S. HRG. 109–602

# OIL SHALE PROVISIONS OF EPACT

## HEARING

BEFORE THE

## COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

ON

THE IMPLEMENTATION OF THE OIL SHALE PROVISIONS OF THE ENERGY POLICY ACT OF 2005

GRAND JUNCTION, CO, JUNE 1, 2006

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# CONTENTS

## STATEMENTS



## APPENDIXES

### APPENDIX I



### APPENDIX II

# OIL SHALE PROVISIONS OF EPACT

**THURSDAY, JUNE 1, 2006**

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
*Grand Junction, CO.*

The committee met, pursuant to notice, at 9:45 a.m., at Grand Junction City Hall Auditorium, 250 North Street, Grand Junction, CO, Hon. Pete V. Domenici, chairman, presiding.

## OPENING STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. We'll come to order. Good morning, everyone. My name is Pete Domenici. I'm the Senator from the State of New Mexico. At this time in my life, I happen to have the honor of chairing the U.S. Senate Committee on Energy and Natural Resources. We're having a field hearing in your city and in a little while, we'll explain some basic rules to all of you. That's just the way it has to be in order to conduct our business in an orderly manner. We hope that will be accommodating to you all and we're most appreciative that you would all take some time, some of your precious time, to join us here today. So once again, first of all, good morning.

I want to thank each of you for coming today, once again. I want to thank, in particular, Senator Salazar for joining me here today. He's a member of the committee, which I have just enumerated to you. He's been a very valued member, although he's only been on the committee for a very short period of time.

We have a very enviable record, that committee. In that short period of time, we produced the first comprehensive energy policy for these United States in the last 15 to 20 years. And we believe it has set the path and set the record straight, for quite some time, for America's energy future.

It was a real luxury on my part to have him as a member of the committee and I want to personally thank him, for the first time in the presence of the members of his constituency here in Colorado, for all the hard work he spent in putting that bill together and getting us to where we are today.

He and I spent the day yesterday looking at some of the oil shale research projects currently underway, in this part of the United States. In a moment, I'll ask him to make a brief statement as we commence this hearing. In the short time that he spent in the Senate, he has proven to be a valuable part of the committee and I have come to value his input immensely.

I also want to welcome a very long-time dear friend, Senator Orrin Hatch, who is here before us. He's sitting at the witness table. He could either be there or up here. I choose, every now and then, when I can, to put him down there.

[Laughter.]

The CHAIRMAN. He didn't ask me why, but that's why we're going to do it this way. And then, when we're finished with the testimony, he can come up here and join us, if he would like, and we hope that he will. Senator Hatch has recognized the urgency of our Nation's energy situation and the potential that this resource brings for mitigating our energy shortfalls.

As everyone here knows, we face enormous energy problems in this great country of ours and many are aware of the potential resources found in this region. With over two trillion barrels of oil in place, we all understand the significance of oil shale.

The subject we are considering today can affect you here in Colorado, and your neighbors in Utah and Wyoming, in an immense way. We want to be part of having that take place in a manner that is good for all of you, not bad for you, that it is good for all of us, and good for America, because we believe that is clearly its potential.

Some will argue that we need to conserve more. Others think adding increased efficiency to our cars and trucks or switching to renewables is the answer. There are others who would argue that oil shale is a bad bet, pointing to the past boom and bust. I believe that it is eminently clear that things are different now. We are more dependent on foreign oil than ever before. Our world is a more fragile and unstable place than it was before and energy prices have soared compared to where they were the last two times that we ventured into oil shale. But it's also different in terms of what it means to you.

We're not going to follow the mistakes of the past. We're going to make sure that we do this right for you, and with you, for your communities, and for the environment, and with your communities. With private citizens, and local government, and industry all working together as a group, we can make this work for America, if it is going to work at all.

And we note some signs up here that say: "Slow." I don't think anybody intends to go too fast successfully developing this vast oil shale resource. It will mean so much more to America than just finding one more source for energy. It could literally shake the world. Most are familiar with the traditional recovery process where the rock is mined and then heated in a retort. We're also seeing an exciting new and innovative process, such as shale's in-situ process that will heat the rock in the ground in order to recover the oil.

Senator Salazar and I, and those who work with us, are very proud of the Energy Policy Act that we passed last year. This bill is already having an impact and is setting the stage for sound development of these resources over the next several years. As it relates to oil shale and tar sands, the energy bill directs the Secretary of the Interior to make certain lands available for leasing for Research and Development, complete a programmatic environmental impact statement for a commercial leasing program, issue

final regulations, and implement a commercial leasing program in consultation with the States. It also directs the Secretary of Energy to establish a task force that will develop a program to coordinate and accelerate the commercial development of oil shale and tar sand resources, and assigns responsibility to the Office of Petroleum Reserves to coordinate, and evaluate, and promote the activities of the Federal Government.

It's our intent here today to get a better understanding of the local perspective on these provisions and the potential development of oil shale in the region.

Now, let me turn to Senator Salazar, a member of the committee, before we start with the committee process, and before the eminent Senator Hatch speaks.

Senator Salazar.

**STATEMENT OF HON. KEN SALAZAR, U.S. SENATOR FROM COLORADO**

Senator SALAZAR. Thank you very much, Chairman Domenici. Let me, at the outset, just say to all of the people who are here from Colorado that we are fortunate to have the Chairman of the Senate Energy Committee here in our State today. I thank him for coming to our State to listen to our issues and the potential that we have with oil shale, as well as with respect to concerns that people also have in terms of how we move forward.

I will say this about the chairman, he is effective and I very much enjoyed my work with him in my first 18 months in the U.S. Senate. I think the production last year of the National Energy Policy Act of 2005 was a milestone in the Nation's national security and it would not have happened had it not been that Senator Domenici helped lead what became a very bipartisan effort that garnered 82 votes in the U.S. Senate for the bill that came out of his committee. So I appreciate his leadership, his mentorship, and his friendship. He comes from the Land of Enchantment, just to the south of our State, and we often talk about the common histories of New Mexico and Colorado, and I appreciate his presence here today.

I also want to recognize and appreciate my good friend from Utah, Senator Orrin Hatch. We share not only the possibility of oil shale between Colorado and Utah, but Orrin Hatch has been one of the Senators who has served long in the U.S. Senate, making sure that we are keeping our country strong, and dealing with some of the toughest issues of our country.

I want to also, just quickly, recognize some members of our committee and staff who have made this hearing possible here in Grand Junction: Bruce Evans, who is our Staff Director for the Energy Committee; Dick Bouts, who works on the Energy Committee—if you'll raise your hand, Dick?—and David Marks, also on the committee—David, if you'll raise your hand?—and Sara Zecher; and from my staff, Steve Black, who works on energy issues and helped write major pieces of the energy legislation last year; and Trudy Kareus, Mary Beth Buescher, Matthew McCombs, and Cody Wertz, who are also on my staff.

I want to also recognize Derek Wagner, who is here from Senator Allard's office, today. Senator Allard could not be here today. And

I want to also recognize Rich Baca from Congressman John Salazar's office.

Let me, at the outset, just repeat my appreciation to you, Mr. Chairman, for bringing the Senate Energy and Natural Resources Committee here to Grand Junction today, and to the Western Slope. The sheer volume of potential recoverable oil locked up in shale is indeed, tantalizing for all of us.

The Energy Information Service has indicated that there is somewhere between 500 billion and 1.1 trillion barrels of oil that could be recovered from the oil shale deposits in Colorado, Utah, and Wyoming. For a Nation that is very wary of the high prices that we are paying at the pump, and which is very worried about our overdependence on those sheiks and kings of the Middle East and other places, where the large global reserves of oil currently are held, it is important that we take a look at these—at this strategic opportunity for the United States of America.

In fact, the amount of oil that we believe is trapped in the oil shales of our three States, is four times the amount of oil currently estimated to be beneath the sands of Saudi Arabia. That tells you the sheer size of the resource. Colorado's blessed to be home of a significant part of these resources and we're willing to work with our Nation, as we address the potential of oil shale development.

But we are also highly aware of the challenges that oil shale poses and has posed in the past. We know the efforts of oil shale extraction in Utah into Colorado in the early 20th Century. We remember the energy crisis of the 1970's and the oil shale mania that that created. And we vividly remember, not so long ago, the Black Sunday of 1982. Our memories of the failures and successes of Western resource development are long and mature, but it also offers us wisdom from those lessons learned about how we ought to proceed in the future.

We know that often, in the past, the non-Western interests sometimes have driven decisions with respect to our development in the West. And in the past, at times, we have not controlled the development or enjoyed the full benefits of that development. The Western communities should have a prominent voice in the debate of whether oil shale development is reasonable and responsible.

Today's hearing is a very good start, because we will hear from those communities that may prosper or suffer, from those whose water and land could be affected, and from those who have stood here before and might do it differently this time around, based on lessons that we learned in the past.

Our shared experiences with resource development in Colorado have taught us to be cautious and methodical, when others may be impatient and frenzied. When we rush the development without considering the effects of local communities' land and water, we sometimes end up, as we have, on the ground, MSEP or BLM may allow gas exploration and production in the midst of the watersheds of the town of Palisade and the city of Grand Junction.

Before we take the bigger steps with regard to oil shale, we must answer several questions that are of vital importance to western Colorado. First, we must determine the economic feasibility of oil shale development. Even in small-scale private projects, the economic feasibility of oil shale extraction is still uncertain and no-

body has even attempted to build a commercial-scale plant at this point. As part of this analysis, we must determine whether oil shale will be a sustainable and stable element in the regional economy.

This State has endured dozens of busts, when the price of commodities have suddenly changed, so we need to make sure that, as we move forward with oil shale development, we are doing it in a manner that is sustainable over time.

Second, we need to make sure we are protecting Colorado's land and water. The techniques we use to extract the oil should not place our natural heritage at risk. The land and water of western Colorado are just too important to the economy and our way of life to be compromised for an uncertain oil future. For that reason, the energy bill that we passed last year, required that we move forward in a sequential and thoughtful manner, as we contemplate commercial leasing of oil shale.

Third, we must assure that Colorado's water rights are protected and gain a better understanding of the amounts of water that will be used with regard to oil shale development. On the Western Slope, water, we all know, is as precious as oil and we need to know how we will protect the very life blood of the Western Slope.

Finally, I agree we must be realistic about the role that oil shale can play in the Nation's quest for energy independence. The sad truth is that neither oil shale nor any other domestic production can satisfy America's appetite for oil. We consume 25 percent of the world's oil, yet we have only 3 percent of the world's reserves here in our country. If we can address all the challenges associated with oil shale development, oil shale can play a significant role in reducing our dependence on foreign oil. But it alone will not set America free from our dependence on foreign oil. We must also embrace the combined strategies of conservation, improve deficiency, and renewable energy resources. These are large steps that we can take, and are taking today, to overcome our national security crisis, stemming from our dangerous overdependence on foreign oil.

Now, this is not to say that oil shale will not play a major role in our energy future, but we in Colorado have learned that oil shale is not an easy resource to develop. As we try one more time to extract oil from Western shale, let us be sure to act prudently to protect the land, the water, and the people of Colorado, Wyoming, and Utah.

Mr. Chairman, I thank you for agreeing to hold this hearing. I hope there will be many, many more opportunities for Western communities to shape this process. The West has a responsibility and a right to help determine what role oil shale will play in our Nation's future. Thank you.

[The prepared statement of Senator Salazar follows:]

PREPARED STATEMENT OF HON. KEN SALAZAR, U.S. SENATOR FROM COLORADO

Thank you, Mr. Chairman. On behalf of everyone here today, and the great State of Colorado, I want to welcome you to Grand Junction. It means a lot to me that my Chairman and colleague on the Senate Energy and Natural Resources Committee is here to gather information about oil shale, its prospects for development, and what it means to communities in western Colorado.

I also want to say thank you to all the witnesses who are here today. I look forward to hearing your testimony.

The sheer volume of potential recoverable oil locked up in shale is tantalizing: the Energy Information Agency estimates that between 500 billion and 1.1 trillion barrels of oil could be recovered from oil shale deposits in Colorado, Wyoming, and Utah. For a nation that is weary of high gas prices and anxious to kick its addiction to foreign oil, our oil shale resources—four times larger than Saudi Arabia's oil reserves—inspire hope for a more energy independent future.

