

# THE U.S. GEOLOGICAL SURVEY PROGRAM OF 1995

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

REVIEWING THE U.S. GEOLOGICAL SURVEY'S MINERAL RESOURCE  
SURVEYS PROGRAM PLAN. THIS PLAN WAS PREPARED PER THE  
REQUEST OF THE 103RD CONGRESS IN THE FISCAL YEAR '95 AP-  
PROPRIATIONS ACT FOR THE AGENCY.

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MAY 30, 1996—WASHINGTON, DC

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THURSDAY, MAY 30, 1996

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

The Subcommittee met, pursuant to call, at 2:05 p.m., in room 1324, Longworth House Office Building, Hon. Ken Calvert (Chairman of the Subcommittee) presiding.

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

Mr. CALVERT. The Subcommittee on Energy and Mineral Resources will come to order. We are having an oversight hearing on the USGS Mineral Resource Survey Program. The subcommittee meets today to review the U.S. Geological Survey's Mineral Resource Surveys Program plan. This plan was prepared per the request of the 103rd Congress in the fiscal year '95 Appropriations Act for the agency.

It was evident even then that budgets would get tighter and that the Survey could not expect to receive funding increases each and every year. Therefore, it was incumbent upon the agency to put forth a realistic plan for meeting its mission.

But the USGS has an "organic act" that most agencies would die for because it is so broadly written as to legitimize practically any scientific endeavor. The Act of March 3, 1879, States that the Geological Survey is established for "classification of the public lands and examination of the geological structure, mineral resources, and products of the National domain."

The Act also bars the Director and members of the USGS from having personal or private interests in lands or mineral wealth of the region under survey or from performing surveys for private parties or corporations.

Except for some very minor addenda regarding cost-sharing with the States and municipalities for cooperative mapping and water studies, that is as much direction as the 58 Congresses which have met since 1879 have been willing to put into law. With such an unfettered mission Statement, it is no wonder why most all the action has been in the Appropriations Committee.

But as the authorizing panel of jurisdiction for the USGS, the Committee on Resources is becoming concerned that the agency may have lost sight of its responsibility to provide the Congress and the Executive Branch with assessment of the potential for dis-

covery of metallic and nonmetallic mineral deposits beneath Federal lands, primarily those managed by the BLM, Forest Service, and the National Park Service, just as the agency periodically assesses the entire onshore U.S. for the discovery of oil and gas fields.

Furthermore, mineral resource investigations and research, in general, appear to be losing out to other activities in the USGS's budget over the past several years, for example, to greatly increased funding of global change and climate history studies. According to our calculations, the mineral resources part of the budget has dwindled to just 10 percent of the agency's overall funding request.

Now, without intending any type of criticism of competing programs, I simply want to know how the Survey plans to meet its Stated mission component of examining the mineral resources of the National domain? Is the job done already? I don't think so, nor will it ever be finished say earth scientists who may always want to look over the same ground again and again with new geologic ideas in mind.

So the question is, how do we balance the fiscal resources likely to be available to the Federal survey with what I think remain as National needs for mineral resources research, assessment, and information dissemination? Is there a role for the State geological surveys working cooperatively with the Feds? What about academia? These are real questions which beg for answers in today's budget climate.

I do want to applaud the Survey for putting this five-year plan together in the midst of unprecedented staffing reductions stemming first from agencywide employee buyouts and then from reductions-in-force actions in the Geologic Division, followed by orders to study a proposal to put the National Biological Service program functions somewhere under the USGS's wing.

Furthermore, I believe the Director's decision to seek outside peer review by the National Research Council's Board on Earth Sciences and Resources was an important step, an admission, if you will, that it was high time to ask the program's "stakeholders" what is right and what is wrong with the Survey's in-house prepared plan. It is the release of this critique which makes today's hearing timely.

Mr. CALVERT. Before I turn to our ranking member, who will be here shortly, I think what we will do is introduce our guests first. And then when Mr. Abercrombie arrives, he may have an opening Statement. But first I want to thank today's witnesses in advance for being here to give us their views. I understand many of you made special travel arrangements to be with us so I appreciate your attendance.

Our first panel is Dr. P. Patrick Leahy, the Chief Geologist of the U.S. Geological Survey and Dr. Samuel S. Adams, Minerals Consultant, Lincoln, New Hampshire, whose father, I understand, served in this House and was Chief of Staff for President Eisenhower. So welcome. First, Dr. Leahy, if you would like to come up to the panel, and, Dr. Adams, you certainly can take your chair also. And first we would like to hear from Dr. Leahy your opening Statement.

**STATEMENT OF DR. P. PATRICK LEAHY, CHIEF GEOLOGIST,  
U.S. GEOLOGICAL SURVEY**

Mr. LEAHY. Thank you, Mr. Chairman. I would like to submit my written testimony to the record. I am pleased to be here today to offer the U.S. Geological Survey's response to the recent National Research Council's review of our Mineral Resource Surveys program.

The USGS Minerals program provides objective scientific information required by decisionmakers to formulate effective land management development policies. The National Research Council reaffirmed these goals in their recent review and recommend several modifications to the program that will reinforce our role as the Nation's leading source of minerals information and will enable us to better serve our customers and cooperators.

In particular, three of the major recommendations made by the NRC will have significant impact on our future activities. These include making greater use of collaborators in the development of projects, emphasizing mineral deposit research and minerals related environmental research, and emphasizing our capabilities to determine the background and baseline abundance of elements in rocks, soils, and water, especially as they relate to the occurrence of mineral deposits.

Let me first say a few things about our Federal role. The USGS has a strong Federal role, the multidisciplinary expertise, and the impartial and private sector/public sector position to permit our Minerals Resource Programs to uniquely meet the needs of a very diverse community of users of minerals information.

For example, through various statutes, Congress has directed Federal departments and bureaus to consider minerals resource information in managing the Nation's lands and resources, has required, defined, and reemphasized the Survey's responsibility in a number of laws such as the Federal Land Policy and Management Act or FLPMA, as it is called, the Alaska National Interest and Lands Conservation Act or ANILCA, and the National Forest Management Act. These Acts require us to assess the Mineral Resources of the Nation and provide timely Mineral Resource information.

Even after our recent reduction in force, the USGS retains the world's only comprehensive, integrated staff of geologists, geochemists, geophysicists, and Mineral Resource analysts who have the scientific expertise, data bases, technology, and research facilities needed to provide estimates of the probable occurrence, types, amounts, and qualities of undiscovered Mineral resources.

They also have the capability to predict the possible environmental consequences of exploration and development, and also to analyze and interpret and disseminate the results to the wide array of users.

The USGS has no regulatory responsibility and provides earth science information from an unbiased perspective. Our appraisals of mineral potential and predictions of possible environmental impact are objective. These data are disseminated in a wide variety of formats and used by diverse groups of stakeholders such as industry, Federal and State regulators, environmental groups, and academia. Our information is available to all.

The USGS Minerals program is organized to serve as the National integrator and disseminator of Mineral resource information; to serve as the scientific advisor to Congress and government agencies; and to serve as a leader in the broader community of minerals information users and providers.

As Stated in the National Plan, the Minerals program addresses four major issues of National importance. These include stewardship of public lands and resources, mitigation of the environmental impacts of resource development, maintenance of a stable, long-term supply of mineral materials, and the availability of timely and objective mineral information and analysis.

The fourth issue that I mention requires a certain amount of elaboration. In January of 1996, Congress transferred the U.S. Bureau of Mines mineral information function to the USGS. The USGS is now in a very unique position of being the comprehensive source for domestic and international mineral deposit and mineral commodity data.

We service the Nation's repository of minerals information for use in preserving our National security and the National infrastructure. With this transferred function, the USGS now has the capability to analyze the economics of mineral material supply and demand in our society—a new role.

I am pleased to report that during the transfer of the function, the continuity of service to the public was preserved. Although not a charge of the NRC Panel in terms of their recent review, the NRC did recommend that the Minerals program include the activities recently transferred from the U.S. Bureau of Mines to the USGS in terms of integrating it into a modified plan.

Let me say a few words about the NRC review and our presentation of it to the USGS. Our request for an NRC review demonstrates our commitment to identify high priority National needs, maintain our research focus on those needs, and develop a priority-setting mechanism that ensures maximized benefit for the use of taxpayer dollars.

External reviews, such as those conducted by the NRC, are an essential element in the maintenance of our scientific health. The Minerals program is already directly integrating the NRC review into our program planning and development process, and on May 1, 1996, Dr. Samuel Adams, Chair of the NRC Panel, and Dr. Craig Schiffries, Director of the NRC Board on Earth Science and Resources, presented the results of the review to all project chiefs in our Mineral program. This presentation was the centerpiece of a three day planning meeting to focus program activities.

I would like to review with the subcommittee a couple of the findings from the NRC Panel. First, the panel strongly endorses the scientific value of a continued minerals resource research. The NRC further reports the Minerals program describes important objectives and a means to accomplish them. Among these objectives is the growing emphasis on research of the geochemical behavior of mineral deposits and the environmental implications of their development. The National issues addressed by the Minerals program in the National Plan are consistent with those envisioned by the NRC Panel.

In conclusion, we greatly appreciate the outstanding job of the NRC Panel. Their recommendations will be invaluable to the USGS and will help us focus and improve our research activities so that we can better respond to the needs of the Nation. Thank you.

[Prepared statement of Mr. Leahy may be found at the end of hearing.]

Mr. CALVERT. Thank you, doctor, and without objection your complete opening Statement will be put into the record. Dr. Adams, if you would like to come forward and go ahead with your opening Statement?

