AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

OVERSIGHT HEARING ON MINING, THE AMERICAN ECONOMY AND NATIONAL SECURITY—THE ROLE OF PUBLIC LANDS IN MAINTAINING A NATIONAL ASSET

OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY
AND MINERAL RESOURCES

OF THE

COMMITTEE ON RESOURCES
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

FEBRUARY 23, 1999, WASHINGTON, DC

Serial No. 106–10

Printed for the use of the Committee on Resources

Available via the World Wide Web: http://www.access.gpo.gov/congress/house
or
Committee address: http://www.house.gov/resources

U.S. GOVERNMENT PRINTING OFFICE

55–675 ⇆ WASHINGTON : 1999

COMMITTEE ON RESOURCES

DON YOUNG, Alaska, *Chairman*

W.J. (BILLY) TAUZIN, Louisiana
JAMES V. HANSEN, Utah
JIM SAXTON, New Jersey
ELTON GALLEGLY, California
JOHN J. DUNCAN, JR., Tennessee
JOEL HEFLEY, Colorado
JOHN T. DOOLITTLE, California
WAYNE T. GILCHREST, Maryland
KEN CALVERT, California
RICHARD W. POMBO, California
BARBARA CUBIN, Wyoming
HELEN CHENOWETH, Idaho
GEORGE P. RADANOVICH, California
WALTER B. JONES, JR., North Carolina
WILLIAM M. (MAC) THORNBERRY, Texas
CHRIS CANNON, Utah
KEVIN BRADY, Texas
JOHN PETERSON, Pennsylvania
RICK HILL, Montana
BOB SCHAFFER, Colorado
JIM GIBBONS, Nevada
MARK E. SOUDER, Indiana
GREG WALDEN, Oregon
DON SHERWOOD, Pennsylvania
ROBIN HAYES, North Carolina
MIKE SIMPSON, Idaho
THOMAS G. TANCREDO, Colorado

GEORGE MILLER, California
NICK J. RAHALL II, West Virginia
BRUCE F. VENTO, Minnesota
DALE E. KILDEE, Michigan
PETER A. DEFAZIO, Oregon
ENI F.H. FALEOMAVAEGA, American Samoa
NEIL ABERCROMBIE, Hawaii
SOLOMON P. ORTIZ, Texas
OWEN B. PICKETT, Virginia
FRANK PALLONE, JR., New Jersey
CALVIN M. DOOLEY, California
CARLOS A. ROMERO-BARCELO, Puerto Rico
ROBERT A. UNDERWOOD, Guam
PATRICK J. KENNEDY, Rhode Island
ADAM SMITH, Washington
WILLIAM D. DELAHUNT, Massachusetts
CHRIS JOHN, Louisiana
DONNA CHRISTIAN-CHRISTENSEN, Virgin Islands
RON KIND, Wisconsin
JAY INSLEE, Washington
GRACE F. NAPOLITANO, California
TOM UDALL, New Mexico
MARK UDALL, Colorado
JOSEPH CROWLEY, New York

LLOYD A. JONES, *Chief of Staff*
ELIZABETH MEGGINSON, *Chief Counsel*
CHRISTINE KENNEDY, *Chief Clerk/Administrator*
JOHN LAWRENCE, *Democratic Staff Director*

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

BARBARA CUBIN, Wyoming, CHAIRMAN

W.J. (BILLY) TAUZIN, Louisiana
WILLIAM M. (MAC) THORNBERRY, Texas
CHRIS CANNON, Utah
KEVIN BRADY, Texas
BOB SCHAFFER, Colorado
JIM GIBBONS, Nevada
GREG WALDEN, Oregon
THOMAS G. TANCREDO, Colorado

ROBERT A. UNDERWOOD, Guam
NICK J. RAHALL II, West Virginia
ENI F.H. FALEOMAVAEGA, American Samoa
SOLOMON P. ORTIZ, Texas
CALVIN M. DOOLEY, California
PATRICK J. KENNEDY, Rhode Island
CHRIS JOHN, Louisiana
JAY INSLEE, Washington

BILL CONDIT, *Professional Staff*
MIKE HENRY, *Professional Staff*
DEBORAH LANZONE, *Professional Staff*

CONTENTS

	Page
Hearing held February 23, 1999	1
Statements of Members:	
Cubin, Hon. Barbara, a Representative in Congress from the State of Wyoming	1
Prepared statement of	3
Gibbons, Hon. Jim, a Representative in Congress from the State of Nevada	6
Rahall, Hon. Nick, a Representative in Congress from the State of West Virginia, prepared statement of	24
Underwood, Hon. Robert A., a Delegate in Congress from Guam	4
Prepared statement of	5
Statements of witnesses:	
Brobst, Dr. Donald, Society of Economic Geologists	25
Prepared statement of	33
d'Esposito, Stephen, President, Mineral Policy Center	11
Prepared statement of	58
Lawson, Richard L., President, National Mining Association	7
Prepared statement of	46
Additional material submitted by	38
Additional material submitted by	40
McKinley, Michael J., Minerals Information Team, U.S. Geological Survey	9
Prepared statement of	32
Menzie, Dr. David W., Minerals Information Team, U.S. Geological Survey	22
Prepared statement of	80
Silver, Douglas, Balfour Holdings, Inc.	21
Prepared statement of	71
Additional material supplied:	
Dobra, John L., PhD., Director, Natural Resource Industry Institute, prepared statement of	106
Drozdoff, Leo M., Division of Environmental Protection, additional comments of	102
Evans, Michael K., President, Evans Group, material submitted by	138
Freeport-McMoRan Copper & Gold Inc., Washington, DC, Excerpt from 1998 Annual Report	95
King, W. Russell, Senior Vice President, Freeport-McMoRan Copper & Gold Inc., Washington, DC, prepared statement of	40
Lutley, John, President, The Gold Institute, material submitted by	148
Menzie, Dr. W. David, USGS, additional material submitted by	112
Milling-Stanley, George, World Gold Council, prepared statement of	104
Silver, Douglas, President, Balfour Holdings, Inc., material submitted by	125

OVERSIGHT HEARING ON MINING, THE AMERICAN ECONOMY AND NATIONAL SECURITY—THE ROLE OF PUBLIC LANDS IN MAINTAINING A NATIONAL ASSET

TUESDAY, FEBRUARY 23, 1999

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

The Subcommittee met, pursuant to notice, at 2 p.m., in Room 1324, Longworth Office Building, Hon. Barbara Cubin [chairwoman of the Subcommittee] presiding.

STATEMENT OF HON. BARBARA CUBIN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WYOMING

Mrs. CUBIN. I want to welcome all of you to the Subcommittee hearing, and certainly, the new Ranking Member, Mr. Underwood. I am delighted to have you in this position, and I know we will have a lot of issues that we will be working on together.

We don't have votes until 5 p.m., and that is one of the reasons that we don't have more members here for the Subcommittee hearing. I think that this is important that we go ahead and get everything accomplished that we can for the record.

So, I do want to welcome the witnesses and members of the public to this inaugural hearing of the Subcommittee on Energy and Mineral Resources, of the 106th Congress. Before we get down to today's hearing, though, we do have some new members on the Subcommittee and I was going to introduce them, but since they are not here, I will just tell you about them. We have Bob Schaffer from the fourth district of Colorado, who was a member of the Resources Committee last year, but not of this Subcommittee; Congressman Greg Walden of the second district of Oregon, and Tom Tancredo, of the sixth district of Colorado. On the other side of the aisle, Mr. Underwood, the Delegate from Guam, as I already mentioned, is our Ranking Member for the 106th Congress. We have already discussed some things that we will be working on, and I don't know if you wanted to talk about your new members or if you want me to mention them. There they are.

[Laughter.]

We have Delegate Faleomavaega from American Samoa, and Congressman Patrick Kennedy from the first district of Rhode Island is a new member on the Subcommittee, and Congressman Jay

Inslee from the first district of Washington. I am looking forward to working with all the new members.

Today's hearing will address concerns the Subcommittee has regarding the domestic hardrock mining industry and the role of public lands in providing an exploration base for the discovery of new metal mines to replace dwindling reserves. Last Congress, the Subcommittee dedicated a lot of time and energy to problems of the oil and gas producers on public lands, including the Outer Continental Shelf. There remains serious concerns and serious problems about the continuing viability of independent oil and gas producers in this country within the dismal price environment for both crude oil and natural gas over the last year and one-half or so. So there are things that we have yet to try to resolve to help gain access to public lands for purposes of exploration and production, but not just in oil and gas, in mining as well.

Metal prices are similarly depressed, perhaps not as much as in the petroleum industry, but they are depressed, as are many basic commodity prices, as a result of the slowdown in the global economy, for one thing. Yet, society continues to demand goods fabricated with metals and non-metallic minerals which we may import in the raw or finished state. Furthermore, the U.S. became the world's second largest producer of gold about a decade ago, a net exporter of the metal, which improves our balance-of-trade picture. So it is important that we help bolster that industry.

Just last week, the Commerce Department announced that the 1998 trade deficit was the largest ever in terms of actual dollars. It would have been even worse if we had not had the contribution of our domestic mining industry and the energy industries, too.

The Subcommittee will return to important business left unfinished last year with regard to valuing oil and gas for royalty purposes, and getting the Federal Government to aid, not hinder, companies seeking to develop all manner of energy and mineral deposits on the public lands and the OCS, and, of course, we want this to be done in an environmentally-sound fashion.

But coming from the West, coming from Wyoming, seeing the reclamation in Wyoming, where you cannot tell where the virgin land begins and the reclaimed land ends, I know that we can develop these resources in an environmentally-sound manner and still be good stewards to the land. Educating other members on this Committee is something that I very much want to do. When we took the leadership to the West, and we took some members from the eastern States to the West the summer before last, and they saw what we actually have in the West, how we have taken good care of the public lands, how we've been able to produce the resources, and save the environment at the same time, for our children, and our children's children, it made a big difference. So educating the members of the Subcommittee that maybe have never seen what good mining practices are, is something that we will be able to get to this year.

We have invited our witnesses today to give us an "update" on the role of public lands and hardrock mining in the American economy and mining's overall contribution to the national economy and to our military security.

Now that we are back from the President's Day recess, it seems fitting to note that Abraham Lincoln recognized the importance of a strong mining industry in a letter that he wrote to the Speaker of the House of Representatives on the afternoon of the date of his "date with destiny"—you might say, April 14, 1865. It was just before he went to Ford's Theater. President Lincoln wrote, and this is a quote: "I have very large ideas of the mineral wealth of our Nation. I believe it practically inexhaustible. It abounds all over the western country, from the Rocky Mountains to the Pacific, and its development has scarcely commenced. Tell the miners from me, that I shall promote their interests to the utmost of my ability; because their prosperity is the prosperity of the Nation, and we shall prove in a very few years that we are, indeed, the treasury of the world."

Now, for a third or fourth consecutive year, the Clinton Administration's budget request includes provisions which, if enacted, would only harm, not help, our domestic miners in the fight to stay competitive globally. Some of these are tax law changes which are not the Committee's charge, they are not under this jurisdiction, while others, such as royalties and reclamation fees, do fall within our jurisdiction. We are not looking at the details of such proposals today, however. We are taking the long view to determine the role of public land, and what role those lands should play in maintaining a key domestic industry.

This administration has made it a mission to change the manner in which hardrock minerals are disposed of on public lands. That is to radically reform the Mining Law of 1872 through regulation, by statute, and huge land withdrawals, is the way it appears to me. I think it is time to find out the consequences that such attitudes have had, and will have, on those who would invest their capital toward finding mineral deposits and then developing mines. My hope is that, as with the proposals to aid our domestic oil and gas producers, we can find bipartisan solutions to the problems of our public lands miners as well.

I now recognize our Ranking Member, Mr. Underwood, for any opening statement that he might have.

[The prepared statement of Mrs. Cubin follows:]

STATEMENT OF HON. BARBARA CUBIN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IDAHO

Today's hearing will address concerns the Subcommittee has regarding the domestic hardrock mining industry and the role of public lands in providing an exploration base for the discovery of new metal mines to replace dwindling reserves. Last Congress the Subcommittee dedicated much of its time to problems of our oil and gas producers on public lands, including the outer continental shelf—and there remain serious concerns about the continuing viability of independent oil and gas operators in the dismal price environment for both crude oil and natural gas over the last year and one-half or so.

But, metal prices are similarly depressed (perhaps not as much as for the petroleum business) as are many basic commodity prices as a result of the slowdown of the global economy. Yet, society continues to demand goods fabricated with metals and non-metallic minerals which we may import in the raw or finished state. Furthermore, the U.S. became the world's second largest producer of gold about a decade ago, a net exporter of the metal, which improves our balance of trade picture. Just last week the Commerce Department announced that the 1998 trade deficit was the largest ever in terms of actual dollars. It would have been worse without the contribution of our domestic mining industry—and energy industries, too.

The Subcommittee will return to important business left unfinished last year with regard to valuing oil and gas for royalty purposes, and getting the Federal Government to aid, not hinder, companies seeking to develop all manner of energy and mineral deposits on the public lands and the OCS, in an environmentally sound fashion. However, our witnesses today have been invited to "update" the Subcommittee on the role of public lands hardrock mining in the American economy, and mining's overall contribution to our national economy and military security.

Now that Congress is back from the President's Day recess it seems appropriate to note that Abraham Lincoln recognized the importance of a strong mining industry in a letter he wrote to the Speaker of the House of Representatives on the afternoon of his date with destiny, April 14, 1865 before going to Ford's Theater. President Lincoln wrote:

> *I have very large ideas of the mineral wealth of our Nation. I believe it practically inexhaustible. It abounds all over the western country, from the Rocky Mountains to the Pacific, and its development has scarcely commenced. Tell the miners from me, that I shall promote their interests to the utmost of my ability; because their prosperity is the prosperity of the Nation, and we shall prove in a very few years that we are indeed the treasury of the world."*

Now, for the third or fourth consecutive year the Clinton Administration's budget request includes provisions which if enacted could only harm—not help—our domestic miners in the fight to stay competitive globally. Some of these are tax law changes which are not this Committee's charge, while others, such as royalties and reclamation fees, do fall within our jurisdiction. We are not looking at the details of such proposals today, however. Rather we are taking the long view to determine the role public lands should play in maintaining a key domestic industry.

This Administration has made it a mission to change the manner in which hardrock minerals on public lands are disposed, i.e., to radically reform the 1872 Mining Law, by statute or by regulation changes and huge land withdrawals it would appear. Its time to find out the consequences such attitudes have had, and will have, upon those who would invest their capital toward finding mineral deposits and then developing mines. My hope is that as with the proposals to aid our domestic oil and gas producers we can find bipartisan solutions to the problems of our public lands miners.

I now recognize our Ranking Member, Mr. Underwood, for any opening statement he may have.

STATEMENT OF HON. ROBERT A. UNDERWOOD, A DELEGATE IN CONGRESS FROM GUAM

Mr. UNDERWOOD. Thank you, Madam Chairwoman. As the Representative of Guam, I am always pleased to hear about the Representatives from the West. I guess I am the furthest west. I am so far west, I may be a little bit east of Washington.

[Laughter.]

But we certainly appreciate the opportunity to receive a primer on the domestic hardrock mineral industry as our first Subcommittee meeting during the 106th Congress. Hardrock mineral production in this country occurs mainly in the West on what is—or once was—public land under the 1872 Mining Law. Many in the Congress, the media, and the public believe the 1872 law is antiquated and should be changed, while, overall, the mining industry opposes reform.

On February 10, 1999, USA Today editorialized, "Sure, mining creates jobs and taxes, but the industry doesn't need Federal subsidies to do that. Indeed, given the industry's economic strength, the least it could do is pay a royalty on the resources it extracts. The gas and oil industry creates jobs and generates tax revenue, and invests in exploration and pays royalties and still makes a bundle. More to the point, the land-grabs authorized by the anachronistic 1872 Mining Law are so outlandish that jobs and taxes are beside the point: Taxpayers are getting snookered."

Certainly, mining is a basic economic activity that supplies the strategic metals and minerals that are essential for agriculture, construction and manufacturing in the United States. The U.S. Geological Survey has estimated the value of U.S. raw nonfuel minerals production in 1998 at more than $40 billion, which was a slight decrease from 1997. The USGS said the decrease occurred "mostly because of falling metal prices." They predict continued growth in the U.S. economy in 1999, but as a slower rate, providing a mild stimulus to the Nation's mineral-consuming industries. USGS also notes that, for the first time, the U.S. is now a net exporter of gold and silver. They believe that there is as much gold and silver and other hardrock minerals undiscovered as already extracted.

So, it is of concern to learn, as those new to this issue do, that the individuals and corporations producing hardrock minerals, located on and extracted from public lands, do not pay a production fee or royalty to the United States. This is unlike all other resources taken from public lands. For example, oil, gas, and coal industries operating on public lands pay a 12.5 percent royalty on gross income of the operation. In addition, Indian tribes charge a royalty on all types of mining, including hardrock mining. In 1990, the average royalty paid to Indian tribes by copper mines was 13 percent. In the private sector, gold royalties range from 5 to 18 percent.

A number of colleagues, including Representative George Miller and Nick Rahall, have advocated changing this situation for many years. Again this year, with the support of many Members of the House, they have introduced legislation to reform the archaic 1872 mining law. We respectfully request, on their behalf, that beyond this oversight hearing, the Chair schedule at least one legislative hearing this year to take testimony on these bills. I look forward to the testimony and to learning more about hardrock mining. Thank you.

[The prepared statement of Mr. Underwood follows:]

STATEMENT OF HON. ROBERT UNDERWOOD, A DELEGATE IN CONGRESS FROM GUAM

We appreciate the opportunity to receive a primer on the domestic hard rock mineral industry as our first Subcommittee meeting during the 106th Congress. Hard rock mineral production in this country occurs mainly in the West on what is—or once was—public land under the 1872 Mining Law. Many in the Congress, the media and the public believe the 1872 law is antiquated and should be changed. While overall, the mining industry opposes reform.

On February 10, 1999, *USA Today* editorialized, "Sure, mining creates jobs and taxes. But the industry doesn't need Federal subsidies to do that. Indeed, given the industry's economic strength, the least it could do is pay a royalty on the resources it extracts. The gas and oil industry creates jobs and generates tax revenue, and invests in exploration and pays royalties and still makes a bundle. More to the point, the land-grabs authorized by the anachronistic 1872 Mining Law are so outlandish that jobs and taxes are beside the point: Taxpayers are getting snookered."

Certainly, mining is a basic economic activity that supplies the strategic metals and minerals that are essential for agriculture, construction and manufacturing in the United States. The U.S. Geological Survey has estimated the value of U.S. *raw nonfuel minerals* production in 1998 at more than $40 billion, which was a slight decrease from 1997. The USGS said the decrease occurred "mostly because of falling metal prices.' And, they predict continued growth in the U.S. economy in 1999, but at a slower rate, providing a mild stimulus to the nation's mineral consuming industries. USGS also notes that for the first time, the U.S. is now a net exporter of gold and silver. They believe that there is as much gold and silver, and other hard rock minerals undiscovered as already extracted.

So it is of concern to learn, as those new to this issue do, that the individuals and corporations producing hard rock minerals located on and extracted from public lands do not pay a production fee or royalty to the United States. This is unlike all other resources taken from public lands. For example, oil, gas, and coal industries operating on public lands pay a 12.5 percent royalty on gross income of the operation. In addition, Indian tribes charge a royalty on all types of mining, including hardrock mining. In 1990, the average royalty paid to Indian tribes by copper mines was 13 percent. In the private sector, gold royalties range from five to 18 percent.

A number of colleagues, including Rep. George Miller and Rep. Nick Rahall, have advocated changing this situation for many years. Again this year, with the support of many Members of the House, they have introduced legislation to reform the archaic 1872 Mining Law. We respectfully request, on their behalf, that beyond this oversight hearing, the Chair schedule at least one legislative hearing this year to take testimony on these bills.

Mrs. CUBIN. Thank you, Mr. Underwood. I have a couple of things I have to say. First of all, Bill told me that I said President Clinton made that statement about mining. Forgive me. I'm sure you can tell by the time it was over, it was President Lincoln who made that remark, and it's not funny.

Mr. UNDERWOOD. They are often confused.

[Laughter.]

Mrs. CUBIN. Not easily. Another thing that I'd like to say is that in the 104th Congress, we did pass mining law reform—the mining law of 1872—and it did include a 5 percent net royalty payment. The President did veto that—President Clinton, not President Abraham Lincoln, but President Clinton vetoed that. So, I think it's only fair to say that there is bipartisan desire to reform the law, but not in a way that makes it more difficult for an already struggling industry to try to make a living for all of the miners.

And now, I would like to welcome Congressman Walden from Oregon to his first Subcommittee hearing, and Congressman Gibbons, who I say has lived the life of every boy's dream. The only thing he hasn't been is a fireman—and he's going to do that next he says—he's been a fighter pilot, a lawyer, a geologist, now a Congressman, and pretty soon, a fireman. So welcome.

Do either of you have any opening statements? Congressman Gibbons.

STATEMENT OF HON. JIM GIBBONS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEVADA

Mr. GIBBONS. Thank you, Madam Chairman, and I want to take just a brief moment to applaud you on your leadership on the issue of holding these oversight hearings to hear about the state of mining in our country today. I believe that mining is one of those industries which we have to protect, not devastate. It's not an industry that we can control the commodity price of the market materials that they produce, and as a result, for those who believe that we should bury the industry with enormous burdens of new taxes—they do pay taxes already on a number of things—we have to be very cautious on our approach to the industry, how it is looked after and preserved. After all, it is the only industry that allows us to have the quality of life that we have enjoyed through these many years.

Madam Chairman, we've seen an exodus of mining companies from my State. We've seen an exodus of mining jobs—high-paying, high-quality mining jobs—that provide men and women in the

State of Nevada a wonderful living—allowing them not just to have a home, but to provide for their children; to provide for an education and a college education for their children.

I am one of those who has had the experience of being from the mining industry. I can tell you that there are a number of challenges before us. The mining industry has stepped to the plate many, many times in an effort to address these issues, and will continue to do so.

In my State, the mining industry is what we would like to call "a good neighbor." It allows, not just for the development of the resource, but for communities of families to have a job and to live in a community in a better state of life than they ever had a chance or ever thought possible before.

I am interested to hear from our witnesses today, Madam Chairman, about the state of the mining industry in our Nation; and I look forward to your leadership in this role. Thank you very much.

Mrs. CUBIN. Thank you Mr. Gibbons.

I'd like to welcome Congressman Inslee to the hearing as well. Again, it is his first Subcommittee hearing and you're welcome to give any opening remarks, if you care to.

Mr. INSLEE. I will do some powerful listening, Madam Chair. Thank you.

Mrs. CUBIN. That is always good. I need to do it more often myself.

Well, now I will introduce our first panel of witnesses: General Richard L. Lawson, president of the National Mining Association; Mr. Michael J. McKinley, Minerals Information Team, U.S. Geological Survey; and Steve d'Esposito, president of the Mineral Policy Center. If you would come to the table, and we look forward to hearing your testimony.

Thank you very much. First, I would like the Committee to hear from General Lawson.

STATEMENT OF RICHARD L. LAWSON, PRESIDENT, NATIONAL MINING ASSOCIATION

Mr. LAWSON. Chairperson Cubin, members of the Committee, I am Richard L. Lawson, the president of the National Mining Association. Our members are the enterprises that deliver to public use most of the basic material resources required to uphold and strengthen America in daily life—the miners and producers of coal, metals, and useful minerals; and the manufacturers of their equipment, and the suppliers of goods and services. Your oversight is timely and welcome.

Our Nation has the world's largest and most useful combination of metal ores, minerals, and energy. We rank first or second in the world production of about 20 essential resources, and high in many more. We hold significant shares of world reserves, and in world markets our presence ensures free competition, imparts stability, and deters attempted cartelization for either economic extortion or political coercion.

Many resources in the West are on the Federal land customarily called "public land," a term that emerging practices belie. Public land alone contains more resources in variety and volume than major groupings of other nations; that is, the European Union and

Japan. Our resources give us flexibility of national policy—national economic policy and national security policy.

Yet the administration is in multiple ways, in multiple venues, locking these public resources away from public use—doing so by direct action and by indirect action. It is doing all things possible to discourage exploration and to prevent development. Many acts are unauthorized by current law or unjustified by the facts. The proximity of Federal holdings has been used to quash by intimidation private activity on private property as well.

This month, the administration put off-limits a big block of so-called "public land" in Montana. It is the most recent of almost half a dozen executive or regulatory confiscations.

Also this month, another major metals company closed its last U.S. exploration office. Exploration budgets are down 50 percent across the industry. No exploration now means no production in the future. Mining companies must have something to mine. Arbitrary delays and related risk hamper financing. They must go where they are allowed to produce minerals.

This pattern of action is forcing America's mining industry overseas to volatile regions and countries that have yet to evolve stable political and economic institutions; that are not necessarily devoted to free market economics and trade, and that may harbor or discover, economic and political ambitions.

These acts are also forcing U.S. dependence for essential resources on these places as well.

Some say they don't care if mining leaves the United States, that it doesn't matter in this new age. They think that a future can be secured without basic material resources. They think that if they produce words and ideas in this information age, then nothing else is necessary.

I know otherwise—that essential remains essential. I know that when anything threatens to destabilize the world economically or politically, America's young soldiers, sailors, and aircrews will be sent into harm's way to make it secure. I had to issue such orders as the Commander of U.S. Forces in Europe, and you know it, too.

I care that the United States remains a major mining Nation, and it has nothing to do with my present employment. I care because my pilot son in the Air Force will be one of those first called upon to secure the source of something essential. If we withdraw from world markets, then he, and many thousands of our sons and daughters who will go with him will be at risk.

U.S. mining is an element of national security. And the policy questions are these: Do we produce these resources, which we have at home, and keep our sons and daughters at home as well? Or do we send the activity, and our sons and daughters overseas?

To envision the importance of mining to America, do just four things whenever you ride the subway to and from the Capitol:

> Never forget that the rails, the wheels, the cars, the electric power that turns the wheels, that moves the cars on the rails, and the control system that coordinates everything—all of it began in a mine;
>
> Remember that every American in the year 1998 required almost 47,000 pounds of new mined material that year;

Remember that almost every material thing you use at work and at leisure began in a mine, or required something from a mine to make it, or grow it, or process it;

Remember that the Federal taxes due directly and indirectly to mining typically equal now more than 3 percent of all revenue—all Federal revenue—greater than the sum of taxes on alcohol, tobacco, and other excise items put together.

And always look up at the walls around the Rayburn boarding platform—look whether coming or going. Recall that on those walls are representations of history's foremost exponents of wisdom and law; and that Moses, the lawgiver, is one of those that has a central place. When he spoke to the people of the Promised Land, the scriptures say he told of, and I quote: "... a land whose stones are iron, and out of whose hills, thou may dig brass. A land wherein thou shalt not lack anything."

America is such a land. Let us determine to keep it so. Thank you.

[The prepared statement of Mr. Lawson may be found at the end of the hearing.]

Mrs. CUBIN. Thank you, General Lawson.

I'd also like to welcome Delegate Eni Faleomavaega to his first Subcommittee hearing as well.

Now, I'd like to recognize Mr. Michael J. McKinley, Minerals Information Team of the U.S. Geological Survey. I just have to say something first. My grandfather's brother was Oliver Otis Howard, who was one of the people who was instrumental in starting the USGS. There's a book written about him, and I'm going to have to get it, to find out for sure, because people have been arguing with me whether or not he was really one of the main guys, and I think he was.

Anyway, so, I'd like to recognize then, Mr. McKinley.

STATEMENT OF MICHAEL J. McKINLEY, MINERALS INFORMATION TEAM, U.S. GEOLOGICAL SURVEY

Mr. MCKINLEY. Thank you, Ma'am. Madam Chairman and members, I am Michael J. McKinley, a physical scientist with the U.S. Geological Survey, currently serving as the Chief of the Metals Section in the Minerals Information Team. I appreciate the opportunity to appear before you to discuss the role of metallic minerals in our national security and comment briefly on the availability of metallic minerals on public lands.

Metallic minerals are a key component of the supply of materials essential to our national security. These minerals are considered to be strategic and critical when the Nation must rely on importing them. Few countries produce them, and their use is critical to military and industrial applications. Despite the dramatic changes in military readiness strategies in present years, the uses of these metallic minerals are still critical and most sources of supply are unchanged.

For example, chromium is a metal that is used in stainless steel and in alloys in high performance aircraft. There is no substitute for chromium in either of these applications. However, 95 percent of the world's identified resources of chromium, which is extracted

from chromite ore, are located in South Africa. The United States has no chromite ore reserves and only limited occurrences of chromite ore at all. As a Nation, we import 80 percent of the chromium we use; the remaining 20 percent is acquired through recycling. Although uses of chromium have changed over time, the supply of chromium has been a major concern since World War I.

For many years, the U.S. Government has maintained stockpiles of strategic and critical minerals. However, as the Department of Defense has changed its primary war planning scenarios; strategies for maintaining an adequate supply of minerals have also changed. There were more than 80 materials identified in the Strategic and Critical Minerals Stock Piling Act of 1939, half of which are metals. Congress has authorized the sale of many of these stockpiled materials in response to changing strategies.

Only three commodities have been designated by the Department of Defense to be stockpiled for future use: beryllium, a very light metal used in aircraft alloys; mica, an excellent insulator used in radar applications with extreme high voltage, and quartz crystals, used as a filter in electronics devices. Whether or not they are stockpiled, most of these materials are still strategic and critical, because they are still necessary for the equipment with which we defend ourselves in wartime and other emergencies. For example, of the more than 12 strategic and critical minerals used in modern fighter aircraft jet engines, only four are commercially recoverable via domestic sources.

At present, there are 141 active metal mines, not including placer mines, in 16 States. Also, current U.S. laws permit location of mining claims on Federal lands in 19 States.

The USGS has a long history of assessing the potential for undiscovered mineral resources. Modern systematic efforts to determine the potential for undiscovered resources, especially metallic mineral deposits, began in the early 1960's. In the early years of this effort, the products were qualitative, describing high, moderate, or low potential for occurrence of undiscovered mineral resources. More recently, probablistic quantitative assessments have been developed, resulting in reports that describe the probability of occurrence of identified quantities of specific mineral commodities.

Mineral resource assessments have expanded over time to address the needs of numerous Federal land and resource planning efforts. The USGS, in coordination with the Bureau of Land Management and the Forest Service, under a Memorandum of Agreement, is conducting mineral resource assessments on individual land units, managed by the BLM and the Forest Service. Also, USGS is just completing a nationwide assessment of potential for undiscovered occurrences of gold, silver, copper, lead, and zinc. This national assessment estimates that about as much of these metals remains to be discovered as has already been discovered.

Although many local-scale mineral resource assessments have been completed, or are in progress for BLM and the Forest Service, there is no national systematic assessment of the potential for metallic mineral resources on all Federal lands. Some of the factors that make such an estimate difficult include the dynamic nature of land status, with lands passing from public to private ownership, and vice versa; methodological difficulties that arise from the rel-

atively small areas included in individual tracts of public land; the inadequacy of scientific data for making predictions in those small areas, and the inherent uncertainties in making probablistic assessments.

The public lands may contain undiscovered deposits of mineral commodities that could be used to ensure the national security. However, ultimately, geologic factors, rather than land ownership, are the most effective predictors of potential for undiscovered mineral resources. For some commodities, such as chromite or bauxite ore, there is very little likelihood of ever identifying commercially significant resources in the United States.

Thank you, Madam Chairman. I will be pleased to respond to any questions you may have.

[The prepared statement of Mr. McKinley may be found at the end of the hearing.]

Mrs. CUBIN. Thank you, Mr. McKinley.

Next, I would like to recognize Mr. Stephen d'Esposito, president of the Mineral Policy Center.

STATEMENT OF STEPHEN d'ESPOSITO, PRESIDENT, MINERAL POLICY CENTER

Mr. D'ESPOSITO. Thank you, Chairman Cubin. Members of the Subcommittee, good afternoon. I am the president of Mineral Policy Center. I come here on behalf of our members and citizens all across the country, concerned about the environmental, social, and economic impacts of mining.

Let me summarize some of the key economic facts related to mining as far as we see it. First, the United States is among the world's leading producers of many metals, including gold, copper, and silver. It has substantial domestic reserves.

Second, changes in mineral exploration and development trends have causes that are multiple and complex. They include ore grade metal prices, government's stability, access to land, and available infrastructure.

Third, while mineral development is flat or down in some parts of the U.S., this is not necessarily due to shortage of supply or environmental protection measures. Changes in metal prices are the most important factor.

Fourth, unstable and depressed mineral and commodity prices, as well as increased mechanization, are reducing employment in mining.

And, sixth, changes in the prices of metals will have vastly different impacts on each metal-producing country, region, and company. Some companies with low-cost operations, may benefit during this period. Some may pursue a strategy of buying other companies and projects rather than investing money in exploration.

We should also not consider that drops in metal prices, and decreases in metals exploration, are not inherently bad for the United States or bad for the economy. For example, more recycling of metals would be good news for the environment, good news for the recycling industry, and good news in terms of preserving public lands.

We do not believe that, when it comes to our public lands, the best economic option is extraction first. There is a strong and grow-

ing volume of evidence that the development of non-extractive industries is in our national interest, particularly on public lands.

Consider some of the following expert conclusions: Intact natural resources are increasingly coming to be seen as an economic asset. Counties with open space now rank among the fastest growing. It is no longer accepted as obvious, the widespread assumption that mining can be expected to lead to economic improvement for rural communities.

Today's public lands policies run contrary to good economics, environmental protection, and common sense. We have singled out mining companies operating on public lands for what amount to multi-million dollar corporate welfare payments. Hardrock mineral producers claim that paying for Federal minerals would force a significant portion of them out of business. It won't. They pay royalties on State and private lands and on other Federal lands.

Hardrock miners claim that they are somehow fundamentally different than other sectors of the industry. They are not, according to the U.S. Office of Technology Assessment. Hardrock mining interests argue they should not pay royalties on public lands because they already pay Federal taxes. This is a misleading argument. Most businesses pay taxes. Paying taxes is not an argument for getting free raw materials.

Inaction is also creating a sizable taxpayer and environmental dent in our public lands. At some points, this bill will come due from yesterday's, today's and tomorrow's abandoned mines. Our estimate is that the cleanup cost could be as much as $72 billion.

We should remember that cleaning up abandoned mines will create jobs. In our view, sound economics and sound economic policy dictates change. First, it is in our interest to take action that will stimulate other commercial and non-commercial uses of public lands.

Although mining will continue to be an important element of our economy, there are clearly economic, environmental, and social benefits derived from other industries and other uses of our public lands, some of which outweigh the benefits of mining. The time is now for Congress to change current U.S. policies that favor mining on public lands.

Second, a mining industry that is rewarded for its environmental performance, and penalized for its environmental mistakes, will be a healthier industry, both in the U.S. and around the world. It is in the interest of Congress to create incentives for better environmental performance in our public lands.

Third, more and more experts are concluding that our environmental economic health and our security will improve if we use Federal raw materials more wisely. We should use fewer resources, use them differently, generate less waste, recycle, and re-use more. Policies that benefit extraction should be turned on their head.

Fourth, there is no justification, economic or otherwise, for policies that provide public subsidies to mining companies, creating an incentive for inefficient mine operations on public lands.

Fifth, as a matter of good economics and environmental protection, and in order to build stronger local economies and create jobs, we should begin today to address the liability time-bomb that is ticking away at our public, State, and public lands. We should

begin a national cleanup program for the hundreds of thousands of abandoned mines.

We believe good environmental policy also makes good economic policy. Profitable mining and environmental protection are compatible. We recommend the following: Permanently end public land giveaways to mining companies; impose a fair royalty for mining on public lands; create an abandoned mine cleanup program, and end the policy of giving mining companies first use of our public lands.

These steps make economic sense. They will lead to healthier community use and healthier ecosystems. Jobs will be created, and we believe will lead to a healthier mining industry.

I would like to close with a quote from the CEO of Placer Dome, John Willson. He said: "We at Placer Dome have concluded that, if a mine cannot afford the full cost of the state-of-the-art systems, then it should not be developed. There is no tradeoff. No mine developer has the right to impose on an ecosystem damage from acid rock drainage, just for the sake of economic activity, returns to investors, jobs, and other benefits. The key message here is that there is no room for compromise in environmental protection."

My prediction, that if Placer Dome lives by these rules, they will in fact become the world's gold leader, and remain so for a long time. Thank you.

[The prepared statement of Mr. d'Esposito may be found at the end of the hearing.]

Mrs. CUBIN. Thank you, Mr. d'Esposito. I will begin the questioning. As we have five minutes to question you. Our questions and answers have to be in five minutes, so we will both try to make them as brief as we can, I hope.

I want to ask, first of all, Mr. McKinley, am I mistaken, it was my understanding, or it is my understanding, that there were potential chromite resources in Montana, but that there are certain technological advances that need to be overcome—some metallurgical problems, and reduction in production costs. But, that is not necessarily a great impediment, if other costs, like access to the land, and so on, were available, too. Is that correct, or am I mistaken in that? Because I know that your testimony said the only chromite was in South Africa.

Mr. MCKINLEY. Right. What we're talking about for bauxite and chromite is that the resources are not economically recoverable in the United States, and the grades of chromite and bauxite ores in the United States are of such low quality that we can probably continue to import them economically for the foreseeable future rather than to mine them domestically. In the case of chromite, we are talking about the deposit in Montana, at the Stillwater Complex. We just don't have the facilities, in the United States, to mine that, and beneficiate it, and smelt it and refine it effectively, without a concerted program, which would probably take several years, according to our specialist.

Mrs. CUBIN. Right. Might be like foreign countries developing sodium bicarbonate synthetically as opposed to the cheap trona in southwestern Wyoming. General Lawson, did you have——

Mr. LAWSON. We have been working with the Department of Energy for the past two years on an issue called "Industry of the Future." And this particular issue is one of the areas that we have

identified. What we are doing is laying out a roadmap of required technologies to enhance the safety, the environmental capability of recovery, along with the recovery of minerals from substandard ores, in an economic fashion.

Mrs. CUBIN. Thank you. Would any of you disagree with me when I say that mining creates wealth in the economy, and jobs in the service sector—and I want to clean up the abandoned mines—the $72 billion, I think that number is in question. But, those jobs do not create wealth, and in order to create wealth, we need to have production of our natural resources. Would anybody disagree with that? Economically?

Then, there was one thing that I wanted to point out, that the mining law provisions that were passed by the 104th Congress, that were vetoed by President Clinton, did provide for, as I said, a 5 percent net royalty, and that money was to be dedicated to abandoned mines reclamation. I would like your opinion, General Lawson, and Mr. d'Esposito, on the effect that that veto has had on the environment, and on the industry.

Mr. LAWSON. Well, the veto simply delayed responsible activity on the part of many. In the interim time, in order to be ready, the National Mining Association and the Western Governors have sat down and developed an extensive program on, first, the identification and the compilation of abandoned mines, of the appropriate technologies that are going to be necessary to accommodate that. We have identified and worked on three mines to date in the recovery process. We believe now, from these first stages of our efforts with the governors, that the numbers have been overstated, and perhaps, with new technologies, the fiscal requirements have as well. But, certainly, all of the things that could have been accomplished during the past two years with an effective reform of the 1872 law have been delayed.

Mr. D'ESPOSITO. Yes, a few points to the answer: The first is that our estimate of $72 billion, which is a range of 32 to 72, is an estimate, that hopefully will prove wrong. We think what is critical is that we start the cleanup process, most importantly, putting resources into that process. I think voluntary efforts are wonderful. I think the efforts of the National Mining Association and the Western Governors Association are steps in the right direction, but the bottom line is, there needs to be funding to make it happen.

I think that the issue in terms of the 104th Congress wasn't so much one of the mine cleanup, but what a fair royalty return was. I think that is where things fell apart, as far as I understand it. But, I do think that the sooner we get funded cleanups, the better.

Mrs. CUBIN. One last very quick question: What are—all three of you—what are your feelings about having the Federal Government establish the standards and levels for cleanup and then allowing the States to accomplish those goals in the most economically-efficient and in the least amount of time? Just down the line, if you all three would do that.

Mr. LAWSON. I think it is absolutely critical that the States and the local areas have the maximum authority to develop the processes, procedures, and practices, because all these are different.

Mr. MCKINLEY. Ma'am, I don't know that I am in a good position to say what I think about the policy of this country. I would have to defer to the Office of the Secretary or the EPA.

Mrs. CUBIN. I understand.

Mr. D'ESPOSITO. We believe that the standard should be set federally. Monies should be collected federally, deposited into a Federal fund for cleanup, and then the monies should be allocated to the States. So, in principle, I agree in what you are saying. Of course, as always, the devil is in the details. But, I think, in principle, that would work as a Federal program carried out State by State.

Mrs. CUBIN. Thank you very much, and now I would like to yield to our Ranking Member, Mr. Underwood.

Mr. UNDERWOOD. Thank you very much, Madam Chairwoman.

Mr. d'Esposito, going back to the 5 percent royalty that was raised in the 104th Congress, was that satisfactory to your organization? Was that something that was consistent with your thinking?

Mr. D'ESPOSITO. I believe that the royalty that is being discussed was what is called a "5 percent net proceeds royalty." That means that not only does the process of developing the ore into a bar of gold get deducted before the royalty is applied, but many other costs as well, and our concern is that as you add up those costs, the royalty starts to disappear, No. 1. And, No. 2, it is really difficult to track all those calculations and deductions. So, that was our concern with what was called the "5 percent net proceeds royalty." We have always pushed for a gross or what is called a "net smelter," because it is easier to calculate, it is more transparent, and you can know what you are going to get.

Mr. UNDERWOOD. Do you have an estimate as to how much the 5 percent net royalty would have raised?

Mr. D'ESPOSITO. I don't off the top of my head, but I can very quickly get that number for you and compare the two. I just don't have it at my fingertips. It was a difference in hundreds of millions of dollars between the two types of calculation.

Mr. UNDERWOOD. I think CBO estimated it at $11 million.

[Laughter.]

Mr. D'ESPOSITO. For the 5 percent net proceeds.

Mr. UNDERWOOD. I am very interested in both the presentations made by Mr. Lawson and Mr. McKinley on the issue of strategic minerals, so that I understand its relationship to national security. Perhaps, Mr. Lawson, you can tell us, I understand the concept that certain minerals are important to national security. Is there any sense on your part that current mining policy of the United States threatens in any way our national security?

Mr. LAWSON. I think it is quite clear when you have 50 percent of the industry that no longer explores in the United States, and a major company such as Asarco shuts its final exploration doors in the United States, the mining industry will be moving offshore because of the varied problems that are associated with developing a mine in the United States. As that industry moves offshore, the strategic minerals are going to have to come from someplace else and that will, I assure you, directly influence military activities in the years to come. I spent six months a year for five years on your

island and national security was involved. Some of the national security in that area had to do with the requirement of strategic minerals and energy.

Mr. FALEOMAVAEGA. Mr. McKinley, in your testimony, you stated that the Department of Defense has changed its policy over the years and has designated some elements or some minerals as not quite being necessary for strategic stockpiling. Is that correct? Are all these minerals necessary? I noticed that in General Lawson's testimony there were a number of minerals that were stated as important for national security. Would you care to comment on that Mr. McKinley?

Mr. MCKINLEY. Yes, sir. As I mentioned, in the 1939 Stock Piling Act, which has essentially remained the same for the type of materials that are in the stockpile, there are about 80 of these materials that were designated as strategic and critical. As of right now, the Department of Defense has said that we only need to stockpile three materials. It does not necessarily mean that the rest of the materials are not strategic and critical.

For example, manganese is listed as one of the materials in there. We have 100 percent import reliance on manganese. There is no substitute for manganese and we absolutely need it for steel. The same could be said for cobalt. We have almost 100 percent import reliance on cobalt. It comes from countries that have geopolitical problems. Cobalt is needed for superalloys and for high velocity armor piercing projectiles.

What I am trying to say is even though the Department of Defense has only designated three materials to be stockpiled, the other materials, for the most part, are still strategic and critical.

Mr. FALEOMAVAEGA. Thank you very much for that clarification.

General Lawson, in your testimony, you referred to the concept of so-called public lands. Perhaps you can explain to me what is the difference between real public land and so-called public land.

Mr. LAWSON. What I thought a real public land meant was that it is available for multiple use in the various ways that the original laws and descriptions of public lands were intended. In the past six months, we have lost almost 2 million acres to various executive orders which had nothing to do with any action on the part of the legislature, which didn't have any scientific justification that we were aware of, and which were withdrawn from total public use. These lands have been completely withdrawn from any use, not just mining: no timber, no grazing, no snowmobiling, no anything; and so I just suggest to all of you that we need to think: Are public lands really public anymore? Is there a move afoot to totally remove and fence up public lands and not make them available for any activity?

Mr. FALEOMAVAEGA. Thank you very much.

Mrs. CUBIN. Mr. Gibbons.

Mr. GIBBONS. Thank you very much, Madam Chairman.

Just briefly, General Lawson, could you give us a thumbnail sketch of the economic study that the mining association did on the contributions of mining to the United States.

Mr. LAWSON. Yes, let me just give you a summary of the activity. We had total, direct, and combined economic activity in the U.S. economy of $523 billion. We had direct and indirect Federal reve-

nues of $56 billion. We had direct or indirect State and local revenue of $27 billion. So, it was a combined business income over that time frame, one year of $295 billion, which was derived from the mining industry during that year. This particular year happened to be 1995.

If I may, let me add one thing. There has been a lot of discussion here about greedy mining companies receiving corporate welfare. In the year 1997 and this comes from the World Almanac of this year, 1999, the mining industry's total profits from the primary metals industries were $5.6 billion. The communications industry had a profit of $31 billion, and the electronic equipment industry had a profit of $25 billion. One questions: how did we get to be called the rich greedy industry with that set of numbers?

Mr. GIBBONS. Thank you very much.

Mr. d'Esposito, I have read your testimony. In fact, as I read most of it, I thought it was deja vu 1950 because as you heard the General talk about the mining requirements of every individual in this country requiring 44 thousand pounds of new material mined every year, I am caught by your statement that all materials should be recycled and reprocessed. I think it is evident from my knowledge that mining in this country only has disturbed one quarter of 1 percent of the land in this nation. In fact, that is less land than is disturbed by paved parking lots in Safeway stores.