Colorado is blessed to be home to these resources and, as evidenced by current oil and gas development, we are willing to do more than our share to provide for the nation's energy needs.

But we are also highly aware of the challenges that oil shale poses. We know the futile efforts at oil shale extraction in Utah and Colorado in the early 20th century. We remember how the energy crisis of the 1970's stirred an oil shale mania—a mad rush to unlock the oil at any cost. And, most vividly, we remember "Black Sunday" in 1982, when this oil shale speculation busted, leaving western Colorado communities holding the bill.

Our memory of the failures and successes of Western resource development is long, mature, and offers invaluable wisdom to us today.

We know that too often we have allowed the whims of non-western interests to drive our development. We neither control the pace of development nor enjoy its full benefits, yet we pay the greatest costs and assume the greatest risks.

Western communities should have prominent voices in the debate over whether oil shale development is reasonable and responsible. Today's hearing is a good start, because we will hear from those whose communities may prosper or suffer, from those whose water and land could be affected, and from those who have stood here before and might do it differently this time around.

Our shared experiences with resource development in Colorado have taught us to be cautious and methodical when others are impatient and frenzied. When we rush to development without considering the effects on local communities, land, and water, we end up as we have on the Grand Mesa, where the BLM may allow gas exploration and production in the midst of the watersheds of the Town of Palisades and the City of Grand Junction.

Before we take big steps forward with oil shale, we must answer several questions that are of vital concern to western Colorado.

First, we must determine the economic feasibility of oil shale development. Even in small-scale pilot projects, the economic feasibility of oil shale extraction is uncertain, and nobody has even attempted to build a commercial scale plant. As part of this analysis, we must determine whether oil shale will be a sustainable and stable element in the regional economy. This state has endured dozens of busts when the price of a commodity has suddenly dropped; will we suffer another if we invest millions in oil shale and the price of crude drops from 70 to 40 dollars a barrel?

Second, we need to ensure the protection of Colorado's land and water. The techniques we use to extract the oil should not place our natural heritage at risk—the land and water of western Colorado are just too important to the economy and our way of life to be compromised for an uncertain oil future. For that reason, the energy bill that we passed last year requires a comprehensive programmatic Environmental Impact Study on oil shale development before we begin to contemplate commercial leasing.

Third, we must protect Colorado's water rights and gain a better understanding of the amounts of water that will be consumed to produce oil from shale and to restore the disturbed lands. On the Western Slope, water is as precious as oil, and we need to know how we will protect Colorado water users and its compact entitlements.

Finally, we must be realistic about the role that oil shale can play in the Nation's quest for energy independence. The sad truth is that neither oil shale nor any other domestic production can satisfy America's appetite for oil. We consume 25% of the world's oil, yet have only 3% of the world's reserves.

If we can address all the challenges associated with oil shale development, oil shale could play a significant role in reducing our dependence on foreign oil. But it alone will not set America free from our dependence on foreign oil. We must also embrace the combined strategies of conservation, improved efficiency, and a renewable energy revolution—these are the large steps we can take, today, to overcome our national security crisis stemming from our dangerous dependence on foreign oil.

This is not to say that oil shale will not play a role in our energy future, but we in Colorado have learned that oil shale is not an easy resource to develop. As we try, one more time, to extract oil from western shale, let us be sure to act prudently, to protect the land, water, and people of Colorado, Wyoming and Utah.

Mr. Chairman, thank you again for agreeing to hold this hearing. I hope there will be many, many more opportunities for Western communities to shape this proc-

ess. The West has a responsibility, and a right, to help determine what role oil shale should play in our Nation's future.

Thank you.

The CHAIRMAN. Thank you very much.

Now, we're going to hear from Senator Hatch. Senator Hatch, we're very pleased to hear from you.

Please proceed.

## STATEMENT OF HON. ORRIN G. HATCH, U.S. SENATOR FROM UTAH

Senator HATCH. Well, thank you, Mr. Chairman. I'm honored to be here with you and Senator Salazar in this beautiful community in our neighboring State, the great State of Colorado. I'm grateful for the opportunity to be participating in this hearing today on the implementation of section 369 of the Energy Policy Act. As you know, section 369 is the result of the Oil Shale and Tar Sands Development Act that I introduced along with Senator Allard.

Now, I appreciated your assistance, and fully appreciate it today, in drafting this bill and making it part of the Energy Policy Act. Mr. Chairman, I believe that your vision and that your leadership on this incredibly important issue and the complete energy bill is one of the great examples of senatorial leadership in the last many, many decades. Because of your leadership on this important issue, this will facilitate and will likely be a turning point in our Nation's ability to meet our energy needs in the future.

It is important, Mr. Chairman, that Americans understand the truth about our global energy situation, especially as it relates to liquid fuels. Americans need to understand that the global demand for oil far outstrips the global supply. Historically, the world's producers have responded to this scenario by dipping into spare capacity and restoring order to the market. Americans need to understand that the world's energy producers are at full capacity, that global demand has now outgrown even OPEC's ability to respond, and that we are facing a very serious energy crunch on a global basis and scale. I am pleased that our Nation has begun a new focus on the use of alternative fuels and advanced vehicle technologies, which will help to displace our Nation's dependency on oil.

I was the author of the CLEAR Act. That was included in the Energy Policy Act by you, and I'm grateful for that. The CLEAR Act, or clean efficient automobiles, which resulted from the Advanced Car Technologies Act, offers consumer tax credits to lower the cost of hybrid, electric, and alternative-fuel vehicles, as well as the cost of alternative fuels, and new infrastructure to support their use.

Alternative fuels and advanced vehicle technologies play a critical role in our Nation's energy strategy, but these alternatives will not be sufficient to bridge the widening gap between the global supply and demand for oil. As you know, Mr. Chairman, there is just no escaping our need to increase dramatically our domestic oil production. Just as it is important to recognize the magnitude of our global energy shortage, it is equally important to recognize that North America has a solution that matches the scale of the problem.

The gigantic untapped oil shale and tar sands resources found in Utah, Colorado, and Wyoming are sufficient to meet our domestic energy needs, while also contributing to the ever increasing global demand for liquid fuels. Experts agree that the United States has more recoverable oil in tar sands and oil shale in a small tri-State region than the entire Middle East. The implementation of section 369 begins a necessary shift by our Government from an almost complete reliance on conventional sources of oil to our vast unconventional resources, such as tar sands and oil shale.

We've already seen this shift in focus by the government of Alberta, Canada. Alberta recognized the potential of its own tar sands deposits and set forth a policy to promote their development. As a result, Canada has increased its oil reserves by more than a factor of 10, going from a reserve of around 14 billion barrels to its current reserve of more than 176 billion barrels of oil in only few years.

Most Utahans would be surprised to learn that ¼ of our State's oil imports already come from Alberta tar sands, even though we have a very large resource of those same tar sands in our State sitting undeveloped. I've read a number of newspaper articles and editorials raising questions about whether there's enough water, whether there's enough environmental protection, whether it is economical enough to develop our unconventional resources. These are all very valid questions—Senator Salazar has raised some of them here today—but I believe that they have valid answers. I hope that this hearing will help us to begin to address these questions head-on. The people of this region deserve to have these issues fully explored and addressed.

In drafting the new law, we were mindful of the environment and of State's water resources. We live in a different world than when oil shale and tar sands were first developed in the United States. We have now implemented several environmental laws, such as the Clean Water Act; the Clear Air Act; the Resource Conservation and Recovery Act; the Comprehensive Environmental Response, Compensation, and Liability Act; the National Environmental Policy Act; the Mining Reclamation Act; and the Endangered Species Act.

Also, new technologies make the effort much cleaner and require much less water than in the past. I do not believe there is any aspect of oil shale or tar sands development that would not be covered by existing environmental laws and regulations, but the citizens living in the region deserve to have a high level of certainty that this new activity will move forward in an environmentally sound and in an economically sound way.

Mr. Chairman, I know that it is your goal, and Senator Salazar's as well, to ensure that these issues be addressed and that this hearing is only one step in that process. Again, I want to thank you for holding this hearing in the region that has the greatest stake in the implementation of section 369.

Mr. Chairman, last year I spoke on this issue at the Canadian Embassy and I wonder if I could submit that statement to the committee as part of the record.

The CHAIRMAN. It'll be made part of the record and we thank you for submitting it.

Senator HATCH. And thank you, Mr. Chairman, for the opportunity to give these remarks this day and for your leadership on this important issue. I am extremely interested in it as well, and thank you for inviting me to sit with you on this.

[The prepared statement of Senator Hatch follows:]

PREPARED STATEMENT OF HON. ORRIN G. HATCH, U.S. SENATOR FROM UTAH

"DISCOVERING THE POSSIBILITIES FOR NORTH AMERICAN PETROLEUM PRODUCTION"

*Before the Woodrow Wilson International Center for Scholars, Canadian Embassy, Washington, DC.*

Thank you very much for that introduction and for the opportunity to address you today. Let me say that it is a pleasure to be among you.

If you are in attendance at this conference, there is a good chance you are part of the small but growing group of individuals who recognize—not only that there is a worldwide energy crunch looming in our future—but that an economical and domestically available solution to that problem already exists in North America's vast unconventional oil resources, namely in the form of liquid fuel from oil sands, oil shale, and coal.

You also may have recognized the profound geopolitical shift that will likely occur over the next decade or two as the supply of conventional oil begins to dwindle in the Middle East, and the commercial production of our unconventional resources takes off in North America.

We need to recognize the implications of this shift for our region.

And the governments of Canada and the United States absolutely should be taking a proactive approach to preparing for that future. Those who state otherwise, in my opinion, are underestimating either the economic viability of developing our unconventional resources, or overestimating the world's ability to keep up with international energy demand, or both.

In the United States, our thirst for oil has increased by about 12 percent in the last decade, but during that same time our production of oil has grown by less than one-half of one percent. Is it any wonder that we rely on foreign countries for more than half our oil needs?

And any hope that a worldwide increase in oil production will solve our domestic shortage is based on an unlikely scenario, because the supply shortage is being felt worldwide.

World demand for oil is growing at an unprecedented pace,—about two and a half million barrels per day in 2004 alone, and production is not keeping up. Moreover, new discoveries are certainly failing to keep pace.

The United States imports 56 percent of its oil, and, if existing circumstances persist, that is projected to grow to 68 percent within 20 years.

But who says that we are trapped by existing circumstances? I, for one, don't. The United States Congress has spoken loud and clear on this subject.

I believe the recently enacted Energy Policy Act takes a strong, proactive-approach to addressing our nation's future energy needs by actively changing the circumstances we currently face—changes which I believe will improve the lives of our people.

We are willing to pay high prices for oil because it is so critical to our way of life. Humans initially enjoyed important advances using early fuels such as wood, coal, whale oil, and then gas and steam. But it was liquid petroleum that allowed us to advance into the Space Age and then the Information Age.

For a century, we have relied on a steady supply of light crude, which is the easiest oil to get. Those days are not quite over, but their decline is in sight, and there is no upside to ignoring the fact.

I have been a leader in Congress in promoting the use of alternative sources of energy. I was the author of the CLEAR ACT, which will promote the use of alternative fuels in our transportation sector. The CLEAR ACT was enacted as part of the Energy Policy Act, and I believe it will make a real difference.

At the same time, I also recognize that our society will be dependent on liquid petroleum into the foreseeable future. It's not a fact that I like to admit, but it is a fact, nonetheless.

The world has experienced tremendous growth of service sector, but we shouldn't let that mask the fact that the global economy remains dependent on abundant and affordable natural resources. Even the service industry must have buildings, computers, paper, transportation, communications, and let's not forget food. Other than our bodies and the air we breathe, it would be nearly impossible to find something

in this room that is not produced from agriculture, mining, or oil and gas production. Keep in mind that liquid and gas fuel remains the principal engine driving the production of those natural resources we need to maintain our way of life.

We may have dodged a bullet in the United States with our recent spikes in energy prices. I believe our strong economy has helped to diminish the economic effects of recent sharp increases in energy costs.

This summer, Federal Reserve Chairman Alan Greenspan stated:

> "Markets for oil and natural gas have been subject to a degree of strain over the past year not experienced for a generation. Increased demand and lagging additions to productive capacity have combined to absorb a significant amount of the slack in energy markets that was essential in containing energy prices between 1985 and 2000."

I shudder to think what the effect of these high prices would have on our way of life if they were to occur during a serious economic downturn. I am also intensely aware that sustained high prices could themselves *cause* such a downturn.

We should take note that our major oil companies, including Chevron and ExxonMobil, are beginning to state publicly that we may be reaching peak oil. And with the economic growth in India and Asia and other regions, it looks like we'll have high oil prices into the-foreseeable future.

This is a new scenario for the world, and it forces us to shift our focus to our unconventional resources. Shell Oil Company has, for years, been preparing for such a shift. Its successful activities in Alberta with oil sands and their investment in new technologies to produce oil from oil shale are a testimony to Shell's recognition that unconventional oil is in our future.

Those who doubt that unconventional fuels are economically viable probably are suffering from a neck ailment that keeps them from looking north.

The 800-pound gorilla is sitting just above Montana, and let's face it, it's hard to miss.

Alberta is now second only to Saudi Arabia in proven oil reserves and ninth in the world in annual oil production. This is owing mostly to their successful development of oil sands. In Alberta, you have dozens of major oil companies, using a variety of technologies and recovery—methods, going after very different types of oil sands resources, and in almost every case doing so for less than $20 a barrel, including during their very tough winters. It is a gigantic success story, and it began with Alberta's government deciding to promote the development of this resource and not giving up.

Anyone watching what is happening up north will recognize that, before long, Canada will inevitably overtake Saudi Arabia as the world's oil giant. And Alberta clearly has its sights on increased annual production to match its growing reserve. Already at about a million barrels a day, Alberta's production is expected to double in the next five or six years.

What does all this mean for the United States? I think it means a great deal.

First, it means that the United States can enjoy a new gigantic source of oil from a friendly neighbor.

Here, we have one of the largest energy producing nations sharing a very large border with one of the world's largest energy consumers. Our proximity to one another facilitates our energy relationship in countless ways—the most obvious being the ability to transport energy products cheaply through pipelines and other means.

My state of Utah is an oil producing state, and we also have our nation's largest deposits of recoverable oil sands. Although we are not yet developing our sands commercially, one-fourth of all of our oil imports come in a pipeline from Alberta oil sands. It's an unlikely scenario, but it is possible because of the interdependence our two nations already enjoy.

Alberta's success in developing oil sands is important to the U.S. in another way. It provides our nation with a successful model for developing our own unconventional resources. A number of important U.S. companies are very active in Alberta's tar sands, and are only waiting for the U.S. government to adopt of policy similar to Alberta's which promotes rather than bars the development of our unconventional resources.

Utah has more recoverable oil in oil sands than the entire U.S. reserve. That's a significant number, but it is overshadowed by the fact that the largest recoverable hydrocarbon resource in the world rests within the borders of Utah, Colorado, and Wyoming in the form of oil shale.

Energy experts agree that there is more recoverable oil in these three states than there is in all the Middle East. The U.S. Department of Energy estimates that recoverable oil shale in the western United States exceeds one trillion barrels and is the richest and most geographically concentrated oil shale resource in the world.

This gigantic resource of oil shale and tar sands is well known by geologists and energy experts, but it has not been counted among our nation's oil reserve, because it is not yet being developed commercially. And it is not being developed commercially because, the U.S. government has not allowed industry access to the resource.

Every signal from the U.S. government has been to keep this resource off limits. That is, until now.

With the help of industry, government officials, energy experts, and the chairmen of the relevant congressional committees, I sponsored and was able to pass the Oil Shale Tar Sands Development Act as a part of the Energy Policy Act. My legislation represents a necessary shift by our government from an almost complete reliance on conventional sources of oil toward a focus on our vast unconventional resources, such as tar sands and oil shale.

My legislation will establish a task force to, among other things, to develop a five-year plan to determine the safest and steadiest route to developing oil shale and tar sands. It will also establish a mineral leasing program in the Department of the Interior to provide access to this resource.

Recognizing the tremendous national interest in this resource, my legislation provides a number of programs to encourage oil shale and tar sands development, including federal royalty relief, federal cost shares for demonstration projects, and advance procurement agreements by the military.

Some have said that oil shale has a great future and will always have a great future. It's a cute saying that reflects the view held by a dwindling few that oil shale is just too expensive ever to develop commercially.

The fact of the matter is that producing oil from oil shale is fairly straightforward, and there are a number of technologies that could be used economically to develop this resource, now that the government is making it available.

Many point to the large oil shale operation in Colorado that went bust in the late seventies as an example of how oil shale cannot be commercially developed. However, that was the result of the price of oil dropping down to ten dollars a barrel, not of a lack of efficient technology.

Last time I checked, oil prices were above ten dollars a barrel.

To be honest that old technology could still work efficiently today, but fortunately many new processes have been developed since then, some of which have proven to be very efficient and economical.

I was disappointed with a recent report by Rand Corporation titled *Oil Shale Development in the U.S.; Prospects and Policy Issues.* The report relied on 30-year-old data for its model to show that the price of oil would have to reach $70 a barrel before mining and surface retorting of oil shale would be economical.

Of the various experts involved in the on-the-ground development of these technologies, none believes that the price of oil needs to be higher than $40 a barrel for the economic development of oil shale, and some of the most knowledgeable experts are confident the price could be even lower than that.

I was especially disappointed that the report used its $70 a barrel model to argue that government should not actively promote the commercial development of oil shale in this country. That conclusion can only be made if a blind eye is turned toward the global supply and demand trends that are widely acknowledged to be a major concern for policymakers.

The report assumes that industry will step forward without the help of government to develop this resource. Such a scenario is contrary to the successful Alberta model and ignores the fact that 80 percent of the resource in the United States sits on federal land, which poses certain regulatory impediments to major investment in the development of the resource.

I recall that offshore drilling was once considered an unconventional source of oil too risky and too expensive to pursue. However, with significant government support, the cost burden was overcome, and offshore oil is now considered a conventional resource.

Similarly, getting oil from oil sands in Alberta was once considered by some to be too—expensive and risky. Now the province is producing huge quantities of oil from tar sands at less than $20 a barrel, as a result of government support.

I have to say the Rand report appears to be a bit out of touch with what is happening on the ground among the various industry groups actually pursuing the development of oil shale in the United States.

I have been on the ground and seen how the newest technologies can work, and I have been very impressed with the advances that have been made in this area.

I have no doubt that once industry is given access to our unconventional resources, we will quickly follow in the footsteps of Alberta, Canada.

I have no doubt that the abundance of existing technology and continued growth in the global demand for oil will inevitably lead to a major shift toward the development of unconventional oil resources.

And as this scenario unfolds, I believe the United States and Canada will emerge as the dominant energy powers in the world. It has been slow in coming, but the United States is slowly awakening to this fact.

I commend our friends in Alberta for their active effort to call this to our attention, and their success in leading the way down this path.

The United States and Canada have much to learn from one another and much to share with regard to meeting America's energy needs. By working together in this regard, we can only become stronger, and I have no doubt that all Americans will benefit from it.

Again, I want to thank the sponsors of this conference for the chance to address you. It has certainly been my pleasure. Thank you.

The CHAIRMAN. You're welcome. Now, I have to make a little statement for all of you to pay attention to, because we have to handle things in an orderly manner. So if you'll follow our rules, I think we'll get everything done in due course and properly. Before we get started, let me tell you the process.

Today, the hearing is to gather a local perspective on the prospect for developing our Nation's vast oil shale and tar sand resources. Although we would like to hear from everyone here today, we are limited to testimony from invited witnesses only. I would like to encourage anyone wishing to provide testimony to do so by providing a written statement within the next 2 weeks. That means that this record will be open and the testimony accepted into it, just in the same manner as it's given, so long as you give it to us within the 2 weeks. It will be given the same perusal and the same review.

I would like to remind our witnesses to summarize their testimony within a 5-minute timeframe. This will provide ample time for questions and discussions. All written testimony will be included in the committee's official hearing record and available to the public.

I want to welcome Lieutenant Governor Gary Herbert of Utah; Russell George, executive director of the Colorado Department of Natural Resources; Commissioner Kim Cook from Rio Blanco, CO; Colorado Commissioner Craig Meis from Mesa County; Commissioner Mike McKee from Uintah County, UT; also here are Steve Mut of Shell Oil Exploration and Production; John Baardson of Baard Energy and Oil Tech; Steve Smith of the Wilderness Society; and Chris Treese from the Colorado River Water Conservation District.

We just had Senator Hatch, so now we're going to move ahead with the other witnesses in the appropriate order. Having said that, who are the witnesses that we're going to hear from first?

Mr. Russell George and the Honorable Gary Herbert, Lieutenant Governor of the State of Utah. Thank you both, and welcome. Please proceed. You know the rules.

Mr. HERBERT. Thank you.

The CHAIRMAN. You're first.

**STATEMENT OF GARY HERBERT, LIEUTENANT GOVERNOR, STATE OF UTAH**

Mr. HERBERT. Thank you, Mr. Chairman. I'm honored to be here. For the record, my name is Gary Herbert, Lieutenant Governor of

the State of Utah, and I would like to extend my appreciation to you, Mr. Chairman and Senator Salazar, particularly, for welcoming me to the great State of Colorado and to be here with my good friend, Orrin Hatch.

On behalf of Governor Jon M. Huntsman, Jr., I am honored to represent the great State of Utah this morning regarding an issue we feel is an important component of our public policy agenda.

The primary purpose of my visit today is to ensure this body that the State of Utah is supportive of sustainable development of the oil shale and tar sand resources within Utah's boarders.

The Governor and I recognize that the guiding principles for such sustainable development align well with the objectives that we hope to achieve for the State, namely, one, promote economic prosperity, two, encourage responsible environmental protection, and three, enhance the quality of life by addressing the social and cultural needs of the people of Utah.

We applaud the work of the U.S. Congress for the passage of the Energy Policy Act of 2005 and for specifically addressing oil shale leasing in section 369 of the Act.

I am here today to indicate to this committee that the State of Utah stands ready to support, coordinate, and collaborate with the Federal Government in carrying out the provisions section 369.

Estimates of Utah oil shale resources potential by the Utah Geological Survey exceed 300 billion barrels of oil in the ground and possibly over 20 billion barrels of oil that's recoverable. Development of these resources could represent substantial economic benefit to the State, and therefore is of keen interest to the government of Utah and its people. Also, because over ⅔ of the land of Utah is owned and managed by the Federal Government, Federal land management policy for oil shale development will significantly influence both the methods and timing for development.

In support of Federal responsibilities for oil shale development, there are several organizations within our State government that can play various and important roles. As I've previously mentioned, the Utah Geological Survey performs research and analysis of the State's mineral resources, and the technical professionals of the UGS will be particularly helpful for assisting with the national oil shale assessment described in section 369.

Also within Utah's Department of Natural Resources are the Division of Water Resources and the Division of Water Rights that manage the water resources of the State and adjudicate in matters of water use. These agencies will also be able to provide information pertaining to the demand for and availability of water with respect to the development of oil shale.

From what we understand of current oil shale extraction technology, water resources will play a big part in making such mineral extraction feasible. The State of Utah has recognized this for many years, and plans were made over 20 years ago to consider potential water needs for oil shale development and how those needs might be addressed. These plans will be addressed anew and updated as future proposals for oil shale development are considered.

Another important agency within the Department of Natural Resources is the Division of Oil, Gas, and Mining. This agency conducts the permitting and monitoring of oil shale development as it

relates to mining and extraction operations regulated by the Utah Mined Land Reclamation Act. It is likely that initial efforts to develop Utah's oil shale resources will be mining activities, and DOGM will oversee both exploration and development operations to ensure appropriate accounting, accountability, bonding, environmentally sound operations, and final land reclamation once extraction has ceased.

There currently are no existing or pending oil shale operations permitted, of record, in Utah; however, there are 13 existing and new permits on file with DOGM for tar sand exploration and for tar sand mining operations, and several industrial representatives have contacted DOGM expressing interest in future oil shale development operations.

Of particular interest to our local governments and communities in Utah are the impacts that oil shale development will have on local infrastructure, community services, water resources, and other multiple uses of the land. We encourage Federal land managers to be contemplative and cautious in their planning for oil shale development to ensure that such impacts will be, in fact, addressed. At the same time, we recognize the need of the private sector to proceed expeditiously with business plans and development activities, and we, therefore, urge the Federal Government to timely process leasing and operational applications as they are received.

One proposal has been recently accepted for a research, development, and demonstration project for oil shale development in Utah and should contribute significantly to the body of oil shale knowledge for many companies developing oil shale. This proposal, currently undergoing environmental assessment, would allow the winning bidder to re-establish operations at the inactive White River Oil Shale Mine in Uintah County, UT. I look forward to consultation with the Federal Government, State agencies, and local governments in Utah, as we move forward with environmental assessment on the ultimate consideration of project approval.

In order to continue to support the efforts of the U.S. Bureau of Land Management, the State of Utah seeks, through a Memorandum of Agreement, Cooperating Agency status on the preparation of their Programmatic Environmental Impact Statement that they are conducting for larger-scale oil shale leasing. We are anxious for the prospect that these resources may be responsibly developed in the near future for the benefit of Utah and its citizens, and for America, for that fact.

Our cautiously optimistic view is that many bridges must be crossed prior to full development, and that we will assist companies accomplish those crossings of the environmental, technological, and political divides consistent with existing law.

Clearly, there is significant potential for oil shale and tar sands resources to become one of several alternatives for addressing future energy demands in the United States. Along with the many other mineral and energy commodities that Utah provides for America, oil shale will be needed at some point in the future in order to ensure economic prosperity and domestic self-sufficiency of energy resources.

Finally, let me emphasize and point out that Governor Huntsman and myself believe that development of these resources can be performed with due protection of our environment while enhancing the quality of life for all Americans.

I again thank you, Mr. Chairman, for the allowing me to address the committee. I have brought with me Mr. Mike Styler, our executive director of natural resources, and John Baza, who's the director of our Oil, Gas, and Mining Division. And at the appropriate time, we'd be more than happy to answer any questions you have for us. Thank you again, very much.

[The prepared statement of Mr. Herbert follows:]

PREPARED STATEMENT OF GARY R. HERBERT, LIEUTENANT GOVERNOR, STATE OF UTAH

Mr. Chairman, members of the committee:

For the record, my name is Gary R. Herbert, Lieutenant Governor of the State of Utah.

I would first like extend my appreciation to Senator Domenici for the opportunity to address this committee and to Senator Ken Salazar for welcoming me to the beautiful State of Colorado.

On behalf of Governor Jon M. Huntsman, Jr., I am honored to represent the Great State of Utah this morning regarding an issue we feel is an important component of our public policy agenda.

The primary purpose of my visit today is to ensure this body that the state of Utah is supportive of sustainable development of the oil shale and tar sand resources within Utah.

The Governor and I recognize that the guiding principles for such sustainable development align well with the objectives that we hope to achieve for the state, namely to: 1) promote economic prosperity, 2) encourage responsible environmental protection and 3) enhance the quality of life by addressing the social and cultural needs of the people of Utah.

We applaud the work of the United States Congress for the passage of the Energy Policy Act of 2005 and for specifically addressing oil shale leasing in Section 346 of the Act.

I am here today to indicate to this committee that the state of Utah stands ready to support, coordinate and collaborate with the federal government in carrying out the provisions section 346.

Estimates of Utah oil shale resource potential by the Utah Geological Survey (UGS) exceed 300 billion barrels of oil in the ground and possibly over 20 billion barrels of recoverable oil. Development of these resources could represent substantial economic benefit to the state, and it is of keen interest to the government of Utah and its people. Also, because over two-thirds of the land area of Utah is owned and managed by the federal government, federal land management policy for oil shale development will significantly influence both the methods and timing for development.

In support of federal responsibilities for oil shale development, there are several organizations within our state government that can play various and important roles. As I previously mentioned, the Utah Geological Survey performs research and analysis of the state's mineral resources, and the technical professionals of the UGS will be particularly helpful for assisting with the National Oil Shale Assessment described in Section 346.

Also within Utah's Department of Natural Resources are the Division of Water Resources and the Division of Water Rights that manage the water resources of the state and adjudicate in matters of water use.

These agencies will also be able to provide information pertaining to the demand for and availability of water with respect to the development of oil shale.

From what we understand of current oil shale extraction technology, water resources will play a big part in making such mineral extraction feasible. The state of Utah has recognized this for many years, and plans were made over 20 years ago to consider potential water needs for oil shale development and how those needs might be addressed. These plans will be addressed anew and updated as future proposals for oil shale development are considered.

Another important agency within the Department of Natural Resources is the Division of Oil, Gas and Mining (DOGM). This agency conducts the permitting and

monitoring of oil shale development as it relates to mining and extraction operations regulated by the Utah Mined Land Reclamation Act. It is likely that initial efforts to develop Utah's oil shale resources will be mining activities, and DOGM will oversee both exploration and developmental operations to ensure appropriate accountability, bonding, environmentally sound operations, and final land reclamation once extraction has ceased.

There currently are no existing or pending oil shale operations permitted of record in Utah; however, there are 13 existing and new permits on file with DOGM for tar sand exploration and for tar sand mining operations, and several industrial representatives have contacted DOGM expressing interest in future oil shale development operations.

Of particular interest to our local governments and communities in Utah are the impacts that oil shale development will have on local infrastructure, community services, water resources and other multiple uses of the land. We encourage federal land managers to be contemplative and cautious in their planning for oil shale development to ensure that such impacts will be addressed. At the same time, we recognize the need of the private sector to proceed expeditiously with business plans and development activities, and we, therefore, urge the federal government to timely process leasing and operational applications as they are received.

One proposal has been recently accepted for a research, development and demonstration project for oil shale development in Utah and should contribute significantly to the body of oil shale knowledge for many companies developing oil shale.

This proposal would allow the winning bidder to re-establish operations at the inactive White River Oil Shale Mine in Uintah County, Utah. I look forward to consultation with the federal government, state agencies and local governments in Utah on this environmental document and on the ultimate consideration of project approval.

In order to continue to support the efforts of the U.S. Bureau of Land Management (BLM), the State of Utah seeks, through a Memorandum of Agreement, "Cooperating Agency" status on the preparation of their Programmatic Environmental Impact Statement that they are conducting for larger scale oil shale leasing.

We are anxious for the prospect that these resources may be responsibly developed in the near future for the benefit of Utah and its citizens.

Our guardedly optimistic view is that many bridges must be crossed prior to full development, and that we will assist companies accomplish those crossings of the environmental, technological, and political divides consistent with existing law.

Clearly, there is significant potential for oil shale and tar sands resources to become one of several alternatives for addressing future energy demands in the United States. Along with the many other mineral and energy commodities that Utah provides for America, oil shale will be needed at some point in the future in order to ensure economic prosperity and domestic self-sufficiency of energy resources.

Finally, I would be remiss if I did not point out that the Governor and I also believe that development of these resources can be performed with due protection of our environment while enhancing the quality of life for all Americans.

I thank you again for the opportunity to address the committee and will answer any questions you may have at this time.

The CHAIRMAN. Thank you very much, Governor, for your enlightening remarks.

And now we'll proceed to Mr. Russell George.

## STATEMENT OF RUSSELL GEORGE, EXECUTIVE DIRECTOR, COLORADO DEPARTMENT OF NATURAL RESOURCES

Mr. GEORGE. Mr. Chairman, Senator Hatch——

The CHAIRMAN. First, let me say that it was my privilege to be with you yesterday and to let a little bit of your wisdom and knowledge rub off. I wish I had more time to learn from you, but over time, perhaps we'll have that opportunity with further testimony and a further exchange of views. But thank you for your informed knowledge, and the information you share with us.

Mr. GEORGE. Well, thank you. Mr. Chairman, Senator Salazar, good morning to you all and welcome to our home. I am Russell George, executive director of the Colorado Department of Natural Resources. As the lead State agency responsible for natural re-

source management, I appreciate this opportunity to present to you our latest thinking on oil shale, on behalf of our Governor, Governor Bill Owens.

It was just about a year ago when we were last together in your Senate Hearing Room in Washington, DC, where I was able to present detailed testimony focusing on what worked and what did not work in the oil shale boom of the early 1980's, including Federal incentives, cumulative impact assessments, coordinated permitting, technology implications, and environmental concerns. It was my hope then, as now, that oil shale development will proceed in a fashion that will allow for adequate public review and comment, and regulatory oversight at the State and local level.

Today, I would like to amplify those comments specific to the socioeconomic impacts of oil shale development, as well as issues related to water quantity and quality, and the need for power generation to development of the oil shale resource. I will do all of this with the caveat that many project specifics are unknown, and will be unknown until we see the permit applications in their detail.

Now, I've already submitted much lengthier written testimony. I hope you have an opportunity to review it. I would also hope that it is soon available on your website for fellow citizens here and the rest of the public. So I will only summarize the key points in the short time that we have here.

Let me say that Colorado, and certainly the Department of Natural Resources, is ready to be a full partner in the development of a resource that is both abundant and in the national interest. But of course there are buts, and here are some of the points that I would call standards or recommendations that we would like everyone to consider. First of all, both technology oversight and environmental oversight must be rigorous. We would expect development of this resource to use best available, best management practices at all times to minimize impacts. State and local needs must be anticipated and funded. Development on public land must be prioritized by resource and by region. The cumulative impact of mineral and energy development on both public lands and private lands need to be mitigated.

The Department of Natural Resources has participated already in the development of the EIS for the RD&D parcels and will participate, either formally or informally, in the development of the programmatic EIS. The timeframe to meet Energy Policy Act requirements, as you may know, is extraordinarily tight. Because of potential impacts, our department will dedicate whatever resources are available and necessary to ensure that this programmatic EIS fully addresses the impacts to Colorado's environment.

The CHAIRMAN. What if you don't have enough resources?

Mr. GEORGE. I don't think that's an option, Senator. I think we need to marshal the resources. We need to rise to the occasion. This is here. It needs to be done. Colorado will do its part, somehow.

The CHAIRMAN. All right. So you're telling the people that you have confidence that through the legislature of the Governor's office or elsewhere, whatever needs you think are necessary to do these overviews and oversights that you deem so important, they'll be there?

Mr. GEORGE. I do believe that. I believe we have the Governor's attention and support, and we have the legislature's attention and support.

The CHAIRMAN. And you also are telling this U.S. Senate that if it's not available, you will be the appropriate person to so say?

Mr. GEORGE. And if it gets too large, I'll also come to you and say, please help me.

The CHAIRMAN. That's what I'm talking about.

Mr. GEORGE. We're in this together.

The CHAIRMAN. That's what I'm talking about. If it's not there, it's not there, and you will claim it's not there; is that right?

Mr. GEORGE. Of course.

The CHAIRMAN. OK, thank you.

Mr. GEORGE. Governor Owens has asked us to participate in the Department of Energy's Strategic and Unconventional Fuels Task Force that's in motion now. The task force will make an interim report to Congress on its activities to date, this month. A more formal plan for accelerating commercial development of oil shale will be delivered to Congress by the task force this November.

Colorado has consistently supported the development of oil shale resources in western Colorado while ensuring that the projects are fiscally and environmentally sound, and that the communities do not incur extraordinary economic burdens.

Oil shale leasing, on top of any existing energy development and changing land uses, which includes increasing tourism and recreation in an expanding urban population, all may put more pressure on an already fragile ecosystem and public temperament.

Three things are essential: There needs to be a Federal statutory and regulatory scheme that provides support that is sustainable over an extended period of time, in order to encourage private sector investment; of course there needs to be a thorough ongoing environmental review process; and we think of great importance is that there exists a safety net for local governments that allows for growth to pay its way and allows front-end financing.

Through the history of oil shale, we have learned a few things that we would prefer not to repeat. We should avoid processes that preempt or supercede local and State land use in the environmental permit processes. We should avoid the development of technologies without adequate oversight to ensure that public acceptance and the environmental compatibility exist. We should avoid a national effort that does not address the financial and infrastructure needs at the local level.

The CHAIRMAN. I didn't get that.

Mr. GEORGE. That at least from the national level, we should avoid creating financial hardship on our local communities. We need to build the infrastructure in the local communities to support the change that comes with developing this industry.

The CHAIRMAN. OK.

Mr. GEORGE. The true cost of the development of strategic resources, such as oil shale, must be evaluated, not only in the context of their technology and development costs, but also the costs and benefits to the community. Securing a safety net is the primary lesson of the last bust.

So, we're asking that Congress consider a long-term life cycle of oil shale development, as it contemplates this renewed national oil shale effort. Only this view will portray the complete picture, so that the appropriate technological, environmental, and economic structures can be defined and funded for a successful long-term effort.

I think most of us agree that there is a time for development of oil shale. It may be now, but I think the key that we want to keep in our minds is we really do need to get it right. If, for reasons that we could have avoided, we don't get it right this time, we don't take the time and deal with the enormous complexities it presents to us, and miss this chance, I would guess that we won't get another political or sociological chance for many decades to come.

Over the last 20 years or so, it seems to me, we could have done more in anticipating what we had. A few companies did remain. Paraho continued their technical research, Unocal and Oxidental continued quietly to do their research.

But as Federal, State, and local governments, we haven't done much over the last 20 years. We aren't ready for the demand that's here today, but we can get ready, and I think your energy bill gets us started. I think our willingness to be full partners and to help decide the right way to move forward, that if we'll take our time and do it right, we can really make this work over time and I think that's what we should do for our national policy.

Thank you very much for this time.

[The prepared statement of Mr. George follows:]

PREPARED STATEMENT OF RUSSELL GEORGE, EXECUTIVE DIRECTOR, COLORADO DEPARTMENT OF NATURAL RESOURCES

Members of the Committee, Colorado Congressional members and staff, and local officials—welcome to Western Colorado. I am Russell George, Executive Director of the Colorado Department of Natural Resources (DNR). As the lead state agency responsible for natural resource management, I appreciate the opportunity to present our latest thoughts on oil shale development on behalf of Colorado Governor Bill Owens.

In April 2005, I presented detailed testimony focusing on what worked and what did not work in the oil shale boom of the early 1980's—including, federal incentives, cumulative impact assessments, coordinated permitting, technology implications, and environmental concerns. It was my hope, then as now, that oil shale development will proceed in a fashion that will allow for adequate public review and comment and regulatory oversight at the state and local level.

Today, I would like to amplify those comments specific to the socioeconomic impacts of oil shale development, as well as issues related to water quantity and quality, and the need for power generation to develop of the oil shale resource. I do so with the caveat that many project specifics are unknown pending the submittal of permit applications.

BACKGROUND PRINCIPLE

The State of Colorado has consistently supported the development of oil shale resources in northwest Colorado since the Arab Oil Embargo of the early 1970's. Our focus has been to ensure that the projects are fiscally and environmentally sound, and that the communities do not incur extraordinary economic burdens either before the boom or after any bust. As history has shown, if development pays its way, the community impacts are less if the projects do not materialize. With perhaps as much as two trillion barrels of oil locked in the shales of western states, it is important for federal, state and local governments to partner in the development of this vast resource.

While we still do not know the specifics of the technologies and projects that may be pursued in the current research and commercialization cycle, we do know water availability, materials handling, power requirements, and transportation networks

must be assessed in detail and the impacts mitigated in an appropriate and timely manner.

WHERE WE ARE TODAY

We have record coal production that is straining existing transportation networks. We have record natural gas production levels and ever increasing permit applications for natural gas development. The development of this resource has dotted the landscape, increased truck traffic on county roads, and access to the resource has impacted many private landowners where the surface and mineral estates are severed. Additionally, there is a growing public sensitivity to in-situ activities, such as fracking with "proprietary fluids."

This development overlaps an area with increasing tourism and recreation opportunities and an expanding urban population. Oil shale leasing on top of this existing network of energy development and changing land uses may put more pressure on an already fragile ecosystem and public temperament.

The federal Programmatic Environmental Impact Statement (PEIS) is underway, and the details will be critical. A prioritized use of public lands for the development of specific resources is essential. Federal financial support must be sustainable over several decades to encourage private sector investment. The environmental review process must be thorough. A financial safety net for local governments that allows for growth to pay its way, and allows front-end financing of infrastructure assessment tools and capital needs, is critical. Technology and environmental oversight must be rigorous, and developers must use the best available practices to minimize impacts. Environmental regulatory standards must be set in a way that addresses impacts in the Research, Development, and Demonstration (RD&D) phase as well as the commercial phase in order to achieve desired production levels. In addition, the cumulative impact of mineral and energy development on both public lands and private lands must be mitigated.

DNR intends to participate either formally or informally, in the preparation of the PEIS. During the development of the PEIS, DNR will work with the BLM and other interested entities to ensure that the concerns expressed here are reflected and addressed in the PEIS. The timeframe for development of the PEIS is very aggressive because of the mandate established in the Energy Policy Act of 2005. This timeframe and the magnitude of the issue will result in additional demands on DNR staff. We are prepared to spend the resources necessary to participate in the development of the PETS because of the importance of this issue to the residents of Colorado.

During the past year my department has participated in the review and evaluation of the Research, Development, and Demonstration (RD&D) proposals submitted by industry to the Bureau of Land Management. The evaluation group included representatives of the governors of Utah and Wyoming, Department of Energy, Department of Defense, and Bureau of Land Management. Ten of the twenty proposals to demonstrate the commercial viability of oil shale were located in Colorado and five of those have advanced to the final stages of approval by BLM.

Our State Geologist also worked with the State Geologist of Wyoming, with BLM personnel, and the Utah Geological Survey to develop the geologic setting and Reasonable and Foreseeable Development scenario for the initial stages of the Environmental Impact Statement for the area-wide commercial leasing of oil shale mandated in the 2005 energy bill. The Department is also providing information and working with BLM during the development of this PEIS. Finally, my office has been working with the Department of Energy Task Force on Strategic Unconventional Fuels.

DEVELOPMENT IMPACTS AND CARRYING CAPACITY

A key component of the socioeconomic impact of intense and rapid oil shale development is the cumulative impact of growth on the carrying capacity of the region. Given the density of natural gas and coal development in some areas of NW Colorado, the need for recreational/wildlife habitat/undeveloped areas, and the network of privately held oil shale lands that did not exist in the last boom, the federal government must determine those areas where oil shale development could be accommodated in a manner that is least disruptive to communities and existing activities. Not all types of resource development can occur everywhere. The carrying capacity of the land, communities and infrastructure must be evaluated. That will determine the suitable areas for coal, natural gas, and oil shale development—as well as realistic production scenarios.

One type of mineral and energy development today, may preclude or limit another type of resource development tomorrow. We cannot forget that a consequence of the

oil shale pull-out of the 1980's, and the sustained soft energy market in the 1990's, has been the transformation of the NW Colorado economy from an energy base to a tourism, retirement, second home and recreation base—and public attitudes have changed as well. That cannot be underestimated if accelerated development is to occur.

The Department of the Interior should provide this cumulative impact analysis and identification of areas suitable for oil shale development as an element of any environmental review, leasing plan, and build out over time. Existing resource management plans may also need to be amended and impacts mitigated.

CUMULATIVE ECONOMIC IMPACT

Once the development area is determined, a procedure must be established to evaluate economic impacts at the local level. The federal government should fund, either through a bonus bid process or other authorizing legislation, a process to analyze the cumulative financial impacts of multiple and simultaneous resource development. This analysis would not only guide the timing of needed permanent and temporary community services and infrastructure, but also allow local governments to establish fiscal tools that would insure that growth could pay its own way.

To assess the fiscal impact to individual communities and counties in high development areas, it is essential to model the budgets, revenues and expenditures of affected jurisdictions in northwest Colorado. The key task would be to determine what projects would cause what economic impacts to what jurisdictions in what years based on different population and development scenarios.

FINANCIAL IMPACT MITIGATION

Another component of socioeconomic impacts is the financial burden to local economies to mitigate those impacts. Along with an oil shale lease process that generates production royalties for the federal government, the 1970's concept of the front end bonus bid should be applied to any oil shale leases.

The federal government leased two tracts in each state—Colorado, Utah, and Wyoming-in the early 1970's. Bonus payments accompanied each of these leases that determined the winning bid for the lease. Half of those bonus payments were distributed back to the state. The Colorado General Assembly established the State Oil Shale Trust Fund and Program which developed planning and coordination mechanisms for federal, state, and local governments and provided funding for designated local government services and projects ($100+ million). This economic cushion is essential to community stability, and the ability to withstand the economic shock of a project termination. The federal leasing program should include front-end financing for infrastructure needs and impact mitigation—with the objective to mitigate the "boom town" syndrome.

The federal government should not subsidize private investment by foregoing revenues that would mitigate financial impacts at the state and local level. If favorable tax and royalty terms in the early years are necessary, the federal government must identify the alternative source of state and local impact mitigation funds. A cumulative economic assessment will determine the necessary amount. This analysis would identify major infrastructure requirements, including roads, sewer, water supply and storage, schools and key government services. The investment of industry funds to mitigate these impacts should coincide with the project development schedule. Industry funds should also finance the local government planning and permitting requirements. It will also include the financial reserves necessary to maintain the services, facilities and infrastructure well before industry-generated revenues are available.

If the federal government is willing to forego front-end revenues, a credit against future federal royalties for investment by operators in the socioeconomic and infrastructure needs identified by the affected state/local governments is another option. Make no mistake, this will still be a significant upfront investment by industry as well as lost federal revenue—but it would also send the money directly to the area in need in a timely and efficient manner. Provision of adequate funds should be a necessary and binding condition of any commercial lease.

A condition for a project to move forward should be that no unfunded liabilities should exist for the affected local government. History has proven that low rate loans, loan guarantees and bonds are not practical, if the project and associated future revenues do not occur. Outstanding financial obligations by local entities are not an option. Upfront payment in full for the needed infrastructure and impact mitigation has been proven to be the only effective safety net if a bust occurs.

COORDINATED PERMITTING PROCESS

To fully understand the socioeconomic and environmental impacts of oil shale development, a coordinated and integrated permitting process is essential. The environmental and land use permitting process can be complex and time-consuming when all the local, state and federal requirements are considered. Coordinating the process is essential, and cannot be underestimated. For the requirements in place 20 years ago, the average timeframe to permit an oil shale project was about 42 months. Some processes have become more complex since then—and certainly public interest is more organized and focused.

As a reminder, the Colorado Joint Review process grew out of the concerns raised over the concept of the Energy Mobilization Board. That Board would have had the power to preempt local and state regulatory requirements in the national interest. The reaction in the west was to coordinate and streamline, not dismantle, the existing process. And it worked. Attempts in recent years to truncate the process have been met with public criticism and lawsuits. Such efforts have proven to be counterproductive to the goal of developing these important resources.

Community acceptance is the only way to avoid what could be well organized and sophisticated opposition to oil shale development. Seeking, tracking and addressing stakeholder concerns and encouraging participation is essential for project implementation in the timeframe contemplated by Congress.

Today's Colorado Coordinating Council is an option that the federal government should consider fully funding, or partially funding along with industry, to assure a rigorous review with adequate public input and consultation. A coordinated permitting process will reduce uncertainties by clarifying technical requirements, timeframes, lead regulatory agencies and public input.

The outcome is a centralized facilitation of the permit process at the local, state, and federal level. The council would determine the timelines of the various required permits, coordinate the scoping process for the environmental impact statements, and facilitate public hearings and public comments. The overall coordination of the effort could allow for the application of several permits for an individual project to occur simultaneously.

POWER GENERATION REQUIREMENTS

According to the RAND report, an in-situ extractive type operation is estimated to consume 1,000 MW of dedicated electrical generating capacity for each 100,000 barrels of shale oil produced daily. The power requirements for the commercial base will be based on the technologies used.

But, here is where we are today. Colorado's current permitted coal production capacity is about 48 million tons—about 10 million tons higher than current production. The Craig power Plant, at 1274 MW, uses 5 million tons of coal annually. Therefore, the current productive capacity could fuel two Craig Plants. The key is rail transportation. We urge Union pacific and private investors to resolve those infrastructure needs. Increasing permit capacity at existing mines is a relatively routine process; construction of new coal mines—of which one may be in the works for northwest Colorado—could take several years to permit and construct.

Xcel Energy tells us that their current system on the Western Slope is anticipated to be in balance for the next couple of years—with some supply relief when the Comanche 3 plant comes on line in 2010. The company intends to compensate for additional growth by buying from other regions—or building, if necessary.

WATER REQUIREMENTS

Water will be required for communities, recovery processes, disposal and reclamation purposes. Requirements vary by technology, and will not become apparent until the RD&D applications are submitted. Colorado's permitting process requires a permit applicant to provide an estimate of project water requirements, to include flow rates and annual volumes for development, mining and reclamation. The applicant must also indicate projected amounts from each of the sources of water. It is yet to be determined if the public or the private sector will be required to develop the necessary water storage facilities if senior water rights are not available. It may be necessary for the federal government to play a significant role in defining, planning and constructing the necessary water storage and distribution systems.

The U.S. Water Resource Council estimates that oil shale development will increase annual consumptive water use in the Upper Colorado Region by about 150,000 acre-feet per year for each million barrels (oil equivalent) per day of production, about a 3 to 1 ratio water to oil. The range given is 2.1 to 52 barrels of water per barrel of shale oil produced dependent upon the extractive technology used. The

RAND report goes on to say that the availability of water in the region does not appear to be a "constraining factor," but this statement is too simplistic. What certainly is a continuing factor is the water supply infrastructure.

AIR AND WATER QUALITY

The permitting issues at the RD&D and commercial phases are yet to be determined based on the permit submittals. Probably the best overview of air and water quality issues is contained in the 2005 Rand Report. Let me summarize several of the issues that permitting agencies will review and applicants must mitigate.

*Air Quality.* The proposed development regions are high quality Class II areas. Therefore, only moderate increases in ambient air quality pollution levels are allowed. Specially protected areas are within the Piceance Basin—including the Flat Top Wilderness Area.

Oil shale operation emissions may emit pollutants currently on the list of air toxins by the Clean Air Act. The Rand Report recommends an approach in which emissions limits for initial plants are established so that future production can occur within the allowable PSD Class II and Class I increments. This could be useful input for the Programmatic PEIS and any work by the Air Quality Control Commission of the Colorado Department of Public Health and Environment.

*Water Quality.* The regulatory structure for water quality is an evolving science for hybrid mineral and energy extraction methods such as those proposed in the first round of RD&D leases.

SB 89-181 delegated authority to the Oil and Gas Conservation Commission and the Division of Minerals and Geology for ground water. Classification as a Designated Mining Operation will require an Environmental Protection Plan by the Division of Minerals and Geology. Drill hole casing requirements may be set by the Oil and Gas Conservation Commission for enforcement by the Division of Minerals and Geology. Class II, III and V underground injection wells will be subject to state or federal oversight depending on the type and liquids used. The Water Quality Control Commission will regulate surface water; and the Hazardous Waste Program may have oversight of waste disposal. So, the regulatory regime will be a function of the technology employed.

CONCLUSION

It is essential that Congress consider the life cycle of oil shale development as it unfolds its national oil shale effort. Only this view will portray the complete picture, so that the appropriate technology, environmental and economic structures can be defined and funded for a successful long-term effort. I look forward to working with you in the months ahead.

The CHAIRMAN. OK. Thank you very much. If you have any questions, we're going to proceed to questions. Well first, you, distinguished Senator, you're first.

Senator SALAZAR. Thank you very much, Mr. Chairman. Let me ask a question of both witnesses, Lieutenant Governor Herbert and Executive Director George. I would take it from your comments—I don't know if I'd call you Speaker George or just——

[Laughter.]

Senator SALAZAR. One of the big concerns is the impact to the local communities, and yesterday, when we were in Rio Blanco County, I know that there's a lot of development going on with respect to oil and gas in the Rio Blanco County, and I know that one of the concerns that I hear loud and clear from the commissioners in Rio Blanco County and other affected counties along the Western Slope is what's happening with the roads and what's happening with the infrastructure? And so I would like you to elaborate, if you can, on how it is that we might address some of those impacts as the oil shale research and development and potential commercial development moves forward.

The Lieutenant Governor first, and then why don't we ask Mr. George as well.

Mr. HERBERT. Thank you, Senator. Before I was Lieutenant Governor, I was a local county commissioner, so I have a near and dear appreciation for local government and the challenges they face. And clearly, as we see this opportunity coming to us in Utah, some of our local communities are impacted significantly when it comes to the infrastructure. The big trucks, the rigs that come in and out of their communities are tearing up the roads.

We are addressing that in Utah by a collaborative effort of at least, one, understanding the issue, seeing if, in fact, moneys can be put back into those regions, not only the regions where the extraction is sighted, but those regions where trucks and the traffic impacts are being felt, adjacent to that local community, whether that's a difference in realignment or a tax policy with mineral lease moneys, the sharing of moneys that are generated from this economic expansion. But put back in to keep the——

Senator SALAZAR. Are you doing—excuse me, are you doing it in a manner, Lieutenant Governor, where the moneys that are being collected, whether they're through mineral lease revenues or severance stack, as you may have in Utah and I don't know whether you do, but those moneys are being directed to the most impacted of communities from the mineral development? Is that how you're trying to address it in Utah?

Mr. HERBERT. That's being discussed right now, as far as whether we need to change the tax policy in Utah, so that more money goes back to those regions which are directed. The severance tax and mineral release moneys are looked at as Utah moneys, but some of it goes back already. Whether there needs to be some additional money to go back into those areas for the impact that they're feeling is the discussion or the debate now.

We also believe it's not just infrastructure, but it's impact on schools. There is the boom and bust cycle that people fear. We also think that money should be reinvested to broaden the economic opportunity, to broaden the base. Let's not just look at only natural resource extraction, but there's other areas that we can invest money into, so that when there is a downturn, it will be a soft landing and not such a bust that it hurts everybody, as has been experienced in the past 20 years.

Senator SALAZAR. And that essentially is the security net that you were talking about, Executive Director George. Can you elaborate on the response to the question?

Mr. GEORGE. Well, the Lieutenant Governor has it exactly right. I would add that one of the good things, one of the right things that we all did 20-some years ago was the use by the Federal Government of a bonus payment for the leases of public lands that were granted to the companies. That money was then paid, in part, to the State of Colorado. A General Assembly then took that money, deposited it in what we called the Oil Shale Trust Fund, a considerable sum of money. I recall something around $100 million at that time. Then the Board of that trust fund applied those funds to the impacted communities and this was mostly the towns, cities, and counties all across northwest Colorado. That money was then invested in the front end in order to build the infrastructure and did, in fact, provide an appropriate cushion, not knowing at the time we were going up when and how hard we would come down.

But we did, as we all know. But, except for maybe one school district, I think virtually all of the local governments were substantially protected by the wisdom of how they invested those funds that came through those leased bonus payments administered through the Oil Shale Trust Fund. Some arrangement similar to that would be as appropriate today.

Senator SALAZAR. OK. Let me ask one more quick question, because I know we have three more panelists to go through, on the issue of water. You know, I think Colorado, Utah, Wyoming, and New Mexico have always stood hand in hand with respect to our debate on water usage and allocation on the Colorado River. When we look at oil shale development in three of those States, we're looking at a significant increase in the consumption of water from the Colorado River Basin. Can you respond to the question of the sufficiency of water availability for oil shale development? And knowing your expertise in this, Mr. George, I'll ask you to respond to that question first.

Mr. GEORGE. Senator Salazar, I think the most significant way I can describe what I think the water issue in the oil shale development is, is that the amount of water and the availability of water for the long-term development of oil shale is unknown and I think it's also unknowable. Now, that's pretty hard, but we can't know yet how much water is going to be needed for what purpose until we know what technology is going to used and what the water requirement for that technology is. We can't know about the amount of water necessary for reclamation until we know the extent of the development planned over a time period.

So, I think it's only fair for us to call it like it is: it's unknown, it's unknowable. Nonetheless, we must position ourselves, as we do for all other things in this arid land we live in, to continue to be more efficient in our water use, and to continue to look for ways to develop storage, and therefore, increase the availability.

There are a number of water districts, conservation districts, conservancy districts. The Colorado Water Conservation Board are all hard at work today for a lot of reasons, trying to imagine how we can increase our storage capacity, increase our availability of water in this part of the State, while not shorting our neighbors in the Upper Basin and in the Lower Basin, so that we can also, over the same time period, comply with the Colorado River Compact.

We're bringing more and more resources at the State level to bear on this issue. My guess is that over time as oil shale develops, the need for expending resources on water storage and transportation structure will be greater than we can afford locally and with State support, and we may need Federal assistance and support developing those water resources over time.

Senator SALAZAR. Maybe just a comment, more than anything else. You know my understanding has always been, as I worked on Colorado River Compact issues, that Colorado's entitlement still allows us to develop somewhere between 500,000 at a very low end, to above 1,000,000 acre-feet of water a year. That's Colorado's entitlement. I would assume that, as you think about it as executive director to the Department of Natural Resources, the quantum of water—that some of that quantum of water may, in fact, be available for oil shale development.

Mr. GEORGE. I agree totally with your statement, Senator Salazar.

Mr. HERBERT. Can I just add to what Russell has said? I agree with what he said, from Utah's prospective, he mentioned we learn from history. I think we are into history and we want to make sure we don't make mistakes of the past. But we also learn from history that technology has a way of evolving to meet the demands and the needs of the marketplace. I know there is technology out there that is going to be using less water, maybe no water at all, and I expect that technology will be pressured to evolve as market pressures occur.

I also believe that conservation is becoming much more a way of life, certainly in my State, than ever in the past. And Utahans would probably trade the less long for lower gasoline prices. So there's probably some tradeoff that will occur in the marketplace as we respond to what's available out there. Technology has always been our savior and I think it will be our savior in the future. We need to do our part with the conservation, but I believe that as we move proactively into the future, we will solve the issues working together.

The CHAIRMAN. Let me ask you, Mr. George, I don't think that people quite visualize what I'm seeing up here, but I keep looking up like this, because I can't see his name plate and I hope you understand. And that's just the way they've got this podium constructed. Maybe that's not the way they do their regular meetings.

[Laughter.]

Senator SALAZAR. I think the people of Grand Junction are just very tall.

[Laughter.]

The CHAIRMAN. I mean, I served on as a mayor for a long time, and I wouldn't have been able to see.

Anyway, now let me get it straight, and let's see if all these people out here get it straight. Sir, you're in charge of evaluating these various projects, programs, activities that relate to shale?

Mr. GEORGE. Yes.

The CHAIRMAN. And you just got through telling the people of Colorado, as the principal advisor to the Governor of the people, you're the one that looks at the programs and projects, as they appear; right? That they'll promote them and propose them, and you will look at them, evaluate them, and see how they fit with the availability of the resources for the people, and then you'll square with the people on the impact of the application, if implemented; is that correct?

Mr. GEORGE. That is correct, Senator.

The CHAIRMAN. All right. And so far, what you're telling us, everything seems OK, because you will see to it that the projects and the project needs, as evaluated, versus the availability of resources will be properly presented such that you will either have the resources or you won't; is that correct?

Mr. GEORGE. Yes, sir.

The CHAIRMAN. That's why you say we may have it and we may not, and we don't know. That's why you made that kind of statement, which sounds kind of like you don't know anything.

[Laughter.]

Mr. GEORGE. But, the matter is—

The CHAIRMAN. You know a lot.

[Laughter.]

The CHAIRMAN. Thank you everybody.

Mr. GEORGE. Senator, you probably just gave away my lifelong political secret.

[Laughter.]

The CHAIRMAN. Anyway.

Mr. GEORGE. May I respond?

The CHAIRMAN. Yes, please do.

Mr. GEORGE. I agree totally with your statement and I would like to amplify it this way: More in this discussion than maybe many other things we do, we really are all in this one together. And I mean you folks on behalf our Federal Government, me here as today's spokesman for State government, and all of our friends and neighbors here, speaking on behalf of local governments, and all of us as citizens. This is going to happen. It needs to happen. There are all kinds of world reasons why this needs to happen. You're going to hear that again and again. You've already started the day that way. So my point is that of course we'll do it, that's our responsibility.

The CHAIRMAN. Right.

Mr. GEORGE. And we do it either as regulators, or we do it as partners without regulation and law, but we will, together, get it done right. Thank you very much.

The CHAIRMAN. But it is not expected that anybody knows all of the answers yet.

Mr. GEORGE. Thank you.

The CHAIRMAN. That's the point. And we will hear from the head of a very refined project that is being developed over time, with a lot of resources, by Shell Oil. They're going to tell us how they're proceeding. They're doing it with very, very delicate research, so that they evaluate step by step and they have lots of answers. And everybody should know, their answers are being evaluated versus an enormous investment, so they're not expecting wrong answers, they're expecting right answers; right? Invest $50 million, you expect what the scientist told you is right. You expect to invest $500 million, you expect the answer is probably right; right?

You know, in my opening remarks, I said it could literally, quote, shake the world. Did you hear that?

Mr. GEORGE. I did.

The CHAIRMAN. Well, I wasn't kidding. What we're talking about could shake the world, because if those currently producing energy oil conventionally find out this is going to work, it could shake the world; right? And I clearly don't know whether it's going to happen, but from what I am figuring out—I'm not totally foolish, I think it's going to happen. And for those people that wonder why it didn't happen last time, I want to just remind you of one thing: Just remember what the price of oil was. That's the big difference. The price of oil was so cheap and now it's so high. That's a very big difference in terms of making it feasible, that certain things will fit.

Having said that, unless Senator Hatch has a question, I have no further questions other than one last one. You said you will have to have continual oversight. That was a statement you made,

I wrote it down. Again, for the record, for the Federal Government, as a spokesman for the people of the State of Colorado and working through the Governor's office, there is no question, in your mind, that you are provided with adequate resources in both professional and actual resources, to do that job. Even when you are working up against, and in conjunction with, very wealthy companies, you are not lacking in confidence. Is that a fair statement?

Mr. GEORGE. Senator, we have the responsibility as the State regulator of this industry, to be able to meet the challenge and we will run as fast as we can to stay on top of it. That is our expectation and our promise.

The CHAIRMAN. OK. Thank you. I don't have any further questions. You're excused.

Mr. GEORGE. Thank you very much.

Mr. HERBERT. Thank you.

The CHAIRMAN. Now, we have the county commissioners. If you'd please come up, we'd appreciate it. Chairman of the County Commission of Rio Blanco, is that Mr. Kim Cook?

Mr. COOK. Yes, sir.

The CHAIRMAN. Yes, sir. Mr. Cook, you're right there. And we have Mr. Mike McKee, chairman of the County Commission of Uintah County. And then, we have Craig Meis, county commissioner, Mesa County, Grand Junction. All right, you're all there. You all know the game plan? Your testimony will be made a part of the record as if you read it and you can deliver it in the time provided by the committee. Please proceed, starting with you, Mr. Cook.

**STATEMENT OF KIM COOK, CHAIRMAN, COUNTY COMMISSION, RIO BLANCO COUNTY, CO**

Mr. COOK. Mr. Chairman and members of the committee, my name is Kim Cook, county commissioner of Rio Blanco County, CO. I am here today to present testimony on behalf of my county and two organizations that Rio Blanco County is a member of—Club 20, a community-based organization representing cities, counties, businesses and citizens throughout western Colorado; and the Associated Governments of northwest Colorado, also know as AGNC. And AGNC represents the cities and counties in the five-county region of Mesa, Garfield, Rio Blanco, Moffat and Routt Counties.

I would like to begin my remarks by referring back to comments made by AGNC before this committee last year, when we gave the overall impression that local governments were pleased with the research course that the Federal Government was taking during this time of oil shale development.

In fact, not much has changed in the minds of AGNC members since then. We still believe oil shale presents an opportunity to provide a secure domestic fuel source. And since more than 80 percent of the oil shale resource is located on Federal lands and since that future development is driven by national interests, we continue to believe the Federal Government must play a lead role in addressing the socioeconomic and environmental impacts and costs. We naturally do not want to see local governments and local taxpayers burdened with the costs of new infrastructure and the mitigation of environmental impacts.

As an example, and turning to what may be the foremost Rio Blanco County concern, you must travel on my county's roads to reach all of Colorado's oil shale RD&D leases. These roads have no base, or at best a shale base, and they were never designed for the heavy energy traffic we are currently experiencing due to gas drilling, and expect to receive from oil shale development.

To reconstruct just 1 mile of paved road so that it is designed to carry heavy loads currently costs approximately $1 million per mile. And with 65 miles of paved roads in the Piceance Basin at present and the possible need for more asphalt roads in the future, that is a cost that cannot be borne by Rio Blanco County's 6,500 citizens.

Another example, turning from infrastructure to personnel, would be State troopers. Rio Blanco County used to have four State troopers located in our county, two at each end. Currently, we have none. If you have an accident on State highways in my county, you're a long time waiting for a state trooper to come by. So our county sheriff is burdened with covering the State function. That's my point. There's going to be needs, not only with infrastructure, but with personnel. Whether it be additional Federal personnel at the BLM level to do their work, or at the State level with State troopers or others, there's infrastructure and personnel needs as well.

My county is concerned that efforts to incentivize the unconventional fuels industry, could negatively effect state and local revenue streams, as well as impact funds which are currently utilized to mitigate conventional natural gas development. We are further concerned whether adequate impact funds would be allocated by the Federal Government for the mitigation of impacts which will occur as a result of unconventional fuel research development.

It's our hope that efforts to streamline regulatory approval of projects does not circumvent the intent of the regulations, but focuses instead on providing adequate funding, staffing, and cooperation to enable the regulatory agencies to do the necessary work in a timely fashion. In some, we prefer a deliberate and reasoned approach to oil shale development, which avoids a gold rush of speculators and opportunists, and instead, leases public lands on the basis of promising technologies.

Wrapping up, I would like to return to a final AGNC concern, and that is with regards to funds being accumulated in the U.S. Treasury through the oil and gas lease payments that are occurring at the Naval Oil Shale Reserve lands, also known as the NOSR lands.

Last year, we reported to you that, according to a letter from the Department of the Interior, some $44 million may be accumulated by March 2007 in the U.S. Treasury account from the current national gas leases on those NOSR lands. Those lands were transferred by Congress from DOE to the Department of the Interior with a congressional price we established for natural gas leasing.

Some of those funds, approximately $6 million, are earmarked for an environmental clean-up of the Anvil Points spent shale pile. Otherwise, we believe Congress has the opportunity for the remainder of these funds to be made available to address the socio-

economic and environmental aspects of oil shale development here in northwest Colorado.

In the future, still more revenues should be available from this source and we would appreciate Congress establishing a priority to address oil shale and other energy development impacts in northwest Colorado from these leasing revenues.

Attached to my testimony is also an oil shale policy resolution from Club 20. You will notice that it is a very well thought out and balanced policy, in spite of the cheap shot taken by the editorial writers in today's local newspaper. I think you'll see that as a policy that meshes well with the T-shirts that you see in this audience this morning: Take It Slow on Oil Shale. That policy supports the RD&D leasing program and it appreciates the involvement and participation of local governments in both the DOI oil shale leasing program and the DOE Strategic Fuels Program.

Thank you to the committee for holding this field hearing here in Colorado. I will attempt to answer questions later. Thank you.

[The prepared statement of Mr. Cook follows:]

PREPARED STATEMENT OF KIM COOK, CHAIRMAN, COUNTY COMMISSION, RIO BLANCO COUNTY, CO

Mr. Chairman and Members of the Committee:

My name is Kim Cook, County Commissioner of Rio Blanco County, Colorado. I am here today to present testimony on behalf of Rio Blanco County and two organizations that Rio Blanco County is a member of Club 20, a community based organization representing cities, counties, businesses and citizens throughout Western Colorado; and the Associated Governments of Northwest Colorado (AGNC), which represents the cities and counties in the five-county region of Mesa, Garfield, Rio Blanco, Moffat and Routt.

I would like to begin my remarks by referring back to comments made by AGNC before this committee in April 2005, when we gave the overall impression that local governments were pleased with the course that the Federal government was taking during this time of oil shale development. We further commented on the need for supporting local governments' ability to mitigate socioeconomic and environmental impacts.

In fact, not much has changed in the minds of AGNC members. We still believe oil shale presents an opportunity to provide a secure domestic fuel source. And, we still believe that since more than 80% of the oil shale resource is located on federally-owned public land and recognizing that the future development is driven by national interests, the federal government must play a lead role in addressing the socioeconomic and environmental impacts and costs. We do not want to see local governments (and local taxpayers) stuck with the costs of new infrastructure and the mitigation of environmental impacts.

As an example, you must travel on Rio Blanco County roads to reach all of Colorado's oil shale RD&D leases. These roads have no base, or at best a shale base, and were never designed for the heavy energy traffic we are currently experiencing due to gas drilling, and expect to receive from oil shale development

To reconstruct one mile of paved road so that it is designed to carry heavy loads currently costs approximately $1 million. With 65 miles of paved roads in the Piceance Basin at present and the possible need for more asphalt roads in the future, that is a cost that that cannot be born by Rio Blanco's 6500 citizens.

Rio Blanco County has concerns related to the initial DOE report to Congress on "Development of America's Strategic Unconventional Fuels Resources." Efforts to develop "*A fiscal regime that improves attractiveness of capital investment through tax and royalty terms in the early years*" need to provide adequate compensation to state and local funds which would normally use these revenue streams to mitigate development impacts. Proposed incentives to industry relating to royalties, severance tax, and property tax are likely to be detrimental to current sources of local revenue available to mitigate impacts and develop local infrastructure. Allowing capital costs for unconventional fuels to be expensed or depreciated on an accelerated schedule could also have a negative effect on local taxes derived from real and personal property. Likewise, production tax credits could negatively affect severance tax revenues

which contribute to the Energy and Mineral Impact Assistance fund—our major source of grants for impact mitigation.

Funding for socioeconomic impact assessment and community infrastructure planning and development is very important. This needs to be followed up with funding for implementation of these plans and for the operation and maintenance of the expanded infrastructure as well. Much of this region lies within the public domain and has low population density, both of which limit the ability of local governments to study and finance large scale improvements. Therefore, establishing a federal impact fund and/or a local/regional trust fund for the mitigation of impacts is critical to local government efforts to mitigate impacts and create new infrastructure.

Rather than cutting corners in "streamlining" regulatory processes or gutting existing processes and procedures, the integrated program plan should allocate funds to provide levels of staffing to these agencies (BLM, FERC, EPA, etc.) which are adequate to produce the needed throughput in the desired timeframes. Cooperation between intra-agency regions (i.e.: BLM White River Field Office and Vernal Field Office) as well as between agencies should not only be streamlined but required. Be careful in granting regulatory agencies quasi-judicial powers; placing such power in federal agencies risks the loss of local participation in the decision making process. The Colorado joint review process is a model to be encouraged for interagency cooperation.

The Colorado-Wyoming-Utah transportation network needs study and funding to develop efficient and time-effective routes between development sites, communities, and markets. Interstate traffic, even in the current natural gas development boom, follows inadequate and circuitous routes throughout this region. State funding for maintenance of existing roads, much less the development of new roads, is not sufficient for the task. Significant interstate traffic is occurring on county roads which were never designed for such impacts and stretch limited county resources to maintain. Such a regional study in conjunction with the development of unconventional resources should involve state, federal, and local governments in planning, development, and funding.

The future needs of the electrical power infrastructure in the Piceance Basin, considering the current conventional natural gas development and the potential oil shale need for in-situ heating, may be very significant and beyond the current capacity. The demand for electrical power might be best addressed in conjunction with other unconventional resources such as a coal gasification process to generate electricity. Rio Blanco and Moffat Counties have significant coal resources, current $CO_2$ injection in the Rangely Weber Sand oil field, along with the need for additional electrical power in the Piceance Basin.

Rio Blanco County hopes that research park development and community college training programs would be housed within the immediate locale being affected by the resource development, as these types facilities help grow and diversify the local economy and provide for the tax base of the local governments. Any community college unconventional resource programs should include Colorado Northwestern Community College.

Finally, a small number of corporations within the industry have already invested significant private funds in oil shale research and development. Any new federal incentives and initiatives to accelerate the research and development process need to respect this investment and avoid inclusion of those corporations or companies operating in a more speculative and opportunistic fashion.

One final AGNC concern has to do with the funds being accumulated in the U.S. Treasury through the oil and gas lease payments that are occurring on the Naval Oil Shale Reserve lands

Last year we reported to you that in a letter from the Department of Interior, some $44 million may be accumulated by March 2007 in a U.S. Treasury account from the current natural gas leases on their NOSR lands. These NOSR lands were transferred by Congress from DOE to the Department of Interior with a Congressional priority established for natural gas leasing.

Some of these funds, estimated at $6 million, are earmarked for environmental cleanup of the Anvil Points spent shale pile. Otherwise, we believe Congress has the opportunity for the remainder of these funds to be made available to address the socioeconomic and environmental aspects of oil shale development in Northwest Colorado.

In the future, more revenue should be available from this source. According to industry estimates, additional leasing of the NOSR lands could produce leasing bonuses of up to $360 million (to be shared 50% federal and 50% state), plus ongoing production leases of an estimated $32 million annually for at least 20 years. That would be another $640 million total also to be split 50/50, federal and state. Con-

gress should establish a priority to address oil shale and other energy development impacts in Northwest Colorado from these leasing revenues.

However, on December 15, 2005, Colorado State BLM Director Sally Wisely informed AGNC that, as of November 29, 2005, the Treasury had accumulated $37 million.

This leaves only $7.25 million left to be collected. With recent increased gas prices, royalties are averaging $1.25 million per month over the past 11 months. At this rate, the remaining funds should be recouped by June 2006, nearly a year ahead of schedule.

The Transfer Act states that the Secretaries of Interior and Energy must jointly certify to Congress that the monies have been recouped prior to making revenue available for distribution to the State of Colorado. As these funds should be recouped by June, DOI and DOE should currently be coordinating the certification process to Congress.

We respectfully request that the Committee monitor the activities of these Departments in the coming months and push for the earliest possible release of these funds to the states upon certification, per section 7439(f)(2) of the Transfer Act.

We believe this type of funding is necessary to make sure the DOE research and demonstration projects can proceed without interruptions from fluctuations in the price of oil.

Attached to my testimony is an Oil Shale Policy Resolution from Club 20, which is the coalition of individuals, businesses, and local governments representing Western Colorado since 1953.

As indicated in the resolution, Club 20 supports the current R&D leasing program underway to test various oil shale technologies. Three of the leasing applicants are located in Rio Blanco County—Shell, Chevron and EGL. Club 20 supports the conversion of these to commercial scale if the technology proves out.

Club 20 also supports a prudently paced commercial scale leasing program including the Environmental Impact process now being initiated by BLM. We believe the carrying capacity provisions being considered in the EIS will help protect our Western Colorado air quality, water resources, wildlife, and socioeconomic values. Club 20 also supports the establishment of a commercial scale royalty credit, proposed by AGNC, to encourage companies to contribute to the mitigation of socioeconomic and environmental impacts. These mitigation efforts are very important to Rio Blanco County, where most of the development of federal oil shale resources will occur.

Club 20 also appreciates the involvement and participation of local governments in both the DOI Oil Shale leasing program (with affected local governments designated cooperating agency status) and the DOE Strategic Fuels Program (with a local government representative as a member of the Task Force on Strategic Unconventional Fuels).

I would like to thank the Committee for coming holding this field hearing here in Northwest Colorado. I would be happy to answer any questions you may have.

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ATTACHMENT—CLUB 20 OIL SHALE POLICY

OIL SHALE, DEVELOPMENT AND IMPLEMENTATION OF A NATIONAL STRATEGY

WHEREAS the U.S. Department of Energy estimates that 800 billion to 1 trillion barrels of recoverable oil may exist within the oil shale deposits of the Green River Formation in Northwest Colorado, Southwest Wyoming, and Northeast Utah (the bulk of which is located in northwestern CO) and this is the largest known deposit of oil shale in the world and one of the largest untapped hydrocarbon resources available for development, and

WHEREAS CLUB 20 recognizes the potential value of this oil shale resource, and we also recognize the need to realize this value while sustaining the other existing social, economic and environmental values that comprise the overall quality of life in western Colorado; and

WHEREAS oil shale development is important for our country's national security to supplement our nation's growing energy demand, and

WHEREAS, without well-conceived research and development, this region may someday be faced with another crisis-oriented, commercial-scale oil shale program;

THEREFORE BE IT RESOLVED that CLUB 20 supports research and development efforts leading to an environmentally sound, socially responsible and economically viable oil shale program that will result in the efficient recovery of the resource, and

BE IT FURTHER RESOLVED that CLUB 20 supports efforts by the U.S. Departments of Energy, Interior and Defense, in cooperation with State and Local govern-

ments, to continue to develop and implement a national oil shale strategy and urges that this strategy include the following:

1) Incorporate a prudently-paced commercial scale leasing program to allow time for adequate demonstration and testing of experimental development technologies;

2) Provide an opportunity for ongoing participation of directly impacted state agencies, specifically including the Department of Natural Resources and the Department of Health, and local governments by designating them as "Cooperative Agencies" and, in so doing, provide them additional opportunity to observe and comment on the development of oil shale in their area in addition to continuing the opportunity for public participation.

3) Update BLM's existing "carrying capacity" concept which is included in current Resource Management Plans for a) air quality, b) water quality and quantity, c) wildlife impacts, and d) socioeconomic values to assure prudent development of the oil shale resource in balance with these other values;

4) Utilize the Colorado Joint-Review Process to facilitate and coordinate the federal, state and local permit process;

5) Support the existing BLM Research, Development & Demonstration (RD&D) oil shale leasing program, and specifically the conversion of successful technologies (technologies which are environmentally sound, socially responsible, economically viable, and which result in the efficient recovery of the resource) to commercial scale leases; and

6) Encourage tax & royalty structures that result in timely mitigation of impacts from development, including incentives for "up front" industry contributions to state agencies and local governments through establishment of a federal royalty credit for these contributions.

Adopted 4/1105
Amended 3/31/06

The CHAIRMAN. Thank you.
Please proceed.

**STATEMENT OF MIKE MCKEE, CHAIRMAN, UINTAH COUNTY COMMISSION, UINTAH COUNTY, UT**

Mr. MCKEE. Good morning, Senator Domenici, Senator Salazar, and Senator Hatch. I'll just begin by saying I have great admiration for each of you personally and the tremendous work that you're doing, and I appreciate the opportunity to be able to take a few minutes and give a local perspective relating to oil shale, tar sands, and the energy needs that we have.

The CHAIRMAN. Thank you.

Mr. MCKEE. I might just begin by stating, as you aptly brought up this morning, the tremendous reserves found in the Green River Formation. You've mentioned the two trillion barrels, and Senator Domenici and Senator Salazar, you've mentioned the 500 million barrels, on the low end, of recoverable oil and up to 1.2 trillion barrels of oil in the same reserve.

According to the Rand Report, at a mid-level range, at 800 billion barrels, that would be enough to—if ¼ of the Nation's current energy needs were being—that would last the United States for 400 years. And of course, that would be coming from the Green River Formation of eastern Utah, western Colorado, and southern Wyoming.

Uintah County, UT, generally is in support of this development. Much of our economy is derived from energy resources. I will say, though, we do have some reservations, and that will be the majority of my testimony. Particularly, most of that has to do with the financial implications.

Uintah County finds itself thrust into the heart of national energy concerns. The fact that Uintah County contains tremendous energy reserves will forever change the county's economy and the lifestyles of its residents. The resources are critical to national interest, the development of these resources are inevitable, and the county's infrastructure and ability to provide services will be greatly impacted.

Uintah County stands ready to assist the Nation in meeting its energy needs and will be willing partners with industry and government to do so. We recognize that oil shale development will improve our Nation's energy and economic security and benefit the country as a whole.

We believe that it is in the Nation's interest to assist counties of origin with funding needs for planning infrastructure development, community impact assistance, and adequate services. Local communities must provide the public infrastructure, education, community services, utilities and roads at a level that exceeds its funding capabilities.

Our area has already been highly impacted because of the number of oil and gas wells developed in our area. Nationwide, the Vernal BLM Field Office has processed the second highest number of application permits to drill—APDs—in the country. In the past 2 years, it processed approximately 1,400 APDs. It is estimated that this year there will be an additional 1,200 APDs, moving to 1,500 APDs the following year. In addition, Uintah County has some of the richest tar sands in the United States. We believe that commercial tar sand production may come on line before oil shale production, thus adding to an already overburdened system. To meet these needs, there must be up-front funding assistance to the counties for the planning and mitigation of impacts. Currently, there is no mechanism to provide this up front funding.

Several key issues: Mechanisms for obtaining funding are not automatic; local communities must justify—sometimes we feel like we beg—to community impact boards on a project-to-project basis; and costs are being incurred now, but receipts don't arrive until after production.

The county is now facing the onset of oil shale and tar sand development. Failure to fund such impacts will not only prevent the county from meeting the needs of this expanding development, but will also reduce our ability to fund ongoing conventional oil and gas impact and production.

Businesses not directly involved in energy development cannot hire an adequate work force, as they cannot compete with wages paid in energy development. The current lack of housing, particularly affordable and low income, is a factor in this issue. Thus, energy development can have some negative impacts to our communities in the sectors of our economy.

Currently, both the Forest Service and the BLM are in the midst of new resource management planning. Management prescriptions in these plans with respect to wild and scenic rivers management will prevent future water development to meet needs for domestic, agricultural, and energy development. Wild and scenic river desigNation will have an immense negative impact on energy development in our area.

One other thing that I would mention in connection with the resource management plans, the resource management plan in our area will—there should be a record of decision by toward the 1st of the new year and oil shale is not really being considered in this resource management plan. I would suggest that funding mechanisms begin now, to begin an amendment to the plan already, so that oil shale can be developed in this resource management plan.

Another key issue is payment in lieu of taxes. Currently, PILT dollars are reduced proportionately to the amount of discretionary funds received from mineral lease funds. In effect, this penalizes counties when mineral impact funds are received. Legislation should be enacted to resolve this discrepancy. In other words, local governments do not have an opportunity to use mineral lease funds, if we take direct involvement in using PILT dollars, and that is a tremendous disadvantage to local governments. If we could have some legislation to help us with that, it would be immensely helpful to us.

Congress must provide incentives to industry and to conduct research and development activities in order to encourage timely implementation of commercial production.

In summary then, just real quickly, there are four issues we would like to see: Some up-front funding for infrastructure—we feel like that's imperative; allow local governments to have direct access to mineral lease money without forfeiture of PILT with the resource management plans' and wild and scenic river designations would be a disaster, if we want to have tar sand and oil shale development.

Thank you for this opportunity, I appreciate the time. Thank you very much.

[The prepared statement of Mr. McKee follows:]

PREPARED STATEMENT OF MICHAEL MCKEE, CHAIRMAN, COUNTY COMMISSION, UINTAH COUNTY, UT

Chairman Domenici, members of the Committee, thank you for holding this hearing and inviting me to testify.

With reservation, Uintah County finds itself thrust into the heart of national energy concerns. The fact that the County contains tremendous energy reserves will forever change the County's economy and the lifestyles of its residents. One could argue the benefits or negative impacts of such changes, but the fact remains that the County's resources are critical to national interest, that the development of these resources are inevitable, and the County's infrastructure and ability to provide services will be greatly impacted.

Uintah County stands ready to assist the Nation in meeting its energy needs and will be willing partners with industry and government to do so. We understand that oil shale development will improve our Nation's energy and economic security and benefit the country as a whole.

We believe that it is in the Nation's interest to assist counties of origin with funding needs for planning infrastructure development, community impact assistance, and adequate services. Local communities must provide for public infrastructure, education, community services, utilities and roads at levels that exceed its funding capabilities.

Our area has already been highly impacted because of the number of oil and gas wells being developed in the area. Nationwide, the Vernal BLM Field Office has processed the second highest number of applications permit to drill (APDs) in the country. In the past two years it processed approximately 1,400 APDs. It is estimated that there will be approximately 1,200 applications this year and increasing to 1,500 next year. In addition, the County has some of the richest tar sands in the United States. We believe that commercial tar sands production may come on line before oil shale production, thus adding to an already overburdened system.

To meet these needs, there must be upfront funding assistance to the counties for planning, and mitigation of impacts. Currently, no mechanism exists to provide this funding.

KEY ISSUES

Mechanisms for obtaining funding are not automatic; local communities have to justify (beg) requests on a project-to-project basis.

Costs are being incurred now. Receipts don't arrive until after production.

The county is now facing the onset of oil shale and tar sands development. Failure to fund such impacts will not only prevent the county from meeting the needs of this expanding development, but will also reduce funding and impact ongoing conventional oil and gas impact and production.

Businesses not directly involved in energy development cannot hire adequate workforce as they cannot compete with wages paid in energy development. The current lack of housing, particularly low income, is a factor in this issue. Thus energy development is negatively impacting other sectors of our economy.

Currently both the Forest Service and the BLM are in the midst of resource planning. Management prescriptions proposed in these plans with respect to wild and scenic river management will prevent future water development to meet needs for domestic, agricultural and energy development.

Congressional oversight is needed to insure that field offices are adequately staffed and that their policies and procedures are supportive of the provisions of the Energy Policy Act.

Currently PILT dollars are reduced proