushes of old. Disease, lawlessness, and dissolution are the order of the day. And the dream of instant wealth remains just that: few miners break even, fewer still get rich.

The risks associated with gold mining extend far beyond bullets and mercury. Many die in mining-related accidents. At Lipi, a mining camp in the mountains of Bolivia, hundreds of people were killed in 1992 when

a mudslide buried most of the town. The slide was caused when tons of mining waste began to slip down the mountainside after heavy rains.

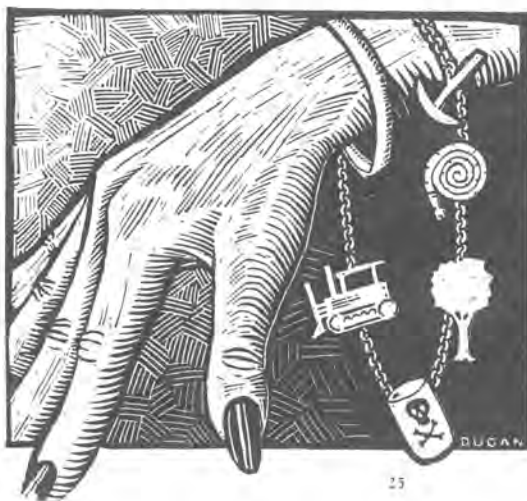
Perhaps the most dramatic impact of gold mining, though, is on indigenous peoples. It has proved particularly ruinous for the native people of Latin America. As author Elizabeth Dore puts it, "The moment Columbus set foot on Hispaniola, mining replaced food security as the organizing principle of society." The conquistadors' desire for gold was so great that some of the people they conquered and enslaved thought the invaders ate the metal.

More recently, the massive incursions of miners into the Amazon have brought disease and environmental destruction to indigenous tribes. Best known is the plight of the Yanomami Indians, a tribe in the northern Brazilian states of Roraima and Amazonas that until recently avoided contact with the outside world. At least 15 percent of the tribe has died of malaria.

The Yanomami gained a reprieve in late 1991 when Brazil established a 22-million-acre reserve for them in which mining is banned. Many miners left or were driven from the area by Brazilian police. Recent press reports have suggested, however, that the tribe now may again be beset by miners—and many other Amazon tribes are suffering with the same problems.

A New Gold Standard

Can the growing demand for gold be reconciled with the metal's environmental and human costs? For many Third World miners, the costs have been too great, and they have given up the search. The global gold rush has slowed in the 1990s, as gold prices have edged down closer to \$300 per ounce. The Brazilian gold rush is clearly on the ebb, and though little information is available, so probably are gold rushes



elsewhere in the Third World.

U.S. production is still growing rapidly, however. It was up 10 percent in 1992. Enormous new mines are now proposed for sites all across the West, from the Meikle Mine near Carlin, Nevada, to the McDonald Mine in the valley of the Blackfoot River in Montana, site of the film and novel *A River Runs Through It*. Damage from existing mines and the threat of expanded mining are generating concern among citizens in communities across the United States.

The damage done by gold miners has been a major factor in the growing movement for reform of the laws governing the U.S. non-fuel mining industry. Most clearly in need of reform is the General Mining Act of 1872, an archaic law that allows miners to purchase federal lands for bargain prices—\$5 or \$10 per acre, depending on the mineral they plan to extract. Bills are pending in both houses of Congress that would eliminate this virtual giveaway and set environmental standards for mining on public lands. Interior Secretary Bruce Babbitt has expressed support for reform of the mining law.

There is a clear need, however, to better regulate mining activities on private as well as public land, since the effects can reach far off-site. A potential model for national legislation has been developed by Oregon, whose legislature passed tough environmental rules for miners in 1991. Among those rules are requirements for reclaiming mined land and posting a bond before mining begins that can only be retrieved when the site is properly cleaned up.

Other potentially useful policy measures include eliminating the special tax status of mining companies, which receive write-offs unavailable to other industries, and taxing sodium cyanide, the active ingredient in heap leaching. Former Congressman Les AuCoin (D-OR) introduced legislation in 1992 for a \$0.50/pound tax on cyanide.

Additional regulation is also needed for large mines in developing countries, although lack of government funds and personnel make it difficult to enforce rules. For small-time miners, some South American nations, including Brazil, have established

technical assistance programs to demonstrate less damaging methods of gold production. In particular, education on the hazards of mercury and on mercury-free production methods is badly needed.

Even with tighter regulation and better-run mines, however, the gold industry's environmental impacts will remain enormous as long as production is close to current levels, which is likely as long as the price for gold remains high. Added up, the local impacts of gold mining pose hazards for entire nations. While the industry may give a major boost to some economies, the costs of cleaning up the messes it creates could eventually outweigh its benefits.

In the long run, the only solution is to reduce demand for gold, and thus its price. Many heap leach mines probably would go out of business, for example, if the price of gold fell below \$250 an ounce. And in the admittedly unlikely event that consumer demand for gold jewelry were largely eliminated, industrial uses could be supplied for centuries by the enormous amounts of gold now in government and private hoards.

There are rumblings of a new attitude toward gold from informed consumers. David Zimmerman of Pony, Montana, whose home is not far from active heap leaching operations, has proposed a nationwide consumer boycott of gold in the belief that the impacts of gold mining are unacceptable. The costs of the industry were summed up succinctly by another Montanan, Don Bachman, in a recent issue of *Wilderness* magazine: "We're trading mountains for neck chains and earrings." To "mountains" he might have added "ecosystems" and "human health."

But demand for gold will not be cut quickly or easily. However rational their arguments, those who struggle against the gold industry are fighting one of the most deeply ingrained human desires. The lust for gold will only diminish when miners and consumers alike begin to take into account the real costs of the metal of kings. ●

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Minneapolis, Minnesota 55408
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January 31, 1995

U.S. House of Representatives
Committee on Resources
Subcommittee on Energy
& Mineral Resources

RE: Subcommittee Hearing -- "Investment in Hardrock Mineral
Exploration and Development: Where Its Going and Why"

MY NAME IS WALTER LEHMANN. I AM AN ATTORNEY PRACTICING IN
MINNEAPOLIS, MINNESOTA. I HAVE BEEN ASKED TO TESTIFY HERE TODAY ON
BEHALF OF MY FATHER, ERNEST K. LEHMANN, A PROFESSIONAL GEOLOGIST
WHO OWNS A MINERAL EXPLORATION AND DEVELOPMENT FIRM BASED IN
MINNEAPOLIS. I AM LEGAL COUNSEL FOR THAT FIRM.

MY FATHER'S ABSENCE FROM THIS HEARING IS AN IRONIC EXAMPLE OF WHERE
INVESTMENT IN MINERAL EXPLORATION AND DEVELOPMENT IS GOING: HE IS
CURRENTLY WORKING IN SOUTH AMERICA.

MY FATHER HAS BEEN INVOLVED IN MINERAL EXPLORATION FOR HIS ENTIRE
FORTY-YEAR CAREER AND IS A FORMER PRESIDENT OF THE AMERICAN MINING
ASSOCIATION. AND YET, AS HE TOLD ME WHILE I DROVE HIM TO THE
AIRPORT LAST WEEK, HE CANNOT FIND ANY PAYING WORK HERE IN AMERICA.
INDEED, FROM MY PERSPECTIVE, THE ONLY PAYING WORK IN MINING HERE IN
AMERICA APPEARS TO BE FOR LAWYERS LIKE MYSELF.

I WANT TO BRIEFLY DESCRIBE MY FATHER'S MINERAL EXPLORATION AND DEVELOPMENT BUSINESS, AND THEN TELL YOU ABOUT OUR EFFORTS TO PURSUE MINERAL DEVELOPMENT IN THE SWEET GRASS HILLS OF MONTANA. OUR EXPERIENCE IN MONTANA IS A GOOD EXAMPLE OF THE DELAYS AND POLICY REVERSALS WHICH ARE FORCING MINERAL INVESTMENT OVERSEAS.

MY FATHER PROVIDES EXPLORATION MANAGEMENT AND MINE VALUATION SERVICES TO A VARIETY OF CLIENTS. AS ONE ASPECT OF THIS BUSINESS, MY FATHER LOCATES AREAS WHICH WARRANT EXPLORATION, PREPARES AN EXPLORATION PLAN, AND THEN MARKETS THE WHOLE PACKAGE TO POTENTIAL INVESTORS ON A JOINT VENTURE BASIS.

MINERAL EXPLORATION IS AN EXTREMELY HIGH COST, HIGH RISK AND LONG TERM ENDEAVOR. LOCATING A DEPOSIT SUFFICIENT TO SUSTAIN A PROFITABLE MINE IS A EXTREMELY RARE EVENT. ENTICING INVESTORS TO TAKE THESE RISKS AND TO STICK WITH THE PROJECT IS EXTREMELY DIFFICULT EVEN IN THE BEST CLIMATE.

INTERMINABLE DELAYS AND ARBITRARY POLICY REVERSALS IN FEDERAL LAND MANAGEMENT DECISIONS, WHICH ARE SYMPTOMS OF THE ANTI-MINING BIAS WHICH HAS OVERTAKEN THE MANAGEMENT OF OUR PUBLIC LANDS, HAS MADE THE JOB OF ENTICING INVESTORS TO FUND THESE EXPLORATION VENTURES ALL BUT IMPOSSIBLE.

TO ILLUSTRATE, I WANT TO QUICKLY SUMMARIZE OUR EXPERIENCE IN THE SWEET GRASS HILLS -- IT IS A GOOD EXAMPLE OF PUBLIC LAND MANAGEMENT

TODAY. I WOULD BE GLAD TO GET INTO THE DETAILS IF THIS COMMITTEE WISHES.

ONE OF MY CLIENTS, THE MOUNT ROYAL JOINT VENTURE HAS BEEN IN THE CENTER OF CONTROVERSY SINCE IT APPLIED FOR A PERMIT TO EXPLORE ON THE PUBLIC LANDS OF THE SWEET GRASS HILLS BACK IN FEBRUARY OF 1992. MOUNT ROYAL HAS, SO FAR, WEATHERED REPEATED DELAYS, POLICY REVERSALS, AND BUREAUCRATIC INFIGHTING -- ALL INTENDED TO DE FACTO PROHIBIT EXPLORATION OF THE MINERAL RESOURCES IN THE HILLS.

DURING THE 1980'S, A NUMBER OF JOINT VENTURES EXPLORED IN THE AREA AND MOUNT ROYAL STAKED WHAT APPEARS TO BE A VERY LARGE, LOW GRADE GOLD DEPOSIT EXTENDING OVER BOTH PRIVATE MINERALS AND PUBLIC MINERAL LANDS.

ALSO DURING THE 1980'S, THE BUREAU OF LAND MANAGEMENT THOROUGHLY REVIEWED THE ENVIRONMENTAL AND CULTURAL RESOURCES IN THE AREA AND PREPARED A RESOURCE MANAGEMENT PLAN OR "RMP".

IN JANUARY OF 1992, BLM ADOPTED THE RMP -- AND DETERMINED THAT THE AREA SHOULD REMAIN OPEN FOR MINERAL ENTRY.

IN FEBRUARY OF 1992, MOUNT ROYAL FILED AN EXPLORATION PLAN TO DO ADDITIONAL DRILLING IN THE HILLS. BLM CONDUCTED THE SAME REVIEW PROCESS USED FOR PREVIOUS EXPLORATION PLANS BUT THIS TIME DECIDED TO REQUIRE A FULL ENVIRONMENTAL IMPACT STATEMENT. THIS IS THE

FIRST TIME BLM HAS EVER REQUIRED A FULL EIS ON AN EXPLORATION PLAN.

MEANWHILE, THE STATE HISTORIC PRESERVATION OFFICE, OR "SHPO", CLAIMED THE AREA WAS ELIGIBLE FOR LISTING ON THE NATIONAL HISTORIC REGISTER. LOCAL BLM OFFICIALS TRIED TO GET SHPO'S INPUT IN PREPARING THE EIS, BUT SHPO REFUSED TO DELINEATE THE BOUNDARIES OF THEIR PROPOSED LISTING OR MAKE ANY EFFORT TO APPLY FOR LISTING.

AT THIS STAGE, MOUNT ROYAL LOST ITS PRINCIPAL INVESTOR.

THE DRAFT EIS WAS PUBLISHED IN JANUARY, 1993. NO NEW EVIDENCE OF POTENTIAL ADVERSE EFFECTS WERE UNCOVERED -- THE PREFERRED ALTERNATIVE WAS TO APPROVE THE EXPLORATION PLAN.

AS THE EIS PROCESS WAS DRAWING TO A CLOSE, SHPO SUDDENLY CLAIMED THAT IT HAD NOT BEEN ADEQUATELY CONSULTED AND THREATENED TO SUE BLM IF THE EXPLORATION PLAN WAS APPROVED.

AFTER PRESSURE FROM WASHINGTON, PUBLICATION OF THE FINAL EIS WAS INDEFINITELY POSTPONED -- THE DISTRICT MANAGER OF BLM WAS ORDERED TO FILE A PETITION TO WITHDRAW THE AREA FROM MINERAL ENTRY. THERE WAS NO NEW EVIDENCE JUSTIFYING THE PETITION, BUT SECRETARY BABBITT ACCEPTED IT NEVERTHELESS.

AS A RESULT, MINERAL ENTRY WAS PROHIBITED FOR UP TO TWO YEARS WHILE THE RMP WAS RECONSIDERED AND THE VALIDITY OF MY CLIENT'S CLAIMS

WERE EXAMINED.

ONLY 14 MONTHS AFTER THE RMP -- WHICH HAD TAKEN SEVEN YEARS TO COMPLETE -- CONCLUDED THAT THE AREA SHOULD BE LEFT OPEN TO MINERAL ENTRY, BLM ARBITRARILY DECIDED TO REVISIT THE QUESTION, EVEN THOUGH THERE WAS NO NEW EVIDENCE OF ANY KIND TO JUSTIFY RECONSIDERATION.

WE WERE TOLD THAT THE RMP AMENDMENT AND THE VALIDITY EXAMINATION PROCESS WOULD BE COMPLETED BY THIS SUMMER. HOWEVER, JUST LAST WEEK WE LEARNED THAT THE MINERAL EXAMINER'S REPORT ON OUR CLAIMS (WHICH HAS BEEN COMPLETED), AND THE DRAFT RMP AMENDMENT (WHICH WAS TO BE PUBLISHED IN FEBRUARY), HAVE BOTH BEEN PUT ON HOLD.

APPARENTLY SECRETARY BABBITT INTENDS TO PERMANENTLY WITHDRAW THE AREA FROM MINERAL ENTRY. WE KNOW OF NO BASIS TO JUSTIFY THIS SUDDEN AND ARBITRARY REVERSAL IN POLICY.

THE ENVIRONMENTAL AND CULTURAL RESOURCES OF THE SWEET GRASS HILLS HAVE BEEN ANALYZED AND REVIEWED AD NAUSEAM OVER THE PAST TEN YEARS. EVEN SO, ANTI-MINING INTERESTS WORKING IN CONJUNCTION WITH WASHINGTON BUREAUCRATS, HAVE MANAGED TO BEND AND TWIST THE LAND MANAGEMENT LAWS IN A CYNICAL EFFORT TO HARASS LEGITIMATE MINING INTERESTS WITH VALID PRIVATE PROPERTY RIGHTS.

IT IS OBVIOUS THAT THESE PEOPLE ARE INTENT ON IMPOSING THEIR OWN ANTI-MINING BIASES ON MANAGEMENT OF THE PUBLIC LANDS AND WILL GO TO

ANY EXTREME TO ENSURE THAT THESE RESOURCES ARE NOT LAWFULLY EXPLORED OR DEVELOPED.

FACED WITH THIS KIND OF ARBITRARY MANAGEMENT OF OUR PUBLIC MINERAL RESOURCES -- THESE INTERMINABLE DELAYS AND COMPLETELY UNJUSTIFIED POLICY REVERSALS -- IS IT ANY WONDER WHY INVESTMENT IN MINERAL EXPLORATION IS GOING OVERSEAS, AND PEOPLE LIKE MY FATHER ARE FOLLOWING?

**GEOLOGY AND EARLY HISTORY
SWEET GRASS HILLS, MONTANA**

The Sweet Grass Hills are located in north central Montana. The Hills are a series of small centers of volcanic rocks (mainly of a type called syenites) which intrude and push up sedimentary formations including the Eagle Sandstone and other formations associated with oil and gas production. These volcanic rocks are part of a 30 to 50 million year old volcanic field, similar to other mountain ranges in north central Montana including the Little Rockies, the Judiths, the Moccasins, the Bear Paws, and the Highwoods. Within and near the contract of these volcanic rocks, there are deposits of gold, copper, florspar and perhaps other minerals.

Probably before European settlement in the area, Native Americans extracted minerals in the Sweet Grass Hills. The main items were probably iron oxide -- ocher -- which occurs in scattered pits, and the purple mineral florspar, which is found at the East Butte and in other areas.

Towards the end of the last century, the Hills were prospected for gold, silver, copper, lead, zinc and florspar. There is evidence of old pits and workings on West Butte, at Middle Butte, and at East Butte. There was also some coal production around the flanks of the Hills. There was some gold production and considerable florspar prospecting and some production at East Butte. The mineral resources of the area were investigated in the 1930's and 1940's by both the U.S. Geological Survey and the Anaconda Company.

In the early 1980's, Mount Royal Joint Venture ("MRJV") did some preliminary exploration in the Hills, including geological and geochemical surveys. Since the results were promising, claims were staked on the public lands at East and West Butte, and agreements were negotiated with the holders of private minerals in these areas. About the same time, BHP, a major Australian mining company, staked ground at West Butte, and a subsidiary of Burlington Northern started exploration at Grassy Butte.

At the end of 1985, MRJV entered into a joint venture with Santa Fe Mining Company was entered into as to Middle and East Butte. This venture lasted until the end of 1987 when Santa Fe withdrew after doing some drilling and trenching.

In 1988, MRJV entered into a joint venture with Comico American, another large company, as to East Butte. Comico carried out exploration in 1988 and 1989, including some drilling and additional geological work. MRJV also entered into a second venture with Placer Dome who drilled at Middle Butte.

In 1991 and early 1992, MRJV entered into two agreements - one as to West Butte with Coeur d'Alene Mines, and one as to East Butte with a small Canadian company called Manhattan Minerals.

SUMMARY OF BLM POLICY REVERSALS
SWEET GRASS HILLS OF MONTANA

- 1983 Mount Royal Joint Venture ("MRJV") undertook extensive geochemical surveys on East, West and Middle Buttes. MRJV staked claims and negotiated mining leases with private owners. Utah International staked claims at West Butte.
- 1984 Meridian Minerals undertook exploration at Grassy Butte.
- 1985 MRJV acquired the Utah claims on West Butte. American Copper Nickel conducted drilling at Grassy Butte. MRJV concluded a joint venture agreement with Santa Fe Mining, Inc. as to East and Middle Butte. This joint venture undertook extensive exploration work.
- 1986 Santa Fe carried out exploration work at Middle and East Butte under the joint venture agreement and filed a Plan ("1986/88 Plan") for drilling and access road building at East Butte.
- BLM and State Lands Office reviewed the 1986/88 Plan.
- BLM began preparing a Resource Management Plan (RMP) for the West High Line Area including the Sweet Grass Hills.
- 1987 Public meetings were held on the 1986/88 Plan. Native Americans were asked to visit the site.
- BLM District Manager approved the 1986/88 Plan.
- Road construction and sampling, and drilling were conducted.
- Blackfoot Tribe appealed the decision to approve the 1986/1988 Plan to IBLA.
- BLM published a draft EIS for the RMP. Meetings were held on the RMP from June to September.
- 1988 Cominco American replaced Santa Fe as MRJV's partner on East Butte.
- July BLM published final EIS on the RMP.
- MRJV filed a protest.
- IBLA upheld BLM's 1988 decision approving the 1986/88 Plan.
- Cominco filed an amendment to the 1986/88 Plan.
- 1989

- June BLM District Manager approved the amendments to the 1986/88 Plan.
- Chippewa Cree petitioned IBLA for a stay of the BLM approval.
- IBLA denied the stay, saying it would fail on its merits.
- Placer Dome drilled at Middle Butte under an agreement with MRJV.
- 1990 Reclamation was undertaken at East Butte.
- 1991 MRJV entered into an agreement with Manhattan Minerals (US) Ltd. as to East Butte. Additional claims were staked.
- 1992
- Jan. 29: BLM State Director issues ROD adopting West Highline RMP and creating an ACEC in the Sweet Grass Hills. Area left open for mineral entry.
- Feb. 25: MRJV files exploration plan ("1992 Plan").
- BLM notifies interested groups and agencies as required.
- SHPO alleges Sweet Grass Hills are "eligible" for historic preservation but refuses to designate boundaries of its proposed historic district or apply to list the area on the National Historic Register.
- July BLM District Manager orders EIS on 1992 Plan to consider the single issue of Native American cultural values.
- 1993
- Jan. Draft EIS published. No new evidence of cultural values produced. Preferred alternative is to approve 1992 Plan.
- March SHPO claims it has not been "consulted" despite repeated contacts with BLM for more than a year.
- June Final EIS postponed indefinitely. BLM District Manager files petition to withdraw federal lands in Sweet Grass Hills from mineral entry subject to valid existing rights. Mineral entry prohibited for up to two years.
- Work begins on amending RMP to consider withdrawal.
- Work begins on validity examination of existing claims.
- 1994
- June Work on validity examination continues.

Work on amending RMP continues.

1995

Jan.

Draft Validity Examination Report circulated at BLM.

Draft RMP Amendment goes to printers and dates for hearings are set. MRJV is not notified of these dates.

Secretary of Interior halts publication of draft RMP amendment and indicates he intends to withdraw federal lands in area from mineral entry regardless of what the draft RMP amendment concludes. Status of validity examination remains uncertain.

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STATEMENT BY

STANLEY DEMPSEY
CHAIRMAN & CEO
ROYAL GOLD, INC.

before the

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

ON THE ISSUE OF
INVESTMENT IN HARD ROCK MINERAL EXPLORATION
AND DEVELOPMENT: WHERE IT'S GOING
AND WHY

U.S. House of Representatives
Committee on Resources

January 31, 1995

Mr. Chairman, members of the Subcommittee, my name is Stanley Dempsey. I am Chairman and Chief Executive Officer of Royal Gold, Inc. Royal Gold is a Denver-based, publicly-owned gold exploration and development firm. It owns a royalty interest in a major new gold mine in Nevada, and has recently announced that it has made a significant gold discovery in California. The company has a market capitalization of approximately \$110 million, and has approximately 3,500 shareholders. Royal Gold has 11 employees; ten of these employees live in the Denver area, and one lives in Elko, Nevada.

Our company works on both grassroots and advanced-stage exploration projects. A grassroots project involves prospecting, often in places where gold has never before been found. We use geological, geophysical and geochemical methods to look for subtle evidence of mineralization. When we find anomalies, we trench or drill to better expose the favorable rocks. We either stake new claims, or lease or buy existing claims from prospectors. Often such claims are held by individuals or small companies. The typical prospector today is a geologist who formerly worked for a big mining company. Many of them have Ph.D.'s in geology. Royal Gold's strategy is to make a discovery and to prove it up enough to attract a major company. The prospector spends tens of thousands of dollars. We put in the next million or so dollars. Then the larger company finishes the job, spending in the tens of millions of dollars. In recent years, our Company has entered into joint venture or lease agreements with such large firms as Western Mining Corporation, Santa Fe Pacific Gold, Battle Mountain Gold, Union Pacific Minerals and Newmont. We perform our work to big company standards, and are rewarded for the risks we take by receiving a working interest or a royalty in the mines we find.

Most of Royal Gold's exploration is on public lands. Even its large venture with Union Pacific Minerals involves the need for access to public lands that are interspersed with Union

Pacific lands in the railroad land grant "checkerboard" across Wyoming. We have staked 528 claims and dropped 259 of them during the last 18 months. Royal Gold makes direct expenditures of approximately \$2.5 million per year on public lands. Much of this money flows directly into local economies, or is paid to the United States for claim maintenance fees. Our direct expenditures go to contract geologists, geophysicists, landmen, and drillers, mainly in Nevada and Wyoming.

During the last year and a half, Royal Gold has paid \$30,000 to Geocon, Inc., \$60,000 to Zonge Engineering, \$32,000 to David Rowe, our claim staker, \$92,000 in royalty payment to landowners, \$183,000 to Eklund Drilling, \$36,000 to GeoFlight, plus various other companies. We have paid over \$100,000 to consultants -- \$60,000 to Roger Steininger, \$32,000 to Joe Anzman. We have also spent \$45,000 for U.S. travel. That money goes to United and Delta airlines, and businesses like the Holiday Inn in Elko, Nevada. Also, our BLM claim fees costs totalled \$172,000 for the past year and a half. This is all money spent in the United States.

I am often asked whether the U.S. still has the potential for major new mineral discoveries. I am always surprised to learn that many people think that prospecting and mining is something that happened early in the last century. It is my experience that many new deposits are being found, some of them at or near the surface.

Most of our exploration is in Nevada. We were fortunate in the late 1980's and early 1990's to have been able to participate in one of the largest new discoveries of gold in recent U.S. history. We leased a claim block in Nevada from a small Billings, Montana-based firm in 1987. The owners are two individuals, a lawyer and a geologist, who retired early from a large mining

firm. They staked a major claim block and came to Royal Gold to value the exploration. We took on the property, did work to check the story, and then made an exploration deal with a large mining company. We made a discovery of ore grade mineralization, and subsequently sold our interest to a major mining company, retaining a net profits royalty interest.

Royal Gold meets all U.S. environmental requirements. Our policy is to practice the same environmental standards overseas as we do in the United States. We do not consider any country a pollution haven and would still maintain our same standards no matter where we are mining. All of our employees are environmentally-conscious. We want our employees to have pride in the Company where they work. We believe good environmental practices equates to good business practices.

Like most gold mining firms, Royal Gold has also been looking at properties overseas as a hedge against possible changes in the U.S. Mining Law. During the past three years, we have reviewed submittals from more than 25 countries, and have carried out mine prospect examinations in Mexico, Peru, Ecuador, Guinea, Kenya, Australia, Greece, Armenia and Bulgaria. We intend to continue to look at such opportunities, as we remain concerned about mining law and regulation issues in this country. In the last year and one half, Royal Gold has paid about \$45,000 to international vendors. We have also paid \$35,000 for consultants to look at properties overseas. In fact, tonight I am on my way to Bulgaria to sign an agreement with the Bulgarian government.

Royal Gold is very concerned about the various proposals for mining law reform that were considered in the last Congress. Several provisions of the bills that appeared likely to be finally

enacted would have damaged Royal Gold's existing situation, and would have created inducements for us to move our activities outside the United States.

Royal Gold accepts that it may be appropriate for the government to impose a reasonable royalty, and to institute certain changes in land tenure and patenting rules. We are, however, very concerned about the continuing efforts of special interest groups, under the guise of "mining law reform," to scrap the concept of multiple use, and to use local land use and "suitability" rules to stop mining projects. We support active efforts to reclaim the scars of the past, and to assure that new mines are properly constructed and eventually reclaimed, but we believe that proposals to use more government command and control measures to impose environmental quality are counter-productive. Royal Gold supports new market-oriented approaches to cleaning up abandoned mine sites. Such approaches should include incentives for innovations in clean-up, and should encourage re-mining as one technique for clean-up.

We also believe the current debate over the uses of land in the western United States is broader than can be effectively addressed in commodity-specific legislation like this mining law. Many of the initiatives put forward in the name of mining law reform, such as unsuitability, water quality protection, and concerns for endangered species are really indirect attempts to control land use. Royal Gold believes land use issues should be dealt with in a broader forum.

Finally, Royal Gold strongly urges that any mining law reform bill include a transition clause making it absolutely clear that owners of old mining claims will have a reasonable time to perfect those claims. This reflects the law as it has existed for more than 120 years, and will help the government and claim owners avoid years of expensive litigation over the issue. Our system of law has always frowned upon retroactive application of laws which take away or modify rights.

On behalf of Royal Gold's shareholders, employees, contractors, and vendors, we ask your support in coming up with satisfactory reform of the United States mining law. We plan to keep looking for opportunities abroad, but would like to continue to work in our own country as much as possible. The folks in Elko, Nevada, hope we can do so as well.

TESTIMONYOVERSIGHT HEARING ON INVESTMENT IN HARDROCK MINERALEXPLORATION AND DEVELOPMENTJANUARY 31, 1995

Good Morning Chairman Calvert, and other Honorable Members of the Subcommittee. My name is Harry Smith and I am here on behalf of Magma Copper Company. Magma is a J.S. based New York Stock Exchange company and is one of the largest primary copper producers in the United States. Magma produces high-quality copper cathode and rod for sale to customers worldwide. It has operations in San Manuel, Miami and Superior, Arizona, in Ely, Nevada and in southern Peru. Our headquarters are located in Tucson, Arizona. I am a Vice President of Magma and President of the Company's Nevada Mining Division subsidiary.

It is my understanding that you will hear today from a number of people on mineral exploration and development, where it is going and why. I truly hope that I can shed some light on that issue based on Magma's experience as a "new" international company, having just acquired a property in Peru. More importantly, Magma is a company that has a long established history of production, mining operations and copper refining in the U.S. Not only do we have long established mines and operations in the United States, but we have also recently permitted a major project using federal lands in Nevada and are looking at new projects in the U.S. and around the world. These projects deal with very basic commodity, copper, which is used in almost everybody's everyday life. Copper is a world marketplace commodity and its production must be competitive in the world in terms of cost where it is produced and sold. I have spent my entire career working with mining operations here in the U.S. Over the past four years I have had both the pleasure and frustration of working with the development of Magma's

Robinson Project near Ely, Nevada. I have become more familiar that I care to admit with the various environmental and public land policy issues associated with the various environmental and public land policy issues associated with developing a mining project in the U.S. What I have learned in the past four years is that this Congress and the people of the United States have to clearly look at what they are doing and how they will deal with mineral development in the future. Many of the things that are required of our industry today and, indeed, the actions that are being contemplated by the 104th Congress will have a profound effect on the future of our industry in the United States. There are clearly challenges that must be met but they must not be at the expenses of a healthy competitive U.S. Mining industry.

I would like to briefly describe the Robinson Project near Ely, Nevada for members of the Subcommittee. This is a \$300,000,000 project in which I am intimately involved in and have direct responsibility to the management and stockholders of Magma Copper Company. I have spent the last four years in making the Robinson Project a reality. Production will not start until the first quarter of 1996. Since 1991, a tremendous amount of effort has been focused on permitting this project. The Robinson Project includes both public and private lands. In fact, the majority of the project is on private lands and indeed in a historic mining district that has been mined for over 100 years. Magma will reinitiate copper mining in this historic district. However, I am here today to tell you that, contrary to popular belief or perception a company must go through detailed, painstaking and time consuming environmental review to obtain a permit to build and construct a mine on federal lands. Our project does involve public lands and we in fact had to go through two very rigorous environmental review processes that, as I have told you, took over four years to accomplish. What we, Magma Copper, have learned is that

it is an incredibly long and expensive process to successfully permit a project. And judging from the debate that occurred during the last Congress and the fact that there remains no resolution of reform of the mining law we are still uncertain as to what affects future requirements will have on our project at Robinson.

Based on my experience with the Robinson Project, several key points can be made:

1. If you want to permit a mining project in the U.S. it is going to be very expensive. For example, to permit Robinson we spent in the neighborhood of \$5 million for environmental consultants alone. There are a myriad of regulations and requirements, both state and federal, that currently exist for mining projects. Many of these regulations do not fit into a nice little neat package, in fact, some are even contradictory. When you believe that you have fulfilled all the requirements of the State permit for example, you may find that there is some type of Federal regulation or permit or some other state permit that requires something vastly different. So it becomes very much a challenge to know exactly what it is you have to do to get a project permitted.

2. The second thing that I can say is that it is going to take a significant amount of time to accomplish permitting and there will be no guarantees that after you have spent this time and money you will be in a position to have any security or to advise your investors that you can in fact build and operate your project. At the end of the day, after having spent many years and millions of dollars in first acquiring and then attempting to permit your project, you can be standing there, literally with draft permits in hand and be the victim of the "32 cent appeal", the

cost of a postage stamp, that can add many, many months, if not years of delay to your project. Once again I can speak to that with some experience and authority, since this is what precisely occurred at Robinson after Magma had invested close to \$100 million on the project.

Even after doing what is considered a rigorous and thorough environmental impact statement under the National Environmental Policy Act, a project can still be subjected to the uncertainty of an appeal that, regardless of the merits of that appeal, which can create a cloud over you project for many, many months.

What this Committee needs to realize and what every person in the U.S. has to realize, is that risk is a real factor that comes to play in deciding where any mineral development company invests its money. If by experience they can see that there may be additional cost constraints or new regulatory requirements and these risks, uncertainties and potential time delays exist in the U.S. but are not as pronounced elsewhere in the world, there is nothing else that can be done in good faith but to recommend the investment in a location with the least amount of risk and uncertainty.

As a matter of comparison, I can also speak directly to a project that Magma Copper Company has just acquired, Tintaya, located in Peru. Tintaya is currently the second largest copper mine in Peru. Magma was fortunate enough to be the winning bidder in acquiring this property from the government of Peru for roughly \$250 million. What we see in Peru is one set of regulations, one ministry to deal with in terms of getting environmental permits and we see a commitment from that country to encourage and foster the responsible development of this property. Let there be no doubt that there are environmental requirements in Peru. We know that for a fact. We also know that we have a project that is currently operating. We have a

project that the government has conveyed to us without uncertainty, with clear rights to develop, and with additional property around it. In fact, our biggest commitment to the government of Peru is to demonstrate to them our ability and commitment to invest more money to insure the long term productivity of this mine. Their biggest concern is: What will Magma do to make this property continue to produce copper, and generate revenue, jobs and opportunity in Peru?

As a matter of clarification, I would like to point out that Magma considers itself an international mining company. We define international as to include the United States and not to exclude it. But, clearly, in order to include the United States, every effort has to be made to maintain and increase the competitiveness of the U.S. mines in the world.

As you may or may not be seeing, copper and, in fact most minerals, are operating in a world market regardless of our sentiments and our desires. The real harsh reality is that if mines in the U.S. cannot compete with mines overseas they just will not survive. They will not be profitable and therefore will be closed. Our employees realize that. Our stockholders realize that. I only hope our government realizes that. There is a need for standards of operation to protect the environment. But every little regulatory change which might have only a slight incremental benefit can have a real effect on the cost of our operations, and if the cumulative effects of those factors are not taken into consideration, pretty soon the harsh reality is we are no longer strong, no longer competitive. The result will be no fundamental wealth generation, no wages, no taxes, no royalties.

I would like to provide one more example relating to Magma Copper Company's global exploration efforts. During the next three years we have approximately \$70 million earmarked for exploration. Approximately \$12 million of that is for exploration in the U.S. And that my

friends is just the harsh reality of our assessment based on our actual experience. It is testimony to the high level of uncertainty in the U.S. right now and until that uncertainty is resolved, the focus of our exploration dollars will be overseas. Compared to even a year ago or certainly five years ago a tremendous amount of capital is now going overseas because of the concern of the regulatory climate in the U.S. and the potential for excessive costs and excessive delays in getting projects permitted. Any further obligations and costs must be seriously considered by this subcommittee and the entire country in terms of what the ultimate effect will be on where our minerals are produced in the future, and where the people from the United States will have to go to buy the mineral products that they want to support their standard of living.

**Statement of FMC Gold Corporation to the House Committee on Resources
Subcommittee on Energy and Mineral Resources, January 31, 1995.**

We appreciate your holding a hearing examining the current regulatory climate for minerals exploration and production in the United States. As a U.S. based company, FMC Gold believes that it is important to determine how the U.S. can best create incentives for mining activity in our country, consistent with our nation's high standards of protecting the public lands for current and future beneficial uses, and recognizing the need by the federal government to realize a fair return from mineral extraction.

FMC Gold has its headquarters in Reno, Nevada. We currently have investments in an operating gold mine in Nevada and are attempting to develop a mine in Idaho. In addition, we are reclaiming mine sites in both California and Nevada. We continue to explore actively for reserves in the U.S. and are committed to further minerals development in this country.

At the present time, FMC Gold does not have any active mineral production facilities offshore. However, we have significantly increased our global exploration activity, a trend which is consistent with our competition and our commitment to becoming a global business. This growth in our offshore exploration is, we would note, largely being conducted with U.S. employees and with exploration technologies which were developed in the U.S.

We are very proud of the contributions of FMC Gold to the overall performance of the U.S. Precious Metals industry over the last decade. The domestic gold industry has had a consistently positive impact on the U.S. balance of trade, been indirectly responsible for as many as 500,000 jobs in support industries and employed up to 30,000 at its peak in the nineteen eighties.

Over the last five years, exploration activities by U.S. companies offshore, including FMC Gold have increased at an inversely proportional rate to the decline of investment in exploration in the U.S. The reasons for growth in offshore exploration are severalfold. They include, with some notable exceptions, a failure to make major new reserve discoveries here. Moreover, expansion of existing domestic reserves, once thought to be promising, has in many instances, including ours, proven not to be the case.

Whether in the United States or abroad, the decision to develop new reserves is guided by prospective profitability given prevailing gold prices. In determining the costs of developing a reserve, many other factors are at play, including the geology of the discovery (i.e. the difficulty of extraction), the economic infrastructure of the region, the availability of skilled human resources, the investment required to bring the mineral into production, etc. In weighing

offshore discoveries, other factors also enter into any final investment decision, including the availability of financial resources, the stability of the political and financial situation, the strength of the currency, any foreign ownership restrictions, and the predictability of tax law.

With mining activities in particular, there are additional important considerations which address access to the reserves themselves; the security of tenure once established; the burden of any special taxes, royalties or fees; and the time required to permit the mine. It is for these reasons, that we have supported the enactment of responsible Mining Law Reform in the last several Congresses. However, the introduction of Mining Law Reform legislation in prior Congresses which, in our view, would have established excessive royalty rates, unnecessarily limited access to federal lands, and subjected already permitted mining activities to further threats of citizen law suits served only to increase the uncertainty factor with respect to future mineral development in the United States. We are hopeful that the effort to reform the Mining Law will be successful in this Congress so as to remove the uncertainty factor around issues of land tenure, royalty rates and environmental requirements. A good reform effort was in reach in the last Congress which would have allowed a fair return on mineral value extracted from the public domain, allowed lands to revert back to the public domain once mineral activity ceased, and recognized the important role of the states in ensuring that sound reclamation occurs. We are hopeful a reasonable reform package can be enacted in this Congress.

With other countries now competing with ours for minerals development, we welcome your review of the current investment climate here as compared with abroad. A February 1993 analysis by The Gold Institute documented the several reform efforts being undertaken by Latin American nations to attract U.S. precious metals investment. We have enclosed this analysis and would ask permission that it be included in the Hearing record.

While as indicated above, many factors govern the final decision to proceed with mineral development, our recent experience in attempting to bring on line a new precious metals facility in Salmon, Idaho suggests the need for this Congress to pay particular attention to The Endangered Species Act as it identifies potential impediments to the development of mining in the United States.

FMC Gold adheres to the Worldwide Environmental Policy of FMC Corporation, our parent company. In particular, we recognize that in developing mineral reserves in a National Forest (in our current situation the Salmon National Forest), we have a special obligation to make certain that our activities are consistent not only with all federal, state and local environmental requirements, but where feasible, go beyond compliance. Our track record is proven in this

regard. For example, at our Gabbs Nevada Gold facility, which we are now reclaiming, we double lined our tailings pond, a measure not required by either federal or state law for such facilities. At our Beartrack mine in Salmon, Idaho, we have upgraded our heap leach liner and added another layer of geosynthetic liner to our metal processing ponds. Both of these initiatives exceed existing regulations or the requirements in our permits.

FMC Gold, through its subsidiary, Meridian Gold, started permitting the Beartrack Mine project beginning with a proposed plan of operations to the Salmon National Forest on March 24, 1989. After receiving approval and following the issuance of an Environmental Impact Statement on May 28, 1991, we proceeded to obtain the necessary permits from the state of Idaho, including approval of a reclamation plan and issuance of a cyanidation permit. Numerous agencies from the federal government participated in the review of the state mandated permits and developed specific permits that address wetlands and various sections of the Clean Water Act

In addition, because the National Marine Fisheries Service (NMFS) listed various Snake River salmon as threatened or endangered species under the Endangered Species Act (ESA), and then designated a critical habitat for these species, the Forest Service and NMFS conducted a formal consultation for the project under Section 7 of the ESA. The consultation, despite overly conservative assumptions concluded that FMC Gold's so called Beartrack Project will not jeopardize listed salmon or destroy or modify critical habitat. It also concluded no measurable take of salmon would occur.

Consistent with the terms in the permits and taking all precautions described in the Biological opinion, construction on the new project began in the summer of 1994, employing some 140 people in the Salmon Idaho area, and drawing on another 250 employees who are involved with suppliers to the operation.

But, despite having run this long gauntlet of approvals, the project is now subject to a law suit which threatens to stop all mining, grazing, timber and road development projects in the six national forests of Idaho. A lawsuit brought by The Pacific Rivers Council and The Wilderness Society against the U.S. Forest Service sought to prevent any of these ongoing or contemplated projects from proceeding until after the initiation and completion of new Forest Plan consultations between USFS and NMFS under Section 7 of the ESA. We understand that following the government's initiation of consultations, the plaintiffs and the government have agreed to a temporary stay of an injunction in the litigation. But the situation remains very uncertain for all involved.

In an address before the Boise Chamber of Commerce on September 8, 1994, then Governor Cecil D. Andrus, former Secretary of the Interior under President Carter stated his concerns about the exposure of already permitted projects to this type of legal action, when he said the following:

And they (the plaintiffs in the law suit) are wrong on the Salmon National Forest where the Beartrack Mine has complied with everything from the state's water quality regulations to the Endangered Species Act and has already been approved by all layers of government.

The companies have met all the requirements, have secured all the necessary permits and are investing big money to bring the projects on line and somebody with an ax to grind writes a letter and shuts everything down.

We would concur that Congress should examine the ESA carefully. While the goals it purports are widely shared and laudable, the Act is being used in a way which impedes the responsible development of our resources. It not only unreasonably extends the time necessary to permit a facility, but can subject already permitted facilities to unreasonable shutdown. Our company accepts the burden of proof to show that our facilities will meet rigorous environmental standards, whether located in the U.S. or internationally. But we believe the current method of using ESA as an on-off switch for the National Forests, and more particularly already approved projects, should be subject to your subcommittee's examination. We believe it has the potential to grow in significance as a factor which will turn the decisionmaking as where to invest our future resource dollars.

Sweetgrass Saga

In 1986 when Curly Bear Wagner became the cultural coordinator of the Blackfeet at their reservation in Browning, Montana, one of his first tasks was to go down to Great Falls and protest the Bureau of Land Management's decision to allow exploration for gold mining in the Sweetgrass Hills—an English mistranslation of the Piegan for Sweetpine Mountains. "Me being very new at this, I had to get advice from the elders," Curly Bear recalls. "So I went and I talked with my senior elder, and he said, 'Curly Bear, here. Take this sweet pine, and on your way to Great Falls, you're driving, about halfway between Great Falls and Browning, you turn off and you get out of your car and you face to the east and you burn the sweet pine. You smudge yourself with it all over, and you ask for help from the Great Spirit. Ask Him for help, and by the time you get to Great Falls, you'll have the knowledge of what to say.'"

"So I did this. I stopped and I smudged and I got in my car and I drove on and I got to the Bureau of Land Management office in Great Falls and I walked in and there were a lot of government officials sitting at this table. And I said, 'I'm here to represent the Blackfeet tribe, and we the Blackfeet people appeal your decision. That was all I had to say, and they folded up their books, and I came on home and we gave it to our lawyers and went to work with the procedures for appealing their decision.'"

That prospective mining company pulled out, but another came in to take its place, and when that one left, another came. "The fight is ongoing," explains Curly Bear, who

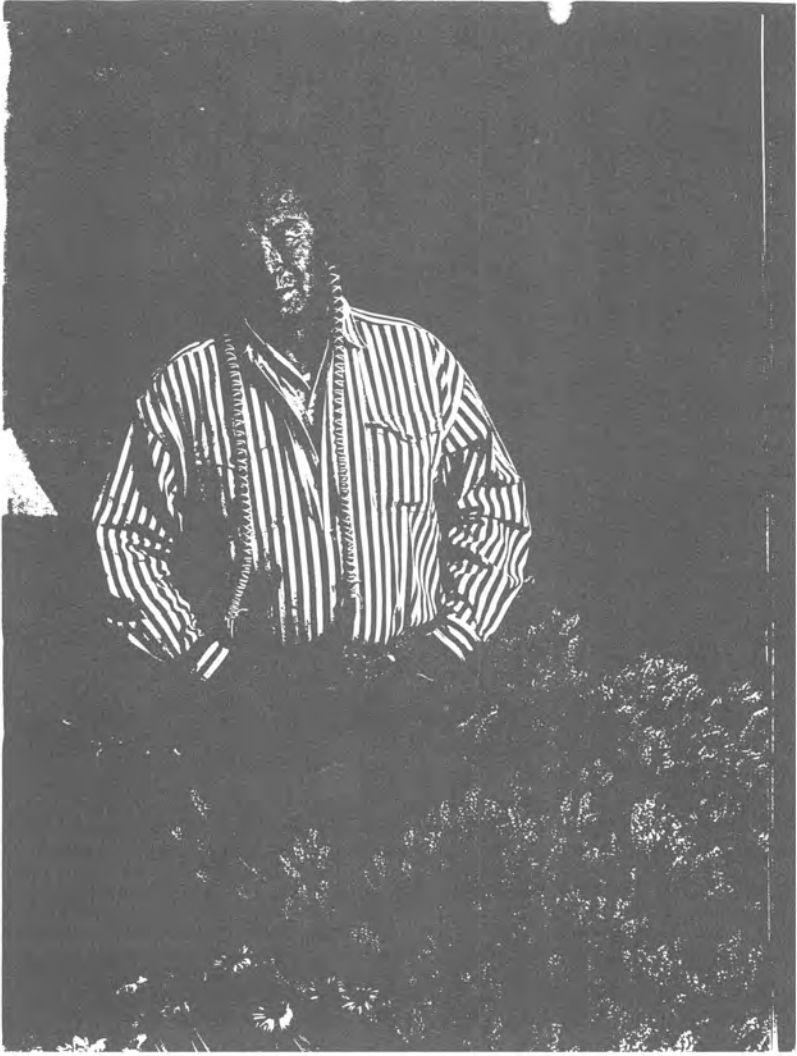


As a member of a Montana coalition of ranchers, American Indians, and environmentalists,

Curly Bear Wagner, the cultural coordinator of the Blackfeet tribe, fights to save the Sweetgrass Hills from destruction by gold mining.

BY JANE BROWN GILLETTE

PHOTOGRAPHY BY SKIP BROWN





Human beings have looked at the Sweetgrass Hills in wonder and awe

is still telling people why the Sweetgrass Hills should be closed to mining. One of Curly Bear's tasks as cultural coordinator is to let people know that the Hills play a long, important role in Blackfeet culture and that the Blackfeet still use the Hills in the practice of their religious beliefs. But Curly Bear has faith in powers that reach beyond those of public relations and politics. "There is so much paper being passed around by government agencies concerning the Sweetgrass Hills, but the people should walk with faith. I know that the Sweetgrass Hills will never be disturbed. Because I have faith, I know that the Great Spirit will protect them."

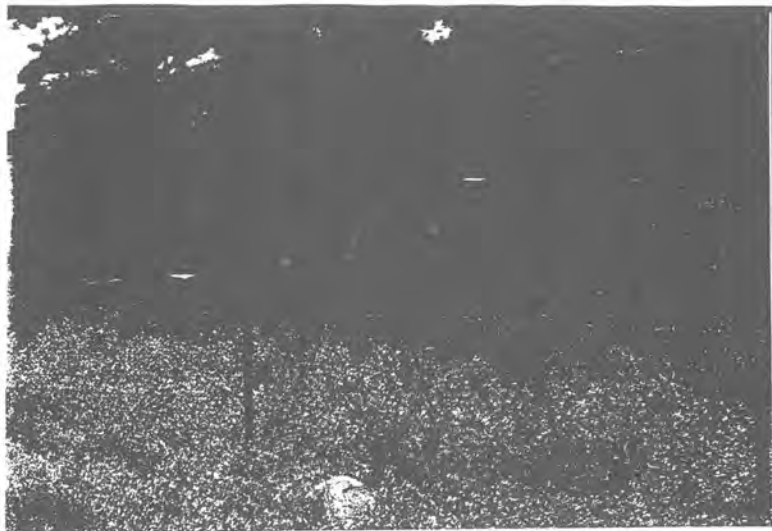
Rocky Mountain "outliers," located more than sixty miles out on the plains, the Sweetgrass Hills are a small range of buttes that rise abruptly from the prairie midway along the common border between Montana and Canada. There are three main buttes—East, Middle or Gold, and West—plus two distinct smaller buttes—Haystack and Grassy. Coming from a hundred miles away, we can see them, perched up on the horizon, and it is easy to imagine how human beings have looked at the Sweetgrass Hills in wonder and awe: for the more than 10,000 years that man has inhabited northern Montana, it is the Hills' unique presence on the landscape that is the basis of their sacred nature.

In 1993 the National Trust placed the Sweetgrass Hills on its

list of the Eleven Most Endangered Historic Places. Shortly thereafter, in light of widespread protest, the Bureau of Land Management (BLM), the agency of the Department of the Interior that controls the use of public lands, sequestered the Sweetgrass Hills from mining for two years so that it could review the validity of the mining claims on public land and its own management plan for the Hills. The BLM is currently examining alternatives that range from one extreme—allowing mining on all valid claims—to the other—a buyout of all valid claims, presumably by some combination of private, tribal, and federal money. The National Trust, along with American Indian and environmental groups, has urged the BLM to ban mining and exploration permanently from the Sweetgrass Hills.

Even if the BLM were to institute this last alternative, the Hills would still be endangered by mining on private lands, which far outnumber the public. But the BLM action could make any private mining of the Hills economically infeasible, and so the decision is eagerly awaited by both sides in the controversy. Action on these matters is politically sensitive, legally touchy, precedent-setting, and, hence, remarkably slow. Reports on both the validity of the claims and the BLM management plan are expected by the end of 1994, conceivably after the Montana congressional election. The current BLM moratorium on mining the Hills will end in the summer of 1995.

For concerned historic preservationists, the Sweetgrass Hills



r the more than 10,000 years that man has inhabited northern Montana.

represent a different kind of historical resource. For one thing, the area that has been determined as eligible for listing in the National Register of Historic Places covers some 1,750 square miles. The importance of the Hills in environmental terms is fairly easy to understand: They are the aquifer for a large agricultural region that produces winter and spring wheat, barley, and alfalfa. Modern gold mining, unlike the more romantic business of earlier times, involves stripping the ore, pulverizing it, piling it onto a leach pad, and infusing it with a cyanide solution to release the gold. Not only does the cyanide threaten the water, but also crushing the ore releases such heavy metals as lead, mercury, and arsenic—all poisonous. And if the ruin of the water supply is possible, the destruction of the landscape is a sure thing, as Montanans have already learned from the mining at Zortman in the Little Rockies.

Beyond environmental ruin, however, lies the threat to a culture that is more complicated and, hence, more difficult to understand. The Sweetgrass Hills are an American Indian sacred site. "We still use the Hills as fasting areas, as ceremony areas, as prayer areas," explains Curly Bear. "We believe the Sweetgrass Hills are a centrally located place, and that's where our prayers are gathered, and they go up from there." The Sweetgrass Hills also figure in the religious beliefs of the Chippewa Cree, the Gros Ventre, the Kootenai, the Salish, and the Assiniboine, among others. Opposition to mining the Sweetgrass Hills

has drawn together a coalition that is remarkable in the West and includes ranchers as well as Indians, preservationists, and environmentalists. If the ranchers talk more about water, they also feel the spiritual dimension of the Hills. William DaFoe, a rancher who came to the Hills from Flint, Michigan, in 1938, puts it well: "I don't oppose prosperity, but to run our water is nuts," he says. "And when my wife died sixteen years ago, I used to go up on the Hills and sit there and get my brain straight." The difference between white and Indian perceptions of the spirituality of the Hills is, however, more than a matter of degree. Some of the elders say that if the Sweetgrass Hills are destroyed, the world will end.

Among the American Indian protesters against the destruction of the Sweetgrass Hills is a member of the prestigious Red Crow family, Curly Bear—named after a famous chief and warrior of the Blackfeet. As cultural coordinator, Curly Bear spends much of his time crisscrossing Montana in his Chevy Blazer and telling the story of the Blackfeet in a guttural voice with an accent reminiscent of Canada—round o's, dropped g's, strong barred r's. For his formal presentations he wears a ribbon shirt, jeans, boots, a bone choker, and several pieces of heavy silver jewelry. His most distinctive physical feature is his long black hair, wrapped into braids by red cloth and bound with cords. His most distinctive personality trait seems to be an inde-

The Sweetgrass Hills are a place where the Blackfeet have gone sin

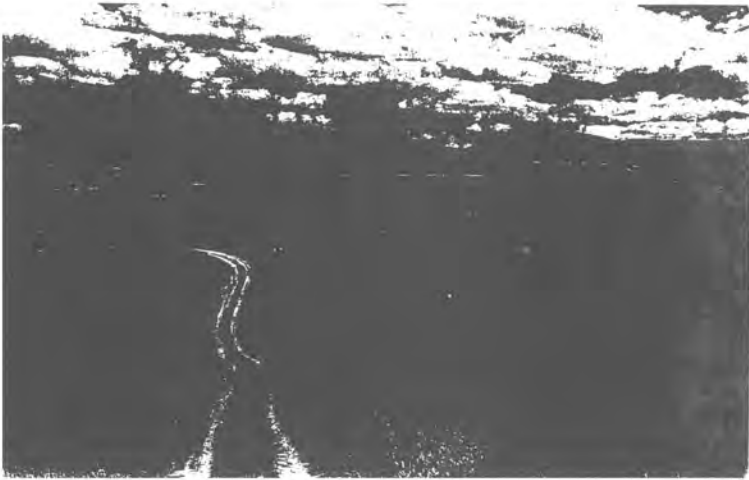
tractible good humor. On foot he hunches forward, head tilted downward, as if heading with determination into a perpetual cold wind.

Dave Schwab, the archaeologist who coauthored the National Register Nomination for the Sweetgrass Hills with Chere Justo, calls Curly Bear "the gatekeeper. He works with the tribe and with the bureaucratic and governmental community. He can function in both worlds." Many Indian traditionalists have been understandably reluctant to discuss their religion with outsiders, but the threat to the Sweetgrass Hills points out the need to work cooperatively and actively to identify and protect other American Indian sacred sites.

While following Curly Bear around for a week, we see how he interacts with both traditionalists and bureaucrats. On a Monday evening in June he hosts a dinner for the elders, but on another more typical night, George and Molly Kicking-woman, medicine persons in their eighties, drop over for an informal supper of hangover stew and tea—and a long discussion about getting back a medicine pipe that someone took to Bozeman. Later in the week Curly Bear meets a BLM agent in Chouteau to discuss proposed signage on an existing trail at a nearby Blackfeet sacred site. They touch on many matters, and it seems to an uninformed observer that the trail matter has basically served as a pretext for a meeting between men who know how important it is to keep in touch beyond the phone. By the end of the meeting, however, the BLM agent seems to have tentatively agreed to a more thorough government-funded ar-

chaeological study of the Sweetgrass Hills. Curly Bear also interacts with bureaucrats on a much more formal level: he spends a lot of time in Helena, the state capital.

Curly Bear is indeed a recognizable—and accessible—figure throughout much of Montana. A waitress in Dillon asks if he knows an Indian she knows, a Sioux named Boots something or other. Small children approach him in restaurants. A National Park guard smiles, "You look like someone famous." The desk clerk at his usual motel greets him with good news: "Curly Bear! Curly Bear! I'm gettin' married!" Endlessly on the road, Curly Bear plays a little video poker, drinks Coca-Cola Classic, smokes a lot, treats himself to cappuccino whenever the opportunity arises, and cheerfully answers question after question after question about the Blackfeet. In the church at the ghost town of Bannack—a Montana state park—he talks about hunting buffalo during the Dog Days. At East Glacier Lodge in Glacier National Park, in a lobby lined with lonic columns fashioned from forty-five-foot logs, Curly Bear talks about Blackfeet marriage customs to more than 100 visitors, including some honeymooners from Washington, D.C. (One of Curly Bear's ancestors, the Pkani chief Lone Walker, had nineteen wives; another, Red Crow, seven.) The park borders the Blackfeet reservation, and Curly Bear speaks there twice a week during the season. At Many Glaciers Lodge (where the log columns in the lobby have Dornic capitals) a drama group Curly Bear has recruited from Indianapolis is using actors from the reservation to present a play about the Blackfeet. In hundreds of such talks and activities Curly Bear is



me immemorial to find out what the Great Spirit wants them to do.

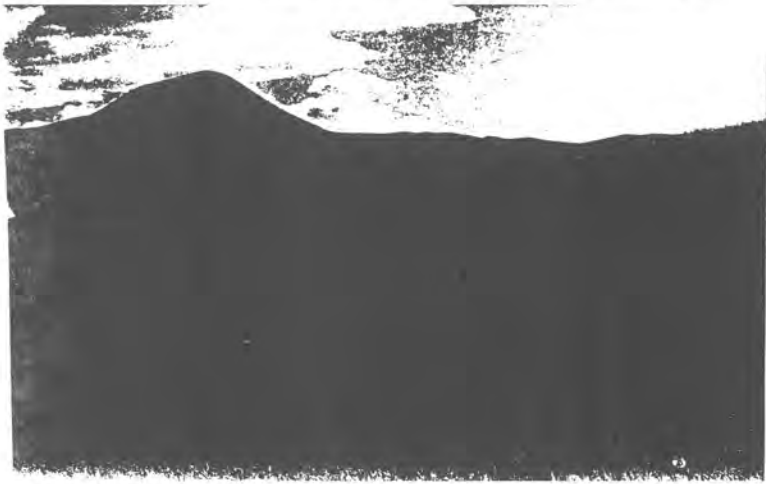
informing an audience about a set of unfamiliar customs and religious beliefs that have helped the Blackfeet survive their history. In listening to Curly Bear it is sometimes hard to tell what happens today from what happened thousands of years ago.

The history of the Blackfeet that Curly Bear recounts is one chapter in the tragedy of American Indian genocide that underlies the foundation of the United States. Estimates of this holocaust differ, but from one to ten million pre-Columbian Indians had dwindled to 300,000 by the 1860s when the western tribes found themselves in the way of white progress, a tale most dramatically told in Dee Brown's *Bury My Heart at Wounded Knee: An Indian History of the American West* (Henry Holt, 1970). The origin of the Blackfeet may be doubly in doubt. Many American Indians dispute the theory that they derive from a group who crossed the Bering Straits into Alaska, in part because this theory has been used by the white man to paint a picture of the Indian as a recent interloper in a land that was up for grabs. Also, for the same reason, many Blackfeet dispute the theory that they are themselves recent western migrants from the Great Lakes region—a theory based on the fact that the Blackfeet language is an Algonkian dialect. The archaeological evidence is still incomplete on these points, and, as Schwab stresses, more relevant is the Blackfeet oral tradition, which places them in the area "since time immemorial." Certainly the Blackfeet, or their ancestors, have been in northern Montana for thousands of years, a stone-age culture that

hunted the Buffalo, used the dog for transportation, and developed an elaborate set of religious rituals long before it made contact with the white man.

In his indispensable history, *The Blackfeet: Raiders on the Northwestern Plains* (University of Oklahoma Press, 1938), John C. Ewers points out that for some 200 years three Blackfeet tribes have been known to white men by separate names: the Pikuni or Piegan (further divided into Northern and Southern), the Kainah or Blood, and the Siksika or Blackfoot proper, often referred to as Northern Blackfoot. The tribes are spoken of as one people, Blackfoot or Blackfeet, or Siksikauw, black-footed people—a name bestowed on them by the Cree presumably because their moccasins were either dyed or coated with ashes from prairie fires. From the end of the seventeenth century, the Blackfeet encountered the white man secondhand through the horse, the gun, and such devastating epidemic diseases as smallpox. Prospective Canadian fur traders were the first white men to reach the Blackfeet in any numbers. And from the beginning relations between the Blackfeet and the Americans were particularly hostile. (In 1806 Meriwether Lewis reached Cut Bank Creek on the reservation, the northernmost point of the Lewis and Clark expedition; a few miles farther south, the group killed a Piegan.)

The gun and the horse initially constituted a technological revolution for the Blackfeet, and the tribe reached its apogee of power in the mid-nineteenth century when its numbers were estimated at 7,630 people. The tribe's. (Continued on Page 90)



OPEN HOUSE

(Continued from Page 83) were supposed to apply for a larger home if the second child was not of the same sex as the first. Like many other Greenbelt rules, this one seems to have been bent on occasion. Both bedrooms at 10-B Crescent Road have cross ventilation and small-scaled furniture to make them look larger. The bathroom is small but a model of white-porcelain cleanliness, with a built-in bathtub (no shower). 10-B Crescent Road also boasts an original toilet seat that survived for fifty years in the office of the local dentist.

In 1952 the federal government got out of the housing business and sold the units to a group of residents as a cooperative, Greenbelt Homes, Inc. (GHI). Most of the

greenbelt was sold in the fifties, and over the years the town of Greenbelt has expanded to include new neighborhoods devoted primarily to either apartment buildings or detached houses. GHI currently owns approximately seventeen percent of the town's housing. The current population is 20,317. African-Americans constitute nineteen percent of the total Greenbelt population. Average household income for the whole of Greenbelt in 1990 was \$40,562. The town center has been sensitively restored, and the Center School is currently undergoing restoration as a community center.

In the historic center of Greenbelt an aesthetics and environmental committee decides all requests for changes to GHI housing. Individuality has taken over in a

not unpleasant way—primarily in the form of small additions, aluminum siding, and shutters. In 1983-84 GHI housing underwent a \$30-million rehabilitation. The casement windows were replaced with thermal-pane windows, and the steam heat was replaced with electric. Greenbelt is not the same, and yet it is immediately recognizable.

Perhaps the question that lies behind utopian daydreaming is the matter of personal survival. Could I live in utopian housing? To the visitor who comes to Greenbelt on a beautiful day in May the answer is a resounding yes. Greenbelt has changed, but its best features remain: the layout of the community, the interior green space, and the spirit of neighborhood cooperation. ▼

SWEETGRASS SAGA

(Continued from Page 33) reputed fierceness helped to keep the white man at bay, but eventually its lands were defined by the United States in the 1851 Treaty of Fort Laramie and the more important 1855 Treaty with the Blackfoot Nation.

The gold rushes of the 1860s drew more and more white people to Montana. In a culture in which possession of horses determined wealth and status intertribal warfare was constant—and unacceptable to white Americans who saw other possibilities for the lands on which this nomadic life took place. Their interaction with the Blackfeet included murder (173 Blackfeet, mostly women and children, were killed in the 1870 Baker Massacre on the Marias River) and the sale of illegal whiskey, in which alcohol was used as a lure by white traders. The Blackfeet grew increasingly dependent on treaty rations; in 1883 the buffalo disappeared, victims of overhunting and the invasion of civilization; and in the Starvation Winter of 1884, the Indian Bureau was unable to obtain a special appropriation from Congress to buy extra food. Approximately one fourth of all the Blackfeet in Montana died. And in 1887 the tribe ceded the greater part of its reservation land to the government. According to Ewers, "elderly Indians who, as young men, affixed their marks to this paper, referred to it in their conversations with me as 'when we sold the Sweetgrass Hills.'"

Unsuccessful efforts to force assimilation on the Blackfeet followed, including suppression of the language and religious ceremonies, especially the Sun Dance. Readers can gain some estimate of the in-

credible strength of the culture from three readily accessible but very different texts: Walter McCintock's romantic account of his travels with the Blackfeet in 1896, *The Old North Trail: Life, Legends, and Religion of the Blackfeet Indians* (University of Nebraska Press, 1910); Hugh Dempsey's biography of Curly Bear's ancestor, *Red Crow, Warrior Chief* (University of Nebraska Press, 1980); and William E. Farr's *Reservation Blackfeet, 1882-1945: A Photographic History of Cultural Survival* (University of Washington Press, 1984). Despite everything, the Blackfeet and their culture survived. Today there are some 14,300 Blackfeet in the United States; half of them live on the reservation.

At first glance Browning, the main town on the reservation, looks bleak, dominated by the signs of poverty. But Browning looks better the more we see of it. For one thing it enjoys a view of the Rockies—called "the backbone of the world" by the Blackfeet—which tends to dwarf all lesser visual considerations, and it harbors a renaissance of Indian culture that may remind us of the Italian version, which also grew out of the horrors of a dark age. Browning is alive with photographers, movie makers, graphic artists, archaeologists, sculptors, jewelers, writers, and practitioners of such recondite arts as tanning skins, breaking ponies, and reviving traditional ceremonies. (This summer, for the first time in forty years, the Crazy Dog Society performed its dance at Indian Days; Curly Bear danced.) Children learn the Blackfeet language in Head Start programs, and classes in language and culture are offered on all levels, from elementary school through community

college. The Museum of the Plains Indian houses a breathtaking display of crafts—most of them created by women—which show a link between a rich past, through a time of suffering, to the renaissance of today.

Although Curly Bear is not an artist, he is in the thick of things, and his personal story speaks of the energy that comes from a brush with annihilation. Born in Seattle, he was sent back to the reservation following his mother's death when he was five. There he was raised by a close friend of his mother's, whom he calls his grandmother in the Indian fashion. Although he grew up speaking English and only picked up his native tongue a little at a time, Curly Bear was exposed to a traditional way of life at his new home in rural Babb in the northern part of the reservation; he was particularly influenced by his uncles' traditional beliefs.

When he was thirteen Curly Bear was sent to an Indian boarding school but ran away after two weeks and afterwards attended the public schools in Browning, where he largely raised himself. Following graduation from Browning High School in 1963 he attended Western Montana College in Dillon and Palomar College in San Marcos, California, on football scholarships and at twenty eagerly went to fight in Vietnam, where he served in the artillery and saw heavy action.

After returning from the war, Curly Bear worked at the Indian Center in Los Angeles and was active in the American Indian Movement (AIM), serving as state coordinator and taking part in the sieges at Wounded Knee, Alcatraz, and the Bureau of Indian Affairs in Washington, D.C. Although he attended Eastern Montana

State College and worked as the director of a federal jobs program in Billings in the 1970s. Curly Bear began to descend into apoplexy, and it was only after a dark decade that he recovered. He credits his survival to a spiritual experience and to both Christian and traditional beliefs. In some of his darkest moments during recovery he gained strength by reading the Book of Job, and he believes that the traditional beliefs of the Blackfeet saved his life.

Shortly thereafter Curly Bear began working for the tribe. In addition to his speaking engagements he serves on committees and boards that range from the Advisory Board of the Buffalo Bill Museum in Cody, Wyoming, to the Toxic Waste Committee for the Lutheran Church. He was instrumental in recovering Blackfeet remains from the Smithsonian Institution in Washington, D.C., and the Field Museum in Chicago and now serves on the Governor's Board for Montana Burial Preservation. His many fund-raising activities include winning a large grant from the National Endowment for the Arts to serve as seed money for founding a cultural center on the reservation.

Although much of Curly Bear's work is centered around the tribe, he is also a private entrepreneur. For the last eight years he has operated a tourism business, showing visitors such sights as a buffalo jump, teepee rings, the site of Starvation Winter, and the Whoop-up Trail—all of this with a running commentary on Blackfeet history, current Indian concerns, and stories about the mythical character Napi that the Blackfeet use to instruct their children. For this tour he won a 1993 tourism award from the State of Montana. He has also won the prestigious 1991/1992 Montana Historic Preservation Award.

Much of Curly Bear's energy in promoting Blackfeet culture in these various public and private enterprises stems from his desire "to give something back" from his firsthand experience of the power of traditional belief. His is powerful testimony. As the elders say, Curly Bear "carries the spirits on his back."

When most of us speak of sacred sites, we think of church buildings. If we speak of the land as sacred we are usually employing a metaphor. These days in the east we hear the term most frequently associated with Civil War battlefields; in this case "sacred" refers to the sense of awe that we experience in places where men have died for

the glory of the state. There are very few natural sites in Western and Judeo-Christian culture that are literally connected with God, Delphi and Olympus come to mind, as does Mount Sinai. The Sweetgrass Hills are a place where the Blackfeet have gone "since time immemorial" to find out what the Great Spirit wants them to do. The Hills are a place for vision quests in which spirits—frequently in the forms of animals—come to the Blackfeet in dreams to give them the knowledge of such things as healing plants, strategies for war and politics, and a range of rituals that affect divine action.

It only seems logical that such holiness would protect the Sweetgrass Hills—especially their higher reaches—from destruction, but this is not yet the case. According to Karen Atkinson, a tribal attorney for the Confederated Salish and Kootenai Tribes of the Flathead Nation and a National Trust advisor for Montana, several Supreme Court decisions in the 1980s were serious blows to the recognition of Native American religious sites. "A coalition of Indian tribes and religious, human-rights, and environmental groups has been working on a federal law that would protect sacred sites," says Atkinson. Senator Daniel Inouye, the chairman of the Senate Indian Affairs Committee, has introduced the Native American Cultural Protection and Free Exercise of Religion Act of 1994, and Atkinson explains that if it is passed in time it can protect the Hills—one of the best documented of American Indian sacred sites.

For example, the Sweetgrass Hills are mentioned in the origin myths and in the various cycles of tales recorded by academic anthropologists and historians. Most accessible for the general reader, however, are the extraordinary stories told by Percy Bullechild, a full-blooded native speaker who lived on the reservation. These are collected in *The Sun Came Down: The History of the World as My Blackfeet Elders Told It* (Harper and Row, 1985). In one of the most important stories, Scarface, who will remind readers of heroes as different as Jack in the Beanstalk and Jesus, undergoes a series of four vision quests in which he is taught various elements of sun worship. The first of these quests takes place on East Butte in the Sweetgrass Hills.

In the traditional fashion still followed by the Blackfeet, Scarface struggles to reach each location, purifies himself (on several occasions in a sweat lodge), and eats and drinks nothing for four days. When he falls asleep on the fourth night

he is visited by a spirit. "A spirit," Bullechild reminds us, "is one of the many lives of nature.... mountains, rivers, lakes, trees, rocks, the birds, animals," and so forth. After his last quest, in an extreme instance of what happens to many questing Blackfeet, Scarface returns to the tribe with knowledge that in this instance ranges from a design for a teepee cover to directions for building a ceremonial site and performing a complex ritual to celebrate the sun.

Today we can see physical evidence of quests like Scarface's in the Sweetgrass Hills. The rock cairns that the quest seekers constructed to provide shelter for their four-day ordeals are the most prevalent man-made remains on the Hills, along with eagle-catching pits, which were used to supply feathers for decoration and ceremonies. Some of the knowledge that the questers brought home consisted of instructions for collecting bundles of natural items—plants, rocks, animal skins, or eagle feathers, for example. Many of the plants, specified in visions and gathered in places like the Hills, were medicinal and over the millennia came to constitute a Blackfeet pharmacology. But other natural objects, like the feathers and skins, seem to have been and continue to be more symbolic in the sense that they are physical reminders of the powers of nature and not themselves the powers. If destroyed, for example, they can be replaced—although like the cross in Christianity they have a power of their own.

These objects and their accompanying rituals constitute an elaborate symbolic structure that alleviated the anxiety of a nomadic culture dependent on game for survival and constantly at war, just as today it fends off the anxiety of the modern world. As Curly Bear explains, "We keep our old ways so that we can get along in this world, survive. These ways were handed down from generation to generation. The Hills are like Mount Sinai. That's where grace comes."

Given the Blackfeet appreciation of the natural world and their highly evolved symbolic representations of the powers of nature, it is particularly irritating that the Sweetgrass Hills are in danger because of a substance that, for the white man, has long been symbolic of eternity, value, virtue—and greed. Montana, or any place where gold has been found in the past, is particularly vulnerable today, given the new technology for recovering "micro" gold, a profitable yet, one suspects, not very

satisfying endeavor since most of today's miners never see so much as a glimmer. In *Last Refuge: The Environmental Showdown in Yellowstone and the American West* (William Morrow, 1993) Jim Robbins points out that the world production of gold is shifting away from South Africa. In 1979 the total production of gold in the United States was 964,000 troy ounces; by 1987 that amount had leaped to 4.9 million troy ounces; and in 1991, to 10 million troy ounces. In addition to a shift, there has been an increasing demand. Some gold goes into coinage and dentistry, uses that consumed some 285 metric tons of gold in 1991. But the greatest amount in that year went into jewelry—gold chains and bracelets and rings and such—which consumed 2,100 tons. Since world production, excepting Russia, for 1991 was only 1,312 metric tons, jewelry also consumed recycled gold and gold obtained from bank sales. Robbins reports that in Japan, a culture formerly subdued in personal style, the average woman today owns nine pieces of gold jewelry.

The Mining Act of 1872, while not directly responsible for the situation in the Sweetgrass Hills, is still the basis for decisions about mining public lands. Federal agencies like the BLM say that "the right to mine," established by the law, overrides even such procedural safeguards to historic sites as the Section 106 review. Efforts continue to amend the law in ways that will bring both safeguards to the land and compensation to the federal government, which is forced by the law to receive a ridiculously small amount of money for mining on public lands. Claims, which can

be patented, must be improved from year to year and must be assessed by experts to see if they hold the promise that their owners assume they do; in the Hills only around twenty claims are critical, including a number owned by E.K. Lehmann of Minneapolis, who is reputed to be one of the largest owners of claims in Montana. It is Lehmann who over the years has tried to bring in company after company to mine the Hills. The validity of these claims is currently being determined for BLM by expert examiners, and Francis R. Cherry, Jr., the acting state director of the BLM in Billings, points out that if the claims are valid they must be honored in some way.

Exploration as well as actual mining should be prohibited in the Sweetgrass Hills, for any activity that endangers their natural qualities destroys the very holiness of the place. When Curly Bear was growing up, one of his uncles asked him, "Who are you?" And basically I didn't answer because I didn't know," remembers Curly Bear. "And then he said to look around me at the sun, the wind, the flowers, the weeds, lakes, rocks, animals, hills. That's who you are. It's where you come from and it's where you go."

But there is a vital difference between human beings and nature—one emphasized by the Blackfeet culture. Humans improve by suffering. In the Napi stories that the Blackfeet tell to instruct their children, even Napi learns by making mistakes. He seems only to suffer a little, but central to Scarface's story is that in order to gain something very important he had

to suffer a lot, undergoing a sort of crucifixion in order to win the chief's daughter in marriage and bring sun worship to the tribe—a ritual that itself has historically involved self-torture. People learn by mistakes and grow stronger from pain; cultures that survive profound upheavals may grow more complex; but the environment gains nothing from suffering.

Arlo Skari, a Sweetgrass rancher who is the director of the Sweetgrass Hills Protective Association, hopes that Secretary of the Interior Bruce Babbitt "doesn't give up on the Sweetgrass Hills and continues to sequester them from mining for the sake of the water and the Native American religion. The Hills just don't deserve to be torn down," says Skari. "We white people have only had 'em for a hundred years, and here we are, launching the Final Assault." Curly Bear is full of hope for the Hills, and also for traditional religion and culture, which he feels may point the way for everyone as the ways that the white man brought to the New World prove increasingly weak. "We haven't assimilated ourselves into the white man's way of doing things," he says. "When the white man came here, his way of survival was tearing up the land. His survival was destroying anything that got in his way. Our survival is looking at those things and gaining knowledge from them." ▼

For more information about the Sweetgrass Hills, contact Arlo Skari, Sweetgrass Hills Protective Association, (406) 792-3602; for more information about Curly Bear's historical tours of the Blackfeet reservation, call (406) 338-2058.

L.A. DEFINED

(Continued from Page 42) president, had been joined the preceding month by Ruthann Lehrer serving as the Conservancy's first executive director. Lehrer, today the neighborhood and historic preservation officer for the City of Long Beach, would lead the Conservancy's preservation efforts on behalf of the library during the 1980s.

Bach, Lehrer, and Welborne sought to strengthen their political hand by winning over the downtown business establishment. Welborne, a third-generation Angeleno who had served on an environmental task force for the central business district, realized that "the senior people at the Community Redevelopment Agency had planning backgrounds and interests in historic preservation, so they knew that

tearing down the Central Library would be a disaster. But they ultimately were under the city council and the mayor."

And so Welborne devised a method for isolating and outflanking those who wanted to tear down the library—primarily the library administration, the brokers of downtown real estate, and Councilman Lindsay. Welborne formed a group called the Citizens' Task Force for Central Library Development that included representatives of the Conservancy and the CRA and set out to win over the prestigious Central City Association representing major corporations headquartered downtown, law firms, and business clubs. He received that critical endorsement following a luncheon meeting of downtown business people at which Phelps presented the case for preserving the building and its grounds and Jones presented his case for

the librarians' needs. "It was a seminal event," says Welborne. "We just blew the opposition away." Beginning with that meeting, Bach confirms, "preservation [of the library] became the darling of the corporate powers of downtown."

Armed with the business establishment's blessing, the task force asked the mayor to delay consideration of the request for proposals and the library board to accept the gift of a management-consultant's services to evaluate the overall operations of the library system and to suggest ways for the building to be saved. The resulting study, by consultants Arthur D. Little, Inc., and another study financed by ARCO and the Los Angeles development firm of Maguire Thomas Partners effectively undermined the 1966 Green Report's demolition premise, provided the rationales for keeping the Central Library as

Statement by the
 Confederated Salish and Kootenai Tribes
 of the Flathead Nation

and the

Chippewa Cree Tribe
 of the Rocky Boy's Reservation

Submitted into the Hearing Record

House Subcommittee on
 Energy and Mineral Resources

Oversight Hearing on Investment in Hardrock Mineral
 Exploration and Development
 Where its Going and Why

January 31, 1995

The Confederated Salish and Kootenai Tribes, the Chippewa Cree Tribe of the Rocky Boy Reservation have requested Congressman Williams to submit the following statement into the above-referenced hearing record.

We have strongly advocated and supported the Bureau of Land Management's ("BLM") actions to protect the Sweetgrass Hills. Congressman Williams has been a successful advocate on our behalf, bringing this issue to the attention of the Department of Interior and to the BLM. Congressman Williams has described the Hills as "one of the most sacred places to the Native Americans of the northern Great Plains, and a place that is deeply, profoundly loved by the farmers and ranchers who've lived for generations in their shadow."

The Sweetgrass Hills has been determined eligible as a National Register District of paramount importance to the traditional religious practices of many Montana and Canadian Tribes, in 1993 it was listed as one of the Eleven Most Endangered Historic Sites in the Nation by the National Trust for Historic Preservation. The Tribes strongly support the withdrawal and segregation of the public mineral estate from locatable mineral entry in the Sweetgrass Hills because open-pit mining in this area would destroy irreplaceable cultural and spiritual sites. Withdrawal of the public mineral estate is necessary to avoid destruction of traditional cultural properties and to protect religious, cultural, and environmental values and practices

associated with these properties.

For perhaps as many as 12,000 years, Sweetgrass Hills has been a significant sacred area of Native American Tribes. The oral traditions of the Blackfeet, Chippewa-Cree, Gros Ventre, Salish, Kootenai and Assiniboine demonstrate that this area continues to be an area of spiritual retreat and an area where ceremonies are conducted. This area is of significant importance to the cultural and religious practices of these Tribes who continue to regularly travel to the Sweetgrass Hills to conduct ceremonies, and to gather medicinal plants and paint.

The Montana State Historic Preservation Office has declared the area eligible for the National Register as a traditional cultural property and has prepared a draft Sweetgrass Hills Historic District nomination. In its nomination, the State Historic Preservation Office has described the Sweetgrass Hills as:

"Rising above the surrounding plains and conspicuously visible from the neighboring country, they appear distinctive and prominent in their prairie setting. It is the hills themselves, organic and primal, which comprise the essence of this cultural landscape. Within this landscape, the cultural remains form the tie between the hills as a sacred, living place and the native people who recognized them for the powers inherent therein."

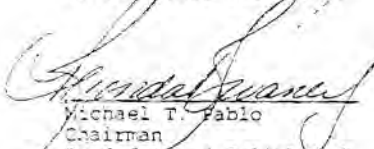
The Sweetgrass Hills is also important to other residents in the area who value the pristine environment of the Hills. The livelihood of local farmers and ranchers depends on the Hills, which provide the only source of potable water in the region. Recognizing the special cultural and environmental qualities of the Sweetgrass Hills, the BLM has designated it as an area of critical environmental concern (ACEC). The ACEC designation specifically acknowledges that the Hills are of important cultural and religious significance to Native Americans. Withdrawal of the public mineral estate is consistent with the designation of the Sweetgrass Hills as an Area of Critical Environmental Concern and would protect other important resource values such as water quality and wildlife habitat.

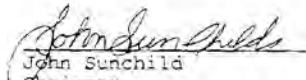
Section 1601.0-5 of Title 43 of the Code of Federal Regulations provides that an ACEC "means areas within the public lands where special management attention is required ... to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems ...". The Sweetgrass Hills is certainly an area where special management in the form of withdrawal of mineral entry is appropriate to protect irreplaceable cultural and religious sites.

Withdrawal from mineral location and entry is also consistent with the federal government's trust responsibility to protect and preserve Indian communities and cultural integrity, and is consistent with BLM's heightened responsibility to consider the effect open pit mining in the Sweetgrass Hills will have on cultural resources and practices. In order for Tribes to continue to use the Sweetgrass Hills for religious ceremonies the Hills must be maintained in a condition appropriate for religious use. These non-mineral values must be given considerable weight in making long-term land use decisions regarding the Hills.

Thank you for consideration of our views on this area of paramount concern to us.

Respectfully submitted,


 Michael T. Pablo
 Chairman
 Confederated Salish and
 Kootenai Tribes


 John Sunchild
 Chairman
 Chippewa Cree Tribe

January 26, 1995

Honorable Members
Subcommittee on Energy and Mineral Resources
Washington DC

Dear Members:

I understand that this committee is hearing complaints and testimony from the mining industry because they are being shut out from the U.S. and having to go elsewhere in the world. I am sure that as in every case, they have some well deserved complaints but there are always things we can complain about. I am writing to you to please consider that there is another side of the mining story.

When the 1872 Mining Law was enacted people basically dug holes in the ground with picks and shovels. They worked and worked to move a ton of rock in several days. With giant machines and large blasting techniques this same ton of rock can be scooped up in a matter of seconds, hoisted on a truck and carried to its destination in no time at all. Yet, the 1872 regulations still oversee this industry. No other industry could even think of operating under such out of date laws. A mine today can eat away at a mountain and in a matter of a couple years completely wipe it off the face of the earth. Left behind is the ugly scar that nature will never fully restore to its virgin existence. This does not even mention the fact that in most cases the groundwater is totally wrecked beyond hope and that streams run red because of their mineralized load. Neither groundwater or surface water is fit for consumption after such an operation. The Landusky-Zortman Mine is such an example. This mine is only 80 miles from us and they have had nothing but problems lately. But that's excusable because there are no laws that said they have done wrong.

The Sweetgrass Hills in northcentral Montana is a very little mountain range with a unique ecosystem in comparison to the surrounding plains. They are a sole source aquifer for 3 major public water systems that serve the rural area around them. The water systems serve people in a 40 mile radius around the Hills and water is delivered to people in 3 counties from the Hills. The geology in this area is very complex and geologists have not gotten a good grasp the the hydrology in the area to date. There are lots of theories and ideas but nothing concrete.

However, most hydrogeologists believe that the aquifers originate in the Hills and supply all the springs in the area. Mining would surely affect the aquifers adversely. Since there is no good potable water in the foothills or plains you can see the concern of many people in the area. Livestock water supplies would be diminished and good potable water for human consumption would be gone. There is no other sources for water other than the Sweetgrass Hills!!!! If it is ruined, so are the people of the area surrounding the Hills.

Currently the BLM has a motorized vehicle closure in affect in the Sweetgrass Hills. This was put into affect because the BLM felt that the ecosystem in this area was so delicate that any adverse activity would ruin the wildlife habitat, grass cover and forest cover of this area. If we cannot drive a motorbike or ATV in the Hills, how in world can a mine exist without total destruction to this delicate system. If it can, it appears that we have a double standard in the system - if you are a miner you can do anything but no one else can. IS THIS FAIR!!! NO!

Right in the center of the area is a well known recreation spot that people from all around come to see and visit. This unique geologic structure is called the "Devils Chimney". It is a limestone outcrop cave that is cherished by many people including the Native American people. Mining in this area would certainly mean the end of this structure. In fact, Mr. E.K. Lehman proposed drilling test holes just a short distance from this cave. The preliminary investigation that has been done has already proved to be destructive to this fragile area. Roads have been made without regard for the slope of the area and as a result of much complaining by the public the mess was secured and the erosion that was taken place slowed.


Native American people frequent the Hills quite often. They do their religious ceremonies and worship their maker. I also get great relief from hiking in the Hills as we all do when we go to the mountains. Mining could not take place in the Hills without total disruption of this religious enjoyment. This due to the fact that you can sit in one spot and basically see the whole Hills from one spot.

I have only touched on a few of the many concerns that I and a majority of people have in this area. If allowed to be mined, the destruction of the surrounding farming, ranching and business community would be ruined as they would be put out of business. I respect Mr. Lehman and his views but I think that the other considerations should be carefully studied in this unique case because of the delicate ecosystem in the Hills and because of the small area they encompass.

Thank you for your time and consideration. If you would ever like to personally visit I welcome you with open hands. You need to see the area to realize its delicate standing. If you need additional information I would gladly help any of you to obtain what you might need.

Thank you.

Respectfully,


Rudy S. Cicon

WOLERY RANCH INC.

% Daniel & Janne Wolery
Rte 83 Box 35
Chester, MT 59522

Telephone (406) 292-3593

January 25, 1995

To Whom It May Concern:

My wife and I are 4th generation cattle ranchers in the Sweetgrass Hills. Our ranch is located about 2 miles downstream from the proposed mining activity on Tootsie Creek. It is the first inhabited dwelling downstream from the proposed mining activity. We are very concerned about the possibility of a mine being started in this area. We depend very heavily on a clear and pure source of water for our ranching business. Without good water on our place the land becomes virtually worthless and the business is shortly bankrupt.

We demand that if any action is taken on this issue, that you would take into consideration our rights as landowners and the value that the water is to us and our business. We feel that any sort of strip mining is going to eventually adversely affect the quality of the water aquifers in this area. We stand very much opposed to any mining activity and consider the moratorium by the BLM to be in our best interests. Thank you.

Sincerely yours,

Daniel Wolery

A handwritten signature in cursive script that reads "Daniel Wolery".

Janine Wolery

A handwritten signature in cursive script that reads "Janine Wolery".



MIKE'S IGA, INC.

Michael and Margaret Novak

Drawer 720

U.S. Highway 2 East Chester, MT 59522

406-759-5538

January 26, 1995

Pat Williams, Congressman
2329 Rayburn Office Building
Washington, D. C. 20515

Dear Pat:

Mike and I have just heard that Lehman Associates has somehow persuaded the mining subcommittee to reconsider the moratorium on mining in the Sweetgrass Hills. We wish once again to voice our opposition to any mining in the Sweetgrass Hills, and we urge you to remain steadfast in your opposition to any exploration or mining in this area.

We have attended numerous hearings regarding the preparation of the EIS for mining in the Hills. We have voiced our opinion to the BLM. As business people in the community (except for the county and school district, we are, we believe, the largest employer in Liberty County), we resist the temptation to make short-term profits at the expense of the watershed for an area that covers hundreds of square miles, both in Montana and Canada. We also count these hills as sacred--both to the Native Americans who have held vision quests there for centuries, and to us white Christians, who delight in God's creation of the wildflowers, elk herds, blue spruce, and some of the last remaining meadows of native sweetgrass that populate these hillsides.

We would hope that people of both sides of the aisle will take into account the fact that the overwhelming majority of people who have testified at hearings regarding mining in the hills have been opposed to it, and that the moratorium on mining the Sweetgrass Hills will not be lifted.

Sincerely yours,

Mike Novak
Margaret Novak

Mike and Margaret Novak

SAGE CREEK COUNTY WATER DISTRICT
P.O. BOX 610
CHESTER, MONTANA 59522

The Honorable Conrad Burns
SS-183 Dirksen Senate Office Building
Washington, D.C. 20510-2603

Dear Senator Burns:

Sage Creek County Water District is a rural water district near the Sweetgrass Hills in northern Liberty and Hill Counties. The district's 96 miles of pipeline serve approximately 50 rural families who depend on the water for their survival in the area. We support strongly Senate Bill 2900 which would place a moratorium on the implementation of the Safe Drinking Water Act requirements until a study has been completed. The current requirements of the Safe Drinking Water Act would place a tremendous financial burden on Sage Creek County Water District which is already operated by a volunteer board of directors and a part time operator. The district chose a site high in the Sweetgrass Hills so we could be assured that we would have good quality water for the future. We do support public health protection, however the present rules are not affordable to small systems such as ours and do not have any documented health protection.

Our system provides safe quality water to our users and we continuously meet all state and federal standards in our system. We encourage you to support S. 2900 to insure that regulatory mandates and the limited resources of our system are directed to effective and affordable public health protection.

We also support reform of the 1872 Mining Law. It seems that the Sweetgrass Hills, the area that we depend on for good quality water, are threatened by a mining law which is completely outdated. Cyanide leaching processes could be implemented on the small area which we depend on for water for our system. Why is it that we should be required to test for the contaminants that are completely avoidable by reforming current mining practices? Our water supply is a good quality and productive supply and will stay that way unless other interests are allowed to "develop" our BLM and State lands.

We appreciate your support and consideration.

Sincerely,

SAGE CREEK COUNTY WATER DISTRICT

cc: Ray Wadsworth

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