I want to turn to your testimony here and, of course, I want to talk about the ticking liability time bomb that you talk about here and you quoted or referenced Leo Drozdoff of the Nevada Bureau of Mining Reclamation. He says that at least 13 major mines in Nevada are currently in bankruptcy. Is that an accurate statement of Leo Drozdoff?

Mr. D'ESPOSITO. That statement was conveyed to me by somebody who spoke directly with——

Mr. GIBBONS. Is it accurate because you are representing it as accurate here? That's my question.

Mr. D'ESPOSITO. The statement is accurate as it was conveyed at a meeting about three weeks ago.

Mr. GIBBONS. Well, my understanding is that these operations are not major, but that really doesn't matter but would you just tell us the hazards to the environment or public health and safety that bankruptcy per se causes?

Mr. D'ESPOSITO. Bankruptcy, if there is not adequate bonding and reclamation as we have seen in places like Zortman-Landusky, potentially places like Summitville mean that adequate cleanup is not done.

Mr.GIBBONS. Is there adequate bonding in the State of Nevada?

Mr. D'ESPOSITO. Is there adequate bonding in the State of Nevada?

Mr. GIBBONS. Yes.

Mr. D'ESPOSITO. Nevada has bonding regulations.

Mr. GIBBONS. Is it true that every one of those mines that you describe here is bonded under reclamation?

Mr. D'ESPOSITO. I would expect that's the case but the point of including them isn't to say each mine will in fact end up being a taxpayer problem or an environmental problem. The point is to say quite a few are in the situation.

Mr. GIBBONS. We are talking about Nevada because that is your statement to this Committee which theoretically is under oath and you are representing that these mines in the State of Nevada represent a ticking public liability time bomb and each one of these mines is covered by bonding in the State of Nevada. Now are you saying the State of Nevada has inadequate revenues to cover the bonding of these mines?

Mr. D'ESPOSITIO. I am saying that a ticking time bomb exists when you have things like Summitville, followed by Zortman-Landvsky, followed by other mines on public lands that don't have adequate bonding.

Mr. GIBBONS. Well, $67 million for Zortman-Landvsky is not inadequate bonding. Is it not?

Mr. D'ESPOSITO. State regulators in Montana have said that the bonds may be short as much as $8 million. We estimate it could be higher. Time will tell. That is a significant amount of money to taxpayers in Montana.

Mr. GIBBONS. Madam Chairman, my time is about up and I will yield back to you for later questioning

Mrs. CUBIN. Thank you, Mr. Gibbons.

I want to make a point before I yield to Mr. Faleomavaega. I brought up earlier the issue of mining, creating, and developing the resources actually creating wealth. I think the point that I failed to make was that we can't protect the environment if we don't adequately develop and we don't have wealth. So, I think the two things have to go hand in hand. The other thing we talked about is the 5 percent net proceeds and the $11 million that the CBO estimated would be generated by a 5 percent net proceeds in the bill that the President vetoed.

Nevada has done a very good job of calculating 5 percent net proceeds levy on mines for about a century, and the State collected $48 million in 1994 alone. So I think that is what happened to these figures, and I think projections can be questioned and I think somehow we have to all come to an agreement on how we are going to do this because I know we all want the same thing.

Mr. Faleomavaega.

Mr. FALEOMAVAEGA. Thank you Madam Chairman. Just a couple of questions.

To the members of the panel: Do we currently have an accurate assessment from the U.S. Geological Survey and from the mining industry in terms of the total value of the metals that we currently have in the United States? Not what is already been harvested or mined, but do we have an accurate assessment both from the U.S. Geological Survey and the mining industry of the dollar value of the mines or the metals that are currently in the United States?

Mr. LAWSON. The U.S. Geological Survey does have a pretty good handle on the value of how much was produced. Now you said you were not interested in that, but we do not have, I would say, a good handle on what has yet to be produced.

Mr. FALEOMAVAEGA. I believe there is a statement in your written testimony, General Lawson, you state that the value of the coal that is currently in the United States was more than all of the oil that Saudi Arabia, Iraq, and Kuwait have in their possession. Now how did we come about with that assessment?

Mr. LAWSON Well, that assessment is based upon coal that has already been researched out, found and explored. We know precisely what the reserves consist of in terms of both quantity and quality, and we know for a fact that they represent both an energy context and total value and that was just a comparison with oil and gas in the area, sir.

Mr. FALEOMAVAEGA. So, that is an accurate statement?

Mr. LAWSON. Yes, but as to the metals, precious metals or strategic metals, we have not made an accurate assessment. Except of those reserves that have been found and located to date.

Our real concern, and a concern that I think the Committee needs to come to grips with, is because of a various number of factors. More and more of our companies are having to give up their exploration in this country. The costs of exploration are not insignificant. The fact is they are part of the most expensive aspect of the mining process and for various reasons both in terms of cost and in terms of delays associated with the time between the finding of the mineral and the actual ability to begin to mine a mineral, companies are electing to go offshore.

Mr. FALEOMAVAEGA. Do you think that might be to our advantage in the long run? Let's extract the mineral contents of other countries before coming back to our own. Why don't we extract the others first before hitting up on our own resources?

Mr. LAWSON. I think from a security standpoint that has some significant problems to say nothing of the economic aspects of it. We have the greatest storehouse of minerals in the world and the opportunity to effectively use those is one of the things that has made our economy number one in the world. We have low cost basic resources to fuel this economy of ours; that is why it is demanding. 47 thousand pounds per person.

Mr. FALEOMAVAEGA. My time is running short. One of the reasons why we have not approved the United Nations Convention of the Law of the Sea was because of these strategic metals. As far as our policy is concerned, the treaty did not give enough to the mining industry if we are to harvest, for example, cobalt and manganese that is contained in these nodules that are found in seabed mines and seabeds of many of the island nations in the Pacific as well as the Atlantic.

Mr. LAWSON. Well, the Seabed Treaty itself has several problems but that is one of the problems that has not been effectively resolved between the nations who are negotiating that Treaty.

Mr. FALEOMAVAEGA. Do you think our policy is accurate that we should not sign into the United Nations Law of the Sea Convention?

Mr. LAWSON. At this time, I think for a whole series of reasons, we should not.

Mr. FALEOMAVAEGA. Very interesting.

One more question, Madam Chairman, if it is all right. I think it seems that the mining industry really has had a very bad reputation. Is it because of the media hype or is it because of the environmental concerns and the history, strip mining, causing a lot of pollution, and things of that sort? Is this an accurate statement of the history of the mining industry?

Mr. LAWSON. Well, I think its 50 years old the assessment that you made. I think we're making dramatic progress in several ways. I like to think that Mr. d'Esposito and his group do an enormous service to the country by being environmental activists, by making us all take a look carefully at everything we are doing. However, I would like to suggest that we the people who put the blood, sweat, and tears and basic resources into cleaning up the environment are the active environmentalists. We are actively engaged in environmentalism.

Mr. FALEOMAVAEGA. One of the biggest problems, sir, that we are having now is that we have a lot of our conglomerate big mining companies doing operations in foreign countries that do not necessarily have high standards as far as emissions and environmental requirements as we have in our own nation, and now some of these tribes I think from Latin America are coming to sue some of these mining companies for some of these environmental things they have caused in these third world countries. Is that a fair way to do business to go and extract the mines and minerals from these countries that have lower standards?

Mr. LAWSON. Sir, I would not accept any of the statements you have made. Wherever we go around the world, we take with us the same kind of laws that we have here in this country. We help those rulers of those countries impose those laws because we in the United States know how to comply with those laws. It's the one way that gives us an edge on mining in other countries around the world to differentiate us from mining companies who come from places that haven't had to create environmental renovation. I think we are doing it.

Mr. FALEOMAVAEGA. I submit to you, sir, that is not what is coming forth right now General Lawson. I would like to see the specific incident; because frankly I've been all around this world.

There is a U.S. mining company doing business right now in West Papua, New Guinea that has caused a lot of pollution and all they had to do was to conform to Indonesian environmental standards. It was not U.S. standards and there were some very serious questions raised on that as an example. I only cite that as an example, sir.

Mr. LAWSON. I would like to see that.

Mr. FALEOMAVAEGA. I will definitely show you because it made the first page of The Wall Street Journal and I'll share that you with you, surely.

Mrs. CUBIN. I'd like to thank our panel for their testimony and for their candid answers to our questions.

Now I'd like to introduce the second panel. Mr. Doug Silver of Balfour Holdings, Inc.; Dr. David W. Menzie, Minerals Information Team of the U.S. Geological Survey, and Dr. Donald Brobst, Society of Economic Geologists.

I would like to remind the witnesses that under our Committee rules, we would like you to limit your testimony to five minutes but your entire written testimony will be submitted into the record.

The Chair now recognizes Mr. Doug Silver.

STATEMENT OF DOUGLAS SILVER, BALFOUR HOLDINGS, INC.

Mr. SILVER. Thank you. My name is Doug Silver. I am a research scientist and owner of Balfour Holdings. We serve as a corporate planning organization for many of the mining companies around the world. I was asked to speak today about exploration issues as they relate to the U.S. mining industry and I'm just going to read my comments.

There has been a dramatic decline in exploration activity in the United States over the past five years for two principal reasons. The depressed metal prices are responsible for general worldwide contraction in exploration expenditures. For instance, U.S. companies have reduced their worldwide exploration by 40 to 50 percent just in the last year and based on where the metal prices are today, we see that as being further cut during the year. The inefficiencies of the United States Federal and State governments in issuing permits compounds the difficulties companies are experiencing when trying to operate in the United States. The United States is no longer considered competitive for mineral exploration despite its strong geological potential for mineral discoveries.

Interviews with many exploration companies for this testimony reflect the consensus of opinion that the Federal and most State governments are trying to phase out the mining industry by catering to the whims of small groups such as the Mineral Policy Center whose deft manipulation of the legal system allow them to indefinitely delay the permitting process by financially breaking the companies. The single largest concern is the regulatory bodies directly or indirectly mismanaging the permitting process. The delays and substantial cost overruns, which are now commonplace, create undue financial hardship on mining companies and extort their legal rights. Companies cannot operate in such a hostile climate so they are taking their capital, ideas and U.S. environmental practices to other pro-mining countries. The possible exceptions to this opinion, of course, would be Nevada and Alaska where the State governments have been very proactive in both developing mining and in protecting their rights.

Only a handful of U.S. base and precious metal projects are currently undergoing the need for the required EIS or EA process. Mr. Faleomavaega, in response to your question, there are about 650 gold deposits in the United States and probably several dozen base metal deposits, most of which are either inactive due to low metal prices or the inability of companies to financially survive the permitting process. As Mr. Babbitt continues his successful circumvention on the legislative branch, some of these deposits will never be developed while others will never be discovered. The permitting process was never intended to be an adversarial process but that's what it has become and it really needs to return to its original roots as a cooperative effort between industry and government. A more streamlined system should be created which should study contents, establish time frames and define how costs are established and maintained.

I have heard countless horror stories of companies who hire the best consultants and work with the government to establish what it would cost in terms of time and money to complete the regulatory requirements and now the government has spent two to

three times that amount and the process still has not been completed. Accountability is the biggest shortcoming of the process right now. We are finding that individuals within government bodies appear to be able to interject their personal agendas into the process. We see no oversight, we see no sense of urgency by the regulatory groups to do a certain number of studies. It is an endless process of draining the cash out of companies and preventing mining. Finally, the Record of Decision which is supposed to be the culmination of all the science and ideas brought together is now being deferred to the non-governmental groups who seem to be able to delay, appeal, and do whatever they want at the companies expenses. You are supposedly meeting to talk about proposed changes to the Mining Law of 1872. However, this debate, in my opinion, is becoming moot because of all these other problems. The mining industry would like to contribute to the U.S. economy but without a sincere effort to create a level playing field, companies can no longer justify spending money in this country.

There is an important ramification, simply the management problems of the regulatory process. We're not talking about discontinuing the EIS's. We're talking about having a system that is organized and works in a set time frame. Fifteen years ago you could permit a mine in two years. Now it is somewhere on the order of 10 years. A lot of the gold mines don't even have mine lives of 10 years and so you've created a huge problem for industry and it's one of the reasons that people are moving offshore. A return to higher metal prices will provide companies with financial breathing room but it will not do anything to alleviate the difficulties in operating in the United States.

The government should be very concerned about the mass exodus of U.S. mining companies because once a company spends tens or hundreds of millions of dollars on a foreign project it can neither move the project back to the United States nor return the funds it spent. Instead, these companies tend to make additional investments in the host countries. Therefore, shifting exploration activity back to the United States would become progressively more difficult as companies are established elsewhere. And, working on an international level, my clients are all sorts of companies, the United States is basically joining the ranks of certain persona non grata in the exploration world and it is terribly unfortunate that the legal rights of the miners are no longer honored. Thank you.

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

Mrs. CUBIN. Thank you, Mr. Silver.

STATEMENT OF DR. DAVID W. MENZIE, MINERALS INFORMATION TEAM, U.S. GEOLOGICAL SURVEY

Dr. MENZIE. Madam Chairman and members, thank you for the opportunity to speak with you today. My name is David Menzie. I am a geologist with the U.S. Geological Survey. I currently serve as the Chief of the International Mineral Section of the Mineral Information Team. In this testimony I will discuss changes in the import and export of metallic mineral resources from 1975 to present.

The United States plays many roles in global mineral markets for metallic mineral commodities. USGS has analyzed the con-

sumption production, imports and exports over the last two decades for 49 commodities to describe changes in imports and exports of metallic minerals. Seven different types of changes were identified and all commodities were grouped into one of these seven types. The major factors that influenced these changes are better understanding of geology, technological change, economics, and political factors.

I refer you to Table 1 of my statement, which presents the percent net import reliance for metallic mineral commodities during the period of 1975 to the present and estimates U.S. consumption for each of the commodities in 1998.

Percent net import reliance is calculated by determining the percent of apparent consumption that is met by net imports. It is one of the ways of examining a country's vulnerability to supply disruptions. Time does not permit me to describe the changes in consumption, production imports and exports for each commodity. Instead, I will identify the seven groups of commodities that exhibit similar patterns of imports and exports. Details for the specific commodities are an attached item.

Group 1 commodities show continued net exports and these include beryllium, lithium, and molybdenum.

Group 2 commodities show changes from net imports to exports and these are gold and silver.

Group 3 commodities show decreased import reliance. These are cadmium, iron ore, and selenium.

Group 4 commodities show changes from net exports to imports. These include aluminum, copper, lead, magnesium metal, rare earths and titanium metal.

Group 5 show continued import reliance of less than 50 percent, iron and steel, mercury and vanadium fall into this class.

Group 6 commodities show increased levels of import reliance. Commodities in this group include antimony, silicon, tungsten, and zinc.

Group 7 commodities show continued import reliance of greater than 50 percent and include arsenic, bauxite, and alumina, bismuth, cesium, chromium, cobalt, niobium, manganese, nickel, platinum-group metals, rubidium, scandium, tantalum, thallium, thorium, tin and yttrium.

Another useful way of examining vulnerability of our economy to disruptions in the supply of mineral commodities is to examine where the imports of these commodities come from and what percentage of total imports come from those sources. Table 2 of my testimony shows the countries of origin and percent reliance on the two largest suppliers of each of the commodities. Some of the major changes in the geologic, technological, economic and political factors that have influenced the pattern shown in Table 1 include an increased understanding of the geographical factors that control the formation of mineral deposits. Gold is a useful example.

Since the late 1970's gold has been the primary commodity of interest for much of the exploration community. Because much of the research that formed the basis for the new understanding was conducted in the western United States, the United States has benefited more from these advances than have countries that have different geological conditions than the U.S.

Another major change has been the development of new technologies for exploration, mining and processing of ore. These include but are not limited to new mining technologies and the development of hydrometallurgical techniques for processing gold and copper which have been extremely important.

A technological area of growing importance is industrial ecology, the study of the flow of minerals and materials from the source to ultimate disposal. It encompasses recycling of materials and the reuse of product. It extends to the design of new products in ways that will reduce the need for raw materials or the cost of recycling. Recycling is already an important factor for materials such as aluminum and steel. Recycling, remanufacturing and redesign are likely to have an increasing impact on many materials in the future.

Global, political, and economic changes have an increasing effect on the patterns of mineral production, imports and exports. The adoption of democratic governments and market oriented economies throughout Southeast Asia and Latin America has greatly changed global patterns of investment in mineral projects. The result has been a major change in the willingness of companies to invest in exploration and production in these areas.

In addition, political reform and transition of the centrally planned economies of the former Soviet Union and Eastern Europe and China toward more market oriented economies were also affecting patterns of mineral production, imports and exports. The transition has resulted in decreased domestic consumption of mineral resources in those countries and increased exports of mineral commodities. Examples of this include aluminum and copper from Russia.

Several changes will affect the pattern of mineral production in the future. In the short term, the recession in Southeast Asia has caused decreases in mineral consumption that has depressed prices of many commodities. In the longer term, continued development of Southeast Asia and China could significantly increase the consumption of minerals over the next 10 to 20 years. Thank you very much.

Mrs. CUBIN. Mr. Faleomavaega.

Mr. FALEOMAVAEGA. Madam Chairman, I would like to ask unanimous consent that these remarks and the written statement by the gentlemen from West Virginia be made a part of the record.

Mrs. CUBIN. Without objection, so ordered.

[The prepared statement of Mr. Rahall follows:]

STATEMENT OF HON. NICK RAHALL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WEST VIRGINIA

Many years ago we had a chairman of this Subcommittee who held hearing after hearing on the importance of minerals to the national economy, and to the nation's security.

Some of you may remember Jim Santini and his love affair with strategic and critical mineral issues.

So it was from that time, during my early years in the Congress, that I began to learn about the subject matter of today's hearing, not just from Jim, but also from our late, great former chairman Mo Udall.

After a time, when I was chairman, it is an established fact that this Subcommittee again held countless hearings on hardrock mining issues, and not just in Washington, DC, but in several locations in the West as well.

With this background, I have no doubt that hardrock mining is an appropriate use of lands in the public domain.

I have never questioned the concept of multiple use of those Federal lands not reserved or withdrawn for specific purposes.

But what I have questioned is the appropriateness of a regime in which hardrock mining is conducted on public domain lands with virtually no return to the American public for the use of those lands.

This practice simply defies logic, especially as we approach the new millennium.

No company, no private individual, would allow mining on lands they hold title to without requiring financial compensation. And I fail to see why the Federal Government should be the exception.

I have also questioned the appropriateness of a regime in which the mining and reclamation aspects of hardrock mining on Federal lands is largely regulated under a patchwork of state environmental laws and regulations.

Even where there are Federal laws specifically for this purpose, such as SMCRA for coal, problems arise as we have seen in southern West Virginia with mountaintop removal mining.

One does not have to imagine, then, what types of problems are occurring under a loosely woven quilt of state law and BLM policy.

When all is said and done, yes, hardrock mining is important. But so, to, is our responsibility to be good stewards of the public domain. And so, to, is our responsibility to those citizens who must contend with the environmental ramifications of these operations.

I hold no pretenses that H.R. 410, my mining law reform bill, will ever see the light of day in this Committee. Nor do I believe it is a perfect bill. But I do believe that resisting reform is bad business for the mining industry.

Thank you

Mrs. CUBIN. I wanted to announce to the Committee that a vote is going on—a 1-minute vote on H.R. 171, then a 5-minute vote immediately following on H.R. 193. I think we really don't have time to give Dr. Brobst adequate time for his testimony before the vote so we will go vote and then we will return as quickly as we can after that and then we will proceed with questioning of the witnesses. I apologize for the delay.

[Recess.]

Mrs. CUBIN. I may go ahead and call the Subcommittee back to order, and recognize Dr. Brobst for his testimony.

STATEMENT OF DR. DONALD BROBST, SOCIETY OF ECONOMIC GEOLOGISTS

Dr. BROBST. Good afternoon, Madam Chairman and members of the Subcommittee on Energy and Minerals. I am pleased to be here to speak to you on behalf of the Society of Economic Geologists, a 79-year-old society that now includes about 3,000 geologists who work in academia, government, and industry, but have no formal ties to any one of these parts.

We are greatly concerned about the future availability of the minerals and fuels that are the lifeblood of our civilization, the basis of our economy, and our personally comfortable lives. We look around this room and consider the origin of the materials. We either mine them or we grow them. Remember that it takes mineral fertilizers and soil conditioners, as well as fuels, to grow things.

Land issues are fundamental aspects of mineral exploration and mining. We must examine large areas of land to find new mineral and fossil fuel deposits. Land policy opens or closes land to exploration and mining. Land policy—that is mining law. The Mining Act of 1872 and the Leasing Acts of 1920 and later recognized the need for access to public lands for exploration and mining. Since the enactment of the Wilderness Act in 1964, land policy seems to

be traveling a new path toward tighter restriction on exploration and mining.

If closure to these activities is the wave of the future, we must ask, why is this so? Perhaps this is an early manifestation of anxiety about how the resources are used and how the planet is degrading. But we must come to the realization that through understanding and desire for change, these things evolve. The facts must be faced realistically. We need these resources to live on. Earth's resources are finite and aren't evenly distributed. A minable deposit of anything is a rare and beautiful thing.

Most of these rare and beautiful deposits will be needed—I should say, more of them will be needed as the population grows in the 21st century. Compound growth is a real killer for resource consumption and population growth. Mineral deposits are sought and mined at great risk and high cost in time and money. We need accessible land to carry out this effort. Work on a promising prospect may take 10 to 20 years to bring into production, and whose life might last 10 to 20 years. Therefore, deposits that we hope to be mining in 2010 to 2020 must be identified very soon.

A nation that cannot provide its own minerals and fuels must buy them abroad, if it can. Problems may be created in foreign relations. Cartels may try to limit prices, production and distribution. Many a war has been fought over the access and possession of resources.

Being without these commodities leads to a degradation of the standard of living, and that may be followed by civil unrest. We need a balanced view of the need for these nonrenewable resources and a need for a safe, healthy environment.

Better technology for exploration and mining is developed constantly. This allows environmentally-safe operations and leads to the use of formerly uneconomic materials. These technical developments also extend the use of our finite resources, but generally require more energy to produce.

The development of new ideas and technologies suggest that multiple mineral assessments of land are certainly needed, as stipulated in the wilderness legislation. As designated assessor of these lands, the U.S. Geological Survey should be supported in the multiple assessments of those withdrawn lands, and the assessments should include drilling for information about the third dimension: depth.

Mineral assessments without subsurface information are much less valuable and reliable. By 1996, wilderness areas already included more than 100 million acres, in 11 States of the Far West and Alaska and mostly on the public lands under discussion. This region has a geologic history through which conditions were favorable for the formation of many known large mineral and fuel deposits, and probably many more undiscovered ones.

Would it not be a good idea to allow for future access to these lands? Would it not be wise to get a better idea of the mineral wealth on and under our Federal public lands before putting them all out of commercial reach? The Nation needs land accessible to mineral entry.

In the few minutes that I have, I have tried to highlight some major points that I made in the statement that I submitted to you.

My written statement also contains a bibliography that includes references cited in the statement, and also lists some other works that focus on our mineral resource problem.

Thank you.

[The prepared statement of Mr. Brobst may be found at the end of the hearing.]

Mrs. CUBIN. I would like to thank the entire panel for their testimony. I will begin the questioning.

First, I would like to ask Dr. Menzie, and then followed by Dr. Brobst, if he wishes: One of the witnesses on the first panel testified—and this is a quote from his testimony—"Recycling should be thought of as a source of minerals." I would like to ask you both, what are the recycling rates for some of the metals that you discussed, and realistically, how much can the recycling rate for these metals be increased?

Dr. MENZIE. Madam Chairman, I don't have the recycling rates at my fingertips, but they generally are less than 50 percent for any given metal. It varies quite considerably, depending on the particular metal. But, in general, recycling has increased over time, and it is largely in companies' interests to recycle. They, therefore, do so. So the rates have increased over time, but they don't provide more than—well, they are all less than 50 percent of the supply.

Mrs. CUBIN. Realistically, do you think that this recycling rate could be increased by any significant level in the short term?

Dr. MENZIE. That would be beyond my expertise. You would have to get into metallurgy and recovery. So I think you need to talk to someone else about that.

Mrs. CUBIN. Dr. Brobst, did you want to respond?

Dr. BROBST. Well, I might stick my neck out a little bit on that. I think that one of the interesting things about recycling is we can, undoubtedly, do more in a lot of areas. Some years ago, I visited the Reynolds aluminum facility down in Richmond, Virginia, and they were talking about the recycling of beverage cans, the aluminum ones. They were saying that they believed at that time that very close to 70 percent of the beverage cans were being recycled, which I think sounds phenomenally high. But you can recycle those cans, those aluminum cans, with about 5 percent of the energy that it takes to smelt virgin aluminum bauxite.

So there are certain things that could be done, such as a lot of recycling education—getting people to do it. You can tell I am old enough to have been around during World War II, and I recall my mother recycling unused aluminum cans and that sort of thing. So after the war, we stopped all that, but it could really be started again.

Mrs. CUBIN. Dr. Menzie, I am wondering if we could trouble you to furnish the Committee with those recycling rates, if you wouldn't mind?

Dr. MENZIE. I would be glad to provide the recycling rates.

Mrs. CUBIN. Thank you very much.

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

Mrs. CUBIN. This question is for Mr. Silver. I am concerned about the trends in domestic mineral exploration spending. I understand that U.S. exploration expenditures have been declining steadily since 1992, whereas worldwide exploration expenditures were in-

creasing prior to the onset of the economic problems in Asia. Could you elaborate for me a little on the exploration trend since 1992?

Mr. SILVER. Whenever metal prices go up, you always get an increase in exploration expenditures because the companies can afford it. Exploration is considered a discretionary expenditure by most companies, or, in our language, many mining companies view exploration as a necessary evil. Lately, with metal prices being low, they are forgetting the word "necessary." It is expensive to explore. It is very, very high risk. It can take a very long time to do, which is very hard for a commercial enterprise.

It has been decreasing—gold prices, in particular, have been dropping. The other commodities are now dropping. So people are cutting way back. In the United States, though, they are having cutbacks because of metal prices, and since 1992, it has dropped off considerably. This year it is down substantially, with many companies cancelling, what we call, generative or grassroots. That is the exploration process where you discover new gold areas or new copper areas. You try new technologies, new research, to find brand-new deposit types and new areas. Most companies cannot afford to do that under today's metal prices. So, instead, they are only exploring, what we call, headframe exploration, which is exploration around the existing mines. When I asked the companies why they were focusing on that, their comment was, those lands are already permitted, and therefore, we can justify spending the money there.

Mrs. CUBIN. I think at some point we do have to be concerned whether sufficient expenditures for exploration are being made to replace the mineral reserves and maintain our Nation's domestic mineral resource base. Otherwise, our domestic mining industry I think will slowly slip into oblivion.

Do you think that current exploration expenditures are adequate to replace domestic reserves at normal mining rates?

Mr. SILVER. Absolutely not. As you know, the United States has become the second largest gold producer in the world. They are mining about 10 million ounces of gold a year. The average gold deposit is measured on the order of several hundred thousand ounces. So you need multiple discoveries to replace any of the U.S. production. So not only do you have an accelerated depletion of the existing reserves, but you are not finding enough new deposits to replace the gold reserves being mined. We are already in a negative curve. If you look at exploration expenditures, you will see they have leveled out, and what the projections are for 1999 forward, they are definitely going to drop off, and so are the discoveries.

Mrs. CUBIN. I recognize that my time has run out. Mr. Tancredo, if you don't mind, since the dais isn't teaming with members to ask questions, I would like to ask one more question of Mr. Silver.

I understand that several years ago you compiled an analysis of the effect of royalties on mining operations. Could you summarize that for me? And would you mind submitting a copy of that for inclusion in the record?

Mr. SILVER. By all means.

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

Mr. SILVER. I was asked last year by the Minerals Exploration Coalition to analyze the new proposed royalty schemes on U.S. mines. I was really fortunate in getting one of the mining compa-

nies to actually provide me with their actual financial data for their three U.S. gold mines, and then we modeled the different royalty provisions.

Mrs. CUBIN. What mines were those?

Mr. SILVER. It was Golden Sunlight, which is in Montana—it is a gold mine—Cortez, which is in Nevada, and the third one was—what is the third gold mine? There is a third one; it will come to me. Bald Mountain, Nevada.

Mrs. CUBIN. What State is that one in? If you can't remember, it is all right.

Mr. SILVER. I am drawing a blank. It was the three gold mines that Placer Dome has in the United States.

Mrs. CUBIN. Okay.

Mr. SILVER. We modeled these and tested them in different provisions. When we did this, because we looked at all the different governmental entities and their different fees they extract from mining operation, we lumped them together on a dollar-per-ounce basis. Because we mine ounces, we look at our cash costs on a per-ounce basis. We, basically, found that this 8 percent provision that was being proposed would, in fact, increase the governmental extraction fees by 50 percent, which we were amazed that that would be acceptable to any American, to have their taxes raised 50 percent, but that is the way it came out with computer modeling.

Mrs. CUBIN. Thank you very much.

Mr. Tancredo, do you have questions for the panel?

Mr. TANCREDO. Thank you, Madam Chairman. I do.

My attention was drawn to the same set of figures that Madam Chairman's references were made to just a minute ago, and only to the extent that I sometimes think that providing the Congress with this kind of information is dangerous. As you probably know, there are a lot of people here who would look at this decline and take it as a very positive statistic, and especially mineral exploration expenditures in the United States. There are people who would certainly want to see it decrease. I know they are in this Congress. You know that they exist. To them, as they look at this and say, "Boy, isn't that great, how far we are going down," maybe pretty soon it will be zero, and we won't be disturbing the environment in the United States anymore.

At any rate, I was wondering, Mr. Silver, if you could also—you, obviously, feel strongly about the current open-ended EIS process. You believe it is detrimental. I certainly agree with you.

The question is: What do you envision as an alternative to it? Could the EPA, in your estimation, undertake something like, what sometimes has been referred to as, the "rocket-docket" process—you know, to expedite project approvals. Are we kind of running down a slippery slope there by handing anything over to them for that purpose?

Mr. SILVER. I wouldn't pretend for a minute to be a lawyer, even at Halloween.

[Laughter.]

When we work with companies and they have a management problem, we can find solutions to the management problem and let the company move ahead with a more efficient structure that bene-

fits the shareholders and the employees. I don't see why we can't do that with the U.S. Government.

Having said that, I realize that anybody can sue you any time they want, and they can appeal anything they want, but it strikes me very odd that we spend millions of dollars and several years conducting studies that are deemed important, and then at the end of it, anybody who wants to appeal or obfuscate the process is allowed to get away with it.

Mr. TANCREDO. Yes.

Mr. SILVER. I think that the government should set a certain number of studies that are agreed upon with expert consultants and with the company and the government. Those studies should have a budget. The budget should be adhered to, and when it is done, a record of decision should be put out, and that should become the final say. If other groups want to come in and appeal it after that, I think it should be the government's responsibility to pay for that, rather than financially bankrupting the companies.

One mining company that is extremely successful in discovering deposits in the United States no longer explores here. When I asked their president why, he said, "Why would I want to discover another deposit in this country and go bankrupt getting a permit."

In Bolivia, the permitting process is set up with timeframes. You are required to submit the information in a timely manner. They are required to review it and make decisions. If the government does not adhere to that timeframe, the permit is automatically issued.

This is the thing: We are taking U.S. environmental practices all over the world, because most of these companies are public companies. Their shareholders demand it. Their management and their employees demand it. But in other countries they help you through the process, and they try to make it efficient. They set deadlines, budgets, and they keep to it. We seem to have an open checkbook policy here, which is just destroying us. It is very frustrating.

Mr. TANCREDO. It certainly is frustrating. I am sure you recognize, and certainly I believe that the reason why we face this kind of a situation has little to do with the actual cost that either the government incurs or you incur in the process. I agree with you; I think there are ulterior—I think there are other motives for the people who are involved to force you and the companies that you are talking about, into the kind of process that you have described.

The last thing I wonder is, you also mentioned that Alaska and Nevada's policies were progressive, proactive. I guess I am wondering, do you know, what has the EPA done about that? Have they found out yet?

Mr. SILVER. I don't think it is just the EPA. I mean, I think it is the State governments as well and a number of other groups. The State of Alaska understands the value of natural resources to its economy. It is a very big part of Alaska. The same thing with Nevada. They appreciate the role minerals play in their economies, creating jobs, opportunities, and everything else. Therefore, I think they stand up a little bit more to the people with special agendas. They don't allow the process to just sort of go on infinitum. They keep people's feet to the fire, and that is what we expect out of our legislators. We have legal rights, too, and right now defending

yourself in litigation is far more expensive than filing litigation. We wish there was a little bit of parity, so that we could get the process done correctly, rather than the way it is right now.

Mr. TANCREDO. As do I.

Thank you very much. I have no other questions.

Mrs. CUBIN. Well, I thank the panel for their valuable testimony, and Mr. Tancredo for his good questions.

If there is no other business before the Committee, we stand adjourned. Thank you very much.

[Whereupon, at 4:22 p.m., the Subcommittee was adjourned.]

[Additional material submitted for the record follows.]

STATEMENT OF MICHAEL J. MCKINLEY, PHYSICAL SCIENTIST, U.S. GEOLOGICAL SURVEY

Madam Chairman and Members:

I am Michael J. McKinley, a Physical Scientist with the U.S. Geological Survey (USGS), currently serving as the Chief of the Metals Section in the Minerals Information Team. I appreciate the opportunity to appear before you to discuss the role of metallic minerals in our national security and comment briefly on the availability of metallic minerals on public lands.

The Contribution of Metallic Minerals to National Security

Metallic minerals are a key component of the supply of materials essential to our national security. These minerals are considered to be strategic and critical when the Nation must rely on importing them, few countries produce them, and their use is critical to military and industrial applications. Despite the dramatic changes in military readiness strategies in present years, the uses of these metallic minerals are still critical and most sources of supply are unchanged.

For example, chromium is a metal that is used in stainless steel and in alloys in high performance aircraft. There is no substitute for chromium in either of these applications. However, 95 percent of the world's identified resources of chromium, which is extracted from chromite ore, are located in South Africa. The United States has no chromite ore reserves and only limited occurrences of chromite ore at all. As a nation, we import 80 percent of the chromium we use; the remaining 20 percent is acquired through recycling. Although uses of chromium have changed over time, the supply of chromium has been a major concern since World War I.

For many years, the U.S. Government has maintained stockpiles of strategic and critical minerals. However, as the Department of Defense (DOD) has changed its primary war planning scenarios, strategies for maintaining an adequate supply of minerals have also changed. Currently there are more than 80 materials identified in the Strategic and Critical Minerals Stock Piling Act of 1939, half of which are metals. Congress has authorized the sale of many of these stockpiled materials in response to changing strategies. Only three commodities have been designated by DOD to be stockpiled for future use: beryllium (a very light metal used in aircraft alloys), mica (an excellent insulator used in radar applications with extreme high voltage), and quartz crystals (used as a filter in electronics devices.) Whether or not they are stockpiled, all of these materials are still strategic and critical, because they are still necessary for the equipment with which we defend ourselves in wartime and other emergencies. For example, of the more than 12 strategic and critical minerals used in modem fighter aircraft jet engines, only 4 are commercially recoverable via domestic sources.

Availability of Metallic Minerals on Public Lands

At present, there are 141 active metal mines, not including placer mines, in 16 States. Commodities produced as a principal product or major byproduct are: antimony, beryllium, cadmium, copper, gold, iron ore, lead, molybdenum, palladium, platinum, rhenium, silver, and zinc. Current U.S. laws permit location of mining claims on Federal lands in 19 States (Alaska, Arizona, Arkansas, California, Colorado, Florida, Idaho, Louisiana, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming).

USGS has a long history of assessing the potential for undiscovered mineral resources. Modern systematic efforts to determine the potential for undiscovered resources, especially metallic mineral deposits, began in the early 1960's, in response to the Wilderness Act of 1964, which required mineral assessments of public lands prior to withdrawal as wilderness areas. In the early years of this effort, the products were qualitative, describing high, moderate, or low potential for occurrence of undiscovered mineral resources. More recently, probabilistic quantitative assessments have been developed, resulting in reports that describe the probability of occurrence of identified quantities of specific mineral commodities. The first of these assessments was published in 1976.

Mineral resource assessments have expanded over time to address the needs of numerous Federal land and resource planning efforts, including those of the Forest and Rangeland Renewable Resources Planning Act of 1976, which applies to National Forest lands; the Federal Land Policy and Management Act of 1976, which applies to BLM lands; and the Alaska National Interest Lands Conservation Act of 1980. The USGS, in coordination with the BLM and the Forest Service under a Memorandum of Agreement, is conducting mineral resource assessments on individual land units managed by BLM and the Forest Service, including BLM districts and resource areas and National Forests. Other assessments are conducted on Alaska National Interest Lands and lands designated for various types of withdrawal.

Also, USGS is just completing a Nationwide assessment of potential for undiscovered occurrences of gold, silver, copper, lead, and zinc. This National Assessment estimates that about as much of these metals remains to be discovered as has already been discovered.

Although many local-scale mineral resource assessments have been completed or are in progress for BLM and Forest Service, there is no national systematic assessment of the potential for metallic mineral resources on all Federal lands. Some of the factors that make such an estimate difficult include the dynamic nature of land status, with lands passing from public to private ownership, and vice versa; methodological difficulties that arise from the relatively small areas included in individual tracts of public land and the inadequacy of scientific data for making predictions in those small areas; and the inherent uncertainties in making probabilistic assessments.

The public lands may contain undiscovered deposits of mineral commodities that could be used to ensuring the national security. However, ultimately geologic factors, rather than land ownership, are the most effective predictors of potential for undiscovered mineral resources. For some commodities, such as chromite or bauxite ore, there is very little likelihood of ever identifying significant resources in the United States.

Thank you, Madam Chairman. I will be pleased to respond to any questions you may have.

STATEMENT OF DR. DONALD A. BROBST FOR THE SOCIETY OF ECONOMIC GEOLOGISTS

Good afternoon, Chairman Cubin and members of the Subcommittee on Energy and Minerals. I am Dr. Donald A. Brobst and I am pleased to be here today representing the Society of Economic Geologists to speak on the future importance of Federal lands to the mineral and energy economy. Our society was founded in 1920 and has a membership of more than 3,000 professional geologists deeply involved with the study of and exploration for mineral deposits of all kinds. We are an organization that is independent of formal ties to government, industry and academia, although we may work individually in research or exploration for a wide variety of employers. The goal of our organization is to foster research and dissemination of geologic information for application to the continuing search for new mineral deposits. Because we deal constantly with the uneven distribution of mineral resources within the accessible portion of the earth's crust, the difficulties in locating them and bringing them to production, we economic geologists believe that we can offer some useful insights into resource problems that might not be as evident to others.

Minerals and fossil fuels are the life blood of our civilization and its economy. They are the foundation of society and our personally comfortable lives. Let's face it, no ancient emperor ever lived better than most of us do now in what we call the developed nations. These minerals are not just some abstract things that support the economy. Look around the room right here. There is stone, cement and steel for the building skeleton, copper in the pipes and wiring, chemicals of mineral origin in the paint. Don't forget the materials that made the tools and other machines that were used to build the building and the energy that made all of these steps possible. In the last few years, 1995 for example, domestic mine production yielded metallic minerals worth about $13 billion and noninetallic minerals worth about $25 billion. The raw minerals after further processing for commercial use had a value of $395 billion in a United States Gross Domestic Product (GPD) of $7 Trillion. The system of mineral supply that has allowed us to develop our high standard of living has worked well. How well will it do in the future is a question to ponder. How can we keep the mineral resource system functional?

As geologists and citizens, we are greatly concerned about the future availability of the minerals and fuels needed to keep the economy of our nation sufficiently productive to support our population in the life style to which it has become accustomed, a style to which the more rapidly rising population of the less-developed world aspires.

The minerals that we use are mined at the surface of the earth as well as to depths of thousands of feet beneath that surface. To find these deposits, we must examine large areas, often examining many prospects that do not turn out to be mineable. Thus, we are in need of land with which to work. Land issues, therefore, are fundamental aspects of mineral exploration and mining. Land policy opens or closes land to exploration for and production of minerals and fossils fuels. Land policy sets mining law. Since the early days of our nation mining law has made exploration and mining permissible on Federal land.

As you well know, a major mining law that applies to Federal land was established in 1872. The notion at the time was to assist individual prospectors in the development of the West. This meant settlement and the establishment of a viable economy in that region. The law allows the claiming of lands to develop and mine minerals after discovery in hard rocks or those associated with stream gravels, notably gold placer deposits. Once the discovery was certified and well assessed, the claimed land could be patented, i.e. removed from public land to private ownership.

The Mining Law of 1872 worked well for years but more recently has presented difficulties (Bailly, 1966). Mineral discovery must be certified on every claim at the time of staking. Currently discovery certification may require control of larger areas for commercial success when "discovery" may not be demonstrable on an individual claim, which encompasses about 20 acres. Discovery is generally now made by drilling and/or underground workings in areas larger than one claim. Other problems are seen in the approved legal status of claims for only two types of deposits, lodes and placers. There is no provision for staking claims on bedded or other types of deposits. The apex rule has been troublesome. Who really claimed the top of the deposit? For it is he who gets to mine downward. Many times the geology of the deposit does not offer a clear-cut case, which has opened many arguments. In recent years, the law has been the subject of considerable debate as efforts have been made to make it more applicable to present day mining problems and practice.

From 1920 onward, new laws allowing the leasing of Federal lands with payments of royalties for production of minerals and fossil fuels were passed by the Congress. These laws have allowed continued access to public lands and generated much additional domestic mineral and fossil fuel production.

It is clear now that U.S. mining law, despite its perceived flaws, has supported the idea that the nation needed to develop its mineral resources for the common good. The history of these mining laws and their problems have been well summarized in a readable style by E. N. Cameron (1986, p. 204-220).

Although mining law has been altered since 1920 by the leasing laws, land policy seems to be traveling in the opposite direction, on a path toward tight restrictions that preclude mining. More and more public land is being withdrawn from mineral entry, particularly under the Wilderness Act of 1964. Under this Act, economic tests were set to make decisions about the comparative value of various uses of the parcels of public land being considered for inclusion into the wilderness system. The law also provided that the U.S. Geological Survey (USGS) and the now defunct U.S. Bureau of Mines (USBM) should survey the mineral potential of these designated areas on a regular and recurring schedule consistent with the ideals of wilderness preservation. It would now seem that the plan of recurring assessment has been abandoned. As time goes on, new ideas and technology appear, making most areas deserving of another look. It is interesting to note that, although the Wilderness Act does not allow mining in these areas, it will allow the gathering of information about mineral and other resources, and even prospecting, as long as the preservation of the wilderness environment is respected. The Departments of the Interior and Agriculture were also requested to review every roadless area of 500 acres or more of contiguous areas within units of the national park system, wildlife refuges and national forests to make recommendations for inclusion of such areas into the wilderness system. The Federal Land Management Act of 1976 and the Alaskan National Interests Land Act of 1980 also authorized wilderness areas but did not include economic tests for the withdrawals.

The Office of Technical Assessment (1976) indicated that by 1974 the location of minerals under the Mining Law of 1872 had been prohibited on almost 42 percent of public domain, severely restricted on about 16 percent and moderately restricted on about 11.5 percent. The total amount of land withdrawn was 500 million acres. With respect to lands under the mineral leasing acts, such activity was prohibited on 36 percent of the public domain, severely restricted on about 23 percent, moderately restricted on about 6.5 percent. This involves 549 million acres. Doubtless, access must be even more restricted today. The affected lands are mostly in the 11 conterminous states of the Far West and Alaska. On a visually stunning map of the distribution and classification of "Federal Land in the Fifty States," the National Geographic Society (1996) indicated that areas assigned to the wilderness system include 102 million acres in 360 areas administered by the Park Service (44 percent), the Forest Service (33 percent), the Fish and Wild Life Service (20 percent), and the Bureau of Land Management (5 percent).

By 1983 the USGS and USBM each assessed 45 million acres of Forest Service lands in, or considered for, the wilderness areas. It took 1,000 man-years of effort (Marsh et al, 1983). That effort did not include any drilling. It appears, therefore, that lands will be assessed without any information in the third dimension—depth. Only Congress can release an area from the wilderness, a likely long procedure even

if evidence of a good deposit is indicated. To demonstrate that might require information about rock and mineral characteristics at depth. Getting that information first as required is probably unlikely. We would hope that the now lone assessing agency, the USGS, will be financially supported in detailed recurring assessments that include drilling. Without information about rocks at depth, the resource assessments are much less valuable and reliable.

If the Wilderness Act with its closure to mining is the wave of the future in public land policy, we must ask why this is so. We must consider the effects of such actions on our national ability to maintain a high degree of mineral and fuel independence that will support firmly our economy, our security, and our comfortable life style through the coming years. This call for a reduction in mining on more Federal public land is perhaps an early manifestation of anxiety about how the human race is using natural resources, how it is degrading its planetary habitat, and what it will leave for future generations. We must all come to realize that understanding and changes evolve, but that certain facts must be faced realistically.

We need mineral resources to live. These mineral resources are finite and difficult to find. What we use we grow or mine. What we grow is renewable; and the minerals we mine are nonrenewable, although in some cases now recyclable to some degree. We geologists know that the mineral and fuel deposits we study and seek are rare and beautiful things. We need to communicate better that message, which I am trying to do today. To find a concentration of mineral or fuel material that we can produce at a profit under the economic conditions of the time is a real prize. Deposits are sought with great scientific and technologic effort at a high price. After discovery, they are developed with more great effort and more money. It is likely now that most of the easy to find deposits of most types that we now know about have been found in most areas of the world. Roscoe, (1971, p 134) noted that in 1951, one in 100 prospects in Canada that were examined during an exploration program lead to a mine development and by 1964 the ratio had been reduced to one in 1,000. This is certainly also true in the U.S. This means that we must continue to develop new and better ways to find more deposits in order to supply more people with their mineral needs. Finding and developing new deposits for production takes time. It may take 10 to 20 years to bring a promising show of minerals to successful production. This is a capital-intensive process. Many economic and legal changes may end a project and cause great losses before any product can be sold. It is a very exciting but risky business, this pursuit of mineral and fuel supplies to support the lives of the consumers (all of us!). We should keep the land access open because we might later want to return a once cancelled project.

We must realize that the resources in sight now will not be sufficient to raise the living standard of the growing world population to that of the so-called developed nations. Mineral production is constantly rising with expanding economies. This says to us quite simply that if we boldly suppose that we now have a 1000 year supply of a mineral commodity in sight at present rates of production and plan to increase that production at a growing rate of 2 percent in each successive year, our 1000 year supply will be gone in 152 years. Compound growth is a real killer for resource consumption and population growth. Is this not a strong argument for continuing research for new deposits of minerals and fossil fuels and for adopting land-use policies that can evolve as the social, political and technologic climate changes?

This line of reasoning implies exhaustion of commodity supplies. We can recognize geologic exhaustion of a mineral deposit when we can remove all of valuable ore material such as that found in a body with sharp walls between ore and adjacent non-mineralized rocks. Economic exhaustion is more common and occurs when some mineral material remains, but it is no longer mineable at a profit. Should some favorable changes occur in economics or technology, the deposit might again be profitably mined. This means that we need to permit continuing access to old mining areas in case they will be opened again as prices or conditions change.

As we turn to lower grade ore, mineable material with a lower percentage of the desired material than is currently available, we will be required to process more tons of rock to obtain the same amount of that material, which will in turn require the use of more fuel. When fuel becomes scarcer and more expensive, the costs of mineral production will rise and those costs will be passed on to consumers.

We should now look at some of these observations again and see what they mean to us now. Mining is done because we need minerals. We want them at the lowest price to sustain our lives at the highest levels possible. To do that for more people means that production must increase. The productive life of many deposits is only 10 to 20 years. If it takes 10 to 20 years to find and bring deposits to production, the deposits we need in production between 2010 and 2020 must be identified soon. That means that we must constantly be looking for new deposits. The need for de-

posits requires access to land for the search. Accelerated rates of production at known deposits are not a satisfactory long-term solution to supply problems.

A nation that cannot produce its own supplies of minerals must try to buy them abroad. Depending on where the supplies are located, special problems in foreign relations may be created. Cartels might seek to control production and distribution. History shows that many wars are fought over access to and possession of minerals and fossil fuel supplies (Youngquist, 1997). Even embarking on such wars requires the availability of mineral and energy commodities.

The only other option is to do without these minerals and fuel supplies. Doing without them will lead to the degradation of living standards at any level. That condition will not be acceptable to many people. Political and civil unrest may follow.

Everyone wants a clean healthy environment but everyone also wants to live comfortably and well. Accomplishing these two objectives will require the use of many resources, including those of minerals and energy, prudently and well in the future and at the least cost to the environment and the consumer. If there were no need or desire for these commodities, there would be no mineral and fuel industries. If there were no geology, there would be no environment.

Much success in the location of new supplies of mineral resources, developing new technology to produce them in an environmentally sound fashion, finding substitutes for scarce, expensive ones, and recycling as much as possible will be required in the days ahead. Not everything is recyclable, fertilizer commodities, for example. Recycling, however, cannot retrieve enough material to supply increased growth. All of these operations will require the availability of energy supplies at reasonable cost. New sources of energy will have to be found and developed. New kinds of energy resources will be called for. Research and development on these topics needs to be given high priority.

A closer look at oil suggests that by the middle of the 21st century world oil production will peak. Following the time of peak production, prices will rise and at some point reach a level high enough to signal economic, if not geologic exhaustion. This scenario of peaking production and subsequent price rise will apply also to any mineral commodity when the search for new deposits fails to turn up additional deposits.

We should certainly ask ourselves whether a fifty year supply of anything now is a great comfort to us. Even a 500 year supply at anticipated increased rates of production is not a great one considering the generations of people marching through coming geologic time. We must note, however, that people will have used up the readily available supplies of oil in about 200 years since Col. Drake drilled the first oil well at Titusville PA in 1859. The world's petroleum supply took millions of years to mature: none is younger than 2 million years. The mineral and fossil fuel deposits that we seek and use have formed at various places and in times that span millions of years. This does not mean that we should not use these resources, but that we should be aware of their origin, the magnitude of their abundance, and their distribution because we need them. We must be ready to adjust to changes in their availability before supply problems cause economic and societal stress. We need access to land to find the new deposits.

In conclusion, we are waking up to our environmental problems. Many people have not yet awakened to the resource problems. Both of these sets of problems must be examined with a balanced view. With the need for energy and minerals and the need for a safe and healthy environment, what balance we set will greatly affect what we do. Look again at that National Geographic map (1996). The 11 western States and Alaska have most of the public lands in question. This region of the U.S. has most of our large metal mines and some large nonmetallic deposits of relatively rare materials. This region has a geologic history through which conditions were very favorable for the formation of valuable deposits on and beneath the present surface. Would it not be a good idea to allow for future access? Would it not be wise to get a better idea of our mineral wealth on and under Federal public lands before putting it all out of commercial reach?

BIBLIOGRAPHY

The bibliography that follows presents information on the publications cited in this text and some other works on mineral resources that might be of interest to readers of this paper.

Bailly, P., 1966, Mineral exploration and mine developing problems related to use and management of other resources and to U.S. public land laws, especially the Mining Law of 1872. Statement to the Public Land Law Conference, University of Idaho. Oct. 10, 1966, 43pp.

Brobst, D.A. in V.K. Smith, ed., 1979, Fundamental Concepts for the Analysis of Resource Availability, in Scarcity and Growth Reconsidered, The Johns Hopkins Press (for Resources for the Future) p 106-142.

Cameron, E.N., 1986, At the Crossroads—The Mineral Problems of the United States: John Wiley and Sons, New York, 320 pp.

Eckes, A.E., 1979, The United States and the Global Struggle for Minerals: University of Texas Press, 353 pp.

Marsh, S.P., Kropschot, S.J. and Dickinson R.G., eds., 1984, Wilderness Mineral Potential Assessment of Mineral Resource Potential in U.S. Forest Service Lands Studied 1964-1984: U.S. Geological Survey Professional Paper 1300, 2 vol. 1183 pp.

National Geographic Society, 1996, Federal Lands in the Fifty-States. A map issued with the Oct. 1996 issue of the National Geographic Magazine.

Office of Technology Assessment Board of the U.S. Congress, 1976, Mineral Accessibility on Federal Land, U.S. Government Printing Office, Washington, DC

Park, C.F. Jr., 1975, Earthbound—Minerals, Energy, and Man's Future: Freeman, Cooper and Co., San Francisco, CA., 279 pp.

Roscoe, W.E., 1971, Probability of an Exploration Discovery in Canada: Canadian Mining and Metallurgical Bulletin v. 64, no.707, pp 134-137

Youngquist, Walter, 1997, GeoDestinies: National Book Co., Portland, OR 499 pp.

SUPPLEMENTAL INFORMATION

SUMMARY

The mining law of 1872 and the subsequent mineral leasing acts of 1920 and later recognized the need for access to public lands for mineral exploration and mining because the nation needed minerals and fossil fuels to support the economy, the national security, and the comfortable lifestyle of most of its citizens. With the advent of the Wilderness Act in 1964, lands began to be withdrawn from mineral entry. If the Wilderness Act with its closure to mining is the wave of the future in public land policy, we must ask why this is so. We must consider the effects of such actions on our national ability to maintain a high degree of mineral and fuel independence that will support firmly our economy, our security, and our comfortable lifestyle through the coming years. This call for a reduction in mining on more Federal public land is perhaps an early manifestation of anxiety about how the human race is using natural resources, how it is degrading its planetary habitat, and what it will leave for future generations. We must all come to realize that understanding and changes evolve, but that certain facts must be faced realistically. Mineral and fossil fuel resources are finite. We need mineral resources to live. These resources must be sought and mined at great cost in time and money. We need accessible land on which to carry out this work. Work on a promising prospect may take 10 to 20 years to bring into a production whose life might last 10 to 20 years. This means that deposits we hope to be mining in 2010 to 2020 must be identified soon. A nation that cannot produce its own minerals and fuels must try to buy them abroad. Problems in foreign relations may be created. Cartels may cause problems and many a war has been fought over access and possession of mineral and fuel resources. Doing without these commodities leads to degradation of living standards and that may be followed by civil unrest. We must have balance between the need for mineral resources and the need for a healthy environment. Look again at the National Geographic map. The 11 States of the Far West and Alaska have most of the public lands under discussion. This region has a geologic history through which conditions were favorable for the formation of many large deposits of metallic minerals, some of rare industrial minerals and probably more undiscovered deposits. Would it not be wise to get a better three-dimensional idea of our mineral wealth on Federal lands before putting them out of commercial reach?

BRIEFING PAPER

Subcommittee Oversight Hearing on "Mining, the American Economy and National Security—The Role of Public Lands in Maintaining a National Asset" February 23, 1999

The Subcommittee on Energy and Mineral Resources is holding this oversight hearing to gather factual information on the state of domestic mining, including trends in domestic mineral exploration, production and reserves. Mining is a basic economic activity which supplies the strategic metals and minerals that are essential for agriculture, construction and manufacturing. A recent study by the National Research Council concluded that one of the primary advantages that the United States possesses over its strongest industrial competitors, Japan and Western Eu-

rope, is its domestic resource base. The domestic mining industry provides about 50 percent of the metal used by U.S. manufacturing companies.

The United States is among the world's largest producers of many important metals and minerals, particularly copper, gold, lead, molybdenum, silver and zinc and still has substantial domestic reserves of these metals. Twelve western states containing more than 92 percent of U.S. public land account for nearly 75 percent of U.S. domestic metal production. Thus, much of the United States future mineral supplies will likely be found on public lands in the West.

Evidence is mounting that while global mineral exploration trends are strongly positive, U.S. mineral exploration has entered a protracted downward spiral. Continuation of this trend in domestic mineral exploration raises serious concerns that as known reserves are exhausted, significant declines in domestic mineral production will occur. A long term decline in U.S. domestic mineral production could result in the loss of thousands of high-paying, skilled jobs in the domestic mining, mineral processing and manufacturing industries and increase reliance on foreign mineral supplies, increasing a worrisome national trade deficit.

The Subcommittee will call witnesses from a national mining trade association, a consulting firm, the U.S. Geological Survey, a professional society and an environmental group to hear testimony on the following issues: (1) the domestic mining industry's contribution to U.S. economic strength and national security, (2) the current levels and trends in domestic mineral exploration efforts, (3) reliance on imported minerals, and (4) the role of mining on public lands in connection with the aforementioned issues.

For further information, please contact Bill Condit at x59297 or John Rishel at x60242.

ADDITIONAL MATERIAL SUBMITTED BY RICHARD L. LAWSON, PRESIDENT AND CHIEF EXECUTIVE OFFICER, NATIONAL MINING ASSOCIATION

Dear Chairman Cubin:

Thank you for the opportunity to testify on the Subcommittee oversight hearing on February 23, 1999 on Mining, the American Economy, and National Security. I believe it gave the mining industry an excellent chance to show why the U.S. needs the ability to access public lands for domestic extraction activities which are essential for our continuing economic strength while maintaining the sensitivity we all want for our collective environment.

During questioning of Mr. D'Esposito of the Mineral Policy Center by Rep. Gibbons of Nevada, several misleading comments were made about the adequacy of the bonding and reclamation at the Pegasus Gold Zortman Landusky complex in Montana. I'd like to correct those errors for the hearing record.

In 1996, Pegasus Gold Corporation and Zortman Mining Inc. (ZMI) reached an agreement with the Environmental Protection Agency, and the Montana Department of Environmental Quality, the Assiniboine and Gros Ventre Tribes of the Fort Belknap Indian Reservation and the Island Mountain Protectors, which settled outstanding water quality issues. Without ascribing liability, the agreement resolved all pending claims against Pegasus and ZMI for alleged water noncompliance. The agreement was the result of approximately three years of technical studies and negotiations. The agreement outlined that Pegasus and ZMI pay a cash civil penalty of $2 million divided equally between the Federal Government and the State of Montana. The companies also agreed to create a $1 million trust fund for the Fort Belknap Tribes to finance projects identified by the Fort Belknap Community Council. In addition, the companies agreed to finance three supplemental environmental projects ('SEP's) for $1.5 million. The SEP's included improvements to the aging water supply and distribution systems for the Hays and Lodgepole communities on the Fort Belknap Indian Reservation, an independent community health study of residents on the Reservation and a detailed inventory of aquatic resources on the southern portion of the Reservation.

In addition, ZMI had to post a compliance bond for the construction and operation of seepage capture systems and water treatment plants at both the Zortman and Landusky mine sites. The compliance bond basically serves as financial assurance for the state and Federal agencies that all corrective actions that were identified in the compliance plan will be completed. Furthermore, the bond had to include contingencies for what-if scenarios and had to be estimated as if the agencies were doing the work. It was also a requirement to post bond for treatment of water into perpetuity.

The compliance bond consists of three parts identified as the capital bond, the operating and maintenance bond, and the perpetuity bond. The capital bond covered

all compliance construction work to be completed by year-end 1997, along with a 10 percent of capital contingency for unforseen problems with water capture and treatment systems. The total came to $7,194,260. Furthermore, there was an additional $2,905,260 bonded for five other what-ifs, bringing the total capital compliance bond to $10,099,894. All of this work was completed by ZMI within the allotted time frame and in accordance with all the terms of the consent decree. ZMI has asked the state for release of this bond.

The operating and maintenance bond consists of operating labor, maintenance labor, direct and indirect costs and G&A costs to operate and maintain all water capture and treatment facilities until the year 2016. This segment of the bond is for the next 20 years and used a 3 percent inflation rate in the calculation. This bond also includes water monitoring and analysis, along with additional what-if contingencies. The total bond requirement for O&M segment was $14,626,422.

The perpetuity of the long term bond is for replacement costs of the water treatment facilities every 30 years discounted into perpetuity, along with costs associated with the operation of the facility, monitoring, testing, etc. The total bond amount is $7,603,996. Hence, the total compliance bond that ZMI secured as part of the settlement totaled approximately $32 million. The bond was put into place before year-end 1996 and remains in place to this date.

On January 16, 1998, Pegasus Gold Inc. and certain of its subsidiaries filed voluntarily to reorganize under Chapter 11 of the Bankruptcy Code. Since that time, the Company's reorganization plan was confirmed of December 22, 1998 and confirmation of the plan occurred on February 5, 1999. During bankruptcy proceedings, all mine sites functioned in accordance with all state and Federal requirements and continue to do so.

Finally, the MDEQ has determined that the reclamation bond of $30 million (this is in addition to the $32 million that is in place for compliance issues) is inadequate, and has asked the bankruptcy court for an additional $8.5 million. However, it is the position of ZMI that all necessary reclamation work can be done for less than the current $30 million and a detailed estimate of the work was completed by ZMI earlier this year. Pegasus Gold, ZMI and the state have been in close contact regarding bond requirements, and negotiations have progressed very well. ZMI and Pegasus Gold have always had good working relations with the regulators and, contrary to what environmental advocacy would like to have others believe, ZMI will continue to maintain our positive working relationship with state and Federal agencies in the future.

In conclusion, Mr. D'Esposito's comments are nothing more than attempts to spread fear, while portraying the mining industry and in particular Zortman Mining, Inc, in a very bad light, when just the opposite is true. While having little or nor credibility regarding mining issues, as the staff of the Mineral Policy Center are not mining experts, and by not adequately explaining the facts of the Zortman/Landusky case, it seems MPC is trying to discredit an industry that has greatly supported the State of Montana both economically and environmentally. For over 18 years, ZMI supplied Phillips County with high paying mining jobs. Over the life of the mine, ZMI employed an average of approximately 210 people, with the highest employment rate reaching 300 people during 1994. ZMI employees consisted of people from all walks of life, including many members of the Fort Belknap Indian Reservation. All mining and associated disturbance has occurred within approximately 1,200 acres of private and BLM land—this acreage includes both Zortman and Landusky mine sites. There are not many ranches or farms of this size, that I am aware of, that can directly provide jobs and income of this magnitude anywhere in the country, not to mention the indirect jobs that were created by the tremendous amount of goods and services that are required to operate and maintain a mine site.

As I stated during the question and answer portion of our panel's presentation, in the vast majority of cases involving mining operations, the U.S. industry serves as "active" environmentalists creating new economic wealth for our nation, not environmental "activists" looking for problems on which they can litigate, but never arrive at a solution.

If you would like further clarification on this issue, please contact me and I'll put you in touch with Mr. John P. Jones who provided NMA with this information. Mr. Jones is currently the General Manager of the Reclamation Services Corporation currently under contract to MDEQ for work relating to operation and maintenance of water capture and treatment facilities at the Zortman and Landusky mine sites. You may also contact Ms. Jill Andrews, Executive Director of the Montana Mining Association.

ADDITIONAL MATERIAL SUBMITTED BY RICHARD L. LAWSON

Dear Delegate Faleomavaega:

During questioning on my testimony before the House Resources Subcommittee on Energy and Mineral Resources oversight hearing on Mining, the American Economy and National Security, you asked me to respond to a Wall Street Journal article which you said alleged U.S.-based Freeport-McMoRan Copper & Gold Inc. was causing pollution and only had to comply with Indonesian environmental standards, not U.S. environmental standards.

Although I have not yet received the article in question, I wanted to make sure I responded to you in a prompt manner. As promised, I checked the situation with Freeport and was surprised to learn you and your staff visited with company personnel and spoke with them several times on this issue. Perhaps Representative Miller's staff representative was unaware of the dialogue with Freeport when she gave you the question that you presented to me on the Irian Jaya, Indonesia situation. I believe your personal staff was checking on the House voting schedule during our exchange on this issue.

At any rate, I'm enclosing a copy of the six-page letter sent to you in August of last year from Russell King, Freeport-McMoRan's Senior Vice President here in Washington, DC. I believe his explanation of Freeport's environmental record in Indonesia on pages four and five of that letter is comprehensive. Further, the some 33 recommendations made by an independent environmental audit done by Dames & Moore which Freeport voluntarily commissioned on its tailing management program, are being fully implemented. I am told you also have copies of these audit reports. This letter also refers to the 42 separate environmental studies done by Freeport as part of its AMDAL (comprehensive environmental assessment) which was approved in 1997. Mr. King also advises me that Freeport is preparing to undergo its second independent environmental audit in the second half of this year, which will also be made public, and I am sure they will provide you copies of that when it becomes available. Finally, I've enclosed Freeport's 1998 Annual Report, which was just printed and includes a 12-page report on progress on social and environmental issues. I'm sure you'll find it of interest.

I also wish to address the clear implication in your comments before the Subcommittee that Freeport and other U.S. mining companies deliberately choose to operate in foreign countries where, in your view, environmental regulations are not as strict. This is a common misconception. With all due respect, mining companies put their mines where the minerals are located. Also, contrary to your suggestion, the environmental laws of Indonesia are very thorough and modern having been patterned after those laws of Canada which are in turn comparable to the United States laws. For your information, I have enclosed a copy of a speech by Lou Clinton, former President and Chief Executive Officer of Freeport McMoran Pacific, detailing the development of environmental regulations in Indonesia. I think you will find this interesting and know you will find it enlightening.

As I stated during the oversight hearing, I believe the companies making up the National Mining Association (NMA) set the world standard for all aspects of mining in production, health and safety, and in environmental remediation and reclamation. Please let me know if you would like to have me or a member of my staff visit with you further on this issue.

STATEMENT OF W. RUSSELL KING, SENIOR VICE PRESIDENT, FREEPORT-MCMORAN COPPER & GOLD INC., WASHINGTON, DC

Dear Congressman Faleomavaega:

Thank you for taking time out of your busy schedule to visit with me and my staff about Freeport-McMoRan Copper & Gold Inc. (FCX) and the operations of our Indonesian affiliate, PT Freeport Indonesia (PT-FI), in Irian Jaya. I wanted you to know the many positive things we are doing.

Our actual operations in Irian Jaya, Indonesia's easternmost province, cover only a very small portion of the much larger area in which we are allowed to explore by our Contract of Work with the Government of Indonesia, In the area where we do operate, we strive to be a model of economic development that minimizes negative impacts, maximizes positive social impacts and respects the rights of local indigenous peoples.

As I mentioned to you, to assist the local people in Irian Jaya, we have, in conjunction with the Government of Indonesia, built hospitals, schools, churches, housing and community facilities, and have instituted a comprehensive series of health and educational programs and training and small business development initiatives to involve the Irianese in the economic development taking place around them. PT-

FI has spent some $120 million on these programs since 1990. We have also sought to be sensitive to the need of Irian Jaya's unique peoples to preserve their cultures at the same time they are merging with modern development. For this reason, PT-FI has long supported the annual Asmat Art and Cultural Festival and this year sponsored the first Kamoro arts and cultural festival, which was highly successful. Catholic Bishop Alphonse Sowada has said Freeport's support has "greatly enhanced" the Asmat event, which he said ". . . immensely bolsters both the feeling of pride and identity within them as being a people of value in the estimation outside their culture."

Since we began operations in the area, the average life span of the local indigenous people has increased and the infant mortality rate has decreased principally due to the efforts of PT-FI and the Government. Company public health initiatives have resulted in an approximate 70 percent decrease in the incidence of malaria over the past six years and dramatic reductions of other communicable diseases in the area inside and adjacent to our Contract of Work. PT-FI has also assisted the Government and the International Committee of the Red Cross (ICRC) in providing food and medical assistance to Irianese in remote areas affected in recent months by food shortages caused by drought as well as by outbreaks of communicable diseases. Henry Fournier of the ICRC recently thanked Freeport for its help in distributing emergency food and said Freeport's Malaria Control and Public Health Program have ". . . been the cornerstone in treating and preventing the unexpected malaria epidemic in the highlands." In an independent audit of PT-FI's social programs, a highly respected LABAT-Anderson consulting team reported that these programs have "improved people's lives" and "go beyond the usual role and responsibilities of a private company."

Over 20 years ago, we voluntarily entered into an agreement (the "January Agreement" of 1974) which recognized the traditional land rights of the indigenous Amungme tribe whose land was in the area of our operation. Under the Indonesian constitution, all mineral rights are reserved to the state. We believe the January Agreement was the first formal recognition of traditional land rights in Indonesia. Dr. Jacob Pattipi, then Governor of Irian Jaya, issued a report following a thorough review, concluding that we had met every legal and moral intent of the "January Agreement." In addition, the Company has offered to negotiate with the Amungme and Kamoro people about "additional voluntary recognition" which takes into account both the greater value of the Company's activities in the area and the longer duration of those activities. The plan we have offered to the Amungme and Kamoro is based on cash generation from dividends and provides the two tribes with voting rights at PT-FI's shareholders meetings.

PT-FI also recently reached agreement with the Kamoro tribal communities of Nawaripi and Tipuka and the Government of Indonesia for the release of traditional rights to additional lands for developmental programs, including the tailings deposition area, power transmission lines, additional roads and the expansion of port and other facilities. In an agreement facilitated by the Sejati Foundation, a noted Indonesian non-governmental organization which works to protect the rights of indigenous people, PT-FI will build even more health clinics, educational facilities, housing, roads, bridges, village offices, churches and other community buildings and conduct economic feasibility studies, for the villages of Nawaripi Baru, Koperapoka, Nayaro, Tipuka and other areas.

We are aware that the social needs surrounding our operation in Irian Jaya are ever-increasing. In an area where only 400 indigenous people lived when we began operations, more than 60,000 people now reside, including thousands from other Irianese tribes not native to the area who have moved there because of the economic growth and prosperity. To help accommodate these needs, we agreed in April, 1996, to commit at least one percent of our gross revenues (not net profits as many mistakenly assert) for the next ten years—an estimated $15 million a year currently—in support of the Government of Indonesia's Integrated Timika Development Plan (ITD), a comprehensive social development plan based upon the input of indigenous leaders during a year-long series of meetings. The ITD was launched in July, 1996, and is supported by other private sector companies doing business in Irian Jaya in addition to PT-FI.

The LABAT-Anderson team supported the ITD concept in both its interim and final reports. However, the group cited problems in the implementation of ITD and made suggestions, for improvements. Moreover, local Irianese church leaders and some tribal leaders called for the suspension of ITD disbursements due to these problems and misunderstandings by the local people concerning the disbursement process. While PT-FI believed the ITD was a good plan when it was launched, the company agreed it was rushed into implementation and that serious flaws resulted. Accordingly, PT-FI agreed with the government, church and tribal leaders to sus-

pend further disbursements from the fund in August 1997 other than for previously approved and essential programs with ongoing funding commitments, such as malaria control and public health, job training and scholarships for Irianese. PT-FI then entered a dialogue with local church and tribal leaders and government representatives on how best to restructure disbursements from the 1 percent fund to meet the LABAT-Anderson recommendations and local desires that the process be village-based, not tribal-based and that it be managed locally in Timika.

From these discussions has emerged the Freeport Fund for Irian Jaya Development (FFIJD), a vehicle for future disbursements from the 1 percent fund within the guidelines of the overall government ITD plan. Representatives of PT-FI, local churches, foundations representing the local tribes—including LEMASA, a key foundation of the Amungme people which had opposed the original ITD—are now meeting regularly to iron out details of the FFIJD funding mechanism in a manner acceptable to all. The funding of important new projects and programs to benefit the local people and their development are now under discussion.

In addition to the important commitments outlined above and at the request of local leaders, PT-FI agreed in 1996 to implement training and educational programs sufficient to quadruple the number of Irianese in its work force over the next ten years and to greatly increase the number of Irianese in management and supervisory positions. Progress toward meeting this commitment has been significant and PT-FI now employs thousands of Irianese. To support these initiatives, PT-FI has undertaken a comprehensive employee and pre-employment training program for the local people and has established a special section of the Human Resources Department—the Office of Irianese Education and Development—to assure the proper hiring, training and evaluation of local employers and potential employees.

Besides supporting the FFIJD and the payment of additional voluntary recognition for the Amungme and Kamoro, PT-FI pays hundreds of millions of dollars annually to the Government of Indonesia for taxes, royalties, fees and dividends and these funds support government services that benefit all lndonesians including the inhabitants of Irian Jaya. Under PT-FI's 1991 Contract of Work, these direct benefits to Indonesia have totaled $1.1 billion. Moreover, during the same time period, 1992-1998, Indonesia has realized another $5.3 billion in indirect benefits in the form of wages and benefits paid to workers, purchases of goods and services, charitable contributions and reinvestments in operations. In all, 94 percent of PT-FI's total revenues have remained in and benefited Indonesia and in particular Irian Jaya.

Concerning environmental protection, we constantly try to minimize our impacts, and are committed to the continuous improvement of our environmental management systems We are in compliance with the environmental regulations of the Government of Indonesia. To help us monitor the environment closely surrounding our operations, we utilize the services of some of the world's best environmental scientists and have built a world-class, modern environmental laboratory.

Furthermore, as part of the Regional AMDAL (comprehensive environmental assessment, monitoring plan and management plans) we prepared for our current expansion, we commissioned 42 separate studies assessing the impacts of the operation as well as the state of the environment in the area—from the nearby glaciers to the impact of our tailings on marine sediments in the Arafura Sea. These studies, including studies of social impacts, were performed by nearly 200 world class independent scientists who are acknowledged experts in their respective fields, and the major studies each underwent a "peer review" process conducted by panels of yet more independent experts to verify and validate the original findings. The results of these studies were presented in a series of academic and scientific workshops, and were included in the AMDAL documents for public scrutiny. Arguably, there is no place on the planet that has received as much intensive environmental and social scrutiny over the past two years as our project area. PT-FI's Regional AMDAL was submitted to BAPEDAL (the Environmental Assessment Agency) and the Regional AMDAL Commission. It was reviewed and revised and approved in December 1997 by the Minister of Environment. PT-FI's AMDAL was termed '. . . the most comprehensive (BAPEDAL) has ever seen," by AMDAL Commission Chairman Paul Coutrier, then-BAPEDAL Deputy Chairman for AMDAL and Technical Development.

However, in both these areas—social and environmental—we recognize that we are developing in a complex arena and that we can always find ways to improve, For that reason, as mentioned before, PT-FI took the extraordinary steps of voluntarily submitting to thorough and independent social and environmental audits conducted under the auspices of BAPEDAL. The findings of the independent environmental audit and interim report of the social audit were made public in 1996 and the final social audit report was released in 1997. We know of no other company

that has submitted itself to such intense, independent scrutiny, the results of which have been released to the general public.

The LABAT-Anderson social-cultural audit team consisted of internationally recognized sociologists and anthropologists, environmental analysts, specialists in development and agriculture, educators and health experts and individuals with a long history of working in Irian Jaya. This helped assure an independent, balanced and thorough approach. The LABAT-Anderson team recognized the complexity of social development issues in Irian Jaya and we benefited from the "fresh look" their report provided, which is one of the advantages of the independent audits. The report found that much progress has been made, but that much remains to be done. Mistakes have been made due to the complexity of Irian Jaya's social landscape and the unprecedented challenges faced there, Nevertheless, we remain completely committed to this process. The LABAT-Anderson team made a number of suggestions for reevaluation of program elements and we completely agree and are implementing their recommendations. At the same time, the report also says PT-FI's efforts "show good intentions" and that the company "recognizes its social responsibility and that social development must keep pace with industrial and economic development."

The environmental audit by Dames & Moore, conducted by a team headed by the Hon. Ros Kelly, former Australian Minister for the Environment, endorsed our tailings management program. Dames & Moore found that PT-FI's tailings management program is "the most suitable option" for the environment in which we operate and that the long-term risks associated with alternative tailings management options are "unacceptable." Moreover, the report found that the tailings are non-toxic and that our mining operations do not pose any significant risk to Irian Jaya's biodiversity. Overall, the Dames & Moore team made 33 recommendations, all of which were accepted and are being implemented.

I left with you copies of both of these audit reports for your information. I realize I left you more information regarding these two areas than you anticipated, but I believe that to have a thorough understanding of our company and its motivations, you have to have at least an inkling of the great lengths to which we have gone and the dramatic steps we have been willing to undertake in order to insure that our operation is beneficial to our Irianese neighbors and our Indonesian hosts.

On the subject of human rights, PT-FI's numerous social programs outlined above have done much to help secure basic human rights for our Irianese neighbors and employees. These include opportunities for employment and an adequate standard of living, access to heaIth care and other social services, educational opportunities and cultural preservation. PT-FI is also working with the Government of Indonesia in a variety of ways to help establish the civilized rule of law in this remote part of the nation, including grassroots education on the basics of law and support for the Government as it establishes a civil and criminal court system. This helps assure Irianese of the human rights protections provided by access to a civil and criminal legal system.

There is a small separatist group operating in Irian Jaya known as the OPM (Organisasi Papua Merdeka) that, over the last several years, has engaged in a number of violent clashes with the armed forces of the Government of Indonesia and there have been allegations of human rights violations in connection with some of this activity. These have been investigated and the individuals in the military who were determined to be involved have been punished. The OPM has also been accused of engaging in human rights violations and terrorist acts, including the murder of one of our Irianese employees and the attempted murder of others and, in 1996, two protracted hostage-taking episodes which resulted in the deaths of four hostages. In one hostage situation, the victims were environmentalists and students affiliated with the World Wildlife Fund. FCX and PT-FI are on record strongly condemning all of these alleged human rights violations by either side in the conflict, as well as taking a strong position in defense of human rights in annual reports, press releases, correspondence and official interviews. FCX and PT-FI have also repeatedly and publicly stated their support of any legitimate investigation of alleged human rights violations. Furthermore, we have urged the ICRC (International Committee of the Red Cross) to establish a permanent presence in the Timika area. We are also working with UNDP and UNESCO to establish representation in the area.

Congressman, once again thanks for taking the time to meet with me and I appreciate your forbearance in reading this lengthy letter. However, I felt that you would appreciate having on record many of the things which we talked about. Please do not hesitate to call upon me if I may be of further assistance.

A PROSPECTIVE ON ENVIRONMENTAL REGULATORY ISSUES IN INDONESIA

Louis A. Clinton

There is a myth that today most U.S. based multi-national companies seek to move their investments overseas to developing countries because those countries care less about the environment and/or do not propose to regulate in order to protect the environment. As a rule, I do not believe this is true for many developing countries, and certainly not for Indonesia. As I will illustrate later in my discussion, Indonesia has a major commitment to environmental conscious developmental policies and has the laws and regulations in place to implement this concern. I might also point out that Indonesia has a very active group of environmental NGO's which affect government policy both within and outside of the relevant Ministries.

Indonesia has developed a broad, comprehensive and fair environmental regulatory system within their country. Permit me to illustrate some of the specific steps they have taken to assure that their environmental laws and policies have kept pace with the increasing interest and priorities in this area. First, the Government of Indonesia (GOI) passed a "omnibus" environment law in 1982 (entitled Act of the Republic of Indonesia No. 4 of 1982—Concerning Basic Provisions for the Management of the Living Environment). This landmark legislation provided for a comprehensive environmental assessment review to be completed for any major project prior to initiation of construction. This comprehensive legislation is quite comparable to the initial development of a similar type of legislation in the United States known as NEPA (National Environmental Protection Act) which began the requirements for Environmental Impact Statements in America for all major projects. Bear in mind that this landmark United States law was enacted in 1969, only 13 years prior to a similar law being passed in Indonesia. It was not until a year later that the U.S. EPA was established; and the specific framework for environmental standards only developed after enactment of U.S. legislation in the mid-1970's. Therefore, the GOI development of similar requirements is somewhat contemporaneous to that in the U.S.

The development of the omnibus environmental law in Indonesia, and subsequent regulatory programs to be discussed later in this talk, was not done in a vacuum. Rather it was done with the assistance of international groups with expertise in the area of environmental management. Specifically, a program was developed in 1983, called the Environmental Management Development in Indonesia (EMDI) Project, which was a cooperative program between the governments of Indonesia and Canada to assist Indonesia with development of environmental regulations. Thus, many of the environmental rules in Indonesia have been patterned after those in Canada which, in turn, are quite similar to U.S. environmental legislation and regulations.

In 1986, the GOI passed Government Regulation No. 29 Regarding Environmental Impact Assessments. This law added form and specificity to the 1982 law and set up the formal Environmental Impact Assessment program (called AMDAL). The cornerstone of this process called for the preparation of an environmental impact statement type document known as an Environment Impact Assessment Document (ANDAL). The ANDAL requires an applicant for any major industrial facility to provide significant technical, environment and social/economic data on all aspects of the project. It also required a comprehensive Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL) which specifically detailed all of the monitoring and environmental management activities to be conducted over the life of the project. The law also established an Environment Impact Assessment Commission to review all ANDALs before a project can begin. The Commission is composed of numerous federal government Ministry and Department heads, as well as Provincial Government representatives, experts from relevant fields and non-government organizations (NGO's). Therefore, there is broad based review of all major projects in Indonesia from an environmental perspective by various federal and regional government agencies, and the general public.

A special Ministry had been created for environmental policies known as the State Ministry of the Environment. It was headed until approximately four years ago by the internationally recognized environmental expert Bapak Emile Salim. In 1990, Indonesia expanded its environmental management capabilities by establishing a new agency within the State Ministry of the Environment known as BAPEDAL (Environmental Impact Management Agency). BAPEDAL's mission was formally established "to execute the government functions to control environmental impacts using ecological principles and the utilization of natural resources such that negative impacts of development do not alter environmental functions." Since its establishment there has been significant growth and development of BAPEDAL. The agency now has a broad range of regulatory control. Regulations exist for water discharge limits,

receiving stream water quality standards, air emission limits, ambient air quality standards, hazardous and toxic materials control, among many others.

In approximately 1992, BAPEDAL developed an Environmental Audit Program and Environmental Performance Rating Program to assess industries compliance with GOI environmental regulations. This program called for major industries in the country to have third party environmental audits conducted at their facilities and the reports to be submitted to the government containing the findings of that company's compliance with GOI regulations and world-wide management practices. The government developed a publicly announced environmental score card or environmental rating system based on a color code given to various levels of compliance performance. The program has been quite effective in bringing public attention to these matters and has resulted in significant conformance with environmental rules in the country by industries.

In addition to the environmental agency and environmental laws and regulations discussed above, the GOI also has environmental standards, controls and inspection rules within various Ministries and Departments of State. For example, the Department of Mines and Energy (DOME) has a special Bureau of Environment and Technology that closely regulates mining and energy projects. This includes routine inspections of operations, as well as requirements for operations to submit comprehensive quarterly information and data on environmental monitoring and management activities. Therefore, there is a double layer of environmental review of these industrial operations by the environmental agency (BAPEDAL) and the respective State Ministry under which that industry operates (DOME, Ministry of Industry, etc.).

Finally, the Government of Indonesia passed in 1992 a national land use/planning law that required Spatial Land Use Plans (RDTR) that emphasized regional and area planning and coordination for all environmental impactive developments. This has enabled the government to study, on a regional basis, environmental impacts so that the most efficient use of resources can be made with the least potential environmental impact.

So as we can see, the Government of Indonesia has for some time now had a very comprehensive environmental legislative and regulatory program that has established landmark "omnibus" type environmental requirements, such as environmental assessment studies prior to initiation of major projects, and; all of the various quality control standards that one can routinely find in developed nations around the world. Truly, the government has done its part in clearly delineating its concern for the environment.

National Mining Association
Foundation for America's Future

American Mining, the Economy, and the Public Lands:
Locking Away Our National and Economic Security

Testimony
of
Richard L. Lawson
President
National Mining Association

Subcommittee on Energy and Mineral Resources
Committee on Resources
U.S. House of Representatives

February 23, 1999
Washington, D.C.

Chairperson Cubin, members of the committee, I am Richard L. Lawson, the president of the National Mining Association. Our members are the enterprises that deliver to public use most of the basic material resources required to uphold and strengthen America in daily life – the miners and producers of coal, metals and useful minerals; and the manufacturers of their equipment, and the suppliers of goods and services. Your oversight is timely and welcome.

Our Nation has the world's largest and most useful combination of metal ores, minerals, and energy. We rank first or second in global production of about 20 essential metals, minerals and coal, and high in many more. We hold significant shares of world reserves. Our presence in world markets ensures free competition, imparts stability, and deters attempted cartelization for either economic extortion or political coercion. Most such resources occur in the West on the federal land that custom calls "public land," a term that emerging practices belie. Public land alone contains more resources in variety and in volume than major groupings of other nations – that is, the European Union and Japan. This gives us flexibility of policy – economic and security policy.

Yet the administration is locking these resources away from public use in many ways in many venues – doing so by direct action and by indirect action. It is doing all things possible to discourage exploration and to prevent development. Many acts are unauthorized by the law or unjustified by the facts. The proximity of federal holdings also is being used to quash by intimidation private activity on private property.

This month the administration put off limits to exploration 670 square miles of so-called public land in Montana. It is the most recent of almost half a dozen executive or regulatory confiscations. This month another major metals producer closed its last U.S. exploration office. Exploration budgets are down 50 percent. No exploration now means no production in the future. Mining companies must

have something to mine. Arbitrary delays make financing difficult. They must go where they are allowed to produce minerals.

This pattern of action is forcing them overseas and into volatile regions and volatile countries – to places that have yet to evolve stable political and economic institutions; that are not necessarily devoted to the principles of free market economics and trade; and that may harbor or develop economic and political ambitions. It is forcing future U.S. dependence for essential resources on these places as well.

Some say they don't care if mining leaves the United States – that it doesn't matter in this new age. They think that a future can be secured without basic material resources. They think that if they produce words and ideas in this "information age" then nothing else is necessary.

I know otherwise – that essential remains essential. I know that when anything threatens to destabilize the world economically or politically, America's young soldiers, sailors and aircrews will be sent into harm's way to make it secure. I had to issue such orders as the commander of U.S. Forces in Europe. You know it too.

I care that the United States remains a major mining nation, and it has nothing to do with my present employment. I care because my pilot son in the Air Force will be one of the first called upon to secure the source of something essential, if we withdraw from world markets. I care for him and for the many thousands of our sons and daughters who will go with him.

U.S. mining is an element of National Security. The policy question is: Do we produce these resources at home and keep our sons and daughters here? Or do we send the activity, and our sons and daughters, overseas?

To call to mind the role of mining in America you need do only four things whenever you ride your subway to or from The Capitol:

- Never forget that the rails, the wheels, the cars, the electric power that turns the wheels that move the cars on the rails, and the control system that coordinates everything – all of it began in a mine;
- Remember that every American requires almost 47,000 pounds of mined materials a year – that almost every material thing you use at work or in leisure began in a mine or required something from a mine to make it, or grow it, or process it;
- Remember that the federal taxes due directly and indirectly to mining typically equal more than 3 percent of all federal revenue – greater than the sum of the alcohol, tobacco, and other excise taxes;

- And always look up at walls around the Rayburn boarding platform – look whether coming or going.

Recall that on those walls are representations of history's foremost exponents of wisdom and law; and that Moses, the lawgiver, has a central place. When Moses gathered the people to tell them of the Promised Land to come the Scriptures say he spoke of:

> "...a land whose stones are iron, and out of whose hills thou may dig brass....A land wherein thou shalt...not lack anything.... "

America is such a land. Let us determine to keep it so.

My written testimony will touch on the following: 1 – Mining in America's Economy: Requirement, Resources and Utility; 2 – The Public Lands: More Minerals Than Europe, More Riches Than Arabia; 3 – Material Resources and National Security; 4 – Mining and Community: Good Jobs, Sustaining Taxes, Good Practices; and 5 – Our Pledge to America's Future: Technology to Resolve Concerns. In addition, there are attachments of statistical detail on mining and the revenues of government, on the value of mining products by state for the 50 states, and on the state-by-state comparison of average wages and mining wages.

1. Mining in America's Economy: Requirement, Resources and Utility

Standard references say an advanced economy requires at least 75 different minerals to get the precious and base metals and alloys and inorganic chemicals that allow it to innovate and keep advancing. America possesses more than 60, and American mining delivers them. There is no state of the 50 states in which something is not mined.

The references say the quality of a nation's standard of living and the vigor of its economy can be inferred from the use of mined resources. Americans require almost 47,000 pounds per person per year. For electric power alone we each use 20 pounds of coal a day.

Most of the world's 6 billion people are closer to 500 pounds a year. They want their share. Be confident that they mean to have it. Resources controlled by the federal government will have a critical role in balancing U.S. policy in the future – critical for the better, or for the worse.

Here's what some standard references say:

- America's resources are in the combination of variety and volume the world's largest concentration of the useful metals and minerals;
- Much of our prosperity is due to their abundance;

- They give American workers important productivity advantages in the world competition;
- They are most important to manufacturing;
- Energy from mining is important to manufacturing and the rest of the economy – especially coal and uranium for electric power;
- America requires more electric power than any other nation;
- And so, the component industries of the mining industry have an importance in the economy disproportionate to their size.

The greatest volume and variety of such resources are produced in the West and Alaska from what is called public land. Most reserves and almost all the prospects for new discoveries are on this so-called public land that the federal government closely controls.

America generally ranks first, second, or third in world production of a large variety of mineral resources, and among them are:

- The metals: copper, gold, silver, magnesium, molybdenum, lead, beryllium, germanium, and rhenium;
- The minerals: boron, bromine, barite, diatomite, feldspar, gypsum, industrial garnet, industrial sand and gravel, lithium, mica, phosphate, perlite, salt, sulfur, soda ash, silicon, talc, and vermiculite.
- And the two fuels that together account for almost 80 percent of America's electric power – coal (57 percent) and uranium (20 percent).

We also deliver an appreciable share of world output of iron ore, zinc, the platinum-group metals, cadmium, hafnium, selenium, titanium and titanium oxide. Other minerals include iodine, kaolin and other clays, pyrophyllite, wollastonite, special bentonite, lime, potash, pumice, and rare earths. This is wide sample, not an inventory.

It would be hard, and maybe not possible, to list every use for any of the major items mined in the United States and most of the lesser ones. Ores become metals, and metals with alloys become tools and capital goods, which become durable goods and services. The industrial minerals like salt, sulfur, phosphate, potash, and soda ash are essential to chemical and manufacturing processes. Some go to make both our computer screens and their glow. Others are critical to the fertilizers that raise the yield of foodstuffs. The industry's saying is this: If it can't be grown, it has to be mined. The extension is that if it is grown, the products of mining are required to fertilize or feed it; to harvest or collect it; to process it, cool it, or heat it; and to move it to market.

Our material resources are the genesis of much activity and the feedstock of more – the material and intellectual feedstock of advanced technologies and new kinds of activity. The table of elements will not change, only the ways in which

the elements are combined for materials. Present-day resources in new combinations beget improvement of existing products, and new products, and new kinds of activities. Their ready availability encourages such activity.

The newer technologies and the next technologies depend on everyday resources in new combinations put to new uses: for example, lasers require silver for mirrors; and the World Wide Web hangs on connections of copper and gold. One advance builds on another. And, of course, almost every new thing requires electric power that is reliable and low in cost, a specialty of coal. The oncoming technologies that require high-temperature superalloys and superconductors will require resources from mining – American mining. They, in turn, will contribute to the more efficient generation and distribution of electric power.

Electric power is the most widely required energy – industrial, commercial, personal. For context: power rates in the global economy per thousand kilowatt-hours compare as follows: Japan – $269 for household power and $185 for industrial power; Germany – $204 for households and $101 for industry; European average – $137 for households and $79 for industries; and the United States – $84 for households and $47 for industries.

Americans and American industry pay less than half what our primary economic competition pays for power. Fuel largely determines price. We'll use almost a billion tons of low-cost coal for power this year, much from public land.

Whether it satisfies want or requirement, luxury or necessity, virtually all human economic activity depends on someone in a mine taking some useful thing from the earth so that others may make things or do things with it.

2. Public Lands: More Minerals Than Europe, More Riches Than Arabia

On average the federal government owns one square mile of every two square miles of the mining West and Alaska. This 815,000 square miles is the equal in size to: The other leading industrialized nations of the world – Japan, Germany, Great Britain, France and Italy; plus Ireland, Denmark, Switzerland, the Netherlands and Belgium with room for several Luxembourgs left over.

This federal sub-continent contains the following: In essential metal and mineral resources, we estimate it is richer than Europe and Japan, and many supplier nations on other continents; and in coal alone, a reserve that in energy content exceeds the combined oil of Iraq, Iran, Kuwait and Saudi Arabia.

To the point: Nevada is an important gold state – 80 percent federal ownership; Idaho an important silver state – 62 percent federal; Arizona an important copper state – 43 percent federal; and Wyoming, the leading state for coal and soda ash – almost 50 percent federal ownership. Western mines deliver the bulk of: copper, gold, silver and molybdenum; and of lesser known but very important alloy metals such as the beryllium and rhenium that are required for National Security applications. In the minerals Western production delivers either the bulk

of or all of: barite, boron, diatomite, perlite, potash, pumice, rare earths, and soda ash.

Public land in the West holds about half the U.S. coal reserve. The largest coal-producing mines are in the West. The power plants with the lowest costs of operations and maintenance are coal-fired and are in the West – about 1 cent a kilowatt-hour. Some send power from coal mined on public lands across the mountains to California, where no coal is allowed.

Closing the Escalante Canyons area by executive order confiscated from the public 60 trillion kilowatt-hours of low-cost electric power – about 20 years' worth at last year's national level of generation. This 30 billion tons of recoverable coal is the energy equal of the oil of almost two Iraqs. Utah is 64 percent federal land.

This administration is using both executive orders and regulation to reorganize and restructure both the societies and the economies of the Western states – doing so across a range of executive agencies in which an excuse can be found to exert a jurisdictional claim. More is involved than mining; but mining is a major target, directly and indirectly. More than 70 proposed regulations or sets of regulation are pending that touch on mining. In many cases the action proposed exceeds the authority granted by Congress, and in some cases moves forward without authority. Some lack scientific underpinning and others are contrary to scientific advice. Many are based on undemonstrated and undemonstrable need.

It is as if much of the executive branch has joined to make good the promise of the Secretary of the Interior – a policy declared when Congress rejected his constrictive and punitive revision of the mining law. He promised "to explore the full range of the regulatory authority we now possess" to enact the provisions denied by Congress. In ways Congress neither considered nor intended these acts have a singular and collective intent: not to correct a flaw but to curtail the act of mining.

In view of these most recent acts the range of authority presumed by administration officialdom appears to be virtually unlimited. Last summer the Secretary told the *New York Times*: "...the real action now is on landscapes and watersheds...the offensive game, and all the fun, is outside of Congress."

Here's how things stand in the "offensive game" across the agencies:

- Substantial public land in the West has been closed off or proposed for closing;
- There is reason to believe the drive to introduce endangered species in certain areas is a means of further expanding the "full range of regulatory authority" along with that of the species;
- There are initiatives to extend the authority to proscribe by regulation deep into the country's most extensive river systems – the Columbia,

affecting much of the mining West, and the Mississippi, covering the rest of the country;

- Regulatory enactment is pending of the punitive federal mining regime that Congress rejected – rules to override state regulation in the West;
- The environmental impact process takes almost 5 years, if there are no problems or interventions;
- In one instance exploration was forbidden in a Midwest national forest that has been open by long practice, regulation and law;
- And proximity to national parks, forests, or wildlife refugees has been used in at least three instances to coerce cancellation or withdrawal of private projects on private land – the threat of extended and expensive regulatory battles on permits.

The federal government owns one square mile of every four square miles of land in the United States: 880,000 square miles of 3.5 million: almost 25 percent of the Nation and growing: more 500 national forests, parks, monuments, recreation areas, historic parks, sea and lakeshores, reserves and preserves, and so on, down to quarter-acre historic sites.

There is no state in which the federal government does not own something. Every acre is part of some watershed or ecosystem. The government has begun to use these holdings as justification to control much more by reach of regulation.

3. Material Resources and National Security

The world is generally at peace now, but it is never at rest. Someone always is watching and probing for an opportunity or weakness to exploit. There are many who would humble the United States, if they but had means and chance. Not all weapons are military. They also can be economic.

National Security and preparedness are terms often applied to defense alone, but both have a second component – industrial capacity. Industrial capacity is to the projection of military power what muscle is to strength.

To be secure the Nation must have the means of flexibility and freedom of action in all events. Preparedness requires a military establishment capable of supporting the foreign policies pursued and an economy able to support both the objectives of government and the aspirations of the people. Security seldom requires more; but it never accepts anything less.

Among the nations of the world, declines in relative economic standing generally cause reactions: influence declines; there is maneuver in the hierarchy of nations; and the shifting throws more pressure on foreign policy and the military establishment. At home the people grow restive when the objectives of government and their personal aspirations are more than a short time in conflict.

When nations study other nations in contemplation of policy there is no method of assessment or examination that does not consider economic structure, especially natural resources. The ongoing instabilities of the Persian Gulf and their connection to imported oil are but one example.

Mining is critical to America's future security. Silver, zinc, titanium, and platinum are designated strategic and critical. Copper, gold, iron ore, lead, molybdenum, phosphate, sulfur and potash are considered essential to the U.S. and world economies. We produce the major share of the world's molybdenum, all in the West, and of phosphate and sulfur. Access to federal lands will be required to continue operations in the decades to come – to uphold the public good.

Mining also upholds American security with efficiency and ever-improving technology. Technology is why we are a major supplier of copper, gold, and iron ore; it allows production from ores of a low metal content – ores that not long ago would not have been worth mining. Our technology extends and expands the reserve base of resources for the U.S. and the world. Better exploration and better production are important in a world of expanding requirements.

When the President locked away 20 years worth of low-cost electric power, he said, "Mining is important...but we can't have mines everywhere." When the Secretary of the Interior threatened an extensive and expensive regulatory fight to block a titanium mine on private property, he dismissed the product with the comment, "Titanium is a common mineral." Titanium in one form is used to whiten the filling of Oreo cookies and in another to impart high strength to airframes and jet engines. Titanium is a strategic commodity, and versatile too.

One standard reference estimates that 90 percent of the metallic wealth ever produced in America came from mines whose combined surface would cover an area not much larger than 30 miles by 30 miles.

The President and the Secretary seem bent on removing public lands from public use and purposes that serve the public. The result puts our National Security and our economic future at risk. Two questions must be asked and answered without quibble or qualification. Do we produce here the essential material resources we have in plenty, and keep our sons and daughters at home? Or do we concede supply and participation in world markets to others, and send our sons and daughters into harms way to keep them secure?

4. <u>Mining and Community: Good Jobs, Sustaining Taxes, Good Practices</u>

Both statistics and performance show mining is a strong, positive force in a community. Miners' pay is 66 percent more than other industrial workers – an average $50,000 for miners to $30,000 for all others. Our baseline study shows that mining, and the economic activities associated with it, and the activities supported by it, typically cumulate directly and indirectly in the American economy as follows: $27 billion a year in revenue for local and state government; $57 billion in

federal revenue, more than the excise taxes; $144 billion in personal income; $296 billion in mining-dependent business income; and a total $524 billion impact on the U.S. economy; and 5 million dependent jobs.

U.S. mining leads the world in developing good practices – in production, in health and safety, in environmental remediation. When the industries of other nations want to improve, they come here to see how we do it.

U.S. mining sets the world standard in reclamation and restoration. Mining is a temporary use of the land. Coal mine reclamation has returned to other productive uses a land area approximately equal in size to the State of Rhode Island. The states require reclamation of other forms of mining. When other nations want to improve, they come here to see how we do it.

5. Our Pledge to America's Future: Technology to Resolve Concerns

America's mining industry is pledged to keep getting better – is an enthusiastic partner in the *Industries of the Future* program. The program is designed to bring to bear the intellectual power of the national laboratories, and other resources, on developing the technologies for the United States mining industry we will create in the 21st century. Our goal is to identify, develop, and deploy technology according to our vision of the future.

Our vision is of an America secure in its resources – low cost resources. Our vision of the future includes:

- Advanced production – minimum ground and community disturbance, lower energy consumption, improvements in miner safety and health;
- Advanced reclamation and remediation with an emphasis on cleaner and more efficient production;
- Greater utility of products and recycling where possible;
- Lower cost products in support of America's competitive participation in the global economy and an ever-improving standard of living.

In coal we are additionally committed to Vision 21 of the Department of Energy. We are aiming at 60 percent generating efficiency with coal by 2010 and near-zero emissions by 2035. We foresee complexes based on coal and high efficiency technology that deliver to public use at low cost an array of goods: electric power; natural gas; other fuels; fuel additives; chemical products; and the means of greater resource recovery from existing oil and gas fields.

Some try to argue for the sake of politics that mining is the industry of an age gone by. But the standard references point out that one may judge the utility of a resource or an industry by the number of useful products that flow from it.

We say mining is tomorrow, not yesterday. We say mining is the foundation for America's future.

Government Revenues from Mining by State
1995

State	Direct Contribution To Federal Government Revenues	Direct Contribution To State & Local Government Revenues	Direct & Indirect Contribution To Federal Government Funds	Direct & Indirect Contribution To State & Local Government Revenues
Alabama	$113,887,000	$58,737,000	$937,925,000	$542,431,000
Alaska	23,387,000	15,668,000	163,941,000	106,140,000
Arizona	268,726,000	192,117,000	853,883,000	778,744,000
Arkansas	22,601,000	17,712,000	507,704,000	189,979,000
California	198,094,000	213,374,000	6,652,676,000	2,822,602,000
Colorado	61,442,000	73,891,000	730,435,000	409,636,000
Connecticut	6,510,000	8,236,000	762,296,000	292,088,000
Delaware	2,849,000	4,036,000	141,352,000	68,978,000
D.C.	-	-	776,450,000	64,085,000
Florida	79,003,000	66,710,000	3,306,930,000	1,013,438,000
Georgia	39,756,000	33,117,000	1,351,033,000	540,382,000
Hawaii	7,050,000	7,437,000	295,380,000	98,592,000
Idaho	17,174,000	12,493,000	197,577,000	103,598,000
Illinois	126,858,000	109,988,000	2,376,600,000	1,098,507,000
Indiana	80,881,000	63,690,000	1,002,190,000	588,757,000
Iowa	33,210,000	31,285,000	511,255,000	295,699,000
Kansas	22,436,000	22,682,000	491,329,000	235,888,000
Kentucky	278,924,000	334,877,000	788,018,000	959,652,000
Louisiana	11,186,000	9,733,000	960,862,000	313,688,000
Maine	5,952,000	5,142,000	276,342,000	89,452,000
Maryland	28,314,000	28,331,000	1,332,587,000	388,039,000
Massachussetts	17,555,000	23,580,000	1,453,076,000	514,238,000
Michigan	94,101,000	49,348,000	1,861,252,000	1,120,204,000
Minnesota	146,015,000	156,269,000	863,008,000	703,530,000
Mississippi	7,093,000	6,831,000	555,002,000	182,617,000
Missouri	65,569,000	61,657,000	1,117,698,000	455,046,000
Montana	$50,714,000	$44,741,000	186,727,000	146,758,000
Nebraska	12,883,000	7,119,000	286,996,000	140,316,000
Nevada	129,545,000	136,314,000	295,774,000	384,801,000
New Hampshire	2,943,000	3,187,000	220,561,000	80,904,000
New Jersey	17,640,000	18,902,000	1,803,596,000	754,130,000
New Mexico	125,114,000	75,879,000	362,406,000	358,963,000
New York	55,444,000	29,314,000	5,163,990,000	1,772,725,000
North Carolina	38,616,000	35,820,000	1,355,965,000	660,873,000
North Dakota	20,180,000	26,324,000	130,354,000	77,736,000
Ohio	88,266,000	67,701,000	2,428,584,000	1,049,661,000
Oklahoma	29,149,000	29,790,000	700,645,000	262,150,000
Oregon	21,135,000	18,938,000	633,816,000	276,989,000
Pennsylvania	190,957,000	116,066,000	2,937,077,000	1,139,582,000
Rhode Island	2,084,000	1,863,000	261,102,000	76,710,000
South Carolina	24,131,000	18,530,000	704,591,000	325,139,000
South Dakota	14,605,000	29,740,000	150,181,000	92,869,000
Tennessee	39,271,000	11,410,000	1,107,341,000	391,181,000
Texas	147,790,000	140,986,000	3,375,042,000	1,622,964,000
Utah	124,942,000	82,836,000	316,291,000	360,316,000
Vermont	5,073,000	3,861,000	110,330,000	52,487,000
Virginia	102,844,000	88,843,000	1,529,178,000	609,788,000
Washington	35,423,000	35,232,000	1,186,944,000	528,805,000
West Virginia	315,390,000	328,557,000	459,419,000	946,269,000
Wisconsin	24,595,000	27,225,000	929,097,000	484,995,000
Wyoming	153,172,000	386,609,000	91,588,000	584,912,000
Total U.S.	**3,530,483,000**	**3,372,828,000**	**56,992,197,000**	**27,157,598,000**

Source: Mining and the American Economy, Everything Begins With Mining.
Western Economic Analysis Center (WEAC). Data latest available.

Value of Nonfuel Mineral Production in the United States
Ranked by State
1997

Rank	State	Value (Millions	Percent of U.S. Total	Principal Minerals in Order of Value
1	Arizona	$3,520	8.91	Copper, sand & gravel, cement, moly, lime
2	Nevada	3,030	7.69	Gold, copper,silver, sand & gravel, diatomite
3	California	2,810	7.13	Cement, sand & gravel, boron, stone, gold
4	Georgia	1,770	4.49	Clays, stone, cement, sand & gravel
5	Utah	1,760	4.46	Copper, gold, moly, magn. metal, sand & gravel
6	Florida	1,740	4.42	Phos. rock, stone, cement, sand & gravel, titanium
7	Texas	1,700	4.31	Cement, stone, sand & gravel, magn. metal, salt
8	Minnesota	1,600	4.06	Iron ore, sand & gravel, stone
9	Michigan	1,560	3.96	Cement, iron ore, sand & gravel, magn. comp., stone
10	Missouri	1,320	3.34	Stone, lead, cement, lime, zinc
11	Pennsylv.	1,240	3.13	Stone, cement, lime, sand & gravel
12	Wyoming	996	2.52	Soda ash, clays, helium, cement, stone
13	New Mexic	994	2.52	Copper, potash, sand & gravel, cement, perlite
14	Ohio	984	2.49	Stone, sand & gravel, salt, lime, cement
15	New York	904	2.29	Stone, cement, salt, sand & gravel, zinc
16	Illinois	880	2.23	Stone, cement, sand & gravel, moly, lime
17	Alaska	827	2.10	Zinc, lead, gold, sand & gravel, silver
18	Alabama	805	2.04	Cement, stone, lime, sand & gravel
19	Tennessee	786	1.99	Stone, zinc, cement, sand & gravel, clays
20	No. Carolin	758	1.92	Stone, phosphate rock, sand & gravel, clays
21	Indiana	669	1.70	Stone, cement, sand & gravel, lime
22	Virginia	600	1.52	Stone, sand & gravel, cement, lime, kyanite
23	Kansas	547	1.39	Cement, salt, stone, helium, sand & gravel
24	Arkansas	535	1.36	Bromine, stone, cement, sand & gravel
25	Washinglo	522	1.32	Sand & gravel, magn. metal, stone, cement, gold
26	Colorado	521	1.32	Sand & gravel, cement, moly, stone, gold
27	So. Carolina	$507	1.28	Cement, stone, sand & gravel,cement
28	Montana	498	1.26	Copper, gold, cement, palladium, moly
29	Iowa	493	1.25	Stone, cement, sand & gravel, gypsum, lime
30	Kentucky	476	1.21	Stone, lime, cement, sand & gravel, clays
31	Idaho	442	1.12	Phosphate rock, gold, sand & gravel, moly, silver
32	Oklahoma	411	1.04	Stone, cement, sand & gravel, iodine
33	Maryland	401	1.02	Stone, cement, sand & gravel
34	Wisconsin	389	0.98	Stone, sand & gravel, copper, lime
35	Louisiana	379	0.96	Salt, sulfur, sand & gravel, stone
36	So. Dakota	340	0.86	Gold, cement, stone, sand & gravel, lime
37	New Jersey	296	0.75	Stone, sand & gravel, greensand marl, peat
38	Oregon	272	0.69	Sand & gravel, stone, cement, diatomite, lime
39	Massachusetts	213	0.54	Stone, sand & gravel, stone, lime, clays
40	West Virginia	190	0.48	Stone, cement, sand & gravel, lime, salt
41	Nebraska	161	0.41	Cement, sand & gravel, stone, cement, clays
42	Mississippi	137	0.35	Sand & gravel, cement, clays, stone, clays
43	Hawaii	100	0.25	Stone, cement, gemstones
44	Maine	88	0.22	Sand & gravel, cement, stone, peat
45	Vermont	68	0.17	Stone, sand & gravel, talc & pyrophylite, gemstones
46	Connecticut	65	0.16	Stone, sand & gravel, clays, gemstones
47	New Hampshir	60	0.15	Sand & gravel, stone, gemstones
48	No. Dakota	32	0.08	Sand & gravel, lime, clays, gemstones
49	Rhode Island	23	0.06	Sand & gravel, stone, gemstones
50	Delaware	6	0.02	Magnesium compounds, sand & gravel, gemstones
TOTAL VALUE:		$39,500	100	

Source: U.S. Geological Survey, Mineral Commodity Summaries 1998.

MINING INDUSTRY WAGES
1997

State	Annual Wages of Mining Employees (Average)	Annual Wages of All Private Industry Employees (Average)
Alabama	$47,890	$25,603
Alaska	$80,247	$31,051
Arizona	$45,720	$27,144
Arkansas	$32,082	$22,846
California	$58,355	$32,962
Colorodo	$58,175	$29,774
Connecticut	$49,524	$38,959
Delaware	$33,202	$32,158
Florida	$38,893	$26,029
Georgia	$40,633	$29,184
Hawaii	$50,266	$26,980
Idaho	$37,310	$23,745
Illinois	$45,799	$32,966
Indiana	$44,128	$27,581
Iowa	$32,498	$24,362
Kansas	$31,868	$25,808
Kentucky	$41,103	$25,359
Louisana	$47,961	$25,928
Maine	$22,651	$24,383
Maryland	$37,400	$30,473
Massachusetts	$38,433	$35,661
Michigan	$41,641	$32,585
Minnesota	$46,217	$30,122
Mississippi	$34,679	$22,459
Missouri	$38,284	$27,782
Montana	$44,166	$20,925
Nebraska	$29,294	$24,189
Navada	$49,912	$27,849
New Hampshire	$34,168	$29,339
New Jersey	$49,992	$37,015
New Mexico	$41,519	$23,622
New York	$49,044	$38,675
North Carolina	$39,359	$26,503
North Dekota	$38,917	$21,584
Ohio	$40,218	$26,764
Oklahoma	$43,473	$23,955
Oregon	$34,780	$27,877
Pennsylvania	$42,169	$29,648
Rhode Island	$31,621	$27,484
South Carolina	$35,900	$24,624
South Dekota	$39,780	$21,079
Tennessee	$43,635	$27,072
Texas	$60,668	$30,102
Utah	$45,572	$25,257
Vermont	$30,089	$25,012
Virginia	$40,169	$28,848
Washington	$44,217	$30,337
West Virginia	$46,972	$24,290
Wisconsin	$37,273	$26,872
Wyoming	$47,060	$23,378
TOTAL AVERAGE	$49,995	$30,053

Source: U.S. Department of Labor, Bureau of Labor Statistics, Employment and Wages, Annual Averages, 1997. Excludes benefits, overtime pay, and bonuses.

MINERAL
POLICY
CENTER

Protecting Communities and the Environment

Testimony of Stephen D'Esposito
President, Mineral Policy Center

Before the House Resources Subcommittee on Energy and Minerals

Washington D.C.
23February 1999

What is left, what seems inviolate, is public land—turf without title attached to it, unique among the nations of the world. We sketch our dreams and project our desires on this American inheritance. And we fight over it with lawyers and guns and history. Nearly half of all Western land—better than 500 million acres—is public. I grew up in a big family with little money, but we had the outdoors: Rock Creek in Montana, Lake Crescent in the Olympic Peninsula, Upper Priest Lake in Idaho. We were rich. And only later did I realize why I never had a truly sad day in the outdoors: This was Wallace Stegner's Geography of Hope.

Not all Westerners appreciate what they are entrusted with, but much of the rest of the world certainly does . . . . sections of public land bigger than some countries, and a past yet to be fully deciphered.

Think of what should never be taken away: . . . the canyonland arches, showing the agelines of many geologic eras . . . Joshua trees in the Mojave Desert . . . North Cascade Mountain apienglow, in July, when it is the most perfect place on earth . . . Bristlecone pines wrapped in centuries-old embrace with a patch of rock . . . Fish that don't come from hatcheries, beasts that weren't hatched in theme parks . . . the shadow of the Front Range at dusk, stretching to the horizon of the Great Plains . . .

Timothy Egan, Lasso the Wind, 1998

1612 K Street, NW
Suite 808
Washington, DC
20006

Telephone:
202.887.1872
Fax:
202.887.1875
Email:
mpc-us@msn.com
Website:
www.mineralpolicy.org

Chairman Cubin, members of the subcommittee, good afternoon. My name is Stephen D'Esposito. I am the president of Mineral Policy Center. Thank you for the opportunity to testify before the subcommittee today.

I come here on behalf of members of Mineral Policy Center and citizens across the country concerned about the environmental, social and economic impacts of mining.

For our supporters and members this is not an abstract or theoretical consideration. It's as real as it gets. For these people, home is where the mines are. And home is where they struggle with balancing the legitimate interest of corporations seeking to develop minerals; with concerns about protecting water supplies, streams, landscapes, ecosystems, national parks and wilderness areas, cultures, their pocket-books, sustainable local economies, and their way of life.

Today's hearing is about the health of the U.S. mining industry and the implications for this nation's health, our economy and our security. By historical measures the domestic mining industry's contribution to the U.S. economy is considerable and the industry is strong, even considering the effects of today's low metals prices.

However, when considering our health and security, it is necessary to look not just at one industry, or the very narrow sector of that industry that operates on public lands. It is necessary to look at the overall public benefits that will accrue now and in the future, from other uses of our public lands. Looking at the issue from this perspective raises a number of important questions about current federal policy and leads us to recommend significant changes.

A Crust Full of Minerals

The earth's crust contains a vast supply of minerals. Today, the U.S. is among the world's leading producers of many metals including gold, copper, silver and lead and has substantial domestic reserves of these metals. There are other metals that we import because sufficient quantities are not found here or they can be mined and processed more cheaply elsewhere.

While exploration and development trends will fluctuate in response to global economic conditions and other factors, there is no evidence that we are in danger of running short of minerals. A look back at history is instructive. In the 1970s, the U.S. government responded dramatically to perceived shortages in the supply of natural resources such as minerals, including fuel minerals like oil. At that time, many saw the issue of natural resource depletion as an urgent environmental and national security issue. However, today it is apparent that the critical environmental issue is less one of natural resource depletion and more one of resource consumption and waste. The consensus is that the threat to our health and security comes from the byproducts of production and consumption of non-renewable resources.

According to a 1996 report of the National Research Council, part of the National Academy of Sciences, we are not in danger of running out of metals. In fact, the numbers demonstrate that new discoveries and technological developments have historically, over the last several decades, more than offset reductions through depletion. According to the Academy, "The available

evidence suggests that additions to reserves through discovery and technological change have more than offset reductions through depletion of existing mines over the last several decades." 1

Worldwide, changes in exploration trends have multiple causes ranging from ore grade, to metals prices, to government stability, to access to land, to available infrastructure. Here in the U.S., today, exploration trends vary from state-to-state. When one looks at the changes in exploration that have occurred in the recent past, particularly for metals like gold, it is the change in metals prices that is often cited as the most important factor. 2

A Silver Lining—Less Extraction Isn't Necessarily Bad

It should also be noted that drops in metal prices, and decreases in metals exploration are not inherently bad for the U.S. or bad for the economy, even if they create problems in a particular industry or sector, during a particular period of time. For example, if demand for extraction of a particular metal was to decrease because more of that metal is being recycled, that is good news for the environment, good news for the recycling industry, and good news in terms of preserving public lands for other uses or for preservation. It may also represent a trend towards more sustainable forms of resources use.

Recycling should be thought of as a source of minerals. According the National Academy of Sciences, "Recycling can be thought of as an extension of primary mining. Recycling is, in fact, an important source of many metals . . ." It should play a "major role" in our use of metals. 3

Therefore, a critical issue for the committee to consider is the root cause of any long-term shifts in mineral exploration and whether those causes represent positive or negative developments. We shouldn't simply assume that because mineral exploration is down in a particular state or region, for a period of time, that it is a negative for our economy or our security.

Further, if one concludes, and we do not, that mineral scarcity is today a significant national security issue, leaving metals in the ground, for now, could be seen as advantageous. These untapped resources could be viewed as "money in the bank, increasing in value over time." And, perhaps in the future, a less environmentally destructive technology for extracting those minerals would be developed. 4

The Multiple Causes of Changing Mining Economics--A Golden Example and A Golden Opportunity

We should not lump-together all metals and draw generalized conclusions, when the causes of price fluctuations and shifts in exploration and production are likely to be driven by multiple causes. Take gold as an example. Some in the industry will argue that environmental regulation increases costs and drives-down exploration. They will often point to problems at a specific mine as an example. Well, to be blunt there are some places where a large-scale mine should not go. If local community leaders have used existing environmental regulations to stop an ill conceived mine proposal, good for them. In the aggregate, the argument that environmental regulations are negatively impacting the industry is easily refuted. Consider the growth in gold mining in this country over the past twenty years, a period during which the U.S. has become a leader in gold production.

In fact, we would argue the environmental safeguards are not strong enough, but more on that later.

Let's take the gold example further. What is the cause of today's relatively low price for gold? Some experts believe that changes in the price of gold are driven by economic cycles. Those that hold this view believe that the relative strength of the U.S. economy means that fewer people feel the need to find a safe haven in gold. When the U.S. economy weakens, demand for gold may increase, the price is likely to go up, and exploration and production will increase. Others believe that a paradigm shift has occurred, that investors no longer see gold as a safe haven and no longer find any extra value in the metal. Those who hold this view don't expect gold prices to increase in response to economic cycles. Consider the following:

- According to London's The Economist magazine, gold is no longer seen as a monetary asset, it has failed to keep pace with inflation and governments have demonstrated that they can hold inflation down without tying their currencies to gold. Gold is now seen as just another commodity. 5

- Terry Smeeto, a senior office at the Bank of England, offered the following analysis: "Younger bankers who have grown up in an era of floating exchange rates don't have the psychological ties to gold which anchored the monetary system after World War II and until President Nixon de-coupled the dollar from gold in 1971." 6

- The Wall Street Journal reported in 1997 "a growing demographic divide" between "older gold bug" and younger investors with greater faith in stocks and paper assets who are "shunning" gold. 7

- Andrew Smith, of Union Bank of Switzerland, also reports that investors are losing interest in gold as an investment. According to Smith, "We try every day to interest people in any form of investment in gold. It isn't working." 8

Our point: if gold exploration is down in some places, and some high-cost mines are closing, due primarily to drops in metals prices, it is not inherently bad for the U.S. economy.

When assessing the economic benefit of gold exploration and extraction to the U.S. economy, we would also recommend that the committee consider the conclusions of a discussion paper that was prepared for the Board of Governors of the Federal Reserve entitled "***Can Government Gold Be Put To Better Use? Qualitative and Quantitative Effects of Alternative Policies***." The paper describes and models the potential economic benefits of selling government gold stocks, rather than obtaining gold from mines with high extraction costs. To quote from the report abstract: "Making government gold available for private uses through some combination of sales and loans raises welfare from private uses by removing . . . inefficiencies." They estimated the total benefit at $130 billion. 9

This raises a rather profound question. Shouldn't this committee, charged with oversight and stewardship of public lands, look closely at the issue the relative costs and benefits (economically, socially and environmentally) of new extraction on our public lands against the potential of benefiting from the sale of publicly held gold reserves? Other countries such as Belgium, Canada, the Netherlands, Russian and Australia have sold significant portions of their gold reserves with significant economic benefit. On July 3rd, 1997, the Reserve Bank of Australia revealed that it had sold 69% of its gold reserves of the previous month and put the proceeds in interest bearing securities. It is estimated that the Australian Bank was losing as much as $150 million per year by holding gold reserves. Canada has sold 85% of it gold since the early 1980s and netted $7.6 billion, plus billions more in interest from investments. Is the U.S. missing a golden opportunity? 10

Sticking with gold as an example, it is also worth noting that changes in the price of metals will have vastly different impacts on each metal producing country, region, and company. This is because such factors as the age of a mine, the ore quality, the cost of production, and the degree of mechanization, can lead to vastly different impacts. For example, a number of industry analysts accurately predicted that today's low gold price would have the greatest negative impact in South Africa and Australia because of the age of the mines and the relatively high cost of operations in those countries. Companies and mines with a relatively low cost of operations will benefit during this period and may gain a competitive advantage. Nevada, for example, has a number of relatively low cost operations. Based on my discussions with one mining company official, a number of companies will use this period to acquire other mines and operations. To truly assess the impact of today's metals prices on the U.S. mining industry, would require one to assess the circumstances of each company. One might actually find that a number of them will improve their competitive advantage during this period and that some are focusing on acquisition rather than exploration. 11

The Public's Economic Interest In Other Uses of Public Land

When considering the health and economic strength of our country and our communities, it is also imperative to consider the relationship between mineral extraction and other forms of economic development. There is strong evidence that the development of non-extractive industries may be in our national interest, particularly on our public lands.

According to David Malin Roodman, a senior researcher at the Worldwatch Institute, "the economic benefits of extracting resources have fallen dramatically relative to the benefits of preserving them." He continues, "Intact natural assets . . . are increasingly coming to be seen as economic assets . . . In the United States, counties with open space now rank among the fastest-growing." "Modern extractive industries . . .usually fail to enrich the local economic fabric . . . Nor does an extractive industry necessarily spur local growth in allied businesses such as mining machinery." 12

The conventional wisdom, that extractive industries form the bedrock of rural economies is changing and public attitudes support this shift. A 1995 poll by Yankelovich Partners found that 59% of U.S. adults opposed expanding mining and grazing on public lands and just 26% supported it. This has important impacts for policy related to the use of public lands. 13

In his 1996 book Lost Landscapes and Failed Economies, Dr. Thomas Michael Power argues that there exists a false belief that mining is responsible for creating spin-off jobs and that mining is the economic engine driving the rest of an economy. According to Power the economies of many western states are undergoing profound changes. Today, in the West, metal mining accounts for a small portion of employment, slightly more than one-tenth of one percent. And the relative importance of metal mining as a source of employment in the aggregate Western economy is shrinking. Between 1980 and 1990, it fell by half. During this period 25,000 jobs were lost in metal mining, while the overall Western economy significantly expanded, adding almost 7 million jobs. 14

Unstable and depressed mineral commodity prices, as well as increasing mechanization and automation of mining and processing are reducing employment in mining. These new production techniques have increased supply potential, driving commodity prices down worldwide, and added to the pressure on all mining operations to further reduce costs, including labor costs. And according to Power "the decline in mining employment during the 1980s largely confirms the impact of limited markets and rising productivity . . .one can expect limited markets and rising labor productivity to continue to exert downward pressure on the employment potential of the industry. In the future, mining is not likely to be a source of economic vitality for America's communities." 15

In a soon to be published paper, "Mining the Data: Analyzing the Economic Effect of Mining on Rural Communities," Professors William R. Fruedenburg and Lisa J. Wilson, from the University of Wisconsin, confirm Power's findings: "Extractive industries such as logging and mining are generally expected to bring significant economic benefits to rural regions, but in recent years, a growing number of findings have challenged that common expectation . . . While it would be premature to consider this analysis definitive, it is clearly no longer possible to accept as "obvious" the widespread assumption that mining can be expected to lead to economic improvement for rural communities." 16

They found negative outcomes in over half the North American communities surveyed, neutral outcomes in a quarter of the communities, and positive outcomes in a quarter. However, over half of the positive findings come from the years prior to 1982. 17

Mining will continue to be an important part of our national and Western economy, but what should be promoted on our public lands is a diversified economy.

Environmental Protection Is Good For the Economy and Mining Companies
Some will argue that environmental protection and safeguards are having a negative economic impact. When looking broadly at this industry, and other industries, there is little evidence to support this claim. Today, a substantial sector of the industry is mining for profit while ensuring environmental protection and sustainability. The two goals are not mutually exclusive. In fact, they can be pursued in tandem.

Consider that Placer Dome is now using its environmental and social sustainability policy to market itself as the world's gold leader. Placer Dome officials can describe to you, in detail, the marketing advantage that they believe this policy gives them in the marketplace. Listen to Placer Dome President John M. Willson in a speech to the Pacific Basin Economic Council, "We in Placer Dome have concluded that if a mine cannot afford the full cost of state-of-the-art systems, then it should not be developed. There is no trade-off. No mine developer has the right to impose on an ecosystem damage from acid rock drainage just for the sake of economic activity, returns to investors, jobs and other benefits . . . . The key message here is that there is no room for compromise in environmental protection." My prediction: if Placer Dome lives by these words, they will become the world's gold leader, and remain so for a long time. 18

One can also look to other industry sectors or other parts of the mining industry for evidence that environmental protection is not an economic negative. According to the Economic Policy Institute "industries that spent more money complying with environmental regulations actually demonstrated superior performance against imports from developed countries." And although the U.S. has lost import competitiveness in the metals processing sector "environmental regulation did not play any significant role" in this loss. Furthermore, the study reports finds no evidence that mining companies are polluting more outside the U.S. 19

In fact many industry leaders tout compliance with U.S. standards as a marketing tool in other parts of the world. Listen to Dr. Donald W. Gentry, President and CEO of PolyMet Mining Corporation and a former Professor of Mining Engineering at the Colorado School of Mines. In a December 1994 article written for Latin Finance, he stated the following:

> *"responsible North American companies operate abroad just as they do at home; that is, they adhere to virtually the same U.S. environmental-related requirements and regulations, incorporate the newest technologies available to mitigate environmental hazards, and pursue rigorous reclamation programs on disturbed lands."* 20

James M. McElfish Jr., who directs the Mining Center at the Environmental Law Institute, concluded that that if mining is to continue to be an important part of the American economy, mining regulation must keep pace with new technologies. In other words, it is in the economic interest of mining companies, and in our interest, to have an advanced regulatory scheme that helps us develop an advanced industry. 21

A corporate strategy premised upon selling shabby environmental performance in developing countries or on "dumbing-down" U.S. standards, is a loser. It is a loser economically, politically and environmentally. The fact is that legislation and regulation in developing countries is likely to evolve in a more environmentally sustainable direction.

Yet, some in the industry will continue to make the claim that environmental reforms, or even today's environmental requirements, will destroy the industry. Perhaps it is because they believe their company is poorly poised to operate in an environment that mandates and rewards safeguards.

We've heard these claims before. Despite dire predictions, the American coal industry was not destroyed by SMCRA reforms in 1977. The industry did not move offshore and it did not go broke. It prospered. One researcher concluded: "Corporate America is not a quick study. Again and again, companies have responded to proposed environmental rules by threatening bankruptcy, huge layoffs, foreign inroads into American markets --- and it has never worked . . .Complying with environmental regulations is often less costly than original predictions would suggest. In many cases the difference between early predictions and actual costs are quite dramatic." 22

Strong environmental protection polices lead to a strong and healthy mining sector. Environmental regulations should help define responsible action and separate the good actors from the bad.

Equal Treatment on Public Lands Is Good For the Economy

Members of this committee, responsible for protecting our public land heritage, and concerned about our overall economic health, should consider some fundamental questions about current public lands policy related to mining. Why have we singled out mining companies, operating on public lands, for what amount to multi-billion dollar corporate welfare payments, especially when we are struggling with issues such as how to save Social Security and Medicare.

Consider these excerpts from the testimony of Dr. W. Thomas Goerold, a noted minerals economist to the Senate Energy and Natural Resources Committee, Subcommittee on Mineral Resource Development and Production, on September 13, 1990:

"Current domestic hardrock mineral producers sometimes claim that paying for federal minerals would be so burdensome that it would force a significant portion of them out of business. A cursory examination of the evidence does not support these claims. Producers of leasable minerals found on federal lands have paid royalties and land rentals since 1920 and no one questions the health of these industries. Moreover, miners of hardrock minerals have a long history of routinely paying royalties and rental payments when these same minerals are found on state or private lands."

"Hardrock mineral miners maintain that there is still a fundamental difference between hardrock minerals production and other businesses, as well as between hardrock minerals firms and other mineral producers that pay land rental and royalty fees to the Federal Government for use of publicly owned resources. Contrary to industry claims, these purported distinctions do not justify the privileged treatment accorded producers of hardrock minerals. The Office of Technology Assessment supports this view. The OTA believes that the distinctions between leasable (generally energy and chemical minerals requiring government permission and payment of lease and royalty fees) and locatable minerals are more artificial than real."

Do hardrock miners on federal lands have more importance than automobile manufacturers, retail store owners, or any other business not eligible for similar government subsidies? Are hardrock miner producing minerals from federal lands more important than these same producers mining state or private lands?

One argument advanced by mining interests against the imposition of royalties for federal hardrock minerals is that the Federal Government already taxes the profits of these companies. This is a misleading argument—most non-mineral businesses do not obtain the inputs to their firms from the federal government at no cost, yet virtually all pay a federal income tax. Royalty and rental free mineral operations are analogous to a gift of steel and rubber to automobile manufacturers, or free office rental to an accounting firm, courtesy of the U.S. Government. 23

Mining companies pay royalty rates for hardrock minerals produced from state lands that typically range from 6.25 to 15 percent gross or net profit on gold production. There are also federal land parcels in Minnesota, Missouri and Ilinois where miners pay royalties for extraction of hardrock minerals. And even on federal lands, mining companies are willing to pay royalties, to other mining companies but not to the taxpayer. 24 In October 1993, Newmont Mining Corporation leased 1872 Mining Law claims on BLM Land at Grassy Mountain in Oregon from the Atlas Corporation. Newmont paid a $22.5 million cash bonus and a $5 net smelter royalty production.

Why do those who mine hardrock minerals on our public lands receive a multi-billion dollar subsidy that no one else receives? Mining companies that mine on private or state land don't receive this subsidy. Yet, nothing has changed since 1990. In fact, nothing has changed since 1872.

The net impact of this policy is to make mining more attractive on federal land than on other lands. "The Federal government by forgiving this normal mineral business cost has distorted the distribution of economic activity, discouraging mining on private, state, and tribal land and encouraging it on Federal land." 25 Continuation of this policy is not in our economic interest.

The Economic Costs of The Ticking Public Liability Time-Bomb

Congressional inaction is also creating a sizeable taxpayer and environmental debt on our public lands. At some point this bill will come due from yesterday's, today's, and tomorrow's abandoned mines. We estimate that a cleanup of yesterday's abandoned mines could cost $72 billion. The 1992 Summitville Mine Disaster in Colorado has left today's taxpayers with a $120 million cleanup bill. In 1998 we found that just three troubled mines, Zortman-Landusky in Montana, the Gilt Edge Mine in South Dakota, and the Stibnite Mine in Idaho could cost state or federal taxpayers over $10 million. And according to Leo Drozdoff, the Bureau Chief of the Nevada Bureau of Mining Regulation and Reclamation, at least 13 major mines in Nevada are currently in bankruptcy.

What is the cost to future generations of the cumulative water quality and water quantity impacts of today's mines, especially where multiple mines are being operated or proposed in one area, such as in Nevada?

In 1993 Secretary of the Interior Bruce Babbitt came before this committee and expressed his concern about the liability time-bomb ticking away today on our public lands. He stated ". . . the Department of the Interior is now a defendant in several lawsuits seeking to hold the government liable for the cost of cleaning up toxic residue from defunct mining operations carried out throughout the West under the Mining Law of 1872 . . . After over a century of making publicly

owned minerals available for nothing, the taxpayers may face cleanup costs running in the billions of dollars." 26

Some say this is yesterday's problem. It's not. The problems continue today, and may get worse tomorrow. Consider just three current case studies.

- At the Goldstrike Mine in Nevada's Carlin Trend a computer model predicted that the water table would return to normal a century after water pumping stops. Dewatering in arid areas, at mines like Goldstrike can dry-up streams and springs. The computer model was wrong. It contained a six-fold discrepancy. The question now is how many centuries will it take for the water table to really return to normal.

- Six of Nevada's open-pit mines have filled with up with water that is polluted beyond federal drinking water standards and aquatic life standards for heavy metals or acidity. One expert predicts that at least 30 new pit lakes will begin to form in the next 20 years. What will the cost be to our children, the taxpayers of the future?

- The Zortman-Landusky gold mine is a poster-mine for what's wrong with the 3809 regulations. The mine has had a series of environmental problems including cyanide spills, severe acid mine drainage, a poor record of community relations, surface and groundwater contamination, and bird and wildlife fatalities. And now, with a bankrupt owner, citizens are likely to foot a multi-million dollar cleanup bill. Why? Because the federal regulators did not provide adequate safeguards for acid prediction, cyanide safety, bonding, penalties for repeat offenders, or well-defined operating standards. In fact, in 1990, a Montana state regulator, Craig Pagel, in a memo to his supervisor, described the reclamation plan as ". . . four paragraphs in length and considerably less in substance, and hardly serves as a model for public disclosure and the application of the natural sciences."

It makes economic sense to begin addressing these problems today through strong environmental safeguards for mining on public lands and a federal abandoned mine cleanup program.

Cleanup of Public Lands is Good for the Economy and Creates Jobs

So what about jobs? Although mining creates jobs, it is not the job engine that industry public relations officials would like us to think. In fact, jobs in the sector are likely to continue an overall decline due primarily to mechanization and market changes. We can "expect limited markets and rising labor productivity to continue to exert downward pressure on the employment potential of the industry. Unstable and depressed mineral commodity prices, as well as increasing mechanization and automation of mining and processing, are reducing employment in mining. The new production techniques, adopted worldwide, have increased supply potential, driving commodity prices down worldwide and adding to the pressure on all mining operation to further reduce costs, including labor costs." 27

Listen to what Richard Parks, the owner and operator of a sporting goods store in Gardiner, Montana, had to say to this subcommittee on March 11, 1993 when arguing for a royalty on public lands mining to be used for mine cleanup and reclmation:

"The equipment operator who puts the mountain back gets paid the same as the guy who took it apart in the first place. Resources, particularly water, are critical to the maintenance of sustainable economies are protected by this work. The clean up of the Clark Fork complex, the largest and most complex Superfund site in the U.S. is currently estimated to cost into the billions of dollars. The West generally is estimated to have $20 billion in work to do on thousands of abandoned mine sites, over 4,000 of them in Montana alone. The technologies developed for doing this work will be marketable on a worldwide basis. Using an interpretation of data from the Bureau of Labor Statistics, Office of Employment Projections, 25 jobs will be created for every 1 million dollars spent. Consequently, the royalty requirement of this bill should be viewed as a jobs creation provision." 28

In a 1993 economic study commissioned by Mineral Policy Center and the National Wildlife Federation, we found that changing policy on public lands to require a royalty for mining and the creation of reclamation programs, would actually create jobs. According to the report: "The net effect of the reclamation programs and the royalty payments on the employment base is positive. The employment associated with the reclamation programs more than offsets the potential declines in mining employment from the Federal royalty." 29

Sound Economics and Sound Economic Policy Dictates Change

The causes of change in mineral exploration and development are multiple and complex. While there is no doubt that mineral exploration and development is flat in some parts of the U.S., this is primarily due to fluctuations in metals prices and potentially ore-grade, not a shortage of supply and not environmental protection measures. A drop such as this is not inherently bad for our economic or environmental health. In terms of jobs, these factors, combined with increased industry mechanization, are having a negative impact. It is in our interest to take action that will stimulate other commercial and non-commercial uses of our public lands. And it is in our interest to pursue environmental objectives that will lead to job-creation in mining communities or former mining communities, such as abandoned mine cleanup.

Second, although mining will continue to be an important element of our national and local economy, there are clearly economic, environmental, and social benefits derived from other industries and other uses of our public lands, some of which outweigh the benefits of mining. We think the time is now for this committee to change current U.S. policies that favor mining on public lands. As Dr. Power points out: "There is nothing in economic theory or empirical economic experience to suggest that commercial economic value is always greater than noncommercial economic value. In fact, that often will not be the case . . ." 30

Third, a mining industry that is rewarded for its environmental performance, and penalized for its environmental mistakes, will be a healthier industry, both in the U.S. and around the world. It is in the interest of this committee to create incentives for better environmental performance on our public lands. Improved environmental performance will increase the competitiveness, marketability, and performance of U.S. mining companies.

Fourth, more and more experts are concluding that our environmental and economic health, and our security, will improve if we use our valuable raw materials more wisely. We should use fewer resources, use them differently and generate less waste, and re-use more. Policy changes that benefit extraction should be turned on their head, so that we reward, rather than penalize, re-use and extraction. It is in our national interest to broaden our definition of the mining industry to include not just those companies that extract metals, but those that recycle. 31

Fifth, there is no justification, economic or otherwise, for policies that provide public subsidies to mining companies, creating an incentive for inefficient mine operations on public lands, perhaps in places that are best used for other purposes. These subsidies lead to an unfair economic advantage for some companies and may result in inefficiencies and over-supply.

Sixth, as a matter of economics and environmental protection, and in order to build stronger local economies, we should begin today to address the liability time bomb that is ticking away on public, state and private lands. We should begin a national cleanup program for the hundreds of thousands of abandoned mines.

We believe good environmental policy also makes good economic policy, profitable mining and environmental protection are compatible.

To summarize, we recommend that Congress permanently end public lands giveaways to mining companies, impose a fair royalty for mining on public lands, create an abandoned mine cleanup program, and end the policy of giving mining companies first-use of our public lands. These steps make economic sense, they will lead to healthier communities and healthier ecosystems, jobs will be created, and, we believe, lead to healthier mining industry.

ENDNOTES

1. "Mineral Resources and Sustainability, National Research Council," National Academy Press, 1996, p8-9
2. "U.S. Gold Producers Maintain Home Exploration," Mining Journal, 30 October 1998, p.337
3. "Mineral Resources and Sustainability," National Research Council, National Academy Press, 1996, p8-11
4. Lost Landscapes and Failed Economies, Thomas Michael Power, Island Press, 1996, p116
5. "Losing the Midas Touch," The Economist, 22 November 1997, p. 91
6. "Old Investors Stick With Gold While Young Buyers Shy Away," The Wall Street Journal, Aaron Luccheit and Michael R. Sesit, 10 September 1997
7. Ibid
8. "Market Place," The New York Times, Jonathen Fuerbringer, 19 June 1997, p D8
9. "Can Government Gold Be Put To Better Use? Qualitative and Quantitative Effects of Alternative Policies," Federal Reserve International Finance Discussion Papers, Dale Henderson, John Irons, Stephen Slant, and Sebastian Thomas, No. 582, June 1997
10. "First Busang, Now This???," North American Mining, Dorothy Y. Kosich, Auguts 1997, p. 5; and "Old Investors Stick With Gold While Young Buyers Shy Away," The Wall Street Journal, Aaron Luccheit and Michael R. Sesit, 10 September 1997
11. "Golden Margins," The Mining Journal, 15 August 1997, p 145; and The Mining Journal, 1 August 1997, p 3
12. The Natural Wealth of Nations, David Malin Roodman, W.W. Norton and Company, 1998, p 52-53
13. Ibid
14. Lost Landscapes and Failed Economies, Thomas Michael Power, Island Press, 1996, p 95-97 and tables 4-7
15. Ibid, p105-106
16. "Mining the Data: Analyzing the Economic Effect of Mining on Rural Communities," Professors William R. Fruedenburg and Lisa J. Wilson, University of Wisconsin, Paper to be Published
17. Ibid
18. Presentation by John M. Willson, President and CEO of Placer Dome, Pacific Basin Economic Council, 30th International General Meeting, 20 May 1997
19. "A New Look at Environmental Protection and Competitiveness," Eban Goodstein, Briefing Paper, Economic Policy Institute, November 1997
20. "To Protect and Preserve, Environmental Concerns of Foreign Mining Companies in Latin America," Donald W. Gentry, Latin Finance, December 1994
21. Hard Rock Mining, State Approaches to Environmental Protection, James M. McElfish Jr., Environmental Law Institute, 1996
22. "Falling Prices, Cost of Complying With Environmental Regulations Almost Always Less Than Advertised," Hart Hodget, Briefing Paper, Economic Policy Institute, November 1997
23. Statement by Dr. W. Thomas Goerold, Testimony Before the Senate Subcommittee on Mineral Development and Production, 13 September 1990
24. Ibid
25. "Not All That Glitters," Thomas Michael Power, Mineral Policy Center and National Wildlife Federation, 1993, p5
26. Statement of Bruce Babbitt, Secretary of the Interior, Testimony Before the Senate Subcommittee on Mineral Resources, Development and Production, 1993
27. Lost Landscapes and Failed Economies, Thomas Michael Power, Island Press, 1996, p105-106
28. Statement of Richard Parks, Testimony Before the House Subcommittee on Energy and Minerals, March 1993
29. "Not All That Glitters, Thomas Michael Power, Mineral Policy Center and National Wildlife Federation, 1993, p3
30. Lost Landscapes and Failed Economies, Thomas Michael Power, Island Press, 1996, p120
31. The Natural Wealth of Nations, David Malin Roodman, W.W. Norton and Company, 1998; and "Mining the Earth," John E. Young, Worldwatch Paper 109, July 1992

Oversight Hearing on Mining, the American Economy and National Security - The Role of Public Lands in Maintaining a National Asset

Committee on Resources
U.S. House of Representatives

February 23, 1999

Douglas B. Silver
President
Balfour Holdings, Inc.
Englewood, Colorado

Summary and Recommendations

There has been a dramatic decline in exploration activity in the United States over the past five years for two principal reasons. Depressed metal prices are responsible for a general worldwide contraction in exploration expenditures. The inefficiencies of the United States Federal and many State governments in issuing permits is compounding the difficulties companies are experiencing when trying to operate in the United States.

The United States is no longer considered competitive for mineral exploration, despite its strong geological potential for mineral discoveries. Interviews with many exploration companies reflect a consensus opinion that the Federal and most State governments are trying to phase out the minerals industry by allowing the permitting process to be usurped by special interest groups. This is being accomplished by the continual catering to the whims of small groups whose adept manipulation of the legal system allow them to indefinitely delay the permitting process while financially breaking the companies. The government's lack of resolve to defend its own Records of Decision and preference to defer its responsibilities to non-governmental organizations raises many questions about who controls the process.

The single largest concern is that regulatory bodies directly and indirectly mismanage the permitting process. The delays and substantial cost overruns, which are now commonplace, create undue financial hardships on mining companies and extort their legal rights. Companies cannot operate in such a hostile climate, so they have taken their capital, ideas and U.S. environmental practices to other pro-mining countries.

The possible exceptions to this general opinion would be Nevada and Alaska where the State governments continue to be proactive in their efforts to encourage mining activity and protect the legal rights of miners. Also, the focus in Alaska is on State-owned lands and privately held Native lands.

Only a handful of new U.S. base and precious metal projects are currently undergoing the NEPA-required EIS or EA process. Despite the United States hosting more than 650 gold deposits and dozens of base metal deposits, most projects are currently inactive due to low metal prices and the inability of companies to financially survive the permitting process. As Mr. Babbitt continues his successful circumvention of the Legislative Branch, some of these deposits will never be developed while many others will never be discovered.

Mineral companies comply with the legal and regulatory rules by conducting scientific studies to determine the impact of the project on the environment and local community. These studies are expensive to complete and very time-consuming but are supposed to provide a sound basis for measuring the economic viabilities and impacts of the proposed mine. Instead, there are a growing number of examples where the government is prematurely terminating this process in order to prevent evidence from being presented that the project will not adversely impact an area. Simultaneously, other projects are suffering from government overkill where so little forethought is given to the commercial consequences of its endless studies that companies are going bankrupt funding this work. In other countries, these same studies are completed in a timely manner, but without the management problems so frequently encountered in the United States.

The permitting process was never designed to be an adversarial confrontation between industry and the government. Today, however, the environmental permitting process has become the playground for special interest groups who opposed mineral development. These groups range from the Sierra Club (550,000 members according to their website), Mineral Policy Center ("several thousand members") and to private individuals. Collectively, these small opposition groups represent an insignificant percentage of the general population, but have mastered the legal, lobbying and media professions. Their alternative agenda does not reflect the will of the people, yet their control of Congress is staggering.

In order to remedy this situation and provide a level playing field, the EIS process must return to its original intention of being a cooperative effort between government and industry. A more streamlined system must be created in which study contents, time frames and costs are well established and maintained. Accountability must be included into this process so that companies are not driven into bankruptcy due to the wastefulness and incompetency of government supervising agencies. An oversight process should be added to guard against government personnel injecting their personal agendas into the EIS process. Finally, the Records of Decision should represent the final decision on a project. All interested parties should be required to meet the deadlines of this process and not be allowed to file endless appeals after the Record of Decision has been announced. Once a decision has been made, the government should be required to legally and financially defend this action, not the mining companies.

Today, we are meeting to discuss proposed changes to the Mining Law of 1872. However, this debate is becoming moot due to these other problems. The mining industry would like to continue contributing to the U.S. economy, but without a sincere effort to create a level playing field, the companies can no longer justify exploring in this country.

There are important ramifications to the problems facing today's minerals industry. Because of the management issues related to the permitting process, it now takes the average mine about ten years from the time of discovery to the beginning of production. Fifteen years ago, the same action could have been completed in two years. Reduced exploration activity will lead to fewer discoveries. This will result in declines of new metal production and increase our country's dependence on foreign supplies. Should metal prices remain depressed for three to five years, the United States can expect to see an accelerated loss in its production capabilities.

A return to higher metal prices will provide companies with financial breathing room, but it will do nothing to alleviate the difficulties of operating in the United States. The government should be very concerned about the mass exodus of U.S. mining companies because once a company spends tens or hundreds of millions of dollars on a foreign project, it cannot move that project (or those spent funds) back to the United States. Instead, these companies tend to make additional investments in the host country. Therefore, shifting exploration activity back to the United States will become progressively more difficult as companies become established elsewhere.

Reduction in Worldwide Exploration Expenditures

The worldwide recession in metal prices has forced mineral and mining companies to reduce discretionary spending as part of their cost-cutting efforts. Exploration falls within this category.

North American mineral companies account for approximately 75% of the world's mineral companies. Therefore, their activities dictate worldwide trends. As shown in Table 1, the recent cutbacks in exploration expenditures by major North American mining companies has been quite dramatic, with U.S. and Canadian companies cutting their global expenditures by 40% and 16%, respectively. On a percentage basis, these companies have reduced exploration efforts by 29% during the past three years.

Table 1
Worldwide Exploration Spending for 16 North American Mining Companies
US$ Millions

	1997	1998	1999E	1997 - 1999 Change
U.S. companies (10):	$379	$269	$229	-40%
Canadian companies (6):	$325	$292	$274	-16%
Total (16):	$704	$561	$503	-29%

This trend began four years ago and has been heightened by the simultaneous decline in both base and precious metal prices.

Exploration spending is typically classified as either "grassroots" (also called "green fields" or "generative") or "head frame" (exploration around existing mine sites). Most of the exploration reductions have been at the expense of grassroots exploration, although some companies are also reducing head frame activity as a consequence of low metal prices.

Reduction in U.S. Exploration Expenditures

During this same period, most of these companies have been winding down their exploration efforts in the United States. The large U.S. copper companies have effectively terminated all exploration activity. Others have abandoned grassroots exploration programs in favor of head frame exploration which is often limited to lands already patented. When asked why they have taken this approach in the United States, the response is uniform. "It is impossible to get new mines permitted, so we are focusing our funds on permitted areas."

Table 2
Mineral Exploration Expenditures in the United States
US$ Millions

	1998	1999E	1998 - 1999 Change
U.S. companies (9):	$69.3	$57.9	-16%
Canadian companies (6):	$25.0	$36.5	+46%
Total companies (15):	$94.3	$94.4	0%

The apparent increase in Canadian spending is related to select companies which own extensive land positions and large mines. Because the majority of their lands are often patented and already permitted for mining, new or additional discoveries will not require submitting to the treacherous permitting process.

The Permitting Process Is Not Servicing Its Intended Use

Mineral companies view the United States' permitting process as inefficient and filled with unbalanced opportunities for opponents to exercise their personal agendas at the expense of the mineral company and preferences of the local population. As one corporate executive stated "Why would I want to discover a deposit in the United States and then go bankrupt trying to get it permitted? We find the risks of operating in South America far more favorable than the risks of obtaining permits in the United States." This same company believes the United States continues to host some of the best potential in the world for gold discoveries but refuses to spend anymore money in the United States.

Phelps Dodge Corporation, one of the oldest and largest American copper producers, reported in their 1997 annual report "We also made the difficult decision to close our U.S. Exploration offices. The lack of resolution on Mining Law reform in the United States, compounded by an inefficient and time-consuming environmental permitting process, had made the development of domestic mineral deposits less attractive when compared with international projects, which can be developed to meet U.S. environmental standards at a fraction of the time and cost. Accordingly, we must expand our focus to opportunities with the greatest potential to create value for our shareholders." (page 5).

Please note that these comments do not say that the process is unnecessary. The companies are pointing out that the processes' inefficiencies are making it prohibitively expensive to comply or survive. It is doubtful that this was the intended purpose when the permitting process was established.

Factual Evidence of the Government's Anti-mining Attitude

Factual evidence supporting this consensus includes, but is not limited to:

1. The House Committee on Resources determined that President Clinton's efforts to exclude the Escalante National Monument in Utah from coal and mineral activities was spurred by re-election politics rather than scientific proof of a need for protection. This situation is one of several examples of the EIS process being pre-maturely terminated so that the facts supporting projects will not be publicly disclosed.

2. Secretary of the Interior Bruce Babbitt's continual rhetoric that the minerals industry is stealing is untrue and does little to foster a sense of cooperation between industry and government. His apparent ignorance of the discovery process and its associated risks and costs strengthen the perception that Babbitt is not serving the will of the people, but select special interest groups.

3. The Department of Agriculture's and Interior's respective actions to remove 428,000 acres in Arizona and 640,000 acres in Montana from mineral exploration without going through the Legislative Branch demonstrates the Administrations' intention to circumvent Congress' prerogative, bypass existing laws and ignore the will of the people.

4. Attempts by some members of Congress to repeal the depletion allowance specifically targets natural resource companies.

5. There are two distinct areas that impact mineral development. The Mining Law of 1872 addresses "land tenure" of mineral rights. The second is "permitting and environmental" law and is governed by NEPA and a myriad of other laws.

The ongoing efforts to destroy the Mining Law of 1872. Several of the past and current royalty proposals would increase the governmental tax burden on mines by more than 100%.

6. The motive behind Vice President Al Gore's recent announcement to sell five million ounces of IMF gold's reserves into a depressed gold market, appears irrational in face of the Executive Office's claims of budget surpluses. When the Australian Central Bank sold 5.4 million ounces of gold in July 1997, it began the downward spiral of gold prices which has yet to recover.

7. The growing number of small mining companies declaring Chapter 11 as a consequence of the relentless spending and delays in obtaining permits is the best direct evidence that the system is not working.

   Example: Dakota Mining Corporation is a small mining company with gold mines in South Dakota and Alaska. They began EIS studies in 1993 for an 37 acre expansion of their Anchor Hill gold project in South Dakota. At that time, the USFS considered it would take two years to complete and would be a simple exercise because it was principally a reclamation project. Five years later, the company still had not received approval. Once the EIS was approved, it was appealed by a small citizen group which delayed the project by another year. These delays and costs financially destroyed the company.

   Example: Atlas Corporation is presently in Chapter 11 because of the inability to finalize the closure plans on its Moab uranium project in Utah. To date, the Company has funded two EIS studies. The position by special interest groups that the reclamation costs would be greater than $100 million versus scientific studies which suggested $10 - 15 million, prevented the company from raising additional funding, merging with other companies or growing its asset base.

"It's quite simple, the United States government is too unfriendly towards mining."
Major American Mining Company

Principal Issues

1. The open ended nature of the EIS process creates several problems.

   A. There is no mechanism for quantifying the cost to complete an EIS and no incentive for the government to work within a budget or get the work completed with any sense of urgency.

Example. Canyon Resources was told to budget $750,000 for the draft EIS of the McDonald gold project in Montana. To date, the government has spent $2.5 million and the report is not completed.

Example: Battle Mountain Gold Company, a large American gold miner with international operations, originally budgeted approximately $5 - 10 million for completing all permitting activities (EIS, studies, applications, etc.) for the Crown Jewel project in Washington. To date, more than $25 million has been spent. Small companies cannot survive with these types of cost overruns.

B. There is no containment mechanism for the work items deemed important by the government. These studies need to be identified and quantified.

C. There is evidence that the personal political agendas of individuals in environmental agencies overseeing the EIS process are allowed to impose their personal agendas into the process.

Example: In the Draft EIS for ASARCO's Rock Creek copper project in Montana, the following language described the impact of the 25 year mining project on the local economy. "Economic and social dependence on resource extraction industries is widely regarded as an economic and social liability because it ties social well-being to declining economic sectors . . . " The same document states "Mine operations would provide a substantial boost to local employment and economics over the estimated six years of mine development and 24 to 30 years of mine operations . . ." How can boosting employment and the local economy for two to three decades be considered negative?

To take the position that long-term employment and tax revenue opportunities is negative to a rural economy is ludicrous and symbolic of what happens when government personnel are allowed to insert their personal agenda into the EIS process.

Example: Several companies cited examples where anti-mining groups were receiving government information about their projects before they were formally notified. This raises legitimate concerns about personal agendas of government employees.

2. Even with these problems, the EIS process is never comprehensive enough to satisfy all interested parties. This creates a second layer of problems.

The government makes no effort to stand behind its Records of Decision. There are several projects currently being delayed because the government allows frivolous appeals and individuals to file lawsuits which serve only to delay and financially punish the mining companies. The government's inability, unwillingness, or inactivity to prevent these actions raises serious questions about how the EIS process has been distorted.

Example: Crown Resources Corporation, an American exploration firm with a stellar record of discoveries, recently won a court battle in Washington state concerning a solid waste permit for its Crown Jewel gold project. In its dismissal of the lawsuit brought on by a special interest group, the Okanogan County Superior Court ruled "the petitioner must point to some set of facts or to some legal theory justifying its case. Personal distaste for gold mining on the part of OHA (Okanogan Highland Alliance), other members of the public or any public official cannot alter clear legislation." The mining industry appreciates the judge acknowledging what the industry has been claiming for years. Unfortunately, there is no mechanism for Crown Resources to be compensated for its legal costs, project delays or business opportunities lost.

Example: The Carlotta copper project has spent $60 million and ten years trying to obtain permits, despite the project being located within an active copper-producing district in Arizona.

Recommendations

A. The EIS process was designed to address the impact of mineral projects from many scientific, economic and social aspects. The government should enforce this perspective and require all interested parties to work within the time frames and budgets agreed upon at the outset. Clear and specific appeal rules should also be established to prevent special interest groups from using delay tactics as a form of warfare.

Example: One company commented that "Anti-mining forces get multiple free swings at the bat while mining companies can only stay involved as long as they can afford it." The cost to file litigation is far less than the cost to defend it.

B. Individuals within governmental or special interest groups which impede the permitting process should be held financially and legally accountable for all legal fees and economic damages when their lawsuit or appeal fails. The current system has no mechanism for rapidly identifying frivolous lawsuits nor does it punish those who improperly use the court systems for political agendas. Lawsuits destroy

companies due to the ease at which our legal system allows individuals to manipulate the system.

C. The government agencies must be forced to work with a sense of urgency. Under the existing system, these agencies have an open checkbook from the mining companies to pursue any studies they deem necessary. Many times these studies are unnecessary, but there is no protocol for defining the selection of work activities.

Example: One study required of Bond International Gold when they were developing the Colosseum gold mine in California involved slaughtering dozens of small rodents and birds to inspect the lead levels in their livers. This was required to insure that small rodents and birds would not suffer lead poisoning from gold mining. The only noted lead occurrence in the region was not in the proposed mining area. Do dozens of animals were killed simply because someone asked the question. Does it not make more sense to determine which questions are of merit, rather than requiring a study on every question?

Every time a company or project dies due to the drawn-out and inefficient permitting process, more proof is established that the Federal and some State governments oppose mineral development. Other countries are adopting U.S. environmental standards, yet work with industry to build mines. They have permitting processes which are both comprehensive and efficient. For example, in Bolivia, the time to issue permits is dictated by law. If the government does not complete all of the necessary studies during the allotted time period, the permit is automatically issued.

Statement of

W. David Menzie
U.S. Geological Survey

Before the
Committee on Resources
Subcommittee on Energy and Mineral Resources

February 23, 1999

Madam Chairman and Members:

Thank you for the opportunity to speak to you today. My name is David Menzie; I am a geologist with the US Geological Survey and currently serve as Chief of the International Minerals Section of the Minerals Information Team. In this testimony I will discuss changes in imports and exports of metallic mineral resources from 1975 to present.

Summary

The United States plays many roles in the global markets for metallic mineral commodities. The USGS analyzed the consumption, production, imports, and exports over the last two decades (1975-1998) for 49 commodities or commodity groups to describe changes in import and export of metallic mineral commodities. Seven different types of changes were identified and all commodities were grouped into one of these seven types. The major factors that influence these changes are a better understanding of geology, technological change, economics, and political factors.

Patterns of Change in Mineral Imports and Exports

I refer you to table 1 of my statement which presents the percent net import reliance for metallic mineral commodities during the period 1975 to the present and estimated U.S. consumption of each commodity in 1998. Percent net import reliance is calculated by determining what percentage of apparent consumption is met by net imports, calculated as imports minus exports and adjusted for changes in stocks. The percent net import reliance is a way of examining the country's vulnerability to supply disruption.

Time does not permit me to describe the changes in consumption, production, imports and exports for each commodity. Instead I will identify seven groups of commodities that exhibit similar patterns of imports and exports. Details for specific commodities can be found in the appendix attached to my written remarks.

1. Continued net exporter: beryllium, lithium, and molybdenum
2. Change from net importer to exporter: gold and silver
3. Decreased import reliance: cadmium, iron ore, and selenium
4. Change from net exporter to importer: aluminum, copper, lead, magnesium metal, rare earths, and titanium metal
5. Continued import reliance less than 50%: iron and steel, mercury, and vanadium
6. Increased levels of import reliance: antimony, silicon, tungsten, and zinc
7. Continued import reliance greater than 50%: arsenic, bauxite and alumina, bismuth, cesium, chromium, cobalt, columbium (niobium), manganese, nickel, platinum group metals, rubidium, scandium, tantalum, thallium, thorium, tin, and yttrium

Sources of Mineral Imports in 1996

Another useful way of examining the vulnerability of our economy to disruption in the supply of a mineral commodity is to examine where imports of that commodity come from and what percentage of total imports come from those sources. Table 2 presents countries of origin and the percentages of reliance by the most dependent country and the two largest suppliers of each commodity. For example, the United States is 21 percent dependent on imports of cadmium (see Table 1); 45 percent of these imports come from Canada and 58 percent come from Canada and Mexico (see Table 2).

Factors influencing changing patterns of mineral production, imports, and exports

The unique patterns of imports and exports can be described by changes in the consumption, production, and trade of mineral commodities; however, these patterns do not explain the major reasons for these changes. Hewett (1929) identified four factors as important determinants of mineral production and thus, an explanation for these changes. The most basic factor is the **geology** of the region, because it encompasses those processes that control the types of minerals that a region contains and their quantities and qualities, such as grade or richness. Although the geological characteristics of a region do not change, our knowledge of them does change, and such increases in knowledge can in some instances lead to fundamental changes in mineral production. The second factor that Hewett identified was **technological change,** which encompasses those techniques and facilities that allow the profitable discovery, extraction, and processing of ores into mineral commodities and ultimately to final goods. The third factor affecting mineral production is **economics**. Hewett understood this to mean the prices of commodities and the costs of producing them. We now realize however, that economic factors often are linked to what Hewett identified as his fourth **political** factor which include a wide variety of things, such as trade policy, tax laws, resource management, and monetary policy.

What are some of the major changes in the geologic, technological, economic, and political factors that have influenced the patterns of mineral production, imports and exports presented in Table 1?

Certainly one major change has been an increased understanding of the geologic factors that control the formation of a variety of types of mineral deposits. Gold is a useful example. Since the late 1970?s, gold has been the primary commodity of interest for much of the mineral exploration community. Because much of the research that formed the basis for this new understanding was conducted in the western United States, the United States has benefitted more from these advances than have countries that differ from the United States in their geologic characteristics.

Another major change has been the development of new technologies for exploring for, mining, and processing ores. These changes include but are not limited to development of new mining technologies, such as in-pit grinding, and driverless vehicles in open pit mines and the use of trackless vehicles in underground mines. Development of new hydrometallurgical techniques for processing gold and copper ores have also been an important change. The U.S. industry has adopted many of these new changes. These technological changes however, have spread rapidly and are being adopted in many places around the world.

A technological area of growing importance is industrial ecology, the study of the flow of minerals and materials from source to ultimate disposal. It encompasses recycling of materials and reuse of products, and extends to the design of new products in ways that reduce the need for raw materials or the costs of recycling. Recycling is already an important factor for materials such as aluminum and steel. Recycling, remanufacturing, and redesign are likely to have an increasing impact on many materials in the future. It is not clear which material will be affected most by this technological change, but efforts to utilize minerals data collected by the USGS and others to understand material flows are underway.

Global political and economic changes are having increasing affects on patterns of mineral production, import, and export. The adoption of democratic governments and market-oriented economies throughout Southeast Asia, and Latin America has greatly changed global patterns of investment in minerals projects. These countries have embraced foreign investment through wide-ranging reforms that are designed to reduce perceived risks to private investment. These reforms have covered topics from foreign ownership and control of assets, to tax policy, mining law, and environmental regulation. The result has been a major change in the willingness of corporations to invest in mineral exploration and production in these areas. According to the World Bank (1996)

investment in exploration in Latin America increased 130 percent in the early 1990's, and in 1994 and 1995, Latin America was the region that attracted the largest investment in exploration.

In addition, political reform and the transition of centrally planned economies of the former Soviet Union, Eastern Europe, and China toward more-market-oriented economies were also affecting patterns of mineral production, imports, and exports. Reform in these countries has been slower than in Latin America and Southeast Asia, and in many cases, the transition has resulted in decreased domestic consumption of mineral resources and increased exports of mineral commodities. Examples include increased exports of aluminum and copper from Russia.

Although changes in any of Hewett's four factors can act to change mineral production, the recent increases in gold production in the United States suggest that changes in a combination of these factors can produce major changes in patterns of mineral production. The new knowledge of the geologic processes that control the formation of gold deposits led to the recognition of new kinds of deposits in the western United States. This understanding, coupled with new mining and processing technologies, and a substantial increase in the price of gold, have led to major change in U.S. production of gold.

Several changes could affect the pattern of mineral production, imports, and exports in the future. In the short term, the recession in southeast Asia has caused a decrease in mineral consumption that has depressed the prices of many mineral commodities. In the longer term, the continued development of southeast Asia and China could significantly increase their consumption of minerals in the next 10 to 20 years.

Thank you, Madam Chairman. I will be pleased to respond to any questions you may have.

References

Hewett, D.F., 1929, Cycles in metal production: Transactions of the American Institute of Mining and Metallurgical Engineers, p. 65-98.

U.S. Bureau of Mines, 1978, Mineral Commodity Summaries 1978, 200 p.

U.S. Bureau of Mines, 1982, Mineral Commodity Summaries 1982, 183 p.

U.S. Bureau of Mines, 1987, Mineral Commodity Summaries 1987, 189 p.

U.S. Bureau of Mines, 1992, Mineral Commodity Summaries 1992, 204 p.

U.S. Geological Survey, 1997, Mineral Commodity Summaries 1997, 197 p.

U.S. Geological Survey, 1999, Mineral Commodity Summaries 1999, 199 p.

World Bank, 1996, A Mining Strategy for Latin America and the Caribbean, World Bank Technical Paper 345, 108 p.

Appendix A: Definitions

Mine production is the mineral production measured at the point it comes out of the mine.

Primary mineral production is the result of a multistep process that begins with the mining of ore and proceeds to separation of useful minerals from waste, and the smelting and refining of those minerals into metals. Primary production includes both minerals that have been processed from domestic mine production and domestically processed ores of foreign origin.

Secondary mineral production includes reprocessed material either from losses in the primary production process or from reprocessing of used goods.

For the purpose of examining mineral supply as it relates to national security it is common to consider the production of refined material from primary and secondary sources.

Mineral consumption is measured as apparent consumption. It is calculated as mineral production plus imports minus exports, adjusted to account for changes in mineral stocks. **Net import reliance,** is calculated as imports minus exports adjusted for

changes in stocks.

The most commonly used measure of the vulnerability of our economy to disruption in the supply of a mineral commodity is the **percent import reliance** which is defined as net imports as a percentage of apparent consumption.

Appendix B. Details of changes in mineral imports and exports

1. Continued net exporter: beryllium, lithium, and molybdenum

The United States remains a leading world primary producer and exporter of these metals. Beryllium is used as an alloy in electronic components and aircraft. Lithium is used primarily in ceramics, glass and primary aluminum production; it is also used in batteries. Molybdenum is used as an alloy in certain steels.

2. Change from net importer to exporter: gold and silver

During this period, U.S. mine production of gold and silver expanded significantly. Mine production of gold increased from 30 tons in 1980 to 360 tons in 1997. In 1998, mine production of gold stood at 350 tons. The United States has been a net exporter of gold since 1988. Mine production of silver increased from 998 tons in 1980 to 2,150 tons in 1997. The United States became a net exporter of silver in 1997.

3. Decreased import reliance: cadmium, iron ore, and selenium

Domestic cadmium production decreased from about 2000 tons in 1979 to 1010 tons in 1994 and percent import reliance rose. Cadmium production however, increased to 2,100 tons in 1998, and percent import reliance decreased. The largest single use of cadmium is in batteries.

Production of iron ore decreased from a high of 87 million tons in 1979 to 39 million tons in 1982. Since then, production has increased significantly; it currently is 62 million tons. Imports of iron ore decreased from 38.5 million tons in 1977 to 13 million tons in 1983. Since then imports have increased but at slower rates than production; as a result, percentage import reliance has declined.

Selenium production, which occurs as a byproduct of copper refining, increased rapidly from about 226 tons in 1977 to 544 tons in 1981; since then, production has varied between 250 and 450 tons per year. Imports reached 445 tons in 1987 and have declined to 350 tons in 1998. Selenium is used in glass manufacture, chemicals and pigments, electronics, as an feed supplement in agriculture, and as an alloy.

4. Change from net exporter to importer: aluminum, copper, lead, magnesium metal, rare earths, and titanium metal

U.S. consumption of aluminum has increased from almost 4.4 million ton in 1982 to 6.9 million tons in 1998. Primary aluminum production reached a high of almost 4.7 million tons in 1980 and decreased to 3.1 million tons in 1986. Since then, primary aluminum production has increased. Secondary production of aluminum increased steadily from about 480,000 tons in 1977 to 1.5 million tons in 1998. Primary production however, reached a peak of 4.1 million tons in 1991 and declined to 3.7 million tons in 1998. Imports of aluminum increased from about 760,000 tons in 1977 to 1.4 million tons in 1990. Imports have increased significantly since the early 1990's and were 3.3 million tons in 1998.

U.S. consumption of copper has increased from almost 1.7 million tons in 1982 to more than 3 million tons in 1998. Mine production of copper decreased from 1.4 million tons in 1979 to 1.1 million tons in 1985, and percentage import reliance rose. Mine production however, has increased significantly since the mid 1980's and reached 1.9 million tons in 1996. During this time, percentage import reliance declined. In the last several years consumption of copper has risen more quickly than in the late 1980's and early 1990's, and imports have risen again.

U.S. consumption of lead has increased from 1.1 million tons in 1980 to 1.7 million tons in 1989. Primary lead production has decreased from 548,000 tons in 1980 to 351,000 tons in 1994. Secondary lead production however, has increased from 676,000 to 877,000 tons during the same period. After declining in the late 1970's, lead consumption has increased significantly; and imports have increased from about 200,000 to 300,000 tons since 1992.

Consumption of magnesium metal has grown from 96,000 tons in 1977 to 177,000 tons in 1998. Primary production reached a high of 154,000 tons in 1980 and declined to about 93,000 tons in 1982. Since then, primary production has varied between 125,000 and 150,000 tons. Secondary production has increased from 30,000 tons in 1977 to 80,000 tons in 1998. In 1998, primary production fell to 117,000 tons and the US became a net importer of magnesium metal. Magnesium metal is used in aluminum based alloys, castings, and in steel making.

Consumption of rare earths has varied between 14,000 and 30,000 tons since the late 1970's. Production of bastnaesite concentrate from the sole U.S. producer, has varied between 14,000 and 23,000 tons during the same period, and the United States was a net exporter of rare earths in 1985, 1987, 1993, 1994 and 1994. In 1998, U.S. production of bastnaesite concentrates fell to 10,000 tons and import reliance rose to 29 percent. Rare earths are used in catalytic converters for automobiles, as catalysts in petroleum refining,

in permanent magnets, and as metallurgical additives and alloys.

The United States was a net exporter of titanium metal through 1991. At the beginning of 1992, one of the then three U.S. producers of titanium metal closed its plant because of decreases in spending for military aircraft. Since then, the U.S. has been a net importer of titanium metal.

5. Continued import reliance less than 50%: iron and steel, mercury, and vanadium

U.S. consumption of steel was 122 million tons in 1979 and fell to about 80 million tons in 1982. Since 1982, consumption has grown to more than 110 million tons. Production of raw steel fell from 124 million tons in 1978 to about 68 million tons in 1982 and has since grown to about 100 million tons. Since 1980, import reliance has fluctuated between 12 and 22 percent.

Reported consumption of mercury in the United States reached a high of about 2,140 tons in 1979 and fell steadily to about 400 tons in 1998. During the same period, production fell; currently, the only production of mercury in the United States occurs as a byproduct of gold production. Because this production is withheld to protect proprietary data, it has not been possible to calculate percent import reliance since 1985. Mercury is used in the manufacture of chlorine and caustic soda, in electronic applications, and measuring and control instruments.

Reported consumption of vanadium for the United States grew from about 4,800 tons in 1977 to nearly 9,800 tons in 1985. Since then, consumption has been between 4,200 and 4,800 tons. U.S. mine production of vanadium fell from 5,900 tons in 1977 to less than 1,500 tons in 1984, the last year for which production is reported. Imports of ores, slags, and residues have risen from 574 tons in 1984 to 5,000 tons in 1998. Vanadium is used as an alloy in steels.

6. Increased levels of import reliance: antimony, silicon, tungsten, and zinc

U.S. consumption of antimony decreased from almost 42,000 tons in 1977 to 8,500 tons in 1982. Since 1982, consumption has risen to about 46,000 tons. U.S. mine production of antimony, which was negligible in the late 1980's, has increased to 500 tons in 1998. As a result, U.S. primary production of antimony, 23,000 tons in 1998, comes mainly from imported raw materials. Secondary production has fallen from 30,000 tons in 1988 to 7,000 tons in 1998. As a result, percent import reliance has risen. Antimony is used as a flame retardant, and in batteries, chemicals, ceramics and glass.

U.S. consumption of silicon fell from nearly 650,000 tons in 1979 to about 330,000 tons in 1982. Subsequently, consumption has risen to about 630,000 tons in 1998. Production

fell from about 550,000 tons in 1979 to about 250,000 tons in 1982. At this time, percent import reliance increased from less than 10 percent to between 20 and 40 percent. Ferrosilicon is used in steel making. Silicon is used as an alloy with aluminum and in the chemical industry. Semiconductors account for a few percent of silicon consumption.

U.S. consumption of tungsten was about 8,500 tons in 1977, and fell to about 6,000 tons in 1982. Since 1982, consumption has increased to about 12,800 tons in 1998. U.S. primary production was nearly 3,200 tons in 1981; by 1987, all U.S. tungsten mines had closed. Consequently, percent import reliance increased from 42 percent in 1982 to 95 percent in 1994. Since 1994, percent import reliance has decreased to 78 percent in 1998, mainly as a result of byproduct and secondary production. Tungsten is used in making carbide parts for cutting that are used in metalworking, oil and gas drilling, and mining and construction. It is also has electrical and chemical applications.

U.S. consumption of zinc declined from 1,150 thousand tons in 1977 to 869,000 tons in 1982. Since 1982, zinc consumption has risen to 1.5 million tons in 1998. U.S. mine production of zinc decreased from about 400,000 tons in 1977 to about 190,000 tons in 1987. Since 1987, mine production of zinc has risen to 655,000 tons in 1998. Although mine production of zinc has risen, a significant part of this production is exported as concentrate to Canada. Thus, U.S. production of refined zinc has remained steady and percent import reliance, which is calculated by using production of refined metal, has risen. The principal use of zinc is in producing galvanized steel. Zinc is also used as an alloy and in chemicals.

7. Continued import reliance greater 50%: arsenic, bauxite and alumina, bismuth, cesium, chromium, cobalt, columbium (niobium), manganese, nickel, platinum group metals, rubidium, scandium, tantalum, thallium, thorium, tin, and yttrium

U.S. consumption of arsenic has increased from 13,600 tons in 1983 to 29,000 tons in 1998. Until 1985, the United States produced arsenic as a byproduct of copper smelting; since then, the US has been 100-percent reliant on imports. Most arsenic is used in chemicals, of which wood preservatives are the most common.

U.S. consumption of bauxite and alumina, measured in aluminum equivalent, increased from 4.8 million tons in 1977 to 5.7 million tons in 1981. In 1982, consumption fell to about 3.7 million tons. Consumption rose to almost 4.9 million tons in 1992 and has since declined to 4 million tons in 1998. U.S. production of bauxite and alumina fell steadily from the late 1970's. U.S. percent import reliance has fluctuated between 90 and 100 percent.

U.S. consumption of bismuth reached a high of 2,900 tons in 1986. Since that time, it has varied between 1,300 and 2,200 tons. Until 1998, the United States produced bismuth as

a byproduct of lead refining. The United States is now 100-percent reliant on imports for bismuth. The largest use of bismuth is in pharmaceuticals and chemicals; it is also used in fusible alloys and solder and as a metallurgical additive.

U.S. consumption of chromium fell from about 550,000 tons in 1979 to 290,000 tons in 1982. Since 1982, consumption has risen to 418,000 tons in 1998. The United States has no primary production of chromium; secondary production varies between 80,000 and 110,000 tons. Since 1985, U.S. percent import reliance has remained between 75 and 85 percent. The largest use of chromium is in stainless steel.

U.S. consumption of cobalt has increased from about 5,200 tons in 1982 to almost 11,000 tons in 1998. The United States has no primary production of cobalt. Secondary production has increased from 270 tons in 1982 to 2,500 tons in 1998. Consequently, percent important dependence has decreased from more than 90 to 77 percent. The largest use of cobalt is as a superalloy in aircraft turbines. It is also used in cemented carbides and magnetic alloys.

U.S. consumption of niobium increased from 2,600 tons in 1983 to 4,000 tons in 1989. The United States has no primary production of niobium and, thus, is 100 percent dependent upon imports. Niobium is used as an alloy in specialty steels.

U.S. consumption of manganese has increased from 570,000 tons in 1984 to 755,000 tons in 1998. The United States has no primary production and is 100-percent reliant on imports. Manganese is used in steel making.

U.S. consumption of nickel has fluctuated between about 120,000 and 160,000 tons since 1986. Although the United States has produced a small amount of nickel from one mine and from imported ores, percent import reliance has consistently remained between 59 and 80 percent. The largest use of nickel is in production of stainless steel.

In spite of increased U.S. production of platinum group metals, the United States continues to be highly reliant on imports because consumption of platinum group metals has increased. Platinum group metals are used as catalysts such as those used in automobile converters and as alloys for jewelry and dental materials.

U.S. consumption of tantalum has risen from about 450 tons in 1981 to about 550 tons in 1998. The United States has no mine production of tantalum. U.S. production comes either from imported ores and metals or from secondary recovery of tantalum. Percent import reliance remains at 80 percent of apparent consumption. The largest use of tantalum is in the production of tantalum capacitors.

U.S. consumption of thallium has fallen steadily from 1.4 tons in 1987 to 0.3 tons in

1998. The United States is 100 percent reliant on imports of thallium.

U.S. consumption of thorium has decreased from 77 tons in 1982 to 7 tons in 1998. The United States has been 100-percent dependent on imports of thorium since 1992.

US consumption of tin has decreased from almost 70,000 tons in 1979 to 53,000 tons in 1998. U.S. mine production of tin has been negligible. Secondary production of tin has decreased from 21,000 tons in 1979 to about 12,000 tons in 1998. Percent import reliance has varied between 68 and 85 percent. The largest use of tin is as a coating on cans and containers. It is also used in electrical equipment.

U.S. consumption of yttrium has increased from about 140 tons in 1977 to 450 tons in 1998. The US currently imports all of the yttrium it consumes. Yttrium is used in phosphors in color televisions and computer monitors, fluorescent lights, temperature sensors and X-ray sensitive screens.

Table 1. Percent import reliance and annual U.S. consumption for selected metallic minerals.

		Percent Import Dependence					U.S. Consumption (tons)
Mineral Commodity	1975	1980	1985	1990	1995	1998	1998e[1,2]
Aluminum	E[7]	E	16	E	23	25	6900000
Antimony	49	48	W	51	75	84	45600
Arsenic	W	W	90	100	100	100	29000
Bauxite and Alumina	91	94	96	98	99	100	4000000
Beryllium	W	W	20	E	E	4	240
Bismuth	W	W	W	W	W	100	1800[2]
Cadmium	41	55	57	46	E	21	2650
Cesium	100	NA	100	100	100	100	a few tons
Chromium	91	91	75	79	80	79	520000
Cobalt	98	93	94	84	82	77	10800
Columbium (Niobium)	100	100	100	100	100	100	4000
Copper	E	14	28	3	7	16	3030000
Gallium	W	56	NA	NA	NA	NA	23000[2]
Germanium	NA	NA	NA	NA	NA	NA	28
Gold	52	18	46	NA	E	E	140[2]
Hafnium	W	W	W	NA	NA	NA	NA
Indium	NA	NA	NA	NA	NA	NA	50
Iron Ore	30	25	21	21	14	17	74300000
Iron and Steel	9	15	22	13	21	18	113000000
Iron and Steel Scrap	E	E	E	E	E	E	69000000[2]
Lead	11	E	13	3	17	21	1720000
Lithium	E	E	E	E	E	W	2900
Magnesium Metal	NA	E	E	E	E	16	177000
Manganese	98	98	100	100	100	100	755000
Mercury	69	49	51	W	W	W	400[2]
Molybdenum	E	E	E	E	E	E	23600
Nickel	72	73	72	72	59	65	187400[2]
Platinum Group Metals	83	88	92	88			
Palladium						88	90 [4]
Platinum						94	70 [4]
Rare Earths	E	NA	E	21	6	29	14000
Rhenium	67	W	W	W	W	NA	22
Rubidium	NA	NA	100	100	100	100	a few tons
Scandium	100	NA	NA	NA	NA	NA	W
Selenium	66	59	W	46	38	W	564[3]
Silicon	6	8	25	29	35	32	632000
Silver	30	7	60	NA	13	E	5240
Tantalum	81	90	89	86	80	80	550

Tellurium	50	W	W	W	NA	NA	NA
Thallium	69	W	100	100	100	100	.3 (6)
Thorium (ThO2)	NA	NA	NA	NA	100	100	6.9
Tin	84	79	72	71	84	85	53000
Titanium Metal	W	W	E	E	36	28	32600
Tungsten	55	53	68	73	84	78	12800
Vanadium	38	17	W	W	W	W	4700(2)
Yttrium	NA	W	100	NA	100	100	450
Zinc refined	61	60	70	51	71	70	1290000
Zinc all forms				37	35	35	1520000
Zirconium	W	W	W	6	W	W	W

W - withheld to avoid disclosing proprietary data; NA - not available

(1) apparent consumption unless otherwise noted.

(2) reported.

(3) estimated.

(4) data from Johnson Matthey, Platinum 1998, Interim Review.

(5) data for 1998 withheld, data are for 1996.

(6) 1997.

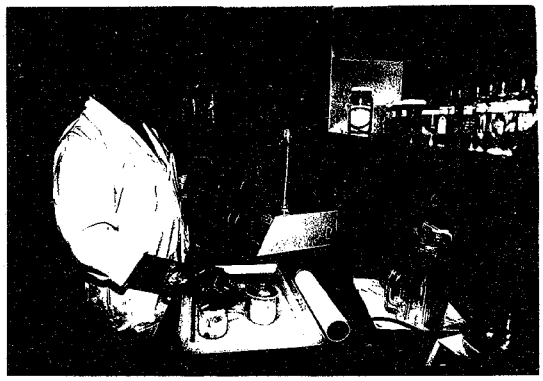
(7) Net exports.

Table 2. Sources of mineral imports, 1993-1996.

	Percentage of Imports		Leading Source of Imports	
	1 Country	2 Countries	1st	2nd
Mineral Commodity				
Aluminum	62	80	Canada	Russia
Antimony	55	66	China	Mexico
Arsenic	88	93	China	Japan
Bauxite and alumina	31	52	Australia	Guinea
Beryllium	46	66	Russia	Kazakhstan
Bismuth	34	68	Mexico	Belgium
Cadmium	45	58	Canada	Mexico
Cesium			Canada	
Chromium	37	50	South Africa	Turkey
Cobalt	21	40	Norway	Zambia
Columbium (niobium)	66	87	Brazil	Canada
Copper	48	70	Canada	Chile
Gallium	50	68	France	Russia
Germanium	30	46	Russia	United Kingdom
Gold	63	70	Canada	Mexico
Hafnium	91	96	France	Germany
Indium	40	53	Canada	Russia
Iron ore	54	79	Canada	Brazil
Iron and steel	30	48	European Union	Canada
Lead	69	88	Canada	Mexico
Lithium	97		Chile	
Magnesium metal	44	79	Canada	Russia
Manganese	28	44	South Africa	Gabon
Mercury	42	74	Russia	Canada
Molybdenum	30	50	United Kingdom	Chile
Nickel	39	54	Canada	Norway
Palladium	47	69	Russia	South Africa
Platinum	60	70	South Africa	Russia
Rare earths	86	100	Australia	France
Rhenium	55	74	Chile	Germany
Rubidium			Canada	
Selenium	39	67	Canada	The Philippines
Silicon	24	39	Norway	Russia
Silver	26	49	Canada	Mexico
Tantalum	28	42	Australia	Thailand

Tellurium	23	45	United Kingdom	The Philippines
Thallium	42	73	Belgium	Mexico
Tin	30	52	Brazil	Bolivia
Titanium metal	60	85	Russia	Japan
Tungsten	35	55	China	Russia
Yttrium	81	100	China	Japan
Zinc	60	74	Canada	Mexico
Zirconium	53	99	Australia	South Africa

Cenderawasih University in Jayapura to prepare a baseline study documenting the history and contemporary social, economic and cultural situation of the Amungme and Kamoro peoples in PT-FI's operations area. In August 1998, the team presented its first report, which included a number of recommendations to improve communications and understanding between PT-FI and the local people and to strengthen the company's community affairs programs by providing additional financial, development and training resources and by providing for on-site management. Steps are being taken to implement these recommendations. The team also recommended further research, and PT-FI supports this recommendation.



The state-of-the-art environmental lab plays a key role in providing data to PT-FI's environmental scientists.

III. ENVIRONMENTAL MANAGEMENT

Environmental Commitments. FCX and PT-FI are fully committed to minimizing the impact of their mining operations on the surrounding environment and to reclaiming and/or revegetating land that is disturbed by operations. As part of its comprehensive Environmental Policy, FCX is a signatory to the International Council on Metals and the Environment (ICME) Environmental Charter. Through this policy, FCX commits to giving its highest priority to sound environmental management and practices, to providing adequate resources to fulfill that responsibility and to continuous improvement of its environmental performance at every operational site. FCX also commits strongly to supporting scientific research to find the best applicable environmental technologies; to comprehensive monitoring to ensure that its practices are working; and to both internal and external environmental audits to measure performance.

PT-FI made a series of specific commitments as part of its AMDAL, which is the Indonesian acronym for the environmental impact assessment process, all of which have been implemented or are being implemented. These commitments, which were approved by the GOI in 1997 and are related to PT-FI's operational expansion, are detailed in the AMDAL approval, issued as a Decree of the State Minister for Environment. They are also listed on the FCX web site.

Management and Monitoring. Significant new environmental activities at PT-FI in 1998 centered around the implementation of comprehensive and expanded Environmental Management and Monitoring Plans approved by the GOI in December 1997 as part of the AMDAL. New plans have been developed and implemented for the expansion of operations and support activities. Existing plans have been enhanced and revised to reflect changes in current operations. A specific management and monitoring plan now exists for all major aspects of the PT-FI operation and privatized infrastructure.

Auditing. FCX's Environmental Policy requires the performance of annual internal environmental audits. The 1998 internal audit concluded that PT-FI's Irian Jaya operations are in material compliance with GOI laws and regulations.

In addition, PT-FI has made a commitment to independent external environmental audits by qualified experts every three years, with the results to be made public. The first such audit was in 1996, when PT-FI was the first company in Indonesia to undergo a voluntary external environmental audit of its operations under a new program of the Indonesian government. An independent, internationally qualified environmental consulting firm conducted the audit. The results of that audit were made public and its 33 principal recommendations have been implemented.

The second external triennial environmental audit is scheduled for 1999 and its results will also be made public. In addition, the independent consultants conducting this audit will make recommendations for various programs, monitoring data, or other measures to serve as benchmarks against which PT-FI can measure its future environmental progress.

ISO 14001 Environmental Management Systems. ISO 14001 is a voluntary international standard that provides a systematic approach to continual improvement by companies in their environmental management systems (EMS). An EMS consists of organizational policies and

procedures enacted to ensure that all environmental issues are handled in a quality manner. The system works to minimize the operations impact on the environment and to ensure compliance with regulations. PT-FI is developing a comprehensive EMS, including protocols and program descriptions, for ISO 14001 certification of its Irian Jaya operations in the year 2000. The implementation of an ISO 14001 program is part of PT-FI's 300,000 MTPD expansion AMDAL commitment to the GOI.

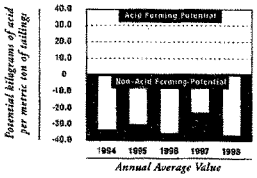
Tailings Management Plan. Monitoring and refinement of the Tailings Management Program continued in 1998. (Tailings are the finely ground natural rock left over from the processing of copper ore by physical grinding and flotation methods.) The construction of the Ajkwa Deposition Area (ADA), essentially the flood plain of the Ajkwa River encompassing some 13,000 hectares, has been completed and the ADA is operating as designed as an engineered, managed system for the deposition and control of tailings.

Programs have been instituted to monitor the development and effectiveness of the ADA system. Tailings reclamation studies show that the ADA can be readily revegetated with native and agricultural plant species once mining is completed. As part of its AMDAL commitment to further study its operations and search for ways to improve, PT-FI is conducting an Ecological Risk Assessment (ERA) of the Tailings Management Program. The ERA will involve stakeholders, will be carried out by world-class experts and the results will be made public.

Tailings have an alkaline pH when released from the mill and data show that the pH in the Ajkwa River system is alkaline, meaning the tailings are not producing an acidic condition. (The pH is a measure of acidity or its opposite, alkalinity. Neutral is 7.0, meaning any pH greater than that is alkaline.) The annual average pH in the Ajkwa River for 1994 to 1998 ranged from 7.5 to 8.1. Additionally, Figure 2 shows that the tailings do not have an acid forming potential.

Fig. 2

Tests on tailings show a non-acid forming potential



PT-FI does not use cyanide in its operational processes; therefore, cyanide in the river water systems is not an issue. Comprehensive water quality sampling of the tailings management system shows that the water in the Ajkwa River and ADA meets U.S. Environmental Protection Agency (U.S. EPA) and World Health Organization (WHO) drinking water standards for metals, including copper (Figure 3a). In addition, when the data are compared to U.S. EPA Water Quality Criteria (1997), and other scientific information on copper impacts on aquatic organisms, the values for dissolved copper in the Ajkwa River system are within and/or below the range of these values.

Fig. 3a

Copper concentrations from comprehensive water quality sampling in the Ajkwa River meet drinking water standards and criteria

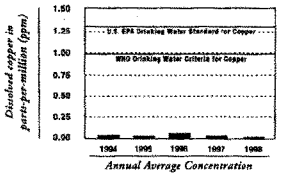
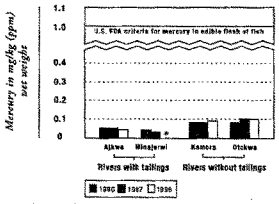


Fig. 3b

Comparisons of mercury in edible flesh of fish and shrimp-annual averages



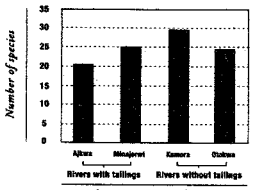
* *1998 data not available.*

Mercury is also not used in PT-FI's mill processes but does occur in trace amounts in the Ajkwa River with tailings, as well as in similar river systems in the area without tailings. Water quality data for dissolved mercury in the Ajkwa River show amounts lower than detection limits using modern analytical techniques. Figure 3b shows that mercury is found in edible flesh of fish and shrimp only in small amounts, and well below U.S. Food and Drug Administration (U.S. FDA) criteria for human consumption. The data also show that mercury in both fish flesh and fish organs – such as the liver, which concentrates metals – are lower in the river system with tailings than in reference rivers in the area without tailings.

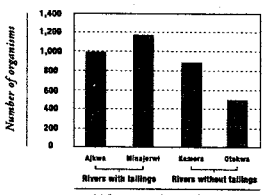
Extensive biological sampling shows that comparable numbers of species and aquatic organisms were collected in the Ajkwa and Minajerwi estuaries downstream of the tailings ADA as

Fig. 4

Tailings estuaries (Ajkwa and Minajerwi rivers) have comparable numbers of aquatic species and organisms as reference estuaries without tailings (Kamora and Otokwa rivers) based on per unit catch by trawl-net sampling.



1996 to 1998 Quarterly Average



1996 to 1998 Quarterly Average

were found in baseline or reference estuaries without tailings (Kamora and Otokwa) based on per unit catch by trawl-net sampling (Figure 4).

Overburden Management Plan. Overburden is the rock which has to be moved aside in order to reach the ore in the mining process. Metals can occur in nature as minerals called sulphides. If they are mined, and rock or tailings containing sulphides are left exposed to the elements, the action of water, oxygen and natural bacteria can create sulphuric acid. This acidic water will dissolve metals contained in rock and, if not collected or treated, the contaminated water can be harmful to many aquatic organisms and plants. This condition is called Acid Rock Drainage (ARD).

PT-FI continually monitors and manages ARD. PT-FI's current Overburden Management Plan, which was approved by the GOI, includes three types of control: minimization – cover of the overburden to minimize production of ARD; remediation – treatment of runoff from the overburden piles for neutralization of ARD with capture/recovery of copper; and/or prevention – blending potentially acid-forming overburden with acid-consuming materials.

Monitoring of the overburden stockpiles, which at the end of 1998 encompassed an estimated 575 hectares of surface area, continues as part of the program to optimize placement of overburden to minimize the generation of ARD. It should also be noted that with the recent mine and mill expansion, cutoff grades for ores to be processed have been lowered so that material that otherwise would have been overburden will now be processed, reducing the total amount of overburden. However, there will be a net increase in tailings as a result of the lower cutoff grade.

A Molecular Recognition Technology (MRT) pilot-test unit has been constructed and placed into operation to capture and recover copper from acidic drainage. Drainage from the mine area is captured and routed to the MRT unit, which utilizes molecular recognition and electro-winning to capture and recover copper. The "Wanagon Lake" water catchment basin is used as a capture point for West Grasberg overburden ARD to prevent its release to the environment. This ARD is directed to the catchment basin where it is neutralized with lime. The metal precipitates from the neutralization process are captured in the catchment basin. As the stockpiles advance, the Wanagon catchment basin will eventually be filled with overburden, but will still serve as a natural collection point for ARD from the overburden stockpiles. The ARD will be drained from the basin through underground drainage drifts and drill holes. It will then be directed to the mill area MRT plant for treatment and copper recovery.

FCX is a member of the International Network for Acid Prevention (INAP), an organization of 16 of the world's mining and minerals companies, established to undertake research and development to control ARD from mine materials. INAP will bring together engineers and scientists from over 23 countries to undertake research and develop technologies to reduce the impact of ARD. The member companies of INAP, which represent around 40 percent of the world's mining activity, will share their knowledge and participate in joint research projects.

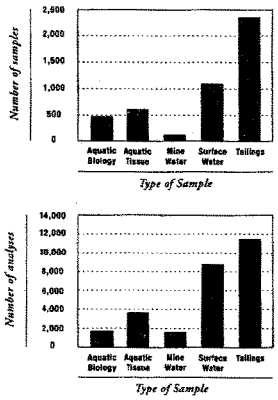
Wanagon Lake Incident. On June 20, 1998, after a period of heavy rainfall, a sudden discharge of water occurred from the Wanagon Lake water catchment basin into the Wanagon River. Geotechnical experts have concluded that it was caused by a slough of rock from mine stockpiles, which in turn triggered several landslips along the steep river banks recently saturated by heavy rains after 18 months of record drought. The ensuing mudslide reached the downstream village of Banti. No people were hurt, but some pigs and gardens belonging to local residents were lost and PT-FI has compensated those affected.

Floods and mudslides are common in this part of Irian Jaya and similar incidents have occurred recently having no connection to mining. However, steps have been taken to reduce the potential for sloughing and to lower the level of the Wanagon catchment basin. An alarm system was in place to warn of

sloughing from the top of the mine stockpiles, but the June 20 sloughing took place at the base of the stockpiles and was not detected. In response to this incident, additional alarm systems have been installed to warn of sloughing at the base of the stockpiles, as well as any basin overflow. The basin water level has also been lowered to reduce the likelihood of any outflow.

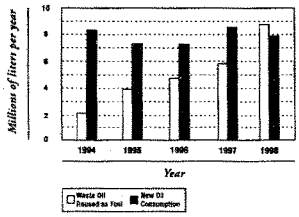
Long Term Environmental Monitoring Plan. PT-FI continues to conduct the Long Term Environmental Monitoring Plan (LTEMP) to evaluate the potential impact of operations on water quality, biology, hydrology, sediments and air quality. This comprehensive program ensures that PT-FI has all of the necessary scientific information available for all environmental aspects of its operations in order to minimize, mitigate and properly manage environmental effects. Figure 5 shows the number of samples and analyses conducted in 1998 as part of this extensive program.

Fig. 5
Comprehensive LTEMP program encompasses a large number of samples and analyses every year; data shown are for 1998



Waste Management and Recycling Plan. PT-FI has continued in 1998 to incorporate a comprehensive waste management program into its daily operations. The concepts of waste reduction, reuse and recycling have been implemented as a practical means to manage all wastes in an environmentally acceptable manner. Those materials that can be reused or recycled are separated from the waste stream at the point of origin. Steel is stockpiled at several strategic locations for reuse by construction and operations. Copper, aluminum and other recyclable metals are currently being held pending permission from the government for resale or trade. Combustible waste materials are segregated from the waste stream and sent to several air curtain incinerators to reduce the amount of wastes placed in the onsite landfills. Biodegradable wastes are collected and transported to an engineered landfill at Mile 38, which is lined and which also provides for the collection and treatment of water leaching from the waste. PT-FI also utilizes a state-of-the-art medical waste incinerator. Indicative of PT-FI's recycle/reuse programs, Figure 6 shows the amount of waste oil reused annually as fuel compared to the amount of new oil consumed.

Fig. 6
Waste oil reused as fuel vs. new oil consumption



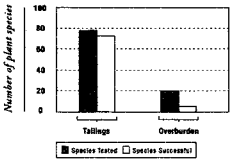
Reclamation and Revegetation. PT-FI's comprehensive reclamation testing and revegetation program continued in 1998. Revegetation and reclamation programs for the ADA have been in place for several years. Demonstration projects have been developed to show that numerous species of native plants, agricultural crops and fruit trees grow well on the tailings deposited in the ADA. PT-FI has also developed other successful revegetation and reclamation projects involving the development of lakes, wetlands, forests and agriculture in areas disturbed by construction. A large hydro-mulcher machine is a centerpiece of this aggressive revegetation program to quickly reclaim land disturbed by construction. Mining activities are ongoing and the placement of overburden in the West Grasberg and Carstensz valleys and the deposition of tailings in the ADA will continue for many more years. Because of this, the reclamation of the majority of the overburden and the tailings deposits will not be feasible until mining operations cease. PT-FI has established a fund to accumulate at least $100 million by the end of the mine life to help fund mine closure and reclamation. The fund will be used to restore properties and related facilities to meet the

requirements of Indonesian environmental and other regulations, as well as PT-FI's own commitments outlined earlier in this report.

Figure 7 depicts the number of species tested on overburden and tailings. Numerous species of native and agricultural plants have been successfully grown on tailings in the lowlands. Several native species have also been successfully grown on overburden, and research continues in this challenging, high-altitude environment to find additional adaptive species.

Fig. 7

Reclamation tests show success for many species on tailings; overburden testing to date reflects challenges of high-altitude reclamation



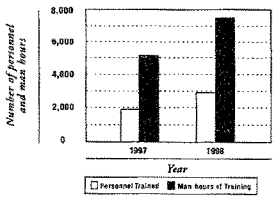
Pineapple is one of the many plants successfully tested in tailings reclamation areas.

Research continues to show encouraging results in challenging, high-altitude overburden reclamation testing.

Training and Technology Transfer. An important element of PT-FI's sustainable development program is the training of employees and local people in environmental management issues, programs and procedures at the company's operations. Included in this training is technology transfer for modern pollution control equipment, environmental sampling and monitoring methodologies. Figure 8 shows the number of personnel involved and manhours spent in environmental training in 1997 and 1998.

Fig. 8

Environmental training of PT-FI and contractor personnel



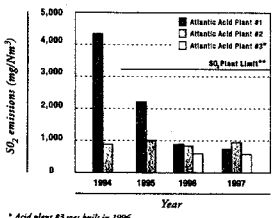
ATLANTIC COPPER, S.A.

Environmental Programs Update. ISO 14001 is the world's first series of internationally accepted standards for environmental management. Implementing an ISO 14001 environmental management system provides the framework for a high level of environmental performance. In April 1998, Atlantic's environmental management system at its Huelva, Spain copper smelter was certified under 14001 by AENOR, the Spanish Certification Agency. Later in the year, the metal cable facility at Cordoba, Spain was also certified under ISO 14001. Atlantic is committed to conducting periodic environmental, safety and industrial health audits to ensure that its facilities and operations comply with applicable legal requirements, company policies and protocols, and generally accepted standards. The 1998 audit confirmed that Atlantic is in material compliance with all current applicable environmental and safety regulations, as well as all requirements established by the company. The audit recognized the improvements that have been made in these areas during the last few years and Atlantic has incorporated as part of its objectives additional management practice recommendations made by the auditors.

In 1996 and 1997, Atlantic successfully completed the environmental improvement project started in 1994 in conjunction with expansion activities at its copper smelter in Huelva. New technology substantially reduced atmospheric emissions from its operations even with an approximate doubling of production capacity (Figure 9). In addition, dust emissions have decreased as a result of the installation of new facilities for handling ore concentrates and the addition of

new bag filters in the concentrate drying and furnace tapping areas. New gas scrubbers have significantly reduced acid mist and particulate emissions.

Fig. 9
Sulphur dioxide (SO_2) air emission rates from Atlantic's three acid plants

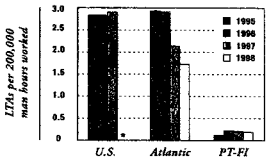


** Acid plant #3 was built in 1996.*
*** Maximum regulatory limit for SO_2 emissions for post 1975-constructed acid plants (does not apply to acid plant #1, because it was constructed prior to 1975)*

FCX SAFETY

Safety and health are a high management priority at FCX, and both PT-FI and Atlantic maintained or improved their safety performance in 1998 over the previous year for their employees and contractors. Management's active support of the safety effort is exemplified by the significant training initiatives in 1998. At PT-FI, these programs have included literacy and language programs, basic skills training, a four-year apprenticeship program, the establishment of learning centers to support self-paced learning, and management and technical training as well as activities designed to specifically support the integration of the Irianese employees into the workforce.

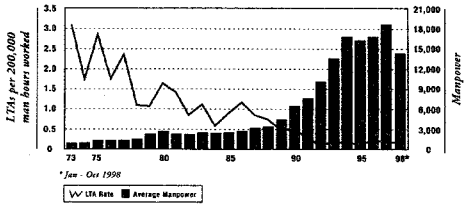
Fig. 10
Lost time accident (LTA) rate comparisons



** Data for U.S. not yet available for 1998*

FCX operations, including employees and contractors, worked in excess of 45 million hours in 1998, achieving a lost time accident rate of 0.23 per 200,000 hours worked. This is significantly lower than the 1997 U.S. mining industry average of 2.9. Figure 10 shows this graphical representation of PT-FI and Atlantic's lost time accident rates compared to the U.S. mining industry. Figure 11 is a historical perspective of PT-FI's performance, showing that as manpower has increased significantly, the lost time accident rates have decreased dramatically since the early years of production.

Fig. 11
PT-FI LTA rate vs. manpower



LOOKING AHEAD

As miners and explorationists, we at FCX are accustomed to looking at long-term planning horizons. That's because the job of providing the minerals needed for modern society is huge, capital- and labor-intensive and, considering the enormous size of world-class ore deposits such as the Grasberg, very long-term. We know that our commitment to working toward sustainable development will not be easy to fulfill and that some missteps may lie ahead. But we bring to this effort the same pledge we bring to our mining: a promise to stay focused on our long-term objectives and to patiently deal with problems we encounter along the way.

PETER G. MORROS, Director
ALLEN BIAGGI, *administrator*
(775) 687-4670
TDD 687-4678
Administration
Water Pollution Control
Facsimile 687-5856
Mining Regulation and Reclamation
Facsimile 684-5259

STATE OF NEVADA
KENNY C. GUINN
Governor

Waste Management
Corrective Actions
Federal Facilities
Air Quality
Water Quality Planning
Facsimile 687-6396

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
333 W. Nye Lane, Room 138
Carson City, Nevada 89706-0851

March 2, 1999

The Honorable Barbara Cubin, Chairman
U.S. House Resources Subcommittee
on Energy and Minerals
1626 Longworth House Office Building
Washington, D.C. 20515

Re: February 23, 1999 Subcommittee Hearing

Dear Ms. Cubin:

It has come to my attention that Mr. Stephen D'Esposito, President of the Mineral Policy Center testified before the U.S. House of Representatives Resources Subcommittee on Energy and Minerals on February 23, 1999. Mr. D'Esposito apparently stated that I have said there are "at least 13 major mines in Nevada which are currently in bankruptcy." For the record, I did not make that statement. I believe Mr. D'Esposito's false testimony stems from remarks I made at a mining conference held at the University of Nevada-Reno in January 1999, which was attended by over 200 mining operators, regulators and environmental groups.

In a round table discussion, I was asked what special challenges face mining regulators in the face of current economic conditions. I answered, in part, that current economic conditions meant that regulators may find themselves working in the bankruptcy arena with unfamiliar players such as bankruptcy trustees, bonding companies and contractors. I went on to say that there are 13 mining operations in Nevada that are in or close to bankruptcy. While the Nevada Division of Environmental Protection does not use the term "major" to classify mines in Nevada, you should know that 10 of the 13 operations are very small and only one, Florida Canyon previously owned by Pegasus, could realistically be called large or major.

As you can see, the addition of the word "major" and the failure to put the remark in the context as I have attempted to do dramatically and unnecessarily alters my statement. I plan to follow up on this issue with Mr. D'Esposito directly as well.

Please feel free to contact me at (775) 687-4670 ext. 3142 if I can clarify any other testimony relevant to mining issues in Nevada. Thank you.

Sincerely,

Leo M. Drozdoff, P.E.
Bureau Chief
Bureau of Mining Regulation
and Reclamation

LMD/btc
cc: Jack Finn, Governor's Press Secretary
Nevada Congressional Delegation
Dr. Craig Schiffries, National Academy of Sciences
Peter Morros, Director DCNR
Allen Biaggi, Administrator, NDEP
Stephen D'Esposito, President MPC

444 Madison Avenue
New York, NY 10022 USA
Telephone (212) 317-3800
Facsimile (212) 688-0410

The Honorable Barbara Cubin, Chair
Subcommittee on Energy and Mineral Resources
U.S. House of Representatives
1626 Longworth House Office Building
Washington D.C. 20515-6202

March 8, 1999

Dear Ms. Cubin:

These comments are submitted for inclusion into the record of the Subcommittee's oversight hearings on "Mining, the American Economy and National Security – The Role of Public Lands in Maintaining a National Asset". In particular, the comments are designed as a rebuttal to portions of the testimony of Stephen D'Esposito, president of the Mineral Policy Center, to the Subcommittee on February 23, 1999.

Mr. D'Esposito asks the rhetorical question: "What is the cause of today's relatively low price for gold?", and proceeds to offer a variety of explanations. One of these suggests that changes in the price of gold are driven by economic cycles, but he confines his references to economic cycles in the U.S. It is a matter of demonstrable fact that economic cycles in the U.S. are not the only, and by no means the most important, driving forces behind global gold prices.

In his discussion of the "low" gold price, nowhere does Mr. D'Esposito make any reference to the indisputable fact that today's gold price is only low in terms of the U.S. dollar, nor to the significance of that fact in any serious analysis of the gold market. It is worth pointing out that in terms of the currencies of all the major producing countries, with the single exception of the United States, the gold price is at historically high levels. This fact has provided gold mining companies in for example South Africa (ranked #1 in world production), and Australia (#3) with some measure of insulation from the potential impact of the "low" price.

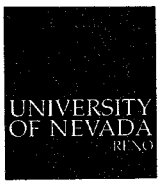
Mr. D'Esposito goes on to cite "a number of industry analysts (who) accurately predicted that today's low gold price would have the greatest negative impact in South Africa and Australia". It is true that South Africa's production has fallen in recent years, but the decline has been a function of intrinsic factors such as the extensive restructuring and rationalization of the country's gold mining industry, rather than a response to any change in the gold price. In Australia, by contrast, gold production has risen recently to record levels.

Elsewhere in his testimony, Mr. D'Esposito suggests that "a paradigm shift has occurred, that investors no longer see gold as a safe haven". This is in direct contradiction of the fact that investment demand for gold has been rising around the world as investors increasingly see gold as a safe haven against turmoil in financial markets. This turmoil was actual in the case of many countries in Asia, Russia and Brazil in recent months, and potential, with the perceived threat of Y2K computer problems. To offer just one concrete example, the demand for bullion coins in the United States increased 109% in the course of 1998 to an all-time record high.

Finally, Mr. D'Esposito's testimony recommends for the consideration of the Subcommittee a discussion paper entitled "Can Government Gold be put to Better Use? Qualitative and Quantitative Effects of Alternative Policies", prepared for the Board of Governors of the Federal Reserve by Mr. Dale Henderson and others. What Mr. D'Esposito's testimony fails to mention is that the conclusions of this paper were widely dismissed by responsible commentators on the gold market. Typical comments included the following from Mr. Terry Smeeton, at the time a senior officer at the Bank of England and one of the authorities cited by Mr. D'Esposito himself in his own testimony: "The Henderson paper was an academic exercise, with no practical application for the gold market."

Yours sincerely,

George Milling-Stanley
Manager, Gold Market Analysis
World Gold Council



Natural Resource Industry
Institute/302
232 Mack Social Science
Reno, Nevada 89557-0060
(702) 784-6859
FAX: (702) 784-1473

March 1, 1999

The Honorable Barbara Cubin, Chair
Subcommittee on Energy and Mineral Resources
U.S. House of Representatives
1626 Longworth House Office Building
Washington, D.C. 20515-6202

Dear Ms. Cubin,

These comments are submitted for inclusion into record of the Subcommittee's oversight hearings on "Mining, the American Economy and National Security – The Role of Public Lands in Maintaining a National Asset. My comments primarily focus on the economic impacts of proposed changes in U.S. mining laws and federal regulations affecting mining and mineral exploration. However, I would also like to comment on several issues that were raised at the February 23rd hearings.

The Natural Resource Industry Institute at the University of Nevada, Reno, of which I am Director, is about to publish its semi-annual publication on the U.S. gold industry so some of my comments are a preview of what will appear in that report. As you are probably aware, the U.S. gold industry is centered in Nevada. The State accounts for over 70 percent of U.S. output. As a result, the health of the gold mining industry is extremely important to Nevada's economy since it accounts for approximately 10 percent of the value of Gross State Product.

This is a unique situation because, as Mr. D'Esposito testified on February 23rd, mining as a whole has diminished in its relative importance to the U.S. and Western economy over the past decades. In Nevada, however, the relative importance of mining, particularly gold mining, has increased dramatically over the past two decades.

Comments such as these are intended to suggest that if Congress or the administration pursues policies detrimental to this small industry there will be no great harm from it. Certainly, there will be no great harm to many, but these policies tear the economic foundations and social fabric of tens of thousands of people in the communities dependent upon the mining industry. Furthermore, in states like Nevada, these policies would generate some small harm to a lot of people who would have to pay more in taxes, for example, to make up for the loss of mining based revenues. Consequently, the following provides a brief look at three issues that I hope the Subcommittee will consider in its oversight of mineral policies.

Industry Profitability and Outlook

An important issue that testimony at these hearings has raised is the current financial health of the industry and its prospects. One commentator offered the assessment that the industry is strong. We wondered just which industry was being referred to?

In the interest of providing some facts that would allow the Subcommittee members make their own assessment of the strength of the industry the accompanying table shows key financial indicators for 22 North American gold producers with producing properties in the U.S. based on corporate disclosures. The data only goes through 1997 because 1998 year end financial reports are not yet generally available. Since the average price of gold in 1998 has been 11 percent below 1997 levels, 1998 results are not likely to improve in spite of industry efforts to cut production costs.

North American Gold Industry Financial Indicators, 1995-1997.

	1995	1996	1997
Average gold price	$ 384	$ 388	$ 331
Worldwide gold production (1,000 oz)*	12,997	14,261	16,897
Sales ($millions)	$ 6,117.8	$6,498.0	$ 7,327.5
Assets ($millions)	$ 15,438.8	$ 18,352.9	$ 17,626.7
Equity ($millions)	$ 9,532.6	$ 10,870.5	$ 10,046.2
Net income before federal taxes ($millions)	$ 351.9	($ 125.4)	($ 1,710.7)
Return on equity (%)	3.69 %	(1.15%)	(17.03%)
Net income before federal taxes and write- downs ($millions)	$ 478.4	$ 282.8	$ 326.5
Return on equity (%)	5.02 %	2.60%	3.25%
Market capitalization ($millions)	$28,854.5	$ 30,659.2	$ 20,251.5

Companies represented in the totals produce the vast majority of U.S. gold and silver but also have operations in other countries, hence total production on the table of 16.9 million ounces of gold exceeds U.S. production. All but one of the 22 North American companies represented in the total are public.

As the table indicates, both production and sales have increased for the industry over the three-year period shown, although 1997 increases in production, 18.5 percent, have not been matched by increases in sales revenues, 12.8 percent, because of price declines.

Perhaps the three financial indicators shown on the table that best reflect the industry's current depressed conditions are related to earnings and market capitalization.

As would be expected given the price decreases in 1997, earnings are not good and return on equity for the industry is well below comparable industries in the currently booming U.S. economy. However, as a result of two factors, hedging gains and cost cutting, earnings before taxes and asset write-downs actually increased between 1996 and 1997. Based on publicly available financial data, 13 of the 22 companies in the group showed a loss before taxes and asset write-downs and the remaining nine showed combined incomes $326.5 million more than the combined losses of the other 13 companies. This improved on their aggregate 1996 earnings by approximately $43.6 million but, from the perspective of the industry's return on investment, a 3.25 percent return on owner's equity is quite anemic.

While cost cutting has helped preserve the industry's meager "bottom line" in these troubled times, to some extent cost cutting has been achieved by lay-offs of workers. Overall employment in the industry is down by several thousand jobs, and the overall economic impact on employment in producing states, including indirect effects, is down by almost 8,000 jobs.

Other financial indicators on the table also reveal a situation that is much more serious. Net income before federal taxes (NIBT), which includes the effects of asset write-downs, is more indicative of the effects of the current low price environment. In 1997 the industry wrote down $2.04 billion of its assets, or 11 percent of its assets at year-end 1996. With these asset write-downs, the 22 companies represented had a combined loss before federal income taxes of $1.7 billion for a return on owners' equity of –17 percent.

These asset write-downs reflect a variety of actions taken by producers in the face of the current low price environment. These actions ranged from write-downs and closure of entire operating properties, to write-downs of investments in exploration targets and assets such as investments in development work at existing properties that remain in operation and other investments in plant and equipment. In most of these cases, these write-downs are associated with a loss of proven and probable reserves or loss of resources at exploration sites that could possibly have been brought into the reserve category in the future.

On one hand it can be argued that these write-downs are a one-time event and perhaps should not reflect on the outlook for the industry. More positively, these write-downs will allow the industry to show higher rates of return in the future, whatever gold prices do, write-downs of exploration targets and related investments can be reversed, and these resources could ultimately be brought into the reserve category at higher prices. With the exception of the latter point, however, most of these arguments relate to accounting conventions, not real economic phenomena and industry prospects. Low prices over the past two years have clearly had significant negative impact on the industry's reserve base, and these write-downs simply reflect this fact. The extent of the damage, however, will not be known until reserves are re-evaluated at prices that the industry is likely to realize in the future.

The financial indicator on the table that reflects the investing public's assessment of the damage done to the industry by current low prices is the industry's market capitalization, which fell approximately 34 percent during 1997 compared to a price

reduction of 15 percent. Share prices have remained depressed versus 1996 levels through most of 1998. It should be emphasized that this is a reflection of the investing public's perceptions and, as such, is affected by many factors other than the economic fundamentals of North American gold mining companies including the political risks faced by the industry.

Political Risks of American Gold Producers

It was noted above that political risks are one of the factors weighing down the industry's market capitalization. The importance of this issue goes beyond low stock prices because it reflects the ability of the industry to raise capital. These political risks currently derive from two sources: 1) prospective changes in federal mining laws, and 2) proposed regulatory changes, such as changes in 43 CFR § 3809 regulations affecting exploration access to federal lands. These, and other regulatory changes affect the ability of individuals and corporations to obtain permits to explore, develop mines and produce from federally owned lands in the U.S.

The problem of assessing the economic impacts of these federal actions is currently compounded by the relatively depressed condition of the precious metals industry. Under these circumstances proponents of royalties and regulatory changes have argued that these policy changes will have little impact on the precious metals industry.

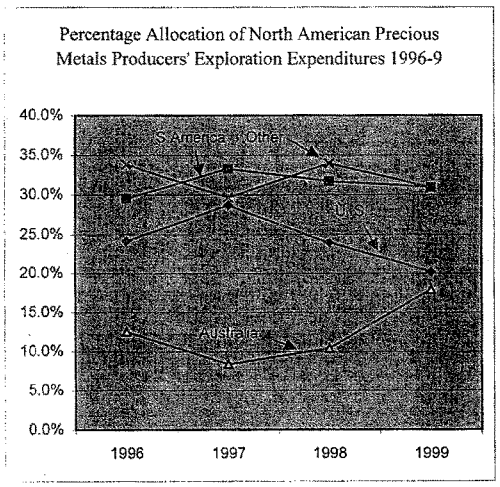
The proposed royalty, for example, would only be paid by a relatively small fraction of producers, would raise little money and would have little economic impact. Similarly, it has been argued that additional restrictions on access to federal lands for exploration purposes have not been responsible for a decline in exploration expenditures, the decline has been due to low prices.

We would argue, however, that it is not sufficient to simply point to low prices and conclude that political risks have no affect on U.S. producers. All that a low price means is that less money will be spent on exploration. We believe that to demonstrate that proposed policy and regulatory changes are not affecting the industry it is necessary to show that the U.S. is retaining its share of the money that is still being spent. Some partial evidence on these impacts is available. Data on exploration and development expenditures are published by various sources including the *Engineering & Mining Journal*, the *Journal of Economic Geology*, etc.

Perceived political policy risks in the U.S. and, of course, trends toward liberalization in other nations, have been cited by North American industry leaders for increasing investment outside of the U.S. Critics have claimed that these claims about political risks in the U.S. have been overstated. Whether these statements are overstatements or not, the figure below indicates that industry leaders have acted on these concerns. Consequently, while reasonable people can argue about the real or imagined implications of proposed policy changes, the data suggests that these proposed changes have had economic impacts. The figure shows, for example, that the share of exploration funding spent in

the U.S. has declined since 1996 and is expected to continue to decline in the foreseeable future.[1]

This trend not only implies that the U.S. is currently losing these investment expenditures, but if the price cycle were to reverse itself, i.e., if precious metals prices were to rise as they did in 1993, the resulting increase in precious metals exploration expenditures would be increasingly allocated outside of the U.S. This would also further imply that, based on historical records of exploration success leading to mine development, that funds for development and capital expansion at mining properties would also be increasingly allocated outside of the U.S.



[1] The figure is based on a survey of 17 large and mid-sized North American precious metals producers conducted during the summer of 1998.

Penniless in Paradise

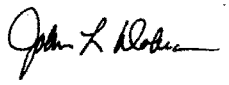
Finally, it should be added that comments in record such as those dismissing the impacts of federal mineral policies are further disingenuous because they go on to say that if mining is deterred, there will be compensating economic benefits from alternative uses of the public lands. These benefits, they contend, will come from reclamation of abandoned mines and recreational uses of the land. With respect to the claims concerning the economic benefits derived from reclamation, it is true that people will get paychecks for working on reclamation projects. But, the argument ignores a fundamental distinction that Congress, as steward of these public resources cannot afford to overlook: the distinction between activities that create wealth and activities that merely redistribute it.

Admittedly, there can be value created for society by abandoned mine reclamation and particularly in egregious cases of environmental harm. However, these problems are dealt with through the Superfund program.

The argument that recreational uses of the public lands are preferable to mining and other extractive uses and that economic activity derived from recreation will replace that from extractive uses is another favorite canard of opponents of mining. It is important, however, to understand the implications of the argument. They propose that the nation will be better off by eliminating $50,000 per year jobs in mining and replacing them with lower paying jobs in the tourism industry. One need to look no farther than Montana to see the implications of this policy advice. Montana's shift away from extractive industries over the past two decades has been accompanied by a steady decline in per capita income to the point where it now has the fourth lowest per capita income in the U.S. Apparently, those that make this argument prefer for their neighbors to be "penniless in paradise" rather than enjoying rising standards of living that come from environmentally benign resource development.

In conclusion, it is hoped that the information and perspectives on the issues provided will be helpful to the Subcommittee. If I may be of any further assistance in this matter, please let me know.

Sincerely,



John L. Dobra, Ph.D., Director
Natural Resource Industry Institute

The Attached Material on Recycling of Metals Was Submitted by Dr. W. David Menzie in Response to a Committee Request

USGS
science for a changing world

Mineral Industry Surveys

RECYCLING—METALS

1997 Annual

For information, contact:
Author referenced at section heading
U.S. Geological Survey
989 National Center
Reston, VA 20192

MINES FaxBack: (703) 648-4999
Internet: http://minerals.er.usgs.gov/minerals

Introduction[1]

Recycling, a significant factor in the supply of many of the key metals used in our society, provides environmental benefits in terms of energy savings, reduced volumes of waste, and reduced emissions associated with energy savings. The reusable nature of metals contributes to the sustainability of their use. Table 1 shows salient U.S. apparent supply and recycling statistics for selected metals. The value of the 80 million metric tons of domestically recycled metals reported for 1997 in table 1 was about $22 billion.

The U.S. Geological Survey (USGS) provides information and analysis on more than 100 raw and/or processed minerals. Mineral commodity specialists assess collected data, and information is disseminated to government, industry, academia, and the general public through more than 100 periodical hardcopy publications as well as the Internet and MINES FaxBack automated retrival system. This Mineral Industry Surveys Annual Review summarizes metal recycling. Separate annual reviews are published for each of the metals summarized in this report. Those separate reviews contain more detailed information about individual metals and the recycling of the metals.

The primary sources of minerals and metals are ore deposits. The secondary sources of metals and other materials are recycled materials. Recycling practices, and the description of those practices, differ substantially among the metal industries covered in this chapter. Generally, scrap is categorized as new or old, where new indicates preconsumer sources and old suggests postconsumer sources. The many stages of industrial processing that precede an end product are the sources of new scrap. For example, when metal is converted into shapes—plates, sheets, bars, rods, etc.—new scrap is generated in the form of cuttings, trimmings, and off-specification materials. When these shapes are converted to parts, new scrap is generated in the form of turnings, stampings, cuttings, and off-specification materials. Similarly, when parts are assembled into products, new scrap is generated. Once a product completes its useful product life, it becomes old scrap. Used beverage cans are an example of old consumer scrap; used jet engine blades and vanes are also an example of old industrial scrap. A wide variety of descriptive terms including home scrap, mill scrap, purchased scrap, prompt scrap, etc. have evolved in response to the wide variety of industry practices.

Aluminum[2]

Aluminum scrap, in one form or the other, is recovered by almost every segment of the domestic aluminum industry. Integrated primary aluminum companies, independent secondary smelters, fabricators, foundries, and chemical producers can recover aluminum from scrap. Integrated primary aluminum companies and independent secondary smelters, however, are the major consumers of scrap.

The independent secondary aluminum smelters consume scrap and produce alloys for the diecasting industry. A cursory look at the distribution of these smelters in the United States reveals a heavy concentration of smelters in the automotive and appliance manufacturing areas of the country.

The other major consumers of aluminum scrap are the integrated aluminum companies. The integrated companies frequently purchase scrap from their industrial customers directly or on a contract-conversion basis. Major integrated aluminum companies also operate can recycling programs and have set up thousands of collection centers around the country for used aluminum beverage cans.

Used beverage can (UBC) scrap is the major component of processed old aluminum scrap, accounting for approximately one-half of the old scrap consumed in the United States. Most UBC scrap is recovered as aluminum sheet and is manufactured again as aluminum beverage cans. Most of the other types of old scrap are recovered in the form of alloys used by the diecasting industry; the bulk of these diecasts are used by the automotive industry.

[1]Prepared by John F. Papp (703) 648-4963; Fax: (703) 648-7757.

[2]Prepared by Patricia A. Plunkert (703) 648-4979; Fax: (703) 648-7757.

Aluminum scrap has become an important component of the supply and demand relationship in the United States. The aluminum recycling industry has grown dramatically over the last 30 years, increasing from a total metal recovery of 900,000 metric tons in 1970 to almost 3.7 million tons in 1997, according to data derived by the USGS from its "Aluminum Scrap" survey.

According to figures released by the Aluminum Association Inc., the Can Manufacturers Institute, and the Institute of Scrap Recycling Industries, 66.8 billion aluminum UBC's were recycled in the United States during 1997. The recycling rate, based on the number of cans shipped during the year, was 66.5%, an increase from the 63.5% recycling rate reported in 1996. According to the organizations' joint press release, aluminum beverage cans produced domestically in 1997 had an average 54.7% postconsumer recycled content, the highest recycled content percentage of all packaging materials (Aluminum Association Inc., 1998).

Purchase prices for aluminum scrap, as quoted by American Metal Market (AMM), followed the general trend of primary ingot prices. Scrap prices closed the year at slightly higher levels than those at the beginning of the year. The yearend price ranges for selected types of aluminum scrap were as follows: mixed low-copper-content aluminum clips, 56 to 57 cents per pound; old sheet and cast, 49 to 50 cents per pound; and clean, dry aluminum turnings, 50 to 51 cents per pound.

Aluminum producers' buying price range for processed and delivered UBC's, as quoted by AMM, fluctuated during the year. The price range began the year at 53 to 54 cents per pound, reached a high of 59 to 61 cents per pound in April and in August, and closed the year at 55 to 56 cents per pound. Resource Recycling published a monthly transaction price for aluminum UBC's in its Container Recycling Report. The average annual UBC transaction price for 1997 was 60.3 cents per pound, an increase from the 1996 annual average of 54.7 cents per pound.

The yearend indicator prices, as published in AMM, for selected secondary aluminum ingots also increased compared with those of 1996 and were as follows: alloy 380 (1% zinc content), 81.31 cents per pound; alloy 360 (0.6% copper content), 86.53 cents per pound; alloy 413 (0.6% copper content), 86.35 cents per pound; and alloy 319 (3.5% copper content), 84.71 cents per pound. Platt's Metals Week published an annual average U.S. price of 75.5 cents per pound for A-380 alloy (3% zinc content). The average annual London Metal Exchange (LME) cash price for a similar 380 alloy was 66 cents per pound.

Beryllium[3]

Beryllium is used in a wide number of applications where light weight and stiffness properties are important. The United States is one of only three countries that can process beryllium ore and concentrates into beryllium products, and it supplies most of the rest of the world with these products.

Beryllium-copper alloys, most of which contain approximately 2% beryllium, are used in a wide variety of applications and average about 75% of annual U.S. consumption on a beryllium-metal-equivalent basis. Beryllium metal composes about 10% of annual U.S. beryllium demand and is used principally in aerospace and defense applications. Beryllium oxide composes about 15% of U.S. beryllium demand and serves as a substrate for high-density electronic circuits. Because of its high cost, beryllium use is restricted to those applications in which its properties are crucial. Substitutes such as graphite composites, phosphor bronze, steel, and titanium exist for certain beryllium applications, but with a substantial loss in performance.

In 1997, U.S. apparent consumption of beryllium totaled about 205 tons. Unknown quantities of new scrap generated in the processing of beryllium metal and beryllium-copper alloys were recycled. The new scrap generated during the machining and fabrication of beryllium metal and alloys was returned to the metal-alloy producers for recycling. The beryllium in beryllium-copper fabricated parts was so widely dispersed in products, and so highly diluted when those products were recycled, that it was essentially dissipated. Additionally, smaller quantities of obsolete military equipment containing beryllium were recycled.

Cadmium[4]

Recycled cadmium is derived either from old scrap or, to lesser degree, new scrap. The easiest forms of old scrap to recycle are spent nickel-cadmium (Ni-Cd) batteries, some alloys, and dust generated during steelmaking in electric arc furnaces. Most of the new scrap is generated during manufacturing processes, such as diecasting. All other applications of cadmium are in low concentrations, therefore difficult to recycle. Consequently, much of this cadmium is dissipated.

Recycling of cadmium is a young and growing industry spurred by environmental concerns and regulatory moves to limit dissipation of cadmium into the ground from discarded cadmium products. Because about three-fourths of cadmium is used in nickel-cadmium batteries and because it is the easiest form to recycle, most recycled cadmium comes from spent Ni-Cd batteries.

Cadmium is recovered by a limited number of companies using pyrometallurgical or hydrometallurgical methods. The annual rate of secondary production in the United States amounts to about 500 tons. The largest recycling company, International Metals Reclamation Co. Inc. (Inmetco), is in Ellwood City, PA. Although the plant was established in 1978, cadmium recovery there began in 1996, using the High Temperature Metal Recovery (HTMR) process. Large batteries, usually weighting more than 2 kilograms and containing an average of 15% cadmium, are emptied of their electrolyte and dismantled; the cadmium and nickel plates are separated. Detached cadmium plates then go directly into the HTMR furnace, where cadmium is reduced using carbon. Cadmium in smaller sealed batteries is recovered by burning off the castings and separators at a lower temperature than is used in the HTMR process. The resulting 99.95% pure cadmium is shipped to battery manufacturers for reuse.

Future collection and recycling of batteries may be further spurred by the Mercury-Containing and Rechargeable Battery Act of 1996 (Public Law 104-142). The act requires uniform battery labeling by May 1998 and provides for streamlining of regulatory requirements governing battery collection and recycling. It is estimated that by 2005 roughly 70% of spent Ni-Cd batteries in the United States will be recycled.

[3]Prepared by Larry D. Cunningham (703) 648-4977; Fax: (703) 648-7757.

[4]Prepared by Jozef Plachy (703) 648-4982; Fax: (703) 648-7757.

Chromium[5]

The major end use of chromium is in stainless steel, and it is in this form that chromium is recycled. Chromite ore is smelted to make ferrochromium, a chromium-iron alloy that results from the removal of oxygen from chromite. Ferrochromium is then added to iron at steel-producing plants to make the chromium-containing alloy commonly called stainless steel. Stainless steel scrap can substitute for ferrochromium as a source for chromium units. Stainless steel comprises two broad categories of grades, called austenitic and ferritic. The names are related to the molecular structure of the steel but also identify which grades are nickel-containing (i.e., austenitic) and which are not (ferritic). Nickel content increases the price of the alloy and its scrap.

Scrap is generated during the manufacturing process (new scrap) and as a result of recycling obsolete manufactured products (old scrap). Scrap from these sources is collected and sorted by grade (i.e., chemical composition) in scrap yards. Scrap brokers play a role in moving material from where it is recovered to where it is consumed. The steel industry consumes stainless steel scrap as a source of chromium and nickel units. A study of the domestically produced stainless steel found that its average chromium content is about 17% (Papp, 1991).

Cobalt[6]

Cobalt-bearing scrap originates during manufacture and/or following use in these applications: alloys such as superalloys, magnetic alloys, wear-resistant alloys, and tool steels; cemented carbides used in cutting and wear-resistant applications; catalysts used by the petroleum and chemical industries; and rechargeable batteries. Depending on the type and quality of the scrap, it might be recycled within the industry sector that generated it, processed to reclaim the cobalt as a cobalt chemical or metal powder, downgraded by using it as a source of nickel or iron in an alloy with a lower cobalt content, or processed to an intermediate form that would then either be further refined or downgraded. The products of recycled cobalt scrap include pure cobalt metal, metal powder, chemicals, tungsten carbide-cobalt powders, mixed metal residues, and alloys.

In 1997, scrap consumption reported by U.S. cobalt processors and consumers increased 26% to 2,530 tons of contained cobalt from a revised 2,000 tons in 1996. U.S. imports of cobalt waste and scrap decreased 21% to 448 tons, gross weight, valued at $7.9 million. Eight countries supplied 93% of these materials—the United Kingdom (26%), Germany (16%), Belgium (13%), Canada and the Netherlands (each 9%), South Africa (8%), France (7%), and Japan (5%). U.S. exports of cobalt waste and scrap are reported in combination with exports of unwrought cobalt metal and metal powders.

Copper and Copper Alloy Scrap[7]

According to data compiled by the International Copper Study Group, estimated world production of secondary refined copper in 1997 was 2.1 million tons, an increase of about 100,000 tons from 1996, but slightly below the record-high level in 1995. This secondary refined copper accounted for about 15% of total world production of refined copper (International Copper Study Group, 1998). According to data compiled by the World Bureau of Metal Statistics, an additional 3.3 million tons of copper was recovered from the direct remelting of copper scrap (World Bureau of Metal Statistics, 1998). Following 3 years of decline, secondary refined production in the United States increased by about 15%, or 50,000 tons, in 1997. The decline in 1994-95 was attributed to closure of a major secondary refinery in 1994. In 1996, lower copper prices further discouraged scrap copper recovery. In 1997, higher prices during the first half of the year, coupled with forecasts of a future decline in prices, encouraged the recycling of stockpiled copper scrap.

In 1997, copper recovered from all refined or remelted scrap (about one-third from old scrap and two-thirds from new scrap) comprised 37% of the total U.S. copper supply and had an equivalent refined value of $3.4 billion. Copper recovered from old scrap increased by 16%, to 496,000 tons, the highest level since 1994. Purchased new scrap, derived from fabricating operations, yielded 956,000 tons of copper, a 7% increase from that of 1996. Consumption of new scrap has trended upward over the past 6 years, both in quantity and as a percentage of total scrap consumption, increasing by 40% since 1991. This large increase in new scrap consumption reflects the increased domestic consumption of mill products. About 85% of the copper recovered from new scrap in 1997 was consumed at brass mill and wire-rod mills. Copper recovery from new scrap at refineries, ingot makers, and other consumers of scrap, declined in 1997.

During the year, 7 primary and 4 secondary smelters, 8 electrolytic and 6 fire refineries, and 14 electrowinning plants operated in the United States. Two of the electrolytic refineries were dedicated facilities associated with secondary smelters and mostly processed anode derived from scrap; several refineries principally associated with primary smelters processed some secondary anode. All the fire refineries processed copper scrap. In September, Franklin Smelting and Refining Co. in Philadelphia, a relatively small secondary smelter with the capacity to produce about 15,000 tons per year of blister copper, closed as a result of the high cost of environmental compliance.

Copper was consumed, both as refined copper and as direct melt scrap, at about 35 brass mills, 15 wire rod mills, and 600 foundries, chemical plants, and other miscellaneous consumers. Of the total copper recovered from copper-, aluminum-, nickel-, and zinc-based scrap, brass mills recovered 55%; copper smelters and refiners, 27%; brass and bronze ingot makers, 9%; and miscellaneous manufacturers, foundries, and chemical plants, 9%. Unalloyed scrap accounted for 49% of copper-based scrap consumed.

Copper scrap prices trended upward during the first half of 1997, following the upward trend in refined copper. The U.S. producer price for refined copper averaged $1.16 per pound for the first half of the year. The New York average buying price for No. 1 scrap at brass mills, and for No. 2 scrap at refiners, averaged $1.08 and $0.90 per pound, respectively. In July, refined and scrap prices began a downward spiral in response to rising global copper inventories. The refined copper price averaged only $0.98 per pound during the second half of the year, and the No. 1 and No. 2 scrap prices, $0.91 and $0.74, respectively. The margin between

[5]Prepared by John F. Papp (703) 648-4963; Fax: (703) 648-7757.
[6]Prepared by Kim B. Shedd (703) 648-4974; Fax: (703) 648-7757.
[7]Prepared by Daniel L. Edelstein (703) 648-4978; Fax: (703) 648-7757.

refined copper and No. 2 scrap averaged $0.26 per pound during the first half of the year and narrowed with lower prices, averaging only $0.24 per pound during the second half of the year. In December, when the producer price averaged only $0.83, the margin shrank to $0.21 per pound.

The United States was one of the largest international sources for copper scrap, followed closely by Germany and Russia, whose exports of scrap rose substantially in 1997. Canada, France, and the United Kingdom were also large sources of internationally traded scrap. China, including Hong Kong, was the largest recipient of scrap, accounting for about one-third of global scrap imports. Canada retained its position as the largest recipient of U.S. scrap exports, accounting for 42% of the total. Canada and Mexico were the leading sources for U.S. imports of copper and copper alloy scrap and accounted for 81% of imports in 1996.

In 1989, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal came into force. It has since been ratified by more than 100 countries, including the United States, although the latter has not passed legislation necessary to implement its participation in the Convention. In 1997, the Convention's Technical Working Group completed recommendations for assigning materials to the A list, wastes characterized as hazardous, and the B list, wastes not inherently hazardous. Copper scrap, copper slags, and copper oxide mill scale were placed in the B list, the list of materials not covered by the Basel Convention as hazardous and, thus, not subject to any export ban.

Gallium[8]

Substantial quantities of new scrap are generated during the processing of gallium into optoelectronic devices or integrated circuits. These wastes have varying gallium and impurity contents, depending upon the processing step from which they result. Gallium arsenide (GaAs)-based scrap, rather than metallic gallium, represents the bulk of the scrap that is recycled. GaAs scrap that is recycled is new scrap, which means that it has not reached the consumer as an end product, and it is present only in the closed-loop operations between the companies that recover gallium from GaAs scrap and the wafer and device manufacturers. During the processing of gallium metal to a GaAs device, waste is generated in several stages. If the ingot formed does not exhibit single crystal structure or if it contains excessive quantities of impurities, the ingot is considered to be scrap. Also, some GaAs remains in the reactor after the ingot is produced and may be recycled. During the wafer preparation and polishing stages, significant quantities of wastes are generated. Before wafers are sliced from the ingot, both ends of the ingot are cut off and discarded, because impurities are concentrated at the tail end of the ingot, and crystal imperfections occur at the seed end. These ends represent as much as 25% of the ingot weight. As the crystal is sliced into wafers, two types of wastes are generated—saw kerf, which is essentially GaAs sawdust, and broken wafers. When the wafers are polished with an abrasive lapping compound, a low-grade waste is generated. During the epitaxial growth process, various wastes are produced, depending on the growth method used. Because GaAs is a brittle material, wafers may break during the fabrication of electrical circuitry on their surfaces. These broken wafers also may be recycled. The gallium content of these waste materials ranges from less than 1% to as much as 99.99%. In addition to metallic impurities, the scrap may be contaminated with other materials introduced during processing, such as water, silicone oils, waxes, plastics, and glass.

In processing GaAs scrap, the material is crushed, if necessary, then dissolved in a hot acidic solution. This acidic solution is neutralized with a caustic solution to precipitate the gallium as gallium hydroxide, which is filtered from the solution and washed. The gallium hydroxide filter cake is redissolved in a caustic solution and electrolyzed to recover 99.9% to 99.99% gallium metal.

Some GaAs manufacturers recycle their own scrap, or scrap may be sold to metal traders, to a company that specializes in recycling GaAs, or to the GaAs manufacturer's gallium supplier, who can recover the gallium and return it to the customer. Generally the prices commanded by GaAs scrap parallel the price fluctuations of 99.99% gallium metal. Also, prices are dependent on the type and gallium content of the scrap.

Gold[9]

Old scrap generally contributes 13% to 18% of the total U.S. supply of gold. New scrap remains the property of the manufacturers, so it is not counted as part of the market supply. The scrap component of the gold supply is perhaps the most difficult of all metal supply components to quantify. In many areas of the world, especially in those areas where the holding of gold is encouraged by tradition, secondary gold, especially that derived from relatively crude gold jewelry, changes hands both locally and internationally from purchasers to goldsmiths and back again to purchasers. This flow is often in response to variations in the gold price and usually cannot be followed statistically.

A considerable quantity of scrap is generated in manufacturing operations, but because of tight controls over waste materials in precious metals plants, nearly all of this "home-generated" scrap can be recovered. Probably the greatest loss in gold fabrication occurs in gold plating plants where fouled or depleted solutions are sometimes discarded. Some old scrap, on the other hand, is lost because in practice gold cannot be economically recovered from all manufactured products.

Gold-bearing scrap is paid for on the basis of gold content, determined by analytical test, and the market price for gold on the day that the refined product is available for sale. Processing charges and adjustments for processing losses are deducted from the total value in settling payments. Aside from dealer-processors and refiners, there are no markets for gold scrap. The Federal Trade Commission requirement for karat identification of jewelry alloys effectively forces gold refiners to know the chemical analysis of the alloys they purchase and gold refiners to separate the constituents of scrap to assure meeting karat standards.

Refiners throughout the world recover secondary gold from scrap. In the United States, about two-thirds of the scrap comes from current manufacturing operations, and the remainder comes from old scrap in the form of items such as discarded jewelry and dental materials, used plating solutions, and junked electronic

[8]Prepared by Deborah A. Kramer (703) 648-7719; Fax: (703) 648-7722.

[9]Prepared by Earle B. Amey (703) 648-4969; Fax: (703) 648-7757.

equipment. A few dozen companies, out of several thousand companies and artisans, dominate the fabrication of gold into commercial products. Most of the domestic scrap is processed by refiners centered in the New York, NY, and Providence, RI, areas, with concentrations also in California, Florida, and Texas, although the current trend seems to be toward a less centralized industry. Scrap dealers may process the scrap and then ship the upgraded product to refiners and fabricators for further treatment and refining. The U.S. Department of Defense (DOD) recovers significant quantities of gold from military scrap. Other Federal Government agencies either participate in the DOD recovery program or have their own programs.

Data for domestic consumption of new and old scrap, collected by the USGS, are currently under review for future publication. In 1997, U.S. exports of gold scrap decreased, after 5 consecutive years of increase, while imports increased. As it has been for many years, the United States was a net exporter of gold scrap in 1997.

Prices for gold waste and scrap imported and exported in 1997 averaged $173 and $277 per troy ounce, respectively; the average price for refined gold was $332 per ounce.

Indium[10]

Domestic production of secondary indium decreased from the unusually high level of 1996, when high prices temporarily had encouraged the recycling of more old scrap—mainly spent sputtering targets that had been used in the deposition of indium-tin-oxide thin-film coatings for liquid crystal displays for such products as flat television screens. In 1997, as in most past years, most of the secondary indium was recovered from new scrap. The actual quantity of secondary indium produced in 1997 is not available, but it was small; only in 1996, for the first time, did the quantity become significant.

Iron and Steel Scrap[11]

Iron, including its refined product steel, is the most widely used of all the metals, and the recycling of iron and steel scrap (ferrous scrap) is an important activity worldwide. Iron and steel products are used in many construction and industrial applications, such as in buildings, bridges, highways, vehicles, machinery, tools, appliances, and containers. Because it is economically advantageous to recycle iron and steel by melting and recasting into semifinished forms for use in the manufacture of new steel products, a significant industry has developed to collect used and obsolete iron and steel products and the ferrous scrap generated in steel mills and steel-product manufacturing plants. About 65% of the steel produced in the United States is recycled. Every year, more steel is recycled than paper, aluminum, glass, and plastic combined.

The vast quantity of ferrous scrap available for recycling comprises home, prompt, and obsolete scrap. Home or mill scrap is generated within the steel mill during production of iron and steel. Trimmings of mill products and defective products are collected and recycled back into the steel furnace because their chemical compositions are known. The availability of home scrap has been declining as new and more efficient methods of casting have been adopted by the industry. Prompt or industrial scrap from manufacturing plants that make steel products is the most important source of recycled iron. Because its chemical and physical characteristics are known, it is usually transported quickly back to steel plants for remelting to avoid storage and inventory control costs. Obsolete, old, or post-consumer scrap is also available for recycling. The largest source of obsolete scrap is junked automobiles, followed by demolished steel structures, worn-out railroad cars and tracks, appliances, and machinery. Obsolete scrap requires more preparation, such as sorting, detinning, and dezincing, because of its wide variety of chemical and physical characteristics.

The Steel Recycling Institute lists for public benefit more than 30,000 recycling collection locations where used steel products may be deposited. More than 3,000 dealers and as many as 30 brokers, ranging in size from large corporations to small family units, play an integral role in the steel industry by collecting and preparing scrap for transport to steel mills. Scrap dealers process scrap using a variety of equipment, such as large magnets, shredders, and balers into a physical form and chemical composition that steel mill furnaces can consume.

Dealers specializing in the processing of steel cans receive loads of these from smaller dealers or have partnership arrangements with neighborhood waste removers. About 60% of all cans are recycled. Cans are crushed, using balers, into heavy cubes called bales that weigh as much as a ton. There are about 12,000 automobile dismantlers and 250 shredders in the United States. Scrap yards recycle nearly 100% of more than 8 million vehicles they receive each year. About 70% of a typical automobile is recoverable iron and steel. Scrap yards crush automobiles and shred them into fist-sized pieces, which are then passed by powerful magnets to segregate steel from plastics, aluminum, and other materials. Passenger car and light truck tires contain about 1 kilogram of high grade steel. Truck tires can contain as much as 9 kilograms of steel for recycling. Appliances, bicycles, and other steel products are also shredded for recycling. About 81% of appliances were recycled in 1997. By weight, the typical appliance is about 75% steel. More than 1,500 scrap yards process steel from construction and demolition sites by shearing, shredding, and baling.

Manufactured steel products have a wide range of physical and chemical characteristics related to relative contents of the alloying elements carbon, chromium, cobalt, manganese, molybdenum, nickel, silicon, tungsten, and vanadium. Also, some steel products are coated with aluminum, chromium, copper, lead-tin alloy, nickel, tin, or zinc. For these reasons, scrap dealers must carefully sort the scrap they sell and steelmakers must be careful to purchase scrap that does not contain undesirable elements, or residuals, that exceed acceptable levels, which vary according to the product being produced.

Steel mills melt scrap in basic-oxygen furnaces (BOF) and electric arc furnaces (EAF) and, to a minor extent, in blast furnaces. The proportion of scrap in the charge in a BOF is limited to less than 30%, whereas the charge in the EAF can be as much as 100% scrap. Steel and iron foundries use scrap in EAF's and cupola furnaces. In 1997, BOF's were used to produce 56% of total steel in the United States, while using only 22% of total scrap consumed. During the same period, EAF's produced 44% of total

[10]Prepared by Robert D. Brown, Jr. (703) 648-4984; Fax: (703) 648-7757.
[11]Prepared by Michael D. Fenton (703) 648-4972; Fax: (703) 648-7757.

steel, while using 67% of total scrap consumed.

Iron and steel scrap is an additional resource for steelmakers that is more than just economically beneficial. Recycling conserves natural resources, energy, and landfill space. Recovery of 1 ton of steel from scrap conserves an estimated 1.5 tons of iron ore, 0.6 tons of coal, and 54 kilograms of limestone. One pound of recycled steel represents the saving of enough energy to light a 60-watt light bulb for more than 26 hours.

Ferrous scrap is traded worldwide. Because scrap comes from such sources as old buildings, industrial machinery, discarded cars, consumer durables, and manufacturing operations, the mature industrialized economies are the main exporters of scrap. The United States continued to be the leading exporting country of iron and steel scrap in 1997. Other major exporters of ferrous scrap were France, Germany, the Netherlands, and the United Kingdom. The most significant importing nations were, in decreasing order of magnitude, Turkey, Italy, the Republic of Korea, Spain, Belgium-Luxembourg, and the Netherlands. Other Asian importers were China, India, and Japan, which individually imported only about one-fourth of the quantity imported by the Republic of Korea.

The U.S. trade surplus for all classes of ferrous scrap was 6.1 million tons in 1997 (Bureau of the Census, unpub. data, 1997). Total U.S. exports of carbon steel and cast-iron scrap (excluding used rails for rerolling and other uses; ships, boats, and other vessels for scrapping; stainless steel; and alloy steel) went to 59 countries (2 fewer than in 1996) and totaled 7.62 million tons (a 2% increase) valued at $974 million (a 1% decrease) for an average of $127 per ton (Bureau of the Census, unpub. data, 1997). The largest tonnages went to the Republic of Korea, 3.07 million tons; Mexico, 1.36 million tons; Canada, 978,000 tons; Turkey, 555,000 tons; and Taiwan, 521,000 tons. These countries received 85% of the total quantity, valued at $801 million, which was 82% of the total value.

Total U.S. exports of stainless steel scrap went to 38 countries (4 fewer than in 1996) and consisted of 370,000 tons (a 22% increase) valued at $231 million (1% decrease) averaging $623 per ton (19% decrease) (Bureau of the Census, unpub. data, 1997). The largest tonnages went to the Republic of Korea, 114,000 tons; Spain, 59,600 tons; Taiwan, 49,300 tons; Mexico, 49,200 tons; and Canada, 40,000 tons. These countries received 84% of the total quantity, valued at $197 million, which was 85% of the total value.

U.S. exports of alloy steel scrap (excluding stainless steel) were shipped to 45 countries (2 more than in 1996) and consisted of 964,000 tons (a 43% increase) valued at $145 million (an 18% decrease) for an average of $150 per ton (an 18% decrease) (Bureau of the Census, unpub. data, 1997). The largest tonnages went to Canada, 477,000 tons (a 49% increase) and Mexico, 348,000 tons (a 29% increase). These countries received 86% of the total quantity, valued at $112 million, which was 77% of the total value.

Lead[12]

About 76% of the refined lead produced in the United States in 1997 was recovered from recycled scrap, of which a major source was spent lead-acid storage batteries. The recycled batteries consisted of the starting-lighting-ignition type used in automotive applications, as well as the industrial-type used in applications such as uninterruptible power-supply equipment, load-leveling equipment for commercial electrical power systems, industrial forklifts, airline ground equipment, and mining vehicles. Slightly more than 10% of the recycled lead was recovered from other lead-based sources including solder, cable covering, building construction materials, and drosses and residues (new scrap) from primary smelter-refinery operations.

Recycled lead currently is produced by 25 companies operating 32 lead recovery plants. Of the total lead recycled in 1997, about 98% was produced by 10 companies operating 17 secondary smelter-refineries in Alabama, California, Florida, Georgia, Indiana, Louisiana, Minnesota, Missouri, New York, Pennsylvania, Tennessee, and Texas. Most of the recycled lead was recovered either as soft lead or lead alloys to be reused in the manufacture of lead-acid storage batteries. Consumption of lead in storage batteries accounted for nearly 88% of the reported consumption of lead in the United States in 1997. During the period 1993-97, the United States exported an average of about 84,000 tons per year of lead-bearing scrap including battery as well as non-battery forms. Only minimal quantities of lead-bearing scrap were imported during this period. The spot price for smelter's heavy soft lead scrap averaged about $0.19 per pound during this period. The average North American Producer price for refined lead was about $0.41 per pound.

In late 1997, the supply of spent (scrap) lead-acid batteries for secondary smelters was tight. The shortage of spent batteries was attributed to the slower rate of failure of automotive batteries during nearly 2 years of relatively moderate temperatures in the more-heavily-populated regions of the United States. Counter to the short supply of spent batteries, stocks of refined secondary lead and replacement automotive batteries increased by 23% and 3%, respectively, in 1997. At yearend, the market price for whole scrap batteries averaged about $0.08 per pound, translating to a lead price of $0.16 per pound, assuming the average weight of lead in such batteries to be about 50%.

One U.S. company reported engineering design difficulties at its new secondary smelter, which had opened in mid-1995. The difficulties prevented the company from achieving the 90,000-ton-per-year production capacity for which the plant was designed. The company continued to evaluate the progress toward alleviating the problems and was expected to make a decision in 1998 on the status of the plant. The new facility replaced the company's 35-year-old smelter located nearby, which had produced about 20,000 tons of recycled lead per year (American Metal Market, 1997).

Magnesium[13]

Recycled magnesium is derived from two sources—aluminum- and magnesium-base scrap. Aluminum-base scrap consists of new and old scrap of aluminum-magnesium alloys. The primary component of this magnesium-bearing aluminum scrap is used aluminum beverage cans. Although only about 75% of the magnesium originally present in these types of alloys is recovered, it represents a substantial source of secondary magnesium. Magnesium in these aluminum alloys is not separated from the

[12]Prepared by Gerald R. Smith (703) 648-4983; Fax: (703) 648-7757.

[13]Prepared by Deborah A. Kramer (703) 648-7719; Fax: (703) 648-7722.

aluminum; rather it remains as an alloying constituent when the beverage can scrap is recycled.

Magnesium-base scrap generally is in forms similar to those of other nonferrous metals. Castings, gates, runners, drippings, turnings, and drosses from processing operations are the principal sources of new scrap. Old scrap comes from a variety of sources, including aircraft parts, military applications, and discarded power tools.

Melting is the most common process used to recycle magnesium, because it allows almost all types of scrap to be processed into various secondary end products. Because magnesium closely resembles aluminum chemically, there is usually a certain percentage of aluminum scrap mixed in with the magnesium scrap. The aluminum scrap is hand-sorted from the magnesium scrap, and the magnesium scrap then is sorted by alloy. Sorting is a critical step in producing a product of desired specifications.

In melting, sorted scrap is fed to a steel crucible and heated to 675° C. As the scrap at the bottom begins to melt, more scrap is added. The liquid magnesium at the bottom is covered with a flux or inhibitive gas to control surface burning. After any alloying elements are added, such as aluminum, manganese, or zinc, and melting is complete, molten magnesium is transferred to ingot molds by either hand ladling, pumping, or tilt pouring.

In addition to melting, magnesium scrap can be recycled by direct grinding of the scrap into powder for iron and steel desulfurization applications. This method is limited to using only specific types of clean scrap. Drosses and other contaminated scrap are not used because they can introduce impurities into the finished product, and these types of scrap can increase the danger of fire in the direct grinding.

Trade in magnesium scrap represents a small portion of the overall U.S. supply of magnesium-based scrap. In general, imports and exports of magnesium waste and scrap have been equivalent over the past 5 years. In 1996 and 1997, however, a sharp increase in exports of scrap to Canada has contributed to a level of exports that has been 2 to 2.5 times higher than the level of imports.

As more magnesium is used in automotive applications, North American firms plan to construct new magnesium recycling plants. These plants primarily are expected to process new scrap resulting from automotive component diecasting operations, although many of them also will be able to process less pure grades of scrap.

Manganese[14]

Scrap recovery specifically for manganese is insignificant. Manganese is recycled incidentally as a minor component within scrap of another metal, particularly steel and, to a much lesser degree, aluminum. High-manganese (Hadfield) steel, which has a manganese content of about 12%, is recovered for its manganese content, but the quantity of such scrap is believed to be well below 1% of the total quantity of purchased steel scrap. Manganese is ubiquitous throughout the various grades of steel, which contain on average 0.7% manganese. Manganese that is recycled to steelmaking within steel scrap largely is lost because of its removal in the decarburization step of steelmaking, and then has to be added back. Manganese is recycled in the aluminum industry as a component of scrap of certain manganese-bearing aluminum alloys, principally used beverage cans, in which the manganese content is about 1%. Melting and processing of aluminum is nonoxidizing toward manganese, so that most of the manganese is retained. Currently, the amount of manganese being recycled in the aluminum industry is estimated to be in the vicinity of 1% of manganese apparent consumption. In the future, small additional amounts of manganese could be recovered through widespread recycling of dry cell batteries.

Mercury[15]

In response to Federal and State regulations, U.S. industry is reducing discharge or disposal of mercury-containing products. As a result, secondary mercury is recovered from a variety of source materials. Electronic devices including rectifiers, switches, thermostats, and relays; dental amalgams; batteries; and other instruments such as thermometers are processed to recover any contained mercury. However, the largest source of secondary mercury remains the spent catalysts used in the production of chlorine and caustic soda. Three companies, one each in Illinois, New York, and Pennsylvania, produce the bulk of secondary mercury in the United States. Mercury waste generated in the manufacturing of products (new scrap) is either reused internally or collected for reprocessing.

Molybdenum[16]

Secondary molybdenum in the form of metal or superalloys was recovered in small quantities. About 1,000 tons of molybdenum was reclaimed from spent catalysts. Although some molybdenum was recycled as a minor constituent of scrap alloy steels and iron, the use of such scrap did not generally depend on its molybdenum content.

Nickel[17]

U.S. industry recycles a broad spectrum of nickel-bearing materials. The largest source of secondary nickel is stainless steel scrap, which accounted for about 85% of the 68,800 tons of nickel reclaimed in 1997. The 85% represents not only scrap used in raw steel production, but also lesser amounts of scrap consumed by steel and iron foundries, as well as nickel reclaimed from stainless steelmaking residues (e.g., furnace dust, grindings, and mill scale). An additional small percentage came from the recycling of alloy steel scrap. Both old and new scrap are used by stainless steel producers, who are more concerned about the grade of the scrap and levels of critical impurities than about its origin. The five leading producers of austenitic stainless steel in the United States all have their principal meltshops in Pennsylvania. An additional nine companies have medium to small meltshops scattered throughout the eastern United States that make austenitic stainless products largely for niche markets. A facility at Ellwood City, PA, converts a variety of nickel and chromium wastes into a remelt alloy suitable for stainless steelmaking.

Copper-nickel alloy scrap and aluminum scrap accounted for about 9% of the nickel reclaimed in 1997. Scrap in this category comes from a myriad of sources and includes cupronickel (a series

[14]Prepared by Thomas S. Jones (703) 648-4973; Fax: (703) 648-7757.

[15]Prepared by Robert G. Reese, Jr. (703) 648-4981; Fax: (703) 648-7757.

[16]Prepared by John W. Blossom (703) 648-4964; Fax: (703) 648-7757.

[17]Prepared by Peter H. Kuck (703) 648-4965; Fax: (703) 648-7757.

of copper alloys containing 2% to 45% nickel), the Monels (a group of alloys typically containing 65% nickel and 32% copper), nickel-silver (a misnomer for a series of copper-zinc-nickel alloys), and nickel-aluminum bronze. Cupronickel is stronger and more resistant to oxidation at high temperatures than pure copper, making it desirable for saltwater piping and heat exchanger tubes. Nickel-silver—a white brass—is used for rivets, screws, camera parts, and optical equipment.

The remaining 6% of reclaimed nickel came from pure nickel scrap and nickel-base alloy scrap. Superalloy producers and downstream fabricators of turbine engines and chemical processing equipment generate a large part of this material—some of which is sent to scrap processors for salvaging and cleaning and later returned to the producers for remelting. However, because of the stringent specifications for superalloys, much of the superalloy and other nickel-base scrap is not suitable for direct recycling and is sold to stainless steel producers, steel foundries, or specialty alloy casting companies. Aircraft engine repair facilities are an important source of obsolete superalloy scrap. The U.S. collection and recycling program for nickel-cadmium and nickel-metal hydride batteries is in a period of rapid expansion. Federal legislation passed in 1996 helped spur the program. The program is administered by the Rechargeable Battery Recycling Corporation, a nonprofit public service corporation funded by manufacturers, importers, and distributors of batteries and battery-operated products.

Several scrap metal recyclers merged or acquired smaller processors of stainless steel, superalloys, and titanium during 1997 and early 1998. Many of the acquisitions took place in the Pittsburgh area and were designed to provide synergy for cost reduction. Significant consolidations of metal recycling companies also took place in Chicago, Hartford, Houston, and Los Angeles. The closure of smaller processing yards, the sharing of sales expertise, the integration of computer databases, and reduced management overhead helped lower operating costs. One-stop shopping for scrap consumers was expected to make U.S. scrap metals operations more competitive and efficient and make the industry better able to cope with large fluctuations in commodity prices.

Platinum-Group Metals[18]

The major industrial use of platinum-group metals (PGM) is for the catalytic converters used to decrease nitrogen oxides, carbon monoxide, and hydrocarbon emissions from automotive vehicle exhausts. PGM recycled from catalytic converters has grown into an important source of PGM supply. Most of the catalytic converters collected in the United States have been decanned and the catalyst shipped to Europe or Japan for processing. The United States exported about 13 tons of PGM scrap in 1997. However, after years of research by the U.S. Bureau of Mines and other research facilities, more of this material is being processed in the United States. A sampling facility for secondary materials was completed by the Stillwater Mining Co. in Columbus, MT, in late 1997. The facility was designed to accept spent catalyst that can be crushed and charged to an electric furnace. Several test lots were processed successfully. Stillwater expected to begin processing shipments of spent auto catalyst during 1998.

Spent auto catalysts account for most of the 14 to 15 tons of PGM recovered in the United States in 1997. Substantial quantities were recovered from spent petroleum refining catalysts and smaller amounts from chemical process catalysts.

Selenium[19]

Most selenium, except that used on the surfaces of the photoreceptor drums in plain paper copiers, is dissipated as process waste or is sent to a landfill as a minor constituent of a waste product. The small quantities that are added to glass as a decolorant, and to ferrous and nonferrous metal alloys to improve metalworking properties are not accounted for in the recycling of those materials, and are probably volatilized during remelting. Selenium rectifiers, once a major source of old scrap, generally have been replaced by silicon rectifiers. Meanwhile, high processing costs have made it uneconomical to recover the metal from scrapped rectifiers.

Currently, no secondary selenium is recovered in the United States. Worn-out photoreceptor drums and scrap generated in the manufacture of new drums are exported for the recovery of the selenium content. An estimated 45 metric tons of secondary selenium was imported in 1997, or about 13% of all selenium imports. Practically all of the selenium used in photoreceptor drums is recovered through very efficient recycling programs. Secondary selenium is recovered in Canada, Japan, the Philippines, and several European countries. The photocopier market for selenium, still the main feed source for secondary selenium, is expected to continue its decline owing to competition from other technologies, mainly organic photoreceptors. A further possible impediment to the recycling of selenium is the Basel Convention of the U.N. Environmental Program, which could restrict the international movement of certain scrap materials, such as selenium scrap. The shrinking market, together with low prices and surplus foreign secondary capacity, discourages the redevelopment of domestic secondary capacity.

Silver[20]

About 1,360 tons of silver, valued at $200 million, was recovered from scrap in 1997. Photographic scrap was estimated to have generated 1,000 tons of silver, the largest part coming from spent fixer solutions and from X-ray and graphic arts wastes, and a small quantity directly from color film negatives. The remainder was recovered from jewelers' sweepings, spent catalysts, electronic scrap, and other heterogeneous silver-bearing materials. U.S. industrial consumption of silver in 1997 was about 5,000 tons; mine production was 2,150 tons.

Tantalum[21]

In 1997, U.S. apparent consumption of tantalum totaled about 500 tons, with consumed scrap (from various sources) accounting for an estimated 20% of the total. Recycling of tantalum, mostly from new scrap, takes place largely within the processing and end-product industries. In addition, quantities of tantalum are recycled

[18]Prepared by Henry E. Hilliard (703) 648-4970; Fax: (703) 648-7757.

[19]Prepared by Robert D. Brown, Jr. (703) 648-4984; Fax: (703) 648-7757.

[20]Prepared by Henry E. Hilliard (703) 648-4970; Fax: (703) 648-7757.

[21]Prepared by Larry D. Cunningham (703) 648-4977; Fax: (703) 648-7757.

indirectly in the form of used tantalum-bearing cutting tools and high-temperature alloy melting scrap. In recent years, the recycling of tantalum in tantalum capacitors from carefully collected and sorted electronic components has acquired considerable significance. Tantalum recovery from tantalum capacitor scrap requires special techniques owing to the different types of capacitor scrap. Tantalum can be recovered from certain capacitor scrap by electrolysis and acid leaching.

Tin[22]

About 25% of the domestic apparent supply of tin metal is recovered from scrap. In 1997, 12,000 metric tons of tin metal, valued at an estimated $100 million, was recovered from new and old tin scrap. Old tin scrap is collected at hundreds of domestic scrap yards, at seven detinning plants, and at most municipal collection-recycling centers. New tin scrap is generated mainly in the tin mills at six steel plants, scores of canmaking facilities, numerous brass and bronze plants, and many solder-making plants. Most tin scrap processing facilities are close to the tin-using industries and to densely populated areas. Most are in the Midwest and Northeast.

Detinning facilities are unique to the tin scrap industry in that no other major metal industry has large-scale facilities to remove plated metal. Detinning operations are performed on new tin-plate scrap from tin mills or canmaking plants and on old tin-plate scrap in the form of used (post-consumer) tin cans. Over the years, the detinning process has been the only technique in the secondary tin industry by which free tin metal sees its way to the marketplace. The bulk of the secondary tin industry works with the various alloy forms of tin (brass, bronze, solder, etc.); the tin is recycled within its own product-line industries and thus reappears in regenerated alloys.

The Steel Recycling Institute (SRI) continued to promote the recycling of used tin cans, which over the past 15 years have become an important raw material for the Nation's steel industry. SRI announced that the steel can recycling rate had grown from 15% in 1988 to 60% in 1997 (Container Recycling Report, 1997).

Tin scrap prices are rarely published but generally approximate the prices for primary tin metal.

Titanium[23]

About 95% of titanium domestic consumption is in the form of titanium dioxide, which is employed as a pigment in paints, paper, plastics, etc., none of which is directly recycled. Most of the remaining 5% of domestic consumption is in the form of metal primarily used in aerospace applications. The extensive processing of titanium metal generates large quantities of scrap compared to most other metals.

Titanium scrap comprises about one-half of the feedstock for titanium ingot production. New scrap is generated during the melting, forging, rolling, casting, and fabrication of titanium components. In addition, some obsolete or old scrap is recycled from old aircraft components, heat exchangers, etc. Although no data are available as to the percentage breakdown of sources of titanium scrap, it has been estimated that less than 2% of titanium ingot production is derived from old scrap.

Scrap is recycled with or without virgin metal by titanium ingot producers using vacuum-arc reduction or cold-hearth melting practices. Prior to melting, scrap must be analyzed, classified, and processed to remove impurities. Several companies have proprietary processes to accomplish this task.

Titanium scrap is consumed by the steel industry as scrap or it may first be converted to ferrotitanium. Titanium scrap is also used to produce aluminum-titanium master alloys for the aluminum industry. Titanium improves casting and reduces cracking in aluminum alloys.

Although consumption of titanium sponge increased by about 13% in 1997, consumption of titanium scrap was nearly unchanged. While producer receipts of home scrap rose slightly, receipts of purchased scrap decreased about 17%. Meanwhile, yearend prices for unprocessed scrap turnings fell 18% and yearend stocks decreased 4% compared with 1996 levels. The apparent fall in scrap utilization was driven in part by the availability of competitively priced imports of titanium sponge.

Tungsten[24]

An estimated 30% of world tungsten supply is from recycled materials. Tungsten-bearing scrap originates during manufacture and/or after use in the following applications: cemented carbides used for cutting and wear-resistant applications; powder metallurgy products, such as filaments and electrodes for lamps and various heavy metal alloy products; and alloys such as tool steels, high-speed steels, and superalloys. Depending on the type and quality of the scrap, it can be recycled by the industry sector that generated it, used as a source of tungsten by another consuming industry, or used as a substitute for tungsten concentrate by tungsten processors.

Cemented carbide scrap is recycled by several different processes. Some processes result in tungsten carbide powder combined with cobalt, which can be used to make new cemented carbide parts. In other processes, the cobalt is recovered separately and the tungsten is converted to the intermediate product ammonium paratungstate, from which tungsten chemicals, metal powder, or carbide powder can be produced. Tungsten metal scrap from the manufacture of mill products is used to make superalloys, tool steel, cast carbides, and ferrotungsten. It can also be processed chemically to produce ammonium paratungstate. Most heavy metal alloy manufacturing scrap is recycled as home scrap to a prealloyed powder, but it can also be used to produce tool steel, or be chemically converted to ammonium paratungstate. Tungsten-bearing steel scrap and superalloy scrap are recycled by the steel and superalloy industries, respectively.

In 1997, scrap consumption reported by U.S. tungsten processors and consumers increased 10% to 2,930 tons of contained tungsten, from a revised 2,670 tons in 1996. U.S. imports of tungsten waste and scrap decreased 18% to 1,510 tons of contained tungsten, valued at $10.4 million. Nearly 70% of these imports were supplied by five countries (Japan, 23%; Germany, 19%; Russia, 11%; the United Kingdom, 9%; and Israel, 7%). U.S. exports of tungsten waste and scrap decreased 10% to an estimated 507 tons of contained tungsten, valued at $3.3 million. An estimated 63%

[22]Prepared by James F. Carlin, Jr. (703) 648-4985; Fax: (703) 648-7757.
[23]Prepared by Joseph M. Gambogi (703) 648-7718; Fax: (703) 648-7757.
[24]Prepared by Kim B. Shedd (703) 648-4974; Fax: (703) 648-7757.

of these exports was sent to Germany.

Vanadium[25]

The principal use of vanadium is as an alloying element. Very small quantities of vanadium, often less than 1%, are alloyed with other metals to produce various ferrous and nonferrous alloys. Owing to the relatively small amount of vanadium involved, these alloys in general do not lend themselves to recycling for vanadium recovery. Vanadium is also used as a catalyst. It is estimated that catalyst consumption accounts for less than 1% of the total U.S. vanadium consumption. However, processing spent vanadium catalysts accounts for the only significant source of refined secondary vanadium. Three plants located in Arkansas, Louisiana, and Texas accounted for most of the recycled vanadium catalyst. Any new scrap generated in either the production of alloys or catalysts is likely reused internally.

Zinc[26]

About 30% of world's zinc is produced from secondary materials—from brass, galvanizing residues, diecasting scrap, zinc sheet, and flue dust. In the United States, about one-fourth of the 1.5 million tons of zinc consumed annually by domestic industries is secondary zinc. Nearly three-quarters of recycled zinc in 1997 was derived from new scrap, generated mainly in galvanizing and diecasting plants and brass mills. The remaining one-quarter was obtained from old diecasts, brass products, old rolled zinc articles, and flue dust. Recycled zinc was used by 11 primary and secondary smelters mainly for production of zinc metal, including alloys; an additional 12 plants produced zinc chemicals, mainly zinc oxide. The Zinc Corporation of America's plant in Monaca, PA, is by far the largest processor of secondary zinc.

Because of wide differences in the character and zinc content of scrap, the recycling processes for zinc-bearing scrap vary widely. Clean new scrap, mainly brass, rolled zinc clippings, and rejected diecastings, usually require only remelting. In the case of mixed nonferrous shredded metal scrap, zinc is separated from other materials either by hand, by magnetic separation, or by the flotation method. Most of the zinc recovered from flue dust is recovered by using the Waelz process. Because the most common use of zinc is for galvanizing, the latest research is aimed mainly at stripping zinc from galvanized steel scrap.

Trade in zinc scrap, measured in gross weight, is relatively small. About 87% of imported zinc scrap in 1997 was supplied by Canada, while the major destination of U.S. exports was Taiwan (68%). Prices for scrap vary according to quality, presence of other components, geographic location, and environmental difficulties in handling, transporting, or treating. The price for a ton of zinc metal contained in scrap is about three-fourths of the London Metal Exchange price for refined zinc metal.

Zirconium[27]

Zirconium scrap comprises about one-half of the feedstock for ingot production. New scrap is generated during the melting, forging, rolling, casting, and fabrication of zirconium components. In addition, some obsolete or old scrap is recycled from dismantled process equipment, vessels, heat exchangers, etc. Although no data are available as to the percentage breakdown of sources of scrap, it is estimated that less than 2% of ingot production is derived from old scrap. Prior to melting, scrap must be analyzed, classified, and processed to remove impurities. Several companies have proprietary processes to accomplish this task. Scrap is initially melted without virgin metal by the two domestic ingot producers, Wah Chang, Albany, OR, and Western Zirconium, Ogden, UT, using vacuum-arc-reduction melting practices.

References Cited

Aluminum Association Inc., 1998, Aluminum can recycling rate reaches 66.5 percent: Washington, DC, Aluminum Association News, March 6, 4 p.

American Metal Market, 1997, Production clouds a lead market factor: American Metal Market, v. 105, no. 178, September 15, p. 1.

Container Recycling Report, 1997, Steel can recycling: Container Recycling Report v. 8, no. 4, April, p. 4.

International Copper Study Group, 1998, Copper Bulletin: Lisbon, Copper Bulletin, v. 5, no. 8, p. 16.

Papp, J. F., 1991, Chromium, nickel, and other alloying elements in U.S.-produced stainless and heat-resisting steel: U.S. Bureau of Mines Information Circular 9275, 41 p.

World Bureau of Metal Statistics, 1998, World Metal Statistics: London, World Bureau of Metal Statistics, v. 51, no. 8, p. 42.

SOURCES OF INFORMATION

U.S. Geological Survey Publications

Mineral Commodity Summaries, annual.[28]

Mineral Industry Surveys, monthly and annual.[28]

Minerals Yearbook, annual.[28]

United States mineral resources, U.S. Geological Survey Professional Paper 820, 1973.

Other

ABMS Non-Ferrous Metal Data.

Aluminum Association Inc. Aluminum Statistical Review, annual.

American Metal Market, daily.

Battery Council International, special reports.

Brass and Bronze Ingotmakers Association.

Copper and Brass Fabricators Council, Inc.

CRU. Aluminum Metal Monitor (monthly).

Institute of Scrap Recycling Industries.

Lead and Zinc Statistics (monthly bulletin of the International Lead and Zinc Study Group).

Metal Bulletin (London).

Mineral facts and problems, U.S. Bureau of Mines Bulletin 675, 1985.

Platt's Metals Week.

Resource Recycling.

Roskill Information Services Ltd. Zinc 1997, 6th Ed.

U.S. Department of Commerce News.

[25]Prepared by Robert G. Reese, Jr. (703) 648-4981; Fax: (703) 648-7757.
[26]Prepared by Jozef Plachy (703) 648-4982; Fax: (703) 648-7757.
[27]Prepared by James B. Hedrick (703) 648-7725; Fax: (703) 648-7722.

[28]Prior to January 1996, prepared by the U.S. Bureau of Mines.

TABLE 1
SALIENT U.S. RECYCLING STATISTICS FOR SELECTED METALS 1/

	Quantity of metal (metric tons)					Value of metal (thousands)			
Year	Recycled from new scrap 2/	Recycled from old scrap 3/	Recycled 4/	Apparent supply 5/	Percent recycled	Recycled from new scrap 2/	Recycled from old scrap 3/	Recycled 4/	Apparent supply 6/
Aluminum: 7/									
1993	1,310,000	1,630,000	2,940,000	7,920,000	37	$1,540,000	$1,920,000	$3,460,000	$9,300,000
1994	1,580,000	1,500,000	3,090,000	8,460,000	36	2,480,000	2,360,000	4,840,000	13,300,000
1995	1,680,000	1,510,000	3,190,000	8,010,000	40	3,190,000	2,850,000	6,040,000	15,200,000
1996	1,730,000 r/	1,580,000 r/	3,310,000 r/	8,330,000 r/	40 r/	2,730,000 r/	2,480,000 r/	5,200,000 r/	13,100,000
1997	2,160,000	1,530,000	3,690,000	8,880,000	42	3,670,000	2,590,000	6,260,000	15,100,000
Chromium: 8/									
1993	NA	NA	92,000	484,000	19.0	NA	NA	62,500	328,000
1994	NA	NA	99,000	390,000	25.4	NA	NA	63,100	249,000
1995	NA	NA	112,000	566,000	19.8	NA	NA	136,000	687,000 r/
1996	NA	NA	98,400	480,000	20.5	NA	NA	96,000 r/	456,000 r/
1997	NA	NA	120,000	488,000	24.7	NA	NA	123,000	497,000
Copper: 9/									
1993	748,000	543,000	1,290,000	3,260,000	39.6	1,510,000	1,100,000	2,610,000	6,590,000
1994	827,000	506,000	1,330,000	3,510,000	37.9	2,030,000	1,230,000	3,250,000	8,580,000
1995	874,000	443,000	1,320,000	3,410,000	38.6	2,670,000	1,350,000	4,020,000	10,400,000
1996	891,000 r/	428,000	1,300,000	3,720,000 r/	35.3 r/	2,140,000 r/	1,020,000	3,160,000 r/	8,950,000 r/
1997	956,000	496,000	1,450,000	3,900,000	37.2	2,250,000	1,170,000	3,420,000	9,200,000
Iron and steel: 10/									
1993	NA	NA	68,000,000	107,000,000 r/	63 r/	NA	NA	7,650,000 r/	12,000,000 r/
1994	NA	NA	70,000,000	122,000,000 r/	57 r/	NA	NA	8,880,000 r/	15,500,000 r/
1995	NA	NA	72,000,000	114,000,000 r/	63 r/	NA	NA	9,720,000 r/	15,400,000 r/
1996	NA	NA	71,000,000 r/	121,000,000 r/	59 r/	NA	NA	9,270,000 r/	15,800,000 r/
1997	NA	NA	73,000,000	127,000,000	57	NA	NA	9,520,000	16,600,000
Lead: 11/									
1993	55,000	838,000	893,000	1,380,000	64.7	38,500	587,000	625,000	966,000
1994	54,200	877,000	931,000	1,540,000	60.5	44,400	719,000	763,000	1,260,000
1995	46,400	926,000	972,000	1,580,000	61.5	43,300	863,000	906,000	1,470,000
1996 r/	37,500	1,030,000	1,060,000	1,660,000	63.9	40,400	1,110,000	1,140,000	1,790,000
1997	54,000	1,030,000	1,090,000	1,660,000	65.7	55,400	1,070,000	1,120,000	1,700,000
Magnesium: 12/									
1993	28,300	30,600	58,900	176,000	34	81,700	88,400	170,000	508,000
1994	32,500	29,600	62,100	182,000	34	103,000	94,000	197,000	578,000
1995	35,400	29,800	65,100	206,000	32	150,000	126,000	276,000	872,000
1996	41,100 r/	30,100	71,200 r/	205,000	35	159,000 r/	125,000	283,000 r/	872,000 r/
1997	49,700	30,500	80,200	235,000	34	181,000	111,000	292,000	854,000
Nickel: 13/									
1993	NA	NA	54,000	158,000	34.1	NA	NA	286,000	839,000
1994	NA	NA	58,600	164,000	35.8	NA	NA	371,000	1,040,000
1995	NA	NA	64,500	181,000	35.6	NA	NA	531,000	1,490,000
1996	NA	NA	59,300 r/	181,000 r/	32.8 r/	NA	NA	445,000 r/	1,350,000 r/
1997	NA	NA	68,800	193,000	32.7	NA	NA	477,000	1,340,000
Tin: 14/									
1993	4,190	6,950	11,100	43,300	26	32,300	53,500	85,800	334,000
1994	4,290	7,380	11,700	41,900	28	34,800	59,900	94,800	340,000
1995	3,880	7,720	11,600	43,300	27	35,800	70,800	107,000	397,000
1996 r/	3,950	7,710	11,600	37,400	31	35,600	69,900	106,000	339,000
1997	4,520	7,830	12,400	48,500	25	37,900	65,600	104,000	406,000
Titanium: 15/									
1993	NA	NA	15,300	W	50	NA	NA	14,300 e/	NA
1994	NA	NA	15,700	W	48	NA	NA	26,800 e/	NA
1995	NA	NA	20,500	W	49	NA	NA	41,800 e/	NA
1996	NA	NA	26,300	W	48	NA	NA	50,700 e/	NA
1997	NA	NA	26,400	W	45	NA	NA	41,900 e/	NA
Zinc: 16/									
1993	246,000	109,000	355,000	1,370,000	26.0	250,000	111,000	361,000	1,400,000
1994	245,000	116,000	361,000	1,400,000	25.9	208,000	126,000	335,000	1,510,000
1995	242,000	111,000	353,000	1,460,000	24.2	298,000	137,000	435,000	1,800,000
1996	266,000 r/	113,000 r/	379,000	1,450,000	26.1	274,000 r/	114,000 r/	388,000	1,640,000
1997	286,000	88,800	374,000	1,510,000	24.8	376,000	117,000	493,000	1,990,000

See footnotes at end of table.

TABLE 1-Continued
SALIENT U.S. RECYCLING STATISTICS FOR SELECTED METALS 1/

e/ Estimated. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Scrap that results from the manufacturing process, including metal and alloy production. New scrap of aluminum, copper, lead, tin, and zinc excludes home scrap. Home scrap is scrap generated in the metal producing plant.
3/ Scrap that results from consumer products.
4/ Metal recovered from new plus old scrap.
5/ Production plus net imports plus stock changes. Production is primary production plus recycled metal. Net imports are imports minus exports. Apparent supply is calculated on a contained weight basis.
6/ Same as apparent supply defined above but calculated on a monetary value basis.
7/ Scrap quantity is the calculated metallic recovery from reported purchased new and old aluminum-based scrap, estimated for full industry coverage. Monetary value is estimated based on average U.S. market price for primary aluminum metal ingot.
8/ Chromium scrap includes estimated chromium content of stainless steel scrap receipts where chromium content was estimated at 17% (reported by the iron and steel and pig iron industries.) Trade includes reported or estimated chromium content of chromite ore, ferrochromium, chromium metal and scrap, and a variety of chromium-containing chemicals. Stocks include estimated chromium content of reported and estimated produce, consumer, and government stocks. Value calculated from quantity using the average annual value of high-carbon ferrochromium as follows in dollars per metric ton of contained chromium: 1993--679; 1994--638; 1995--1,216; 1996--976; 1997--1,020.
9/ Includes copper recovered from unalloyed and alloyed copper-based scrap, as refined copper or in alloy forms, as well as copper recovered from aluminum-, nickel- and zinc-based scrap. Monetary value based on annual average refined copper prices.
10/ Iron production measured as shipments of iron and steel products plus castings corrected for imported ingots and blooms. Secondary production measured as reported consumption. Apparent supply includes production of raw steel. Monetary value based on U.S. annual average composite price for No. 1 heavy melting steel calculated from prices published in American Metal Market.
11/ Lead processors are segregated by primary and secondary producers. This segregation permits inclusion of stocks changes for secondary producers. Monetary value of scrap and apparent supply estimated upon average quoted price of common lead.
12/ Includes magnesium content of aluminum-base scrap. Monetary value based on the annual average Platt's Metals Week's U.S. spot Western price.
13/ Nickel scrap includes: (1) reported reclaimed nickel; (2) estimated nickel content of reported alloy and stainless steel scrap receipts; (3) reported nickel content of recovered coper-based scrap; (4) reported nickel content of obsolete and prompt purchased nickel scrap (except stainless and alloy steel scrap); and (5) estimated nickel content of various types of reported new and old aluminum scrap. Trade includes: estimated nickel content of nickel cathode, pellets, briquettes, powder, and flake, ferronickel, metallurgical grade nickel oxide, a variety of nickel containing chemicals, nickel waste and scrap, and stainless steel scrap. Stocks include: (1) reported and estimated nickel content of scrap stocks (except copper); (2) reported nickel content in stocks of nickel cathode, powder, oxide, and chemicals; (3) reported nickel content in consumer stocks of various nickel materials; (4) and reported government nickel stocks. Monetary value based on annual average LME cash price of nickel cathode.
14/ Monetary value based on Platt's Metals Week Composite price for tin.
15/ Percent recycled based on titanium scrap consumed divided by primary sponge and scrap consumption.
16/ Monetary value based on annual average Platt's Metal Week metal price for North American special high grade zinc.

Printed on recycled paper

BALFOUR HOLDINGS, INC.

10 Inverness Drive East,
Suite 104,
Englewood, Colorado 80112
Telephone (303) 799-9015 Fax (303) 799-9017

March 8, 1999

The Honorable Barbara Cubin
Chairperson
Subcommittee on Energy and Minerals

Dear Madam Chairperson;

Enclosed please find a copy of a research paper I prepared on the economic impacts of the different proposed royalty schemes.

The conclusion of this research is that the addition of 8% gross royalty would rank as one of the highest governmental extraction fees paid. When applied to one of the largest gold mines in the United States, the projected royalty would increase the governmental extraction fees by 50% and not 100% as I testified. I apologize for the discrepancy.

We were unable to locate a copy of this research in time for the testimony, having lost it and other files in an office fire which occurred shortly after the study was completed. We have since located a copy for your committee.

Thank you for searching for answers to the mining issues.

Sincerely yours,

Douglas Silver
President
Balfour Holdings, Inc.

HOLDINGS, INC.
10 Inverness Drive East,
Suite 104,
Englewood, Colorado 80112
Telephone (303) 799-9015 Fax (303) 799-9017

POTENTIAL IMPACTS OF NEW ROYALTIES ON METAL MINING

Prepared by
Douglas Silver
President
Balfour Holdings, Inc.
Englewood, Colorado USA 80112

for

Minerals Exploration Coalition
Golden, Colorado

July 1997

SUMMARY

1. Each block of ore has an in-situ gross value based upon the amount of metal it contains. Not all of this metal can be extracted. Some of it is lost during mining and other amounts are lost during the metallurgical processing. In addition, there is always a cost to extracting the metal, which further reduces the proceeds received from producing metal from an ore block.

2. A block of rock whose in place or in-situ metal value is less than the cost to extract that metal is considered uneconomic and will not be mined by a prudent miner. This is called "waste." A block of rock which can produce a profit will have an in-situ value greater that the costs to extract that metal. This is called "ore." The dividing point between waste and ore is called the breakeven or cut-off grade.

3. There is an exponential relationship between a deposit's tonnage and metal grades. The highest grades (greatest in situ value) occur in the smallest portion of the tonnage and the bulk of the metal is contained in the largest number of tons and the lowest grade materials. Because of the exponential relationship, small increases in breakeven metal grades will result in large numbers of tons (and metal) being converted into waste.

4. Adding new costs to a project will raise its breakeven grade. Because most of the metal is contained in the lower grade material, this action will reduce the size of the ore body. A smaller ore body will have a shorter mine life.

5. A "gross royalty" would be onerous to the minerals' industry because it would both reduce the size of the exploitable reserve and adversely impact the project's economics. Balfour Holdings' analysis indicates that an 8% gross royalty would rank as one of the highest government extraction fees paid. Because a gross royalty pays the government even when the mine is uneconomic, it would force mine closures. Capitalism is predicated on companies making a profit before the government.

6. Because a gross royalty ignores the profitability of the operation, it would be included in the determination of break-even (cutoff) mining costs. It is well known in the mining industry that increasing the break-even costs results in a downsizing of the available reserves. This downsizing is not a linear function because the lowest grade ores tend to be associated with the largest tonnages which tend to occur on the periphery of the deposit. Any increase in the mining costs (such as that resulting from a gross royalty) will transform ore tonnages into waste rock. Once the higher-

grade portions of an ore body have been removed, the lower grade material becomes uneconomic unless there are increases in metal prices.

Companies always hope, but seldom depend on receiving dramatic price increases. This is why the lower grade material is left behind when the mine is closed and reclaimed. Once the richest portions have been removed, it is unlikely that the lower value materials can ever be recovered.

Therefore, the introduction of a gross royalty would effectively sacrifice part of a known ore body, thus decreasing our national mineral endowment. This action would shorten the mine's life, resulting in lower corporate income, employee income and taxes. One has to question the wisdom of offsetting long-term production, taxes, jobs and national wealth for the short-term dollars generated.

The compounded danger imposed by downsizing reserves, shortening mine life and skimming royalties prior to the determination of profitability all adversely impact the project's economics and should be avoided.

7. A royalty would also reduce the effective amount of income taxes paid, because they would be deducted from profits prior to the income calculation. Therefore, the magnitude of the treasury contribution by imposing a new tax is not an additive function. Given today's low metal prices, this relationship could effectively eliminate the payment of income taxes.

7. If a royalty needs to be imposed, a "net proceeds royalty" provides a better economic format because it allows the mining investor and government to share in the mine's profits. This action is not as impacting on the reserve size so the mine's life may not be shortened and future royalty income lost.

8. In times of low metal prices, companies would not pay a net proceeds royalty. Therefore, their projects would not suffer from the dual impact of low metal prices and from governmental fees.

9. A new net proceeds royalty should be of an amount whereby the mining investor receives a respectable return on its capital investment and the Government can participate in any profits.

In conclusion, preliminary evidence indicates that a net proceeds royalty would be more fair than a gross royalty.

I. Background

Balfour Holdings, Inc., a mineral economics consulting firm based in Englewood, Colorado, was contacted by the Mineral Exploration Coalition to assist it in preparing research and analysis on the various royalty scenarios currently being contemplated in Washington. The purpose of this study was to determine whether one or more royalty formulas would cause undue hardship to the base and precious metals industry.

This research was carried out over several months. The conclusions are derived from information provided by the mineral companies contacted by Balfour Holdings.

II. Governmental Extraction Fees

The local, state and Federal governments obtain revenues for their accounts from various sources. Although not all of these origination points are legally called "taxes," they all represent costs paid by businesses to governmental entities. Therefore, aggregating the values of different governmental fees, taxes and levies provides a sense of an effective tax rate.

As shown in Table 1, Placer Dome operates three open-pit gold mines in the United States: Cortez (Nevada), Bald Mountain (Nevada) and Golden Sunlight (Montana). The differences in the extraction fees paid at each mine is a function of the states in which the mines are located and the project's economics.

This table does not include the income taxes paid by Placer Dome as these are calculated at the corporate level and are complex in their allocations.

These fees have been recalculated on the basis of dollars per ounce of gold produced in order to compare them with the gold price and costs of production.

These three operations offer interesting comparisons. The Golden Sunlight gold mine lost $3,486,000 during 1996, yet paid $6,017,000 in governmental fees, taxes and levies.

This highlights an important economic point. A mine can be operated with Cash Costs significantly lower than the price of gold (in this case $228 per ounce) and still lose money. The reason for this is that Cash Costs only reflect the on-site mining expenses and do not account for capital investments, corporate overhead, royalties and income taxes paid.

When these additional items are included in the calculation, the mine operated at a total cost of $412 per ounce, which was $29 per ounce more than their realized gold price of $383 per ounce.

The Bald Mountain gold mine generated $100,000 in operating income after paying $6.21 million to the various governmental entities. This indicates that the mine is effectively operating on a break-even basis with the governments retaining most of the mine's profits. The mine experienced Cash Costs of $298 per ounce during 1996 and $58 per ounce in additional costs for a total of $356 per ounce.

By contrast, the newly completed expansion of the Cortez gold mine to 393,333 ounces per year is anticipated to provide $18.1 million per year in governmental fees. This occurs because of the mine's large production levels and low costs of production.

None of these examples include the impact of corporate income taxes. These fees add additional burdens to the project.

Using the Cortez example, the different extraction fees vary from $0.08 to $9.84 per ounce produced. As shown in Table 1, Employee Income Tax is universally one of the largest tax burdens. Therefore, if Cortez' 417 employees are terminated due to a premature closing of the mine resulting from poor economics, then a substantial portion of the government's tax revenue source is lost. On this basis, the government should encourage mines to remain operational for as long as possible and keep their people employed.

One final point should be addressed with respect to gross royalties (or NSR royalties in the case of gold). Over the past several years, gold has been traded for approximately $350 per ounce. An 8% gross value royalty would therefore be worth $28 per ounce. In the case of the Cortez mine, this fee level is roughly three times greater than the largest fee currently paid. It is also substantially higher than the largest fee currently paid by the other operations and effectively amounts to a 50% increase in current levies and fees paid by the mines, before consideration is given to corporate income taxes.

Government must come to terms as to whether this proposed royalty is fair. Although everyone believes that their taxes are too high, selectively raising them by 50% on one industry would not be viewed as fair. Given the narrow margins currently obtained during these times of low metal prices, a tax increase of this magnitude would probably not serve the purpose it was intended.

The net proceeds royalties presented in Table 1 are calculated by taking a percentage of the gross revenue less the operating costs. Because of the complexity of depreciation

Table 1
Fees obtained from Placer Dome's U.S. Gold Mines

	Golden Sunlight		Bald Mountain		Cortez	
Annual Production:	117,931 Oz		107,708 Oz		393,333 Oz	
Gross Revenues:	$45,126,000		$38,400,000		$137,666,550	
Metal Price (US$/Oz):	$383		$357		$350	
Cash Cost (US$/Oz):	$228		$298		$135	
Employees:	205		201		417	
	Amount	$/Oz	Amount	$/Oz	Amount	$/Oz
Production Taxes - State:	$709,000	$6.01	$138,000	$1.28	$3,870,000	$9.84
Royalty Holders:	$0	$0.00	$496,000	$4.61	$3,291,000	$8.37
Employee - FICA:	$998,000	$8.46	$1,608,000	$14.93	$3,180,000	$8.08
Employee-Income Tax:	$2,533,000	$23.52	$1,575,000	$14.62	$3,070,000	$7.81
Sales \ Use Tax:	$0	$0.00	$1,608,000	$14.93	$2,400,000	$6.10
Property Taxes:	$626,000	$5.31	$282,000	$2.62	$1,235,000	$3.14
Claim Holding Fees:	$58,000	$0.49	$125,000	$1.16	$620,000	$1.58
Workers Compensation:	$6,000	$0.00	$123,000	$1.14	$200,000	$0.51
Other:	$919,000	$7.79	$105,000	$0.97	$100,000	$0.25
Employee - Unemployment:	$141,000	$1.20	$38,000	$0.35	$70,000	$0.18
Business:	$0	$0.00	$22,000	$0.20	$40,000	$0.10
Fuel:	$27,000	$0.23	$89,000	$0.83	$33,000	$0.08
TOTAL:	***$6,017,000***	***$51.02***	***$6,209,000***	***$57.65***	***$18,107,000***	***$46.03***
8% Gross Royalty:		***$31.00***		***$29.00***		***$28.00***
5% Net Proceeds:		***$8.00***		***$0.00***		***$11.00***
2% Net Proceeds:		***$3.00***		***$0.00***		***$ 4.00***

schedules, the normal allowances for capital have been ignored. Their inclusion would further lower these proceeds.

II. The Effect of Increasing Break-even Grades on Ore Bodies

The purpose of a feasibility study is to allow the engineers to calculate all of the costs associated with mining and processing an ore body. From these calculations, the economics of the ore zone can be determined and a decision reached as to whether the projected capital investment should be made in this project. Since each deposit has unique geometric configurations, their costs will vary. Upon completion of this activity, the engineers assign an in-situ value to each block of rock based upon these cost assumptions, the grade of the block and the metal price. The required ore grade would be a direct function of the costs of production. If costs increase, then so must the value of each ton in order to maintain a fixed profit margin. Likewise, when metal prices rise, lower grade blocks can be mined to achieve fixed margins.

These economic studies tell the engineer the minimum in place value required for each ore block in order to generate a specified profit. Blocks with less than this value are called "waste" and are not processed. Blocks with values above this break point are called "ore" and are mined and processed for their metal content. The grade which separates waste from ore grade blocks is called the "Cut-off or Breakeven grade."

Metal prices serve the same function. Many times companies will report their break-even values as a function of metal prices. For instance, they will report that "This mine can produce copper at a break-even metal price of $1.00 per pound of copper." If copper prices are $1.00 per pound, the company is operating its mine at breakeven. Copper prices in excess of $1.00 per pound will provide a profit, whereas prices less than $1.00 will result in the mine losing money.

Aggregating the amount of metal contained in those blocks above the break-even grade or price and dividing this figure into the total ore tons provides the average grade or price for the deposit. The average grade / price will always be higher than its break-even value.

The relationship between the break-even and average grades of a deposit are not linear because there are many more tons of low-grade than there are of high-grade ores. This is a known geological truth first discussed by S. G. Lasky in 1950 for many different types of ore bodies. Consequently, if the break-even grades are increased (due to the addition of

new costs, such as a royalty), a number of tons and contained metal will be transformed into waste.

Table 2
Cornucopia Resources' Mineral Ridge Gold Mine, Nevada

Break-even Grade (Oz/ST)	*Tonnage*	*Gold Grade Oz / ST*	*Contained Gold Ounces*
0.000	22,390,000	0.0264	592,200
0.015	10,351,000	0.0494	511,000
0.024	7,108,000	0.0633	450,200

Cornucopia Resources is presently constructing a new gold mine in Nevada. As shown in Table 2, a Break-even grade of 0.00 ounces per ton indicates that all of the gold mineralized material will be taken and that costs to accomplish this task are $0.00. On this basis, the mine hosts 592,200 contained ounces. However, there is always a cost to produce an ounce of gold. On the basis of a 0.015 ounce gold per ton cut-off (which means a break-even cost of $5.25 per ton at $350 per ounce gold prices), 511,600 ounces are available to mining. Notice that the tonnage has been reduced by 54% and that 80,600 ounces are not mined because they reside in blocks of rock below the break-even grades.

If Cornucopia Resources' break-even cost is $8.40 per ton ($350 X 0.024 Oz/ST), then the reserves drop from 511,600 to 450,200 ounces and the tonnage declines 68% from the 0.00 Oz/ST cut-off. On this basis, a $3.15 ($8.40 - $5.25) increase in costs translates into 60,800 ounces being lost. The in-situ value of these lost ounces is $21.5 million (at $350 per ounce). Needless to say, fewer taxes are paid as the break-even grade is increased.

Table 3
Lisbon Valley Copper Deposit, Utah

Copper Price Price ($/Lb)	*Tonnage (Millions)*	*Copper Grade*	*Contained Cu (Million Lbs)*
$0.85	33,068,000	0.466%	308.19
$0.90	34,343,000	0.458%	314.58
$0.95	35,536,000	0.452%	321.25
$1.00	36,530,000	0.448%	325.70

Another example is observed in Table 3. Summo Minerals is in the process of building the Lisbon Valley copper mine in Utah. During their feasibility study, they calculated their reserves at a number of different copper prices.

This table demonstrates that as copper prices increase, the in-situ value of each ton increases. Therefore, the copper grade needed to achieve break-even can be lowered. In this case, the $1.00 per pound of copper price provides the largest number of tons, the lowest average grade and the most contained pounds of copper to be recovered. Should metal prices decline, the company will have to mine higher grades to compensate for the value lost from the declining metal price. This will reduce the number of tons and contained metal recovered.

S. G. Lasky of the United States Geological Survey was one of the first people to examine these relations. He mathematically modeled the relationships between break-even and average grades of deposits in 1950 for a number of ore deposits. He proved that as one increases the grade, the number of tons measuring this grade drop lognormally. This is important because it indicates that a small change in the break-even cost calculation can be amplified and a greater proportion of the ore body lost than would be if this was a linear relationship.

Increasing the Break-even grade has several important consequences:

1. A smaller ore body will have less room for economic errors than will a large body. Therefore, the risk of failure increases.

2. For open pit mines, raising the cut-off grades will often result in a much smaller pit because the low-grade material which was included in the low break-even cost analysis will tend to be on the perimeter of the pit. A smaller pit will have a shorter mine life.

3. Even if metal prices increased to a point where the lower break-even grades could be used, it can be difficult to redesign the overall mine plan once the mine has become operational. Small, select portions of lower-grade materials may be recovered, but the overall mine plan cannot be altered without significant economic reasons (e.g., prolonged higher metal prices, long-term forward sales contracts, etc . . .).

4. A shortened mine life will reduce the taxes, levies and fees paid to governmental entities.

Raising the break-even costs also increases mining costs which further reduces the size of the ore body and can have a cascading effect as the high-grade zones become less continuous and harder to cost effectively mine.

The government should be very concerned about the relationships between tonnage, break-even and average grades. Although its intent is to raise revenues through a royalty provision, the enactment of a gross royalty would directly raise the break-even grade of deposits. This would result in smaller ore bodies with shorter mine lives. The value remaining in the ground would probably never be mined, thus leading to a reduction in the Nations' mineral inventories. The tax revenue forfeited by this scenario may prove to be more costly to the Nation's treasuries than the new revenues generated by imposing a new royalty. Closing the mines would result in a loss of both direct and indirect jobs and potential tax revenues.

IV. Net Proceeds Royalties.

Net Proceeds Interests ("NPI") offer a better form of tax burden to the operating companies for several reasons:

1. Mines are operated on the basis of maximizing profits and proceeds. Therefore, the operator and government's perspective are both focused on maximizing the value of the mine. Common objectives reduce potential conflicts of interest which may arise when different parties obtain their share of the mine's revenues at different times during the proceeds generating process.

2. If the royalty is based on a percentage formula, the mine pays a royalty only if it produces a profit.

3. NPI's would not affect mine planning activities as much as would gross royalties. Therefore, it is easier for the mine's operator to measure the impact of an NPI than those derived from gross royalties.

4. The tax revenues currently contemplated by the various NPI scenarios are of similar magnitudes to those presently being paid to existing governmental entities. Consequently, there is a much lower probability that the new royalty provision will serve as the principal factor for closing the mines.

5. For the examples presented in Table 1, the total governmental fees (before consideration for corporate income taxes) range from $46 to $58 per ounce. The

introduction of an additional 8% gross royalty would add another $28 to $31 per ounce (at $350 per ounce gold prices) to these costs.

For these examples, an 5% NPI royalties would range from $8 to $11 per ounce for a profitable operation and nothing to one which is losing money. These values are considered maximums because the royalty calculation has not been adjusted downwards for depreciation. A 2% NPI would only burden the project by a maximum of $4.00 per ounce.

The most profitable U.S. gold mines manage to obtain margins ranging from $50 to $100 per ounce, which implies that the proposed gross royalty would effectively reduce these margins by 30 to 50%. Obviously, this difference can have profound economic consequences on the operation's viability. The NPI is more manageable.

V. General Industry Behavior

According to Gold Fields Mineral Services' annual report on the international gold industry, Gold 1997, the average U.S. cash and total cost of production for 1996 was $237 and $300 per ounce of gold produced. The difference between these two numbers relates to the capital costs and royalties paid. Gold Fields reports that these figures, on a national level, represent a continuing four-year trend toward higher costs of production.

Table 4
Average U.S. Gold Cash and Total Costs

Year	Cash Cost Per Ounce	Total Costs Per Ounce
1996	$237	$300
1995	$225	$293
1994	$212	$271
1993	$212	$284
1992	$218	$286
1991	$237	$299
1990	$230	$296

Reference: Gold Fields Minerals Services 1997

Not included in these costs are the corporation's overheads which often add another $50 to $70 per ounce. These other costs include exploration ($5 to $30 per ounce), general and administrative and finance charges. Aggregating these costs further increases the true total cost of production. For instance, a review of the 1996 financial statements for the largest North American gold producers demonstrates that they are operating on very slim margins. Imposing a gross royalty would aggravate their financial dilemma.

Table 5
1996 Financial Results for the Largest North American Gold Companies

Company Name	*1996 Gold Oz Produced*	*Cash Cost Per Oz*	*Corporate Cost \ Oz*	*Margin Per Oz (1)*
Barrick Gold	3,149,000	$193	$254	$164
Battle Mountain	1,034,000	$212	$299	$110
Homestake Mining	1,968,000	$248	$296	$ 93
Newmont Mining	2,284,000	$220	$281	$ 56
Placer Dome	2,210,000	$240	$407	$116

(1) Sales less Total Costs (Cost of Goods Sold + Exploration + G&A + Finance & Interest charges) / Ounces Produced

References: Corporate Annual Reports

When governmental bodies are seeking to understand the impacts of different royalty structures on the mine's economics, they should be aware that royalties less than $5.00 per ounce should not materially effect the mine's operation. Royalties greater than $5.00 per ounce will become a principal factor in the decision-making process when deciding on the construction of new mines, the expansion of existing operations or for approving exploration expenditures necessary to extend the mine's operating life.

This final point can be demonstrated for Placer Dome's operations in the United States. Only their Cortez mine could sustain the financial hardships incurred by an 8% Gross Royalty. To the other operations, this gross royalty may prove to be the deciding factor in closing the mine. An NPI would not be enforced during leans times, so it would have no impact on a mine which is incurring losses.

National Mining Association

NEWS RELEASE

For Additional Information Please Contact
John Grasser (202) 463-2651
Karen Batra (202) 463-2651

FOR IMMEDIATE RELEASE
February 23, 1999

Mining Industry Explains Opposition to Forest Service Proposal

NMA President Richard L. Lawson calls withdrawal of land a threat to economy, national security

Washington -- The administration "is doing all things possible to discourage exploration and to prevent development," said National Mining Association President and CEO Richard L. Lawson in testimony today on the Forest Service's proposal to remove 430,000 acres of lands in Montana from public use. Speaking before the House Subcommittee on Energy and Mineral Resources, Lawson said, "the administration is using both executive orders and regulation to reorganize and restructure the societies and the economies of the Western states."

This latest Forest Service proposal is yet another step in the Administration's march toward continued removal of lands from public use and comes on the heels of a 1998 proposal to withdraw 605,350 acres of copper- and uranium-rich land in Arizona. In 1996, public lands were withdrawn in Utah for creation of the Grand Staircase-Escalante National Monument, where 62 billion tons of high-quality coal reserves could have generated as much as $1.1 billion in state revenue. "Public land alone contains more resources in variety and in volume than major groupings of other nations -- that is, the European Union and Japan. This gives us the flexibility of policy -- economic and security policy," Lawson said.

Already the federal government, which manages 623 million acres of public land throughout the United States, has placed 44 percent, or 271 million acres, off limits to mining.

-more-

By further reducing the amount of land available for mineral exploration, federal, state and local governments will continue to be deprived of hundreds of millions of dollars in tax payments. Also, thousands of high-paying jobs that would have been created in the United States will instead be created overseas.

According to a 1997 study by the Western Economic Analysis Center, the mining industry contributed over $523 billion to the national economy in a single year. This includes $143.7 billion in salaries and wages (5 million jobs); $295.7 billion in business income; $57 billion in federal taxes and $27 billion in state and local taxes. Montana alone received over $2.2 billion in economic activity from mining, including more than $146 revenue gain by state and local governments.

"No exploration now means no production in the future. Mining companies must have something to mine. They must go where they are allowed to produce minerals," Lawson explained.

Every American uses nearly 47,000 pounds of new minerals each year -- coal for electricity, gold and copper for electronics and wiring, iron ore to make steel, and phosphate for fertilizer.

"Whether it satisfies want or requirement, luxury or necessity, virtually all human economic activity depends on someone in a mine taking some useful thing from the earth so that others may make things or do things with it. Much of it begins in the West, on public land." Lawson said.

The U.S. mining industry produces coal, metals, building materials, and many other essential minerals that define the daily lives of 267 million Americans. In 1995, the industry generated almost $524 billion in total economic benefit and helped to sustain nearly 5 million U.S. jobs.

-NMA-

THE EVANS GROUP • 720 INGLESIDE PLACE • EVANSTON IL 60201
PH (847) 328-2468 • FAX (847) 328-2892 • EMAIL m-evans@nwu.edu

March 3, 1999

The Honorable Barbara Cubin, Chair
Subcommittee on Energy and Mineral Resources
U.S. House of Representatives
1626 Longworth House Office Building
Washington, D.C. 20515-6202

Dear Ms. Cubin:

These comments are submitted for inclusion into the record of the Subcommittee's oversight hearings on "Mining, the American Economy and National Security – The Role of Public Lands in Maintaining a National Asset". In particular, my comments serve to rebut some of the statements made by Stephen D'Esposito, President of the Mineral Policy Center, to the Subcommittee on February 23, 1999.

In his statement, Mr. Stephen D'Esposito offers a melange of reasons why gold mining in the U.S. should be curtailed. While he takes a scattershot approach, his arguments can be grouped into the following categories.

1. Countries whose central banks have sold gold have benefited.
2. Gold isn't an important investment vehicle any more.
3. The gold mining industry isn't very important because it employs so few people, so it doesn't matter if it is curtailed further.
4. However, the gold mining industry could become solidly profitable and continue to expand if it would follow the environmental regulations.
5. However, even if these regulations, coupled with a royalty on gross receipts, did shut down some gold mines, the net effect would be to create jobs because of the additional jobs generated by environmental cleanup.

We examine each of these claims in detail.

1. The Effect of Central Bank Gold Sales

According to Ms. D'Esposito, "On July 3rd, 1997, the Reserve Bank of Australia revealed that it had sold 69% of its gold reserves of the previous month ...", resulting in a net gain of $150 million per year in interest. However, it is more than coincidental that the month before this announcement, the Australian dollar was worth 75.4¢, but it

then started to fall steadily to a level of 58.9¢ a year later. In other words, immediately following this announcement of gold sales, the Australian dollar lost 20% of its value. As a result, Australian consumers had to pay an additional $10 **billion** per year for imported goods, almost 70 times the $150 million in interest earned from interest-bearing securities purchased with the money generated from the sale of gold reserves. This sharp decline in the Australian dollar is illustrated in Figure 1.

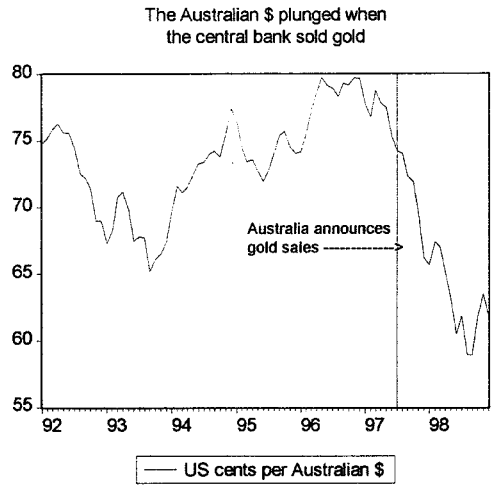


Figure 1

Mr. D'Esposito also suggests Canada has reaped a "golden opportunity" by selling 85% of its gold since the early 1980s. Again, we see a sharp decline in the value of the Canadian dollar since those sales started, shown in Figure 2. This decline in the Canadian dollar led to a lack of investment opportunities by local firms and a substantial rise in the unemployment rate. Before the gold sales, the Canadian unemployment rate tracked the U.S. unemployment rate closely; in recent years, it has been about 5% higher. Canada paid a very high price for its decision to sell gold and reduce the value of its currency.

Mr. D'Esposito also says that "Other countries such as ... Russia ... have sold significant portions of their gold reserves with significant economic benefit". In view of the collapse of the Russian economy last summer, this comment must be considered fatuous. Indeed, it is likely that if Russia had not sold its gold, it would not have been forced to devalue the ruble.

The weight of the evidence clearly suggests that when central banks decide to sell gold, the currencies of those countries often depreciate and their economies suffer slower growth and rising unemployment, far outweighing any small gain that might occur from the return on interest-bearing securities.

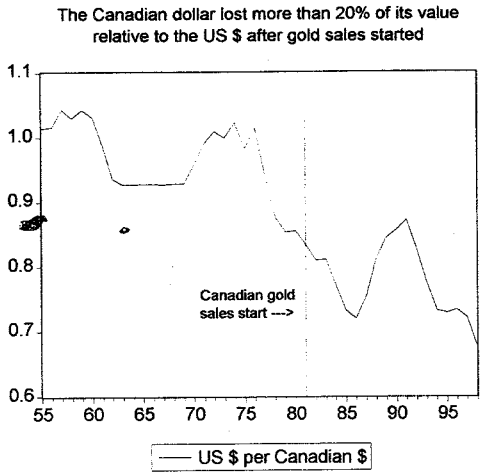


Figure 2

2. Gold is No Longer Important as an Investment Vehicle

Mr. D'Esposito quotes several sources as saying that gold is no longer considered worthwhile by many investors. In particular, he notes that both the Bank of England and the Wall Street Journal have stated that "younger" bankers and investors no longer consider gold a worthwhile asset. Presumably they have refocused their attention on the enduring values for the 2000s, the Internet stocks.

In an era of low inflation and a stable currency, it is indeed the case that "stocks and paper assets" have provided a higher rate of return than gold. However, Mr. D'Esposito makes the mistake of confusing U.S. and Western European demand with world demand. Over the past two years, many investors in Thailand, Malaysia, Indonesia, Korea, Brazil, Mexico, Venezuela, Russia, Greece, and India, among others, undoubtedly wished they had held gold instead of paper assets denominated in local currencies. While sophisticated investors could have purchased U.S. equities, many people in these countries do not have this option. They continue to purchase gold as a store of value against paper currencies that can fall by 50% to 100% or more as a result of misguided government policies.

Gold, of course, is not the only commodity whose price has fallen recently; the drop in oil prices has been much more severe. Yet that does not imply oil is a worthless commodity. Consider the quote offered by Mr. D'Esposito by an employee of the Union Bank of Switzerland, who says, "We try every day to interest people in any form of investment in gold. It isn't working." Now substitute the word "oil" for "gold" and its questionable nature becomes obvious. When any asset is at unusually low prices, whether it be gold or oil – or for that matter, stocks – investor demand is usually at its weakest. That does not imply oil is a worthless asset, any more than is the case for gold.

For the vast majority of world economies that do not have stable currencies, gold remains the investment vehicle of choice. Even in those countries where inflation is low and whose currencies are stable, it is inaccurate to surmise that gold is not a worthwhile investment simply because its price is currently at a cyclical low

3. Gold is an Unimportant Industry

Mr. D'Esposito cannot seem to make up his mind here. On the one hand, he says, gold mining is insignificant and shrinking. On the other hand, he claims, it is increasing. Consider the following quotes.

> ...Today, in the West, metal mining accounts for a small proportion of employment, slightly more than one-tenth of one percent. And the relative importance of metal mining as a source of employment in the aggregate Western economy is shrinking ... [But] mining will continue to be an important part of our national and Western economy... The argument that environmental regulations are negatively impacting the industry is easily refuted. Consider the growth in gold mining in this country over the past twenty years.

So in the space of a few pages we are told that gold mining is growing and metal mining (primarily gold, but also including silver and copper) is shrinking.

Does the hard rock mining industry create jobs or not? Actually, the answer is "it all depends". Following years in which gold mining industry profits have been high, new mines are developed and employment rises. Following years in which profits are low or negative, employment declines. Environmental delays or gross royalty programs designed to decrease U.S. production will sharply reduce employment in the hard rock mining industry in general and the gold mining industry in particular. Following an increase in the price of gold, direct employment in the gold mining industry rose from 3,000 to a peak of 17,000; but repeated environmental delays in the permitting process have reduced that figure to 14,500, with further declines likely to occur.

The claim that the mining industry accounts for only slightly more than 0.1% of the jobs in the West is factually accurate but highly misleading. The "West" includes California, Oregon, and Washington, where mining activity is severely limited. After all, agriculture accounts for less than 1% of the jobs in the West; does that mean it is similarly unimportant?

Admittedly, metal mining employment is unimportant in places such as New York City, Washington, D. C. or Los Angeles. However, it remains the lifeblood of many smaller Western communities; almost all of the jobs in those towns are linked directly to mining activity. The phenomenon of "ghost towns" is well known to most people; close the mines, and economic activity in these rural locations will eventually cease.

However, that doesn't occur to Mr. D'Esposito, because even if some jobs are lost in the mining industry – which hardly matters because, he argues, they are an insignificant 0.1% of total Western employment – they will be more than made up by spending the money on environmental cleanup. Let's examine that argument.

4. The Gold Industry Can Prosper with Strong Environmental Standards

Mr. D'Esposito is quite adamant on this point. His testimony states that:

> It is in the economic interest (emphasis added) of mining companies to have an advanced regulatory scheme that helps us develop an advanced industry ... industries that spent more money complying with environmental regulations actually demonstrated superior performance ... A corporate strategy premised upon selling shabby environmental performance in developing countries or on "dumbing-down" U.S. standards, is a loser. It is a loser economically, politically, and environmentally.

Mr. D'Esposito has confused two different issues. No one in the industry is suggesting that mining companies evade environmental responsibility by "dumbing-down" standards or finding some country abroad that does not care about environmental responsibilities. The mining industry is fully responsive to reasonable, clearly stated, environmental standards, and has been for many years.

However, Mr. D'Esposito creates a straw man when he argues that "some in the industry will continue to make the claim that environmental reforms, or even today's environmental requirements, will destroy the industry". In fact, the hard-rock mining industry has switched most of its investment to overseas locations in the past decade because of the great uncertainty attached to the permitting process and the lengthy wait times of up to 5 years, compared to no more than 1 year in most other countries of the world. The issue is not meeting clearly defined environmental standards; it is meeting standards that are constantly shifting and, in the case of some environmental purists, appear to be designed to keep new mines from opening at all.

5. Environmental Cleanup Creates Jobs

The final issue addressed here is the question of the economic impact of environmental cleanup and reforms. On the one hand, Mr. D'Esposito states that future generations are being cruelly saddled with today's cleanup costs. "We estimate that a cleanup of yesterday's abandoned mines could cost $72 billion ... What is the cost to future generations of the cumulative water quality and water quantity impacts of today's mines?" Yet on the other hand, "The employment associated with the reclamation programs more than offsets the potential declines in mining employment ... ".

Mr. D'Esposito argues that a plan to impose a "fair" royalty for mining on public lands and "create an abandoned mine cleanup program" would mean "jobs would be created". Let's look at the numbers. The cleanup costs, according to Mr. D'Esposito, would be $72 billion. And how much would be raised from a "fair" royalty program?

While reasonable people can disagree on what a "fair" royalty would be, the pro-environmental camp has often suggested a gross royalty of approximately 10%. Recent gold production has been about 400 million metric tons at an average price of about $300/oz, or a value of about $4 billion per year. Based on static revenue analysis, a 10% royalty would thus yield about $400 million, from which must be subtracted the loss of corporate profits at a 35% marginal tax rate. Thus the royalties would equal about $260 million per year under the best-case assumption that gold production would not decline at all. On that basis, it would take 277 years to pay for the abandoned mine cleanup, based on the figures given provided by Mr. D'Esposito.

In fact, long before that happened, the gold mining industry in the U.S. would cease to exist. In most years, profit margins for gold mining are less than 10%, which means after the imposition of a 10% gross royalty, the industry would operate at a net loss. Eventually, all 14,500 jobs (which D'Esposito dismisses as insignificant) would disappear, resulting in a net loss of $174 million per year in personal income and FICA taxes, plus another $140 million in lost corporate taxes – assuming no multiplier effects at all. Considering that the multiplier for gold mining jobs in rural areas is approximately 4, the net loss to the Treasury would be more than $1 ¼ billion per year.

Perhaps that can be regarded as an insignificant sum, well worth paying for an "improved" environment, but it is fatuous to suggest that a cleanup program actually creates jobs.

Mr. D'Esposito also approvingly quotes the viewpoint that "25 jobs will be created for every 1 million dollars spent . Consequently, the royalty requirement of this bill should be viewed as a jobs creation program".

It has been many years since any reputable economist, Democrat or Republican, liberal or conservative, has suggested that the unemployment problem in the U.S. should be solved by boosting public works spending programs. Indeed, this idea became so discredited that the 1990 Omnibus Budget Reconciliation Act specifically prohibited increases in government spending programs unless they were paid for by higher taxes or government spending cuts elsewhere in the budget. It is this legislation that is largely responsible for returning the U.S. budget to a surplus. However, for Mr. D'Esposito and his fellow environmentalists, budgetary considerations take a back seat to environmental purity – no matter what the cost. He then tries to cover up this blatant fiscal irresponsibility by quoting the owner of a sporting goods store in Montana who says an increase in government spending will create jobs.

Conclusion

Contrary to the assertions made by Mr. D'Esposito, we have shown that:

1. Gold is a useful store of value for central banks. Countries that have sold their some or all of their gold stocks have paid the price in terms of weaker currencies, slower growth, and in some cases, hyperinflation.

2. Historically, most nations of the world have undergone periodic bouts of severe inflation. Even the U.S. was not immune from this problem in the 1970s. Whenever those occur, gold remains the most reliable store of value. The fact that gold prices are currently at a cyclical low does not mean gold will remain out of favor as an investment vehicle indefinitely.

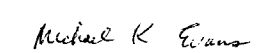
3. The gold mining industry has been, and is currently, a significant source of employment in rural areas of Western mining states.

4. An attempt to impose a gross royalty on the gold mining industry would result in a gradual phaseout of gold mining in the U.S. and an attendant loss of revenues to the Federal government that would exceed $1 ¼ billion per year.

5. The argument that any public works program, including but not limited to environmental cleanup of abandoned mines, is a net creator of new jobs through

increased government spending spectacularly disregards the evidence of the U.S. economy over the past decade, when the economy performed much better as the growth in government spending was curtailed, and the deficit first declined and disappeared completely.

Sincerely yours,



Michael K. Evans
President, Evans Group, and
Clinical Professor of Economics, Kellogg Graduate School of Management, Northwestern University, Evanston, IL

THE GOLD INSTITUTE
GOLD
L' INSTITUT DE L' OR

Administrative Office/Bureau Administratif
Suite 240, 1112 Sixteenth Street, N.W., Washington, D.C. 20036
Telephone: (202) 835-0185 Facsimile: (202) 835-0155
E-mail address: info@goldinstitute.org

Worldwide Association of Suppliers of Gold and Gold Products
Association Mondiale des Fournisseurs de l'Or et des Produits de l'Or

March 9, 1999

The Honorable Barbara Cubin, Chair
Subcommittee on Energy and Mineral Resources
U.S. House of Representatives
1626 Longworth House Office Building
Washington, D.C. 20515-6202

Dear Ms. Cubin:

These comments are submitted for inclusion into the record of the Subcommittee's oversight hearings on "Mining, the American Economy and National Security — The Role of Public Lands in Maintaining a National Asset." The testimony provided by the Mineral Policy Center to the House Subcommittee on Energy and Mineral Resources on Tuesday, February 23, 1999, is full of errors and omissions.

We would like to focus on one major area of omission — timeliness. The current process to permit a new mine in the U.S. has become an inefficient, bloated monster. What used to average one year, as recently as 1991, now takes at least five years and sometimes much longer to complete. These extra years, during which an ore body, which may have already taken many millions of dollars to discover and define, just sits there while millions more are added to the cost. Also, until the process is complete, the owners never know whether they will be allowed to earn a return on this investment at all! It should not be a surprise to anyone,that as a result of these endless delays, more and more of our mining companies are moving overseas.

As recently as 1980, more than 75 percent of the gold needed by U.S. manufacturers was imported. As a result of more than $17 billion invested by the mining industry to discover and develop new mines, U.S. gold production soared during the period of 1985 to 1995, from less than 1 million ounces to nearly 11 million ounces. Instead of being dependent on foreign sources, the U.S. became self sufficient in gold by 1989, and has been an exporter ever since. Today, 30 percent of U.S. gold production is surplus to our needs and is exported, making an important contribution to the balance of trade. How sad that our industry which has made such an important and positive contribution to the U.S. economy is now threatened by the current all-out effort to delay the development of new mines here at home.

Exploration expenditures are the research and development money of the mining industry. In the manufacturing industry, discoveries made through research in one country can be manufactured in another. However, in mining, where your exploration is conducted is where you are likely to discover new ore bodies. And these ore bodies cannot be picked up and moved.

Look at the recent trends in exploration expenditures for 18 large U.S. gold mining companies representing 81 percent of U.S. production. In 1993, 51 percent of their exploration budgets were spent in the U.S. In 1998, they had fallen to only 25 percent of total exploration. At the same time expenditures by these 18 companies have skyrocketed in Latin America and today greatly exceed U.S. exploration.

TOTAL EXPLORATION EXPENDITURES
18 Companies Representing 81% of U.S. Gold Production
(Millions $)

	1993	1994	1995	1996	1997	1998p
Australia & South Pacific	45	55	69	95	70	61
Canada	20	34	47	47	38	23
Former Eastern Bloc	3	3	55	9	17	15
Latin America	56	114	181	237	241	148
United States	154	157	141	159	160	103
Other Countries	5	10	34	38	20	9
Home Office	21	21	21	41	36	58
Total	**304**	**394**	**548**	**626**	**582**	**417**

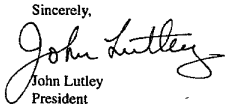
Source: Annual Exploration Survey of U.S. Gold Producers
The Gold Institute (October 1998)

These problems are not unique to gold mining. The chairman of the largest U.S. copper mining company told a recent Senate committee hearing that his company had ceased doing any exploration in the U.S. and was spending 100 percent of their budget overseas. This was because he could not justify to his shareholders any further mining investment in the U.S. until the current anti-mining process was changed and a more certain and effective climate restored.

The Mineral Policy Center wants to add more costs, more uncertainties and more delays. These will only help to accelerate the exodus of mining from the United States.

However, U.S. citizens are not going to give up their cars, home appliances, telephones, computers and many other products made from metals and minerals. The net result of the Mineral Policy Center's policies will be to greatly increase our dependency on imports and widen our trade deficit further.

Sincerely,



John Lutley
President