**STATEMENT OF SAMUEL ADAMS, MINERALS CONSULTANT,  
LINCOLN, NEW HAMPSHIRE**

Dr. ADAMS. Thank you, Mr. Chairman. My name is Samuel Adams. I am here testifying today as the Chair of the National Research Council panel convened to provide an evaluation and review of the U.S. Geological Survey's Mineral Resources Surveys Program plan. My complete testimony has been made available to the committee, and I will speak extemporaneously.

The NRC, National Research Council, as you know, is the operating arm of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

I am a minerals consultant living in Lincoln, New Hampshire. I am also the President of Loon Mountain Recreation Corporation. I am the immediate past President of the American Geologic Institute, past President of the Society of Economic Geologists, and former Professor and Head of the Department of Geology and Geological Engineering at the Colorado School of Mines.

I have spent 25 years in the mining industry. I also serve on various organizations that are environmentally active, such as the White Mountain National Forest Advisory Committee and the Society for the Protection of the New Hampshire Forests.

Now that the pedigree business is out of the way, let me address what we have been doing. In 1994, Congress directed the USGS to prepare a plan for the Minerals programs. In 1995, that five-year plan was completed, whereupon the USGS asked the National Research Council to evaluate the plan and make recommendations for its improvement.

The NRC convened a panel of experts, which included professionals with Mineral resource exploration and development experience, environmental mitigation and remediation experience, and those experienced in the collection of basic data and information, which, for all intents and purposes, is geologic research.

The committee went into a fast-track procedure in order to have our report completed by this time of year when the Survey needed it for its planning purposes. We held three meetings earlier this year and late last year. We received comments from more than 50 representatives of State and Federal agencies, policy groups, and industry. All of these people are familiar with the work products and the functions of the USGS Minerals programs.

On the basis of that testimony, as well as information provided by the Mineral resources program, published and unpublished information, as well as the experience of the panel members themselves, we prepared a report and recommendations. The report is

now available, and I believe, sir, that you have been given a copy of the report.

As an essential point of departure for our report and its conclusions, let me say that the issue of National needs for Mineral resource information is absolutely paramount. Without a fundamental justification for such efforts, there is no hope for a rational program.

And so we focused very heavily at the outset on the needs for this kind of information. They fall into these simple categories: land-use management, public health and safety, environmental quality issues, issues of resource supply and National security, and, finally, issues related to prosperity and the quality of life.

There are essential Federal roles in making such information available for two critical reasons. First, there is no reason why any other organization or entity has the concern or the interest in developing such information, at least on a careful and ongoing basis.

And, secondly, because that information has to be prepared in a way which is excellent in its quality and consistency and credible with all of the users. The Survey is to be commended for having done precisely that through the years.

A difficult challenge in collecting and making available such information is that the needs for the various types of information change from decade to decade. This year, the issue might be land-use planning. Five or 10 years from now, it might be public health. Thereafter, it might be a shortage of three or four different commodities.

So the challenge here is to develop a cadre of people who are flexible and competent enough to deal with these rolling issues and drawing on outside expertise to handle these very special challenges as they come up. And that is a very important challenge to this program.

Historically, the USGS has done an excellent job in its mineral deposit work, which has served the public good very well. A case in point, during the testimony that we received, we heard repeatedly from representatives, in particular, the Forest Service and the BLM, how they relied on Survey publications in order to do their work. And many of these publications are apt to be 95 or 100 years old.

The reason they were valuable was they were written with great care and thoroughness at a time when access to mining operations and so forth were possible. Now that access has been lost. And so these documents, having been done superbly, are wonderful records for the purpose of conducting remediation work.

This data collection and interpretation function is a fundamental responsibility of a Federal agency, and most likely this agency and this program. It has to continue if we are going to be able to be prepared to deal with these health issues, economic issues, and other National needs 10 or 20 years from now.

During the same testimony, however, we did hear many criticisms from users of the Survey's work, and these had to do with issues such as focus, content, timeliness, and usefulness of the information specific to the needs of the agencies.

Considering this, the panel prepared a report with four general recommendations and more than 25 specific ones, and I will ad-



dress briefly only the general recommendations, the first of which is the plan should be modified to include new, clearly articulated Statements of vision, mission, and objectives.

Second, to fulfill its mission, the program and plan should move away from an organizational culture dominated by self-direction and independent research toward one that also embraces projects developed through collaboration with users—the issue is who is going to use this information and make sure that its collection and presentation is detailed for the users' purposes?

Third, the program should place more emphasis on maintaining and continuing to develop its core competence in mineral deposit research and mineral related environmental research in order to anticipate and respond to future National needs for Mineral resource information. This core competence must be present. It must be flexible. It must be committed to National needs rather than self-directed interests.

And, fourth, the MRSP and its plan should place greater emphasis on improving the mechanisms and procedures for comprehensive planning, setting of priorities, and evaluating and enhancing performance, particularly through external reviews or advisory panels. The level of funding for the MRSP and the balance of funding among its subprograms deserves thorough review by the MRSP staff, users, and collaborative agencies and organizations.

In the panel's view, there is so much work that could be done and the resources will be sufficiently limited that it is essential that priorities are very carefully selected and reviewed annually for the distribution of appropriated funds.

And, finally, it is clear that the agency would benefit from a much more open and participatory process of involving users from the outset from the initiation of its programs through their execution and on through the evaluations.

[Dr. Samuel Adams submitted "Mineral Resources and Society" was place in committee file.]

Mr. CALVERT. Thank you, doctor, and without objection your complete opening Statement will be made part of the record. Dr. Leahy, it was just about a month ago you testified before the subcommittee about my bill to reauthorize a Cooperative Geologic Mapping program with your State survey counterparts—academic institutions. I realize that in the USGS budget logic, the Mineral Resource Surveys program is separate from geologic mapping. I would like to ask you if you think there are lessons to be learned from the NGMA program which would apply to this one?

Mr. LEAHY. I think one of the key issues here is our need to maintain some flexibility in what we do. There are varying issues as Dr. Adams has pointed out, and they change with time. Having said that, however, I think that we do need to work with the States cooperatively to leverage some of our limited resources. The question is to decide those on a case-by-case basis.

Mr. CALVERT. I understand with those limited resources that there has been a lot of changes at the Geologics Division, and over the last year you had a substantial reduction in force and buyouts, which I am sure has had quite an effect on your operations. Can you tell the committee if the development of the five year Mineral resources plan contemplated those changes?

Mr. LEAHY. Probably not the extent of the impact of our reduction in force, but certainly the notion of downsizing was in the back of the planner's mind when those plans were put together.

Mr. CALVERT. And certainly you have another responsibility now. You mentioned that the USGS has no regulatory role, which is true; but now that you have the NBS under your wing, which you may like or not like, is there going to be a blur in that? I mean, are you going to be involved do you think in some regulatory function?

Mr. LEAHY. Right now the NBS will not be part of the USGS until October as planned. There are groups that are working to ensure the orderly transfer of those functions per the request of Congress. I do not believe that there will be regulatory functions coming with that transfer.

Mr. CALVERT. But you think it may be possible?

Mr. LEAHY. The planning does not demonstrate that yet.

Mr. CALVERT. Well, I would hope not. Dr. Adams, I can't tell you how refreshing it is to see your palace report and your testimony, your general findings, and perhaps sometimes we forget maybe even USGS—why the Nation needs a Mineral resource program.

In the first place, Members of Congress, as well as the public at large, sometimes forget that cars just don't come from Detroit or refrigerators from Amana, Iowa; that without the raw materials we cannot build these valuable value-added products that we sell throughout this country. Do you think that the message has sunk in the upper reaches of the Department of Interior that we need to continue this function?

Dr. ADAMS. That is pretty hard to tell from northern New Hampshire. I was impressed during our meetings in Denver at what I personally would describe as the preparedness of the Survey staff gathered there to acknowledge that things were going to change and to get on with changing them.

I have subsequently had conversations with the leadership of that program, and it is my understanding that the planning that was initiated that next day to incorporate many of our recommendations got underway with earnest.

I would still suggest that it is tremendously important in these times of such limited resources and such complex issues and such changing terrain that the only way to be sure that we come up with plans that are really going to work is to broaden the constituency which is participating in making those decisions.

And if there is any real failure on the Survey's part in my personal judgment—and I am now speaking personally, though it is also reflected in the report—it has been a tendency to want to hold sacred to itself the design of its own future and not broadly seek input from other constituencies such as academia and industry.

And I would submit that it is tremendously important that begin to happen immediately in the reconstitution of these programs. And I see some evidence that they have heard that. I hope the upper reaches of the organization has too.

Mr. CALVERT. Thank you. Mr. Abercrombie.

Mr. ABERCROMBIE. Thank you very much, Mr. Chairman. Dr. Leahy, the Geologic Division has gone through a reduction in force, has it not?



Mr. LEAHY. Yes. That is correct.

Mr. ABERCROMBIE. Coming as I do from an academic background and having done my undergraduate work at a school which was known primarily for its engineering excellence, Union College—Steinmetz, you may know, founded the School of Electrical Engineering at Union when working for General Electric in Schenectady—and not being an engineer myself, having been exposed as an undergraduate in a liberal arts context to what I call hard science, and having an interest, therefore, all my adult life in the impact of technology on society—I say all of that by way of background to the question I have—I developed subsequently then in my legislative life, which included at one point being Chair of the Higher Education Committee in the State of Hawaii—I developed a profound respect for the specialized knowledge that was required in order to transpose scientific theory and exploration into economic utility, into a broader foundation, which I think is fair to say that Dr. Adams was exploring to some degree in his testimony.

It is all well and good for us to set forth these tasks for you to undertake. It is another thing then to provide the human material necessary to accomplish it in terms of the expertise—the specialized expertise. Now, I will grant you in that further context then that because someone possesses expertise say in electrical engineering or in molecular biology or a high energy physics that doesn't necessarily give you the capacity to develop broad policy—political, economic, social, or otherwise.

But minus that scientific technological expertise in terms of input, you are operating strictly, I think, in a very shaky, philosophical basis, if nothing else, for your decisionmaking. So you know what you are being tasked to do. How does the reduction in force, which I imagine has hit in a scatter-shot way the experts that you have—how does that affect your ability to carry out all of the tasks that I see outlined here?

Mr. LEAHY. I think we were unfortunate in that we had to go through a reduction in force, but I think we were fortunate in that prior to the reduction in force, we had a five-year plan in place that we could use to guide us in terms of defining the expertise, the technical skills we need to accomplish the goals of the plan. What we attempted to do was to match—retain the skills necessary to conduct the plan that was reviewed by NRC.

Mr. ABERCROMBIE. Have you, in the process, then broadened your contacts in the world of academia and business in order to synthesize this process?

Mr. LEAHY. Obviously, that is the next step. We have to leverage the resources we have. We have to fill any gaps in our background; it is absolutely critical we do that through partnerships with academia, with the States, with other Federal agencies.

Mr. ABERCROMBIE. Dr. Adams, if I might, from your perspective as a consultant, do you have contracts now with the USGS?

Dr. ADAMS. No.

Mr. ABERCROMBIE. With your perspective then, what would you say—let me start over again. Are there any gaps in terms of the—within now the USGS and any subcategories within it that you are familiar with? As a result of the reduction in force, do you feel there are areas of expertise that have been lost? Do you have any

recommendations or observations in that regard that you can share with us as someone who could provide an objective analysis?

Dr. ADAMS. In the course of the panel's work, we were on an exceedingly compressed timeframe, and so we did not investigate the staff needs at that level. Let me answer it.

Mr. ABERCROMBIE. I am asking as a layperson you understand?

Dr. ADAMS. The question is a very important one, and with as many people as have been lost to that program, it is one that has to be asked. We simply did not go into it in sufficient detail to be able to answer that. But let me say that even had there not been a reduction in force, my personal view would be that there would have to be some recasting of responsibilities and proficiencies and levels of commitment in order to carry out the tasks that now lie before this group.

Mr. ABERCROMBIE. I understand. I have the light on there so suffice to say at this time, Mr. Chairman, if you will just indulge me a moment more, I think what might be in order then is given the changes that have taken place in the reduction in force and Dr. Adams's observations that perhaps the impact of that is not fully comprehended right at the moment, I think it is precisely because we have oversight responsibility that we should take the next year then to determine whether or not there are some gaps that need to be filled, not because we are looking to punish anybody or point fingers, but rather to aid and assist in carrying out the mission that is before us.

And if there are, whether it is personnel or whether it is a policy change or something, perhaps we can reconvene this panel in a year's time or the next budget phase to see whether or not some adjustments need to be made. Thank you, Mr. Chairman.

Mr. CALVERT. Thank you. Mrs. Chenoweth.

Mrs. CHENOWETH. Thank you, Mr. Chairman. I have some questions for Dr. Leahy. The Chairman touched on this, but I want to ask just a little more in-depth. Many of my constituents and folks all around the country view the National Biological Service with great suspicion—sort of the Endangered Species Act detective squad.

And aside from the harm that could occur to the USGS's reputation for objective scientific analysis if the new Biological Resource Division is misused, how do you plan to ensure the survival of the minerals and other geologic programs in the competition for dollars within your agency?

Mr. LEAHY. As Chief Geologist, my responsibilities are limited to the Geologic Division. I would ask that question be—we will answer the question as part of the record as a Bureau.

Mrs. CHENOWETH. So you wish to submit the answer—

Mr. LEAHY. In writing.

Mrs. CHENOWETH. [continuing]—in writing? All right. Would you also submit a copy of your answer to my office? Do you mind?

Mr. LEAHY. Certainly.

[The following was submitted:]

#### REGULATORY FUNCTIONS OF NBS, OBJECTIVE SCIENTIFIC ANALYSIS OF USGS, AND COMPETITION FOR DOLLARS

First, we would like to respond to the concern raised by you and Chairman Calvert regarding regulatory functions that might be associated with the National Bio-

logical Service (NBS). We want to state clearly for the record that NBS has no regulatory responsibilities. In fact, one of the reasons Secretary Babbitt created NBS was specifically to ensure that the biological science performed by the Department of the Interior was independent from regulatory bureaus. The science performed by NBS (which will become the Biological Resources Division of the U.S. Geological Survey (USGS) once the merger is completed) will continue to be objective and unbiased, as is the research conducted by the other three divisions of USGS. At the same time, the research performed by NBS must be relevant to the needs of resource managers in the DOI bureaus and the states. It is our firm belief that credible, objective and unbiased scientific information is critical to sound management decisions regarding our country's natural resources.

With regard to your concern for objective scientific analysis, USGS works diligently to maintain its historic non-advocacy position. We conduct research and produce scientific products and information which are factual, unbiased, and do not advocate a particular position on an issue. Non-advocacy is part of the foundation upon which USGS has built and maintained its reputation for impartiality and excellence and applies to all our programs including geologic, hydrologic, cartographic as well as biological studies. USGS employs many safeguards to help ensure our non-advocacy position. Congress has recognized the value in this process by requiring that the biological programs of the former NBS be reviewed every five years by the National Academy of Sciences, a type of program review we do routinely for all our major programs at USGS. Just recently, for example, the National Academy of Sciences completed a study of our minerals program.

Finally, in terms of your question regarding the competition for dollars at USGS, all divisions will continue to prioritize their needs through consultation with stakeholders during the budget process, and of course, that process includes the submission of the budget to Congress for its consideration. We believe that this process of active consultation and review ensures that USGS funds are used to address the most critical issues confronting the Nation.

Mrs. CHENOWETH. Thank you. I also want to ask you, Dr. Leahy, when I was still in the real world before I came to Congress working in the natural resource projects, I have got to say the USGS was one of the most enjoyable agencies to work with. The information that I received from them was most valuable.

And I remember looking over some satellite maps of mineral deposits where the satellites were able to detect where mineral deposits were. And I remember seeing those in the early 80's. However, lately, we have not been able to get a hold of those maps, and I did a search for those maps and worked on them for about a month. Those maps have been taken away from the Congress, as well as from the general public. Where are they now, and how can we get a hold of them?

Mr. LEAHY. I think probably the best way to answer that question is all of our information is available to the public, and perhaps we should contact you directly to find out in more detail what maps—where the maps are—you know, which areas they cover and so forth, and we will be glad to track them down.

Mrs. CHENOWETH. Well, that is really good to hear that from you on the record because we were able to trace them to a certain point, and then we were simply told we couldn't get them.

And, as you know, Chairman Young of our Full Committee represents all of Alaska. And as I am sure you know and I am also sure you must realize is the disappointment over what he sees as a diminished effort to assess and discover mineral potential or fast-tracks of the public lands in his State that were withdrawn from the mining and mineral leasing laws in previous Congresses.

Dr. Leahy, if these lands are off limit to industry exploration, but yet with the satellite photography we could even as early as the 1980's detect what the minerals are in there, how is Congress to

know what mineral commodities and potential amounts are in the bank as some interest groups like to say about locked-up minerals?

Mr. LEAHY. We still have a very active program in Alaska. And, in fact, in terms of our reduction force, that minerals activity was the least affected in terms of the number of people we had to let go in that field office relative to the rest of the program.

Mrs. CHENOWETH. My question isn't about personnel. It is about results. And, you know, my concern is that not only from the satellite imagery photography and the maps that we saw from that, somebody somewhere has the calculations. And not only is the Chairman interested, Chairman Young, Chairman Calvert, but all of us are interested. We have got to stay mineral independent, and we look to you and the resources that have been invested in USGS in the past to be able to receive that information.

Mr. LEAHY. We will be glad to visit you and your staff separately to talk about this issue in more detail.

Mrs. CHENOWETH. Would you do that?

Mr. LEAHY. Yes.

Mrs. CHENOWETH. Thank you very much.

Mr. CALVERT. Thank you, Doctor, just a comment. I know it has probably been difficult this last year over at USGS with a reduction in force. It is never easy. I am from Southern California, and I probably understand better than most people what happened, especially in the defense industry in Southern California. A lot of my friends work for companies indirectly for the military who went through great change in the last five to seven years.

But with change, even though it sometimes brings sadness and hardship, it brings opportunities, and as Dr. Adams indicated in his testimony, to refocus the energies of the department back to what we believe is the core mission of the USGS. And as Mrs. Chenoweth Stated, to make sure that we are not dependent, I should say, on other countries for necessary minerals, and that we find those minerals and at least know where they are at in order to take advantage of them sometime in the future.

One gentleman that we are going to be talking to, Dr. Price of Nevada's Bureau of Mines and Geology of the next panel, his written testimony suggests an avenue for cooperations in the minerals information-gathered portion of the minerals resource survey program.

I am not asking for an OK today, but the idea of using the State agencies to gather and analyze mineral industry statistics may or may not be a good idea but would like to see the USGS would seriously consider such a proposal in the future, working with States as Nevada and other States in coordination, since you do have less people, who would need to utilize everyone in accomplishing their goal. Do you have any comment on that?

Mr. LEAHY. We have had some informal discussions with the Association of American State Geologists on this issue. There are a lot of dimensions to it. I am sure that we will continue that dialog over the next few months to find out what the various roles are.

Mr. CALVERT. Dr. Adams, perhaps the most compelling part of your critique involves your reference as an organizational culture. We run into that in various governmental departments here. The FAA was one of those on another committee I am on.

In your general recommendation number 2, because you have been with the industry and academia both, I suspect you brushed up against USGS scientists many, many times over the years so I assume you know what the culture was and is today. Changing a corporate culture in business is not an easy thing. I have been there and done that.

How can the Survey repair its cultural image in your mind? And I guess I am really thinking if you think the Survey can change on its own or already has done so certainly with the great changes they have gone through in the last year with the buyouts and the RIF? Any comment on that?

Dr. ADAMS. I think the pathway to reconstituting their focus and their commitment is most easily achieved by turning to their users, their customers, if you will. A company, when it is trying to straighten itself out, most efficiently looks at its customers, and that is normally where the problems show up and where the solutions lie.

And in the case of the Survey, as we address in our report and as I spoke at the meeting in Denver, the Survey I think, has a very straightforward opportunity to turn to the Forest Service, the Bureau of Land Management, the Park Service, State agencies, and the Mining Industry, and when the time permits, looking beyond that to lower levels of government organizations, county organizations, for example, through cooperations with those States, to find out what it is that is most needed in terms of Mineral resource information. Even EPA—what is needed in terms of Mineral resource information for EPA to discharge its responsibilities. This is the whole range of needs for Mineral resource information.

And in our experience, through the testimony that we received, these users are anxious and ready and waiting to participate with the Survey in explaining what they need in order to discharge their responsibilities and how it would best be configured. And so these negotiations, I think, could be quite straightforward solutions to the Survey targeting better than perhaps it has in the past, though the playing field has been changing.

So it is, in our judgment, a question of collaboration through the formation of oversight boards and advisory committees and just developing a keen interest in who wants our stuff and for what and when and how detailed and how do they want it presented.

Mr. CALVERT. Thank you, doctor. When I was in business, I had a sign over my entryway that said, "Customers Don't Lie." That was something you always have to remember. Mr. Abercrombie, do you have any additional questions? We thank you both for your testimony and for your questions, and we are going to recess for a moment. We have got an awful lot. So we are going to recess probably till 3:15. I am optimistic. How about 3:20 to 3:25 or so we will come back here for the second panel. Thank you very much.

[Recess.]

Mr. CALVERT. The subcommittee will come to order. Thank you for waiting patiently while we voted. I would like to now introduce our second panel, Dr. Odin D. Christensen, Chief Geologist, Newmont Gold Company; Dr. Jonathan G. Price, Director/State Geologist, Nevada Bureau of Mines and Geology; and Mr. W. Hord Tipton, Assistant Director, Resource Use and Protection, Bureau of



Land Management. If you would like to have seats at the head table there, and we will first introduce Dr. Christensen to give his Statement. Doctor?

**STATEMENT OF DR. ODIN D. CHRISTENSEN, CHIEF  
GEOLOGIST, NEWMONT GOLD COMPANY**

Mr. CHRISTENSEN. Thank you very much for inviting me to speak to you today about a very important Federal program. My name is Odin Christensen, and I am the Chief Geologist for Newmont Gold Corporation in Denver, Colorado. Newmont is a U.S. corporation engaged in the exploration, mining, and processing of gold throughout the world. Most of our production is from the State of Nevada. We also have gold production in Peru, Uzbekistan, and Indonesia.

The following comments reflect personal views as a mining industry geologist engaged in international and domestic exploration and development of Mineral resources. I wish to emphasize two important points today. One is that I think there is a very strong National need for a Federal program in the geology of Mineral resources, and I think the United States Geological Survey is the most appropriate agency to do that. They have the technical expertise. As a matter of fact, they are the only group in the world who could do this sort of thing.

The second point is that having said those nice things, I am in full agreement with the findings, the observations, and recommendations of the National Research Council Panel established to critique the minerals resource surveys program, and, in particular, therefore, the general recommendations presented by the panel should be carefully heeded by the USGS.

At the time of its establishment more than 100 years ago, the USGS emphasized geologic research to support the discovery and development of Mineral resources in a young Nation. The United States of 1996 is no longer a frontier country. Our population has grown across the land, and there is growing competition for that land and concern with the environmental impacts of mineral development.

Yet, as you have pointed out, our National appetite for Mineral resources continues to grow. As a consequence, we face very difficult decisions involving supply of Mineral resources, land use, and environmental protection. These decisions should be based on very sound scientific information, the sort of information that the Survey can provide through their programs.

The strong National needs—as pointed out, as our demand for minerals increases, we must face some very difficult choices of whether to produce minerals domestically or to import them, with all of the associated environmental, economic, and social consequences of those choices.

Unfortunately, for land-use planners, Mineral resources can't be developed where we want to have them. Mineral resources, as I well know, are very scarce commodities very irregularly distributed about the earth, and we have to produce them where we find them.

Regardless of individual opinions regarding the desirability of mining in any particular location, it is imperative that we understand the global mineral endowment, the location of those re-

sources, and the character of those resources to make wise land-use decisions.

The location or the lands on which mineral deposits occur will always be of great National interest because it is only from those lands that Mineral resources can be produced. These are lands which are most likely to be subjected to the greatest disruption by man and must be reclaimed. These are areas of the earth which are likely to be areas of conflict.

And, finally, Mineral resources are unusual commodities. The rocks have unusual, uncommon chemistry and mineralogy which results in uncommon interactions when these are exposed at the surface of the earth, and we need to fully understand these occurrences if we are to make wise environmental decisions.

All of us consume and enjoy Mineral resources. We all benefit from the economy that those bring, and yet none of us really want to have mining in our backyard so that understanding of Mineral resources is a National issue, not only a State and local issue.

To go on to the second point, I commend the USGS for developing their minerals resource surveys plan. However, I fully agree with the very cutting observations of the National Research Council Review Panel. I believe the USGS and the Nation will be well served if those recommendations are carefully heeded.

As Dr. Sam Adams has discussed so well, there should be a very clear statement and a very clear acceptance of a vision, a mission, and objective for the USGS Mineral resource activities. That mission has to be very carefully crafted so that it permits attention to long term basic science to provide real insight to solve tomorrow's resource needs, and, on the other hand, it must be responsive enough to respond to issues of immediate National need.

I believe that the most important focuses of that USGS work should be National needs, and they should be long-term needs. Mineral industries look at short-term needs. What we need from the Survey is the long-term focus.

It was recommended by the National Research Council that the Survey program shift away from an organizational culture dominated by self-direction and independent research to one that embraces projects developed through collaboration with users.

I think it is also important to note that there should be greater communication within the branches of the USGS. We recognize that mineral deposits are not isolated occurrences. They are not entities separate from the geologic environment in which they occur. It is extremely important that all of the programs at the USGS—Mineral resources, water, environment, geology—all be integrated, with scientists cooperating within the Survey, with other agencies of the U.S. Government, and with the State agencies.

The National Research Council Review Panel recommended a number of positive actions which might be taken to direct this more open organizational culture. I particularly support the concept of external advisory committees made up of interested users from a variety of organizations. Such committees are used very effectively in many universities and companies to provide objective outside independent oversight and guidance to programs.

Above all else, the minerals resource surveys program should be founded upon the core competence of the USGS in field based min-

eral deposit research. It is this core competence of geologic expertise which makes the USGS a unique National asset.

There should be a renewed emphasis upon geologic mapping in future Mineral resources work. High quality topographic and geologic maps, I believe, are perhaps the greatest contribution that the USGS has ever made to the citizens of the United States. Contrary to much common belief, high quality geologic maps are not available for much of the United States.

Geologic mapping really can be considered as long term geologic research because it is geologic maps which are the foundation of any exploration program no matter what commodity we are looking for today or what commodities we might be looking for in the future.

Just to say something about resource stewardship, our society demands resources, and the worldwide market will assure that this demand is met at some cost from some source. Any individual deposit contains a variable concentration of the desired commodity distributed throughout the body of rock.

We in industry will continue to mine rock as long, and only as long, as we can make a profit at it. It is in the interest of every earth resident to assure that the maximum amount of resource is recovered from any excavation of the earth.

Optimized extraction is resource stewardship, and optimized extraction requires the best available scientific information and application of the best available technology. Past Mineral resource studies of the USGS and the U.S. Bureau of Mines have contributed significantly to the basic scientific knowledge upon which the productivity of today's mining industry operates.

In summary, I would like to say that we believe there is critical National need for the Mineral resource programs. The USGS is well prepared to conduct these. We in the mining industry use the products of the USGS, and they are helpful to us in the conduct of our work. Thank you.

Mr. CALVERT. Thank you, doctor. Next, Dr. Jonathan Price.

**STATEMENT OF DR. JONATHAN G. PRICE, DIRECTOR/STATE GEOLOGIST, NEVADA BUREAU OF MINES AND GEOLOGY**

Mr. PRICE. Thank you. My name is Jon Price. I am the Director and State Geologist of the Nevada Bureau of Mines and Geology and also the Secretary/Treasurer of the Association of American State Geologists, whose 50-member States and Puerto Rico represent all the State surveys within the country.

Thank you for this opportunity to testify about an important Federal program. The main points that I would like to stress are that there are strong National needs for a Minerals program, that the USGS ought to focus on those National needs, and that there are major opportunities to accomplish more with the programs through partnerships and cooperation with State geological surveys and others who have expertise in Mineral resources.

The Minerals program within the USGS has a very fine reputation for both impartiality and scientific credibility. The basic data collected by the USGS and the former U.S. Bureau of Mines, such as regional geologic maps around mining districts, detailed descriptions of mineral deposits, and statistics on mineral production



throughout the United States and world, have greatly assisted the economies of our States and the Nation.

One particularly good example for my State is the discovery of the Carlin trend in 1961. At about that time, Ralph Roberts of the USGS was conducting fundamental geologic work that helped entice the industry to look at what at that time were fairly minor showings of gold. The industry investment in exploration resulted in the discovery of the Carlin Mine which, in turn, led to discoveries of additional deposits in Nevada of similar types, such that now the Carlin trend is one of the premier gold-producing areas in the world.

Gold mining directly provides thousands of jobs; indirectly provides tens of thousands more; helps build and maintain infrastructure of rural parts of the Nation; broadens the tax base for education and other government programs; and significantly decreases the U.S. trade deficit.

In our opinion, there are two main areas of Federal responsibility regarding Mineral resources—information and research. The Federal Government has a clear responsibility to provide information on domestic resources to the public and to policymakers. Such information is critical to the Federal Government's forecasting of the economy and the tax base, for its role as manager of public lands, and for National security.

Federal and State government scientists have a responsibility to help identify what the options for decisionmakers are and what the tradeoffs or consequences of different options may be. Governments should analyze mineral information in an unbiased manner and in context with worldwide economic and environmental factors. For example, decisions to withdraw lands from Federal mineral exploration and development should be put into this context.

Furthermore, the Federal Government has a clear responsibility as the steward of National public lands. For example, areas of high mineral potential for mineral development need to be recognized in land management decisions. This is particularly important in western States like mine where as much as 87 percent of the land is controlled by the Federal Government.

Concerning research, there is a broad need to understand natural processes that both form and destroy mineral deposits, as well as the processes that operate in nature as a consequence of mineral development.

Overall, there are tremendous needs for geologic information and analysis. The private sector typically funds exploration and development of Mineral resources. State and local governments typically fund geologic work on issues within the State and local domains. The Federal Government's role in Mineral resources should focus on critical National needs.

Through developing and strengthening Federal-State partnerships, there is a clear opportunity for the collection of better mineral production and resource data in a more cost-effective manner. The Association of American State Geologists would be pleased to work with the USGS in setting priorities that focus on National mineral issues.

In summary, there are critical National needs and Federal responsibilities regarding Mineral resources. The USGS should focus

on these National needs, cooperate with the State surveys and others with expertise in Mineral resources, avoid competition with the State surveys and private sectors and consultants on projects in the State and local domains.

The Association of American State Geologists commends Congress for directing the USGS to prepare a National plan for its minerals and other programs and for asking for external comments and advice. Thank you.

[Prepared statement of Dr. Jonathan G. Price may be found at the end of hearing.]

Mr. CALVERT. Thank you, doctor. Mr. Tipton, go ahead.

**STATEMENT OF W. HORD TIPTON, ASSISTANT DIRECTOR, RESOURCE USE AND PROTECTION, BUREAU OF LAND MANAGEMENT**

Mr. TIPTON. Thank you, Mr. Chairman. My name is Hord Tipton, and I am the Assistant Director for Resource Use and Protection with the Bureau of Land Management. I am very pleased to have the opportunity to testify before you today on BLM's role as a customer of the United States Geological Survey. I would like to just note some highlights from my testimony but request that the entire testimony be submitted for the record.

The USGS and BLM have a long history of cooperative efforts. One example is the Mineral resources survey program. Since the early 1900's, the USGS has conducted mineral assessments for Mineral Leasing Act classifications for the General Land Office, which later became the BLM.

The USGS has conducted general mineral assessments for the BLM's land-use planning since 1976 under FLPMA. The BLM and USGS have cooperated to conduct mineral assessments necessary to support BLM's land use planning process and land management programs.

New cooperative efforts began with a legislative mandate in 1976. Subsection 603[a] of FLPMA of 1976 required USGS and the Bureau of Mines to conduct mineral assessments and determine the mineral values present in proposed wilderness areas prior to any recommendations for wilderness designation. The USGS and Bureau of Mines completed those mineral assessments of all proposed wilderness areas by 1991.

Since then, the BLM and USGS have continued to cooperate on mineral assessments when the two agencies signed a Memorandum of Understanding for the coordination of mineral surveys in support of BLM's land use planning process.

These assessments are used in the planning process, and the assessments are conducted when BLM prepares a land management plan, a planning inventory, or a resource assessment under the Mineral Leasing Act. The BLM has found the 1991 MOU with the USGS to be an efficient and effective means of conducting these required mineral assessments.

Another program soon to be in USGS that provides essential support to BLM is the National Biological Service, slated to become the Biological Resources Division in Fiscal Year 1997. The NBS also has provided critical scientific information to the BLM, which we use in our land use planning and land management programs.

And, as you know, the NBS was created by consolidating the biological science programs of seven Department of the Interior agencies, including the BLM. In the past, two or more Interior agencies conducted biological research on similar, sometimes often identical, problems. This redundancy of effort duplicated staff time and was not the most efficient use of public funds.

As a customer of this new consolidated agency, the BLM has received direct assistance to meet urgent biological science needs. One problem or an example of a problem facing all the land managers is invasive exotic weeds. BLM is losing an average of 2,300 acres a day to the spread of biological wildlife.

Over 4,600 acres of new infestations a day occur when lands managed by all other Federal agencies are included. That comes to about 1.7 million acres—an area larger than the State of Delaware—of new infestations each year just on Federal lands. In fact, about 20 million acres nationally of Federal lands are infested.

Due to the vast acreage of forests, wetlands, prairies, deserts, urban greenbelts, and parks in both public and private ownership that are threatened by invasive plants, a comprehensive effort is required. Responsive to our request, the NBS has initiated a program to address this problem.

The NBS has also provided scientific research assistance on matters confined to BLM-managed lands. One problem was a high bird mortality around the plaza lakes in the potash mining areas of New Mexico. The NBS cooperated with the BLM and the minerals industries to study this problem and determine the cause of the mortality. The NBS research allowed the BLM to work cooperatively with industry and with the public in seeking a solution.

NBS and BLM have cooperated to supply the scientific research necessary to support the BLM land use planning process and management programs. The BLM looks forward to the same positive and productive relationship with the Biological Resources Division of USGS. The Biological Resources Division, like the National Mineral Resource Surveys program, will assist us in our mission to work with communities and users of the public lands to improve the health of the land. Thank you.

Mr. CALVERT. Thank you, Mr. Tipton. We are going to recess for a few minutes. We have a vote. We should be back here in about 15 minutes. So if you will be patient, we will back, and we will ask our questions. Thank you.

[Recess.]

Mr. CALVERT. The committee will come to order. My allergies are acting up. I think there are some exotic weeds out there someplace you need to take care of. I would like to thank you for your testimony, and first I would like to ask Dr. Christensen a question. I am also going to especially thank you for coming in from Denver or wherever you are coming from today.

I understand you travel quite a bit, and I know that you are probably looking for your company in the various places around the world to extract ore. As the chief geologist, you must be quite conscious of the merits of the USGS, as you mentioned in your testimony, versus other Nations' equivalent organizations. Can you briefly share your experience with the subcommittee in that regard?

Mr. CHRISTENSEN. Well, I think without a doubt the USGS stands way above any other Nation's geological survey. They really have an excellent reputation worldwide, and they are without peer. The publications of the USGS are found on geologists' bookshelves anywhere in the world, and I think that really has given the mining industry in the United States a boost and really helped us out here.

If I could follow up on that, I think one of the comments that I made is that I think one of the attributes that makes any organization function so well is communication. The USGS in the past had excellent communication and a dedication to National needs which has gotten their publications out and available for use.

We work with surveys in places such as Uzbekistan. Their surveys have exceptional academics who work for them—brilliant men and women. None of them talk to each other, and none of them put their publications out for the good of the people, and all their good intentions go for naught.

Mr. CALVERT. One question that I also have in mind. Since your initial discovery of the Carlin Mine—I guess that was before your time with Newmont, but obviously it must be somewhat folklore in Nevada. Obviously that is a big find and the aspect of what I guess they call no see-um gold. Would Newmont have begun to explore that area without Dr. Roberts's mapping work in hand to help unravel the type of geology in that area?

Mr. CHRISTENSEN. No. I think the men who went there initially looked. They had a concept. They had the idea that such a deposit might exist, and particularly their management had foreseen that large-scale mining could make very low-grade resources economic. But their attention to the geologic relationships and the possibility that the gold might exist there were drawn by Ralph Roberts's work. And they freely give credit to him as directing their attention to that area.

Mr. CALVERT. Dr. Price, thank you for taking time out to fly out from Nevada. I know that you served on Dr. Adams's review panel, as you mentioned earlier—generally agree with the conclusions and recommendations. Your State is the primary host to the biggest gold rush since my State entered the Union back in 1850.

Although California does have a few mines active today, which I visit a few, your testimony mentions the convergence, if you will, of the USGS geologic mapping efforts with the industry's willingness to invest in drilling and as they worked discovered the so-called Carlin trend near Elko, I believe it is, Nevada. I know there are a few folks that might believe that USGS should be credited with finding this trend of gold mine because of Dr. Roberts's work some years ago. What do you think? Just what kind of impact has the gold mining boom had on your State and State economy?

Mr. PRICE. Certainly the impact on the State economy has been quite large. Last year, we produced a little over \$3 billion worth of mine products, most of which was gold. A very large percentage of that goes into salaries so that feeds directly into the economy. It certainly helps in the development of infrastructure within the State, and there are lots of other side benefits.

Overall, right now we are looking at a situation in Nevada where the discovered resources are approximately 145 million ounces of

gold. This is what is already known to be in the ground, most of which will probably be able to be mined. That gives us a boom—a continuation of the boom that is likely to last for another 20 or more years. That is unprecedented in the gold mining business anywhere in the U.S. So the overall impact on Nevada has been tremendous and I would say in the broader western States as well.

The question is to whether or not the work by the USGS was very fundamental in the discovery of the Carlin trend. I think Dr. Christensen's Statement is very accurate. We have a publication that I believe was submitted into the record here some time ago about the history of the discovery of the Carlin trend that details some of those particulars.

In my opinion, the work that was being done by the Survey was good, basic, fundamental geologic work. It wasn't necessarily work that was being done to help industry come in and find those deposits. It is work that is fundamental to understanding things like earthquake hazards within the State.

It is work that is fundamental to the proper mining of anything that would be found in those lands. So it is very broadbased, fundamental work that Dr. Roberts was doing, and it was industry who saw the connection that work had and the implication that work had for the mining activities.

Mr. CALVERT. Certainly Dr. Roberts earned his salary and his pension many times over. As a spokesman for the Association of State Geological Surveys, can you elaborate earlier on the idea that the minerals information and analysis function of the former Bureau of Mines could possibly be devolved on the States as Al Gore—famous words?

Mr. PRICE. I wouldn't say it should be devolved into the States because there are certain parts of it that are clearly a critical aspect that the Federal Government has to do, the collation of the data. There is no State that would put it all together for the whole Nation.

In addition, the U.S. Bureau of Mines, now the USGS group, needs to keep track of what is going on on an international basis. We need that international context to understand what is going on our front here in the United States. And the individual States are not willing or able to look at the international side of minerals.

Where I do think there are some opportunities are where we overlap in responsibilities. And in our State, in particular, we conduct an annual minerals survey. We send questionnaires out to the companies asking them for very similar data to what the U.S. Bureau of Mines asked for. That is a duplication of effort.

There is a good chance that we could overall decrease the load of work on the companies, and at the same time save money both for the States and the Federal Government if we collaborated a little more closely in the collection of the data.

In addition, years ago—20 years back, the Bureau of Mines had liaison officers in almost all the States, and more recently—as of about five years ago, we had a liaison officer that covered California, Nevada, and Hawaii. That person was stretched too thin to stay on top of what was really going on within the industry, and even he, located in Reno, could not have time to check what numbers were really valid.

The State surveys and State departments of conservation and natural resources have people in the field on a regular basis and know how to check the numbers to make sure they are really good. So a good, close collaboration with the State surveys would assure that we are getting better data out of the system.

Mr. CALVERT. I want to ask this question also while you are here. State geologists in general obviously think—I am sure you talk to them all. What do they think about putting the National Biological Service with the USGS? Are there any State geological survey programs which also, as far as you know, routinely perform a NBS-type function?

And how well do you think the USGS could protect its traditional programs and mission from possibly raiding other parts of the budget to make sure that they had people out there counting various types of species and weeds and so forth?

Mr. PRICE. The Association itself has not taken a specific position on this issue, but there are a couple of State surveys that do have a dual function that relate to geology and biology. And it is a logical fit in some places.

Another hat that I wear happens to be as the President-elect of the American Institute of Professional Geologists, a group that looks out for the advocacy of the profession of geology. And that particular group has, in fact, taken a position with regard to the merger of other units into the USGS. And the bottom line position there is that the original mission of the USGS should not be compromised by any additions that come in.

The AIPG group has discussed the National Biological Service. There is a little bit of anxiety that perhaps it will detract from the core missions of the U.S. Geological Survey, including the Minerals program. And I think the real message there is that we need to preserve those very vital parts of the original U.S. Geological Survey.

Mr. CALVERT. Also, Dr.—Mr. Tipton, I should say—everybody has been a doctor except you today I think.

Mr. TIPTON. You noticed that too.

Mr. CALVERT. I wanted to hear from the BLM about its needs for the USGS mineral sustenance, in particular, and the Survey program, in general. Unfortunately, your testimony didn't get cleared from OMB in time for me to preview it, but I understand that the BLM in Alaska took on several of the Bureau of Mines assessment staff when the agency was closed. So is it a reasonable assumption that you will continue to use them in that same type of work?

Mr. TIPTON. Yes, sir. That is our intent.

Mr. CALVERT. How will the BLM be using the Survey's MRSP in the future?

Mr. TIPTON. It will be pretty much as we have in the past. The requirements haven't changed that much. Before we can complete a land-use plan—resource management plan, we do have to have these mineral assessments. Finishing off a resource management plan without adequate minerals data does a great disservice to the particular area in question.

Not having information at our agency is one of our biggest concerns, and the more information the better. We also have been real diligent in trying to balance our multiple-use responsibilities in all



areas to make sure that minerals has a seat at the table, fully armed with all the information we can get on high potential areas expressing full interest from the public in general.

Mr. CALVERT. Dr. Christensen, one other question. What does the industry think about the methodology of the USGS for quantitative estimates of undiscovered Mineral resources? Do they have enough data usually to support tonnage and grade estimates at least for the purpose for which they are usually generated—land-use decisions?

Mr. CHRISTENSEN. I think there is quite a bit of skepticism for the quantitative estimates. Those of us who work very hard in exploration and make it our business every day to be out looking for mineral deposits have a hard time guessing the potential of an area.

Often we pick up the exploration properties and spend tens of millions of dollars on something that we think from the geology has great potential to find nothing. Occasionally, we are surprised with something that we doubt has much potential and turns into a bonanza for us.

Quantitative estimates are extremely hard to do, and most of us have quite a bit of skepticism about the quantitative estimates. I think it is difficult to do, and, unfortunately, land-use planners want to hear something other than high potential, medium potential, and low potential.

What needs to be brought out is what type of deposit could be there—high, medium, and low potential—and what the potential value of that is. But to take and really trust that quantitative data—because it is at best very semiquantitative.

Mr. CALVERT. Thank you. I have asked all of my questions. Unfortunately, after our votes, other members had commitments that they could not return. So I apologize for them not being here, but I certainly appreciate your testimony and appreciate your answering our questions. And your additional Statements will be entered into the record, and we appreciate your attendance. This hearing is adjourned.

[Whereupon, at 4:18 p.m., the subcommittee was adjourned and the following was submitted for the record:]

PREPARED STATEMENT OF DR. PATRICK LEAHY

STATEMENT OF DR. P. PATRICK LEAHY, CHIEF GEOLOGIST  
U. S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR TO  
COMMITTEE ON RESOURCES  
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES  
U. S. HOUSE OF REPRESENTATIVES, MAY 30, 1996

Mr. Chairman, I am pleased to be here today to express the Geological Survey's support for the National Research Council's (NRC) review of the USGS Mineral Resource Surveys Program (MRSP). In the March 1996 issue of the scientific magazine *Geotimes*, Senator Larry Craig and Representative Ralph Regula both focused on the critical need for geologic information to manage public lands and to establish policies that strike a balance between the necessity for continued economic development of our nonfuel mineral resources and the necessity to protect our natural resources. The MRSP provides the objective scientific information required by decision makers to formulate effective land management and development policies. The National Research Council reaffirms these goals in its recent review and recommends several changes to the Program that reinforce our role as the leading source of minerals information in the United States and focus our efforts to better serve our customers and cooperators. In particular, three of the major recommendations made by the NRC will have significant impact on our future activities: (a) making greater use of collaborators in the development of scientific projects, (b) emphasizing the development of core competencies in mineral deposit research and minerals-related environmental research, and (c) elevating the Geochemical Backgrounds and Baselines component to subprogram status to reflect its national importance.

I will first provide a brief background on the MRSP, a history of the NRC review, and then specific comments on the NRC recommendations.

THE USGS FEDERAL ROLE IN MINERAL RESOURCES

- Role Authorized by Congress - The USGS Organic Act authorizes the USGS to conduct "an examination of the geological structure, mineral resources, and products of the national domain." This basic authority was amended in 1962 to authorize mineral resource studies outside of the national domain i.e., international localities. Congress has directed Federal departments and bureaus to consider mineral-resource information in managing the Nation's lands and resources, and has required, defined, and reemphasized the Survey's responsibility in a number of laws to assess the mineral resources of the Nation and provide timely mineral-resource information.
- Unique Scientific Expertise and Capability (core competencies) - The USGS has the world's only comprehensive integrated scientific staff of geologists, geochemists, geophysicists, and mineral-resource analysts, with the scientific expertise, data bases, technology, and research facilities needed to provide estimates of the probable occurrence, types, amounts, and qualities of undiscovered mineral resources; to predict and evaluate options for mitigation of possible environmental consequences of exploration and development; and to analyze, interpret, and disseminate the results to our users.



- **Objectivity and Public Availability of Data** - The USGS has neither a financial or political interest in mineral development nor land management or regulatory responsibilities. As such, the USGS provides earth science information from an unbiased perspective and can be entirely objective in its estimates of mineral potential and prediction of possible environmental impact. These data are disseminated in a wide-variety of formats and used by diverse stakeholders such as industry, Federal and State regulators, environmental groups, and academia.
- **Non-Profit Function and National Security** - Industry conducts site-specific research directed at locating mineral deposits because this research gives them a competitive advantage in exploration. These companies do not conduct regional or national mineral-resource studies and the current results of private exploration research are generally not available to the public. The USGS is a long-term stable repository of minerals information that the Nation can count on in preserving our national security and the national infrastructure.

#### CURRENT USGS MINERAL RESOURCE SURVEYS PROGRAM

The USGS has addressed mineral-related national issues since its inception in 1879. As society and the economy have evolved, minerals issues have expanded from those associated with the creation of wealth, jobs, and infrastructure to include sustainable development of resources and protection of the environment. Currently, society acknowledges a need to preserve the ability of future generations to make resource choices rather than forcing those generations to face a world depleted in natural resources, or one damaged by the unwise development and use of those resources. As the issues have expanded and priorities have changed, the MSRP has increased its efforts to assist those who manage public lands and resources, set public health and safety standards, formulate economic policy, and minimize the environmental effects of minerals development, while continuing to provide information to maintain secure and reliable supplies of raw materials.

The USGS Minerals Program is organized to:

- Serve as the national integrator and disseminator of mineral-resource information by connecting all of the Nation's mineral-issue communities including, Federal, State, and local governments, industry, and academia.
- Serve as a scientific advisor to Congress and government agencies.
- Serve as a leader in the mineral-resource community by
  1. Facilitating interaction among community members.
  2. Identifying issues of regional and national importance
  3. Monitoring trends
  4. Providing public access to information
  5. Collecting new data to fill gaps in available information
  6. Adding value to existing data through synthesis, analysis, and interpretation

As written in the National Plan, the Minerals Program addresses four major issues of national importance. Recent accomplishments of the Program are given in Appendix A.

- **Land Stewardship** - The presence of minable mineral resources on Federal lands exerts significant pressure on land-managers to develop responsible resource plans. The MRSP

provides Federal land-managing agencies with unbiased scientific information for land-use planning in the form of resource and environmental assessments. These assessments yield information on where, how much, and what kind of mineral resources are likely to be discovered; identify possible environmental consequences associated with development; and allow agencies to formulate congressionally mandated land-use plans and compare the values of alternative uses.

- **Mitigation** - Abandoned mines and associated acidic drainage are major issues for the Nation. There are potentially thousands of abandoned mine sites and hundreds of moderate to severe acid-mine drainage problems. The cost of remediating these sites is unknown but is expected to be high. Research on these problems can save taxpayer money by providing the scientific information that can allow the establishment of realistic guidelines for remediation. As compared with past activities conducted by the Minerals Program, the National Plan places a greater emphasis on mineral-environmental assessments and research supporting mitigation of environmental impacts related to extraction and use of mineral resources. These changes have come in response to requests made by Federal, State, and private customers and cooperators. Minerals Program scientists work closely with other experts in the USGS, such as soil scientists and hydrologists, to respond to this multidisciplinary issue.
- **Resource Supply** - Minerals and mineral products are important to the U.S. economy, accounting for an estimated \$395 billion of the gross domestic product in 1995. The expanding appetite for minerals in the United States and the world requires new techniques and concepts to better explore for minerals and provide accurate mineral resource information for national policy decisions. Foreign sources account for significant percentages of U.S. consumption of nearly 70 important mineral commodities and many of these imported minerals come from politically unstable regions. The MRSP plays a pivotal role in helping the Nation meet its mineral demands by providing objective, mineral deposit information and conducting research on the occurrence of mineral deposits. This information is equally useful to policy makers, land managers, industry, regulators, economists, and educators.
- **Information** - The MRSP has the unique capability within the USGS to provide national geochemical, geophysical, mineral deposit, and mine geology databases. As part of every assessment, we acquire the fundamental background and/or baseline geologic information that provides the scientific foundation for all our products. These continuously updated data bases are accessible to our users on CD-ROM's and other publications, giving the user objective information to address a spectrum of minerals issues.

With the recent transfer in January 1996 of the minerals information function to the USGS from the U.S. Bureau of Mines (USBM), the USGS is now in the unique position of being the comprehensive source for domestic mineral deposit and mineral commodity data and international mineral commodity information. We also have the capability to analyze both the sustainability and economics of mineral and materials supply and demand in our society. During the transfer of the minerals information function, the continuity of service to the public was preserved and the critical commodity and indicator reports were issued with minimal disruption. Although not a charge of the NRC review panel, a recommendation was made to modify the National Plan to "include activities recently transferred from the USBM to the USGS." Over the next several months, an

integration committee comprised of scientists and managers from the transferred minerals information function, from the Minerals Program, and from other Programs of the USGS will formulate a plan to blend the minerals information activities into the USGS Minerals Program and include their activities in an updated five-year National Plan.

MRSP Program Appropriations from 1992 to present:

Year	FY92	FY93	FY94	FY95	FY96
Appropriation (\$M)					
MRSP	50.3	48.3	46.9	44.6	43.1
USBM (transferred function)					16.0

Staff in the Minerals Program has also been significantly reduced from 639 full time positions in 1992 to 280 full time positions in 1996. The transferred minerals information function includes 168 additional full-time positions. Upon combination, the staff of the Minerals Program will total 448 persons.

#### NATIONAL PLAN AND THE NRC REVIEW

Congress directed the USGS in 1994 to develop a five-year National Plan for Federal mineral resource activities. This plan was reviewed by staff and members of the USGS, Department of the Interior, and Congress. In 1995, the USGS requested that the NRC conduct a study to:

- Evaluate the National Plan of the MRSP in terms of the Nation's long-term needs for minerals research and information, the completeness and balance of the program, and the scientific significance, credibility, and relevance of the overall program.
- Provide recommendations as to how the National Plan could be modified to improve its effectiveness in meeting the long-term needs of the Nation.

Our willingness to participate in this review demonstrates our commitment to (1) focus research on high-priority national needs and (2) develop priority-setting mechanisms that ensure maximized benefit for the use of taxpayer dollars. The MRSP is directly integrating the NRC review into its program planning and development process. On May 1, 1996, Dr. Sam Adams, Chair of the NRC review panel, and Dr. Craig Schiffries, Director of the NRC Board on Earth Sciences and Resources, presented the results of the NRC review to 70 scientists, project chiefs, and managers of the USGS Minerals Program. This presentation was the center piece of a three-day meeting to develop and focus MRSP program activities for the next five years and formulate a new five-year National Plan. Also incorporated into the three-day meeting were presentations and discussions by four panels of cooperators and customers who represented the mining industry, academia, Federal and State agencies, and private consultants.

The National Research Council in their report makes many important recommendations to strengthen the USGS Minerals Program. Most importantly, the NRC report stated:

*"...the panel strongly endorses the scientific value of continued mineral resource research. The panel's confidence in the overall value of the MRSP reflects past mineral resource program successes, the conviction that important resource problems of national relevance will have to be addressed in the future, and the uniqueness of the USGS in terms of technical capability, scope, national jurisdiction, international cooperation, and credibility."*

The panel continues by commenting:

*"The MRSP Plan describes important objectives and the means to accomplish them. Among these objectives, the growing emphasis on research on the geochemical behavior of mineral deposits and the environmental implications of their development are properly emphasized."*

The national issues addressed by the MRSP are consistent with those envisioned by the NRC review panel. The panel states:

*"...the nation requires an unbiased Federal agency to provide reliable information on mineral resources to:*

- promote wise land-use management*
- promote public health and safety*
- preserve and improve environmental quality assure resource supply, and*
- contribute to national security, sustain prosperity, and improve the quality of life."*

Already the Minerals Program has started to implement the four general recommendations of the review panel by:

- (1) writing more clearly articulated statements of the Program's vision, mission, and objectives against which the success of the Program can be measured,
- (2) making greater use of collaborators in the development of scientific projects to more efficiently fulfill the mission of the Program,
- (3) placing greater emphasis on the development of core competencies in mineral deposit research and minerals-related environmental research to be more responsive to future national needs, and
- (4) involving external reviewers or advisory panels in the planning and priority setting process to better meet the needs of the user community.

We also agree strongly with the NRC's recommendation that "The Geochemical Backgrounds and Baselines component should be elevated to subprogram status to reflect the national importance of this activity." The USGS believes that significant savings to the public, local governments, and industry have been realized through this component of the Minerals Program and strengthening this portion of the Program would yield further benefits.

As part of our response to the NRC review, the MRSP plans to hold technical workshops with cooperators and users of minerals information during the months of June and July to discuss new or continuing activities and the more detailed recommendations made in the review. These discussions will lead to the development of a refocused National Plan. A draft of the revised National Plan is scheduled for completion at the end of July. The MRSP welcomes the opportunity to present the draft Plan to Congress for its consideration.

## APPENDIX A: RECENT ACCOMPLISHMENTS OF THE MINERALS PROGRAM

Users of MRSP information are Federal, State, and local, land- and resource-managing agencies, the minerals industry, and the public. Mineral-resource and related environmental information necessary for efficient and responsible management of the public lands is used by the BLM, Forest Service, Bureau of Indian Affairs, Department of Energy, and Department of Defense, the National Park Service, EPA, the Department of Justice, and the Department of State. Some specific examples of our accomplishments in the last few years:

- Provided objective mineral-resource, geochemical, and geological information to the Forest Service in the following Forests: Custer-Gallatin in Montana (bordering Yellowstone National Park), Chugach and Tongass in Alaska, White River and San Juan in Colorado, and San Bernadino in California. The Forest Service has or is in the process of formulating congressionally mandated resource-management plans based on the information provided.
- Provided objective mineral-resource, geochemical, and geological information to BLM in the following Resource Areas: Barstow and Ridgecrest in California, Winnemucca in Nevada and Surprise in California, Malheur and Jordan in Oregon, and Roswell and Mimbres in New Mexico. The BLM is incorporating the data into new resource management plans.
- Examined the environmental impact of numerous mercury-rich deposits that are scattered over several thousand square kilometers in southwestern Alaska. The USGS, in cooperation with the U.S. Fish and Wildlife Service, the Calista native corporation, and private citizens, is measuring mercury concentrations in sediment, water, and fish. The stream sediments and fish collected near the mines contain elevated concentrations of mercury, but the mercury in fish is below the safe level recommended by the Food and Drug Administration and mercury concentrations in stream waters are within safe water quality standards.
- Set for release in 1996 is a series of maps providing locations, summaries of geologic features, and geologic settings for mineral deposit in mainland Alaska, the Russian Far East, and Western Canada. These maps were produced through an unprecedented cooperative effort with Russian, Canadian, and Alaskan organizations to correlate the occurrence of known deposits and mineralized belts across the northern Pacific and to provide information critical to the exploration for new deposits.
- Benefited the economic health of the Western United States through basic research on the origin of gold and silver deposits. The mining industry has discovered about 190 million ounces of gold in Nevada, based in part upon USGS cooperative research (with the State, academia, and industry) on the geologic setting, nature, and distribution of economic mineral deposits. Private industry jobs and associated businesses were created as a result of these discoveries.
- Characterized the environmental signatures of mineral deposits in more than 30 Colorado mining districts as part of a state-wide mineral-environmental assessment. The resulting geochemical classification of drainages is being used by BLM in a study to identify and prioritize sources of water quality impairment in Colorado. This work was conducted in

cooperation with the Colorado Department of Natural Resources, the EPA, BLM, and the U.S. Forest Service.

- Completed studies assessing the effects of contamination attributed to the abandoned Summitville mine and other nearby sources in southwestern Colorado. Alfalfa, which is grown for cattle feed, is irrigated with waters that drain the Summitville site. These waters contain higher concentrations of dissolved metals than other waters in the region. However, the metals in the alfalfa were well below levels considered to be toxic to cattle. This finding helped area farmers save millions of dollars from lost sales.
- Contributed to common-sense management of asbestos. USGS studies on asbestos show that not all mineralogical forms of this mineral are a cancer hazard. In the past the medical community did not include mineralogical data in their studies and did not distinguish among different types of asbestos. Millions of dollars were spent on asbestos removal, much of it unnecessary. Based on data supplied by USGS scientists, a group of epidemiologists at the University of Vermont published in *Science* an influential paper that described the lack of evidence that asbestos causes health risks. The EPA subsequently acknowledged that much asbestos removal is unwarranted. The amount of money wasted on unnecessary asbestos removal has decreased significantly.

My name is Jon Price. I am the Director and State Geologist of the Nevada Bureau of Mines and Geology. I am also the Secretary-Treasurer of the Association of American State Geologists, whose members include the State Geological Surveys of all 50 states plus Puerto Rico. State statutes direct the State Geological Surveys to provide basic earth science information for their state governments. We work on issues of mineral, energy, and water resources; natural hazards; and the environment within our states. We collect data on our own, and we compile data from federal sources (including the USGS), local governments, other state agencies, university researchers, and the private sector. We then analyze this information and report on it for the benefit of the health, safety, and welfare of the citizens of our states and for economic diversity, development, and sustainability.

Thank you for this opportunity to testify about an important federal program. The main points that I would like to stress are that

- there are strong national needs for a federal program in mineral resources,
- the USGS should focus on these national needs, and
- the federal government can accomplish much through partnerships and cooperation with State Geological Surveys and others with expertise in mineral resources.

Please note that the minerals program within the USGS, which soon will include not only the Mineral Resource Surveys Program but also the Information function of the U.S. Bureau of Mines, has a fine reputation for impartiality and scientific credibility. The basic data collected by the USGS and the former U.S. Bureau of Mines, such as regional geologic maps around mining districts, detailed descriptions of mineral deposits, and statistics on mineral production throughout the United States and the world, have greatly assisted the economies of our states and the nation.

A particularly important example of benefit to the nation is the discovery of the Carlin gold deposit in 1961. At that time Ralph Roberts of the USGS was conducting fundamental geologic work in northern Nevada, consistent with the USGS Organic Act, which specifies "classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain." Dr. Roberts' work helped entice geologists from industry to take a close look at what appeared at the time to be minor showings of gold. The industry investment in exploration resulted in the discovery of the Carlin deposit, which in turn led to new discoveries nearby, such that the Carlin trend is now one of the premier gold fields of the world. Discoveries of Carlin-type and related deposits have helped to diversify the economies of western states. Gold mining directly provides thousands of jobs, indirectly provides thousands more, helps build and maintain infrastructure in rural parts of the nation, and broadens the tax base for education and other government programs. Highly skilled miners, including mechanics, engineers, and computer technicians, both women and men, earn the highest average wages of any industry within my state. In 1995 gold production in the United States, 65% of which came from Nevada, was worth \$4 billion and accounted for 15% of worldwide production. Net exports of gold from the United States, valued at \$3.1 billion in 1995, significantly decrease the U.S. trade deficit. Known resources in the western states are immense, and industry continues to make new discoveries. The current boom in gold mining in the United States already has far surpassed other peak periods of historic gold production. We estimate that the resource base in Nevada is sufficient for industry to sustain the current level of production for at least 20 years.

Please note that the geologic groundwork laid by the USGS in northern Nevada was not corporate welfare; it was the collection and analysis of basic information that today is

also important in understanding geologic hazards, water resources, ecology, and environmental consequences of land use.

## NATIONAL NEEDS

In our opinion, there are two main areas of federal responsibility regarding mineral resources -- information and research. These are, however, linked and it is difficult to make a clear distinction between the two. States also have responsibilities in these areas, but I will concentrate on the federal responsibilities.

### Information

The nation needs mineral resources to maintain and improve our economy and our quality of life. For the most part we get our resources on the world market as cheaply as possible. The mineral resources that we need could come from either foreign or domestic sources, but there are many advantages to domestic production, including providing new wealth (for the economy, employment, taxes, and international balance of payments) and optimizing environmental stewardship of the Earth.

The federal government has a clear responsibility to provide information on domestic resources to the public and to policy makers. This includes information on production, reserves, discovered resources that haven't made it into the strictly defined reserve category, and undiscovered resources. Such information is critical to the federal government's forecasting of the economy and tax base, for its role as manager of public lands, and for national security.

Federal and state government scientists have a responsibility to help identify what the options for decision makers are and what the tradeoffs or consequences of different options may be. Government should analyze mineral information in an unbiased manner and in context with worldwide economic and environmental factors. For example, decisions to withdraw lands from mineral exploration and development should be put into this context.

Furthermore, the federal government has a clear responsibility as the steward of national public lands. Mineral information and analysis are critical to environmentally responsible development and land management. For example, areas of high potential for mineral development need to be recognized in land-management decisions. This is particularly important in the western states, where as much as 87% of the land is controlled by the federal government.

Please note that what I have said about the national need for mineral information applies not only to metallic mineral resources, which have been the traditional focus of the USGS Mineral Resources Surveys Program and of the U.S. Bureau of Mines Information and Analysis function, but also to construction raw materials (sand and gravel, crushed stone, gypsum, etc.), energy resources (coal, oil and gas, uranium, and geothermal resources), and water resources (both surface and ground water). We increasingly see the need for integration of information on these resources, along with information on ecological resources and socioeconomic factors, in decision making. The federal government could improve its internal integration of information and could establish stronger partnerships with states to collect and interpret that information.



A vital and fundamental component of information needed in the analysis of mineral issues, including assessment of undiscovered resources and evaluation of potential environmental impacts, is geologic mapping. The National Cooperative Geologic Mapping Program in the USGS, which has a highly successful 50:50 matching component with State Geological Surveys, does not receive enough funding to meet all the geologic mapping needs of the federal government. Although the USGS Mineral Resource Surveys Program does some geologic mapping as part of its projects, the overall geologic data base is incomplete. For example, only approximately 13% of the land in Nevada is mapped at a scale necessary for critical land-management decisions. Detailed geologic maps should be available for use by the USGS minerals program as well as by other federal programs as needed, such as the USGS hazards, energy, and water programs.

## **Research**

Apart from the aforementioned needs for mineral information, there is a broad need to understand natural processes that both form and destroy mineral deposits as well as the processes that operate in nature as a consequence of mineral production. The underwriting of this type of scientific research is clearly a government responsibility when it broadly benefits the public.

Understanding the origin of mineral deposits helps to assess the nation's undiscovered resources by defining the geological environments in which mineral deposits form. Research on genetic and empirical models of ore deposits and on mineral systems is essential to this understanding.

The nation has become increasingly concerned with the environmental consequences of mining. It is critical that we understand how mineral deposits are weathered and eroded under natural conditions, what pre-mining conditions were, and how the metals and potentially toxic elements associated with those deposits will behave in the surface environment during and after mining. Our very existence on Earth, including conserving natural resources and sustaining the economy and the environment, depends on our ability to understand such natural systems.

## **FOCUSING ON NATIONAL NEEDS**

By focusing on national needs in the areas of information and research, the USGS can avoid undue competition with the private sector and others who address site-specific and local problems. There are tremendous needs for geologic information and analysis. The private sector typically funds exploration and development of mineral resources. State and local governments typically fund geologic work on issues within the state and local domains. The federal government's role in mineral resources should focus on critical national needs.

## **PARTNERSHIPS AND COOPERATION**

State Geological Surveys cooperate with the USGS on many fronts, including such programs as the National Cooperative Geologic Mapping Program, the National Earthquake Hazards Reduction Program, cooperative projects with the Water Resources Division and with the National Mapping Division, and Memoranda of Understanding concerning the collection of mineral statistics.

Mineral and energy resources are significant components of most state economies. Therefore most states have strong commitments to providing detailed information on production, reserves, and resources within their borders. There is a clear opportunity for the collection of better data in a more cost effective manner through developing and strengthening federal-state partnerships. Only the federal government, however, can practically collate, integrate, and analyze such information from a national and global perspective.

Appropriate partnerships can be developed between the USGS minerals program and industry, universities, State Geological Surveys, and on rare occasions, local governments. To help maintain the focus on critical national needs, the USGS should seek external comments and advice from constituents at nearly all levels of their programs. Integrating industry and State Geological Survey data and knowledge into mineral resource assessments and integrating university expertise into research projects can improve the products and cost effectiveness of the USGS minerals program. The Association of American State Geologists would be pleased to work with the USGS in setting priorities that focus on national mineral issues.

## SUMMARY

In summary, there are critical national needs and federal responsibilities regarding mineral resources. The USGS should focus on these national needs, cooperate with State Geological Surveys and others with expertise in mineral resources, and avoid competition with the State Geological Surveys and private-sector businesses and consultants on projects in the state and local domains.

The Association of American State Geologists commends Congress for directing the USGS to prepare a national plan for its minerals and other programs and for asking for external comments and advice. Thank you.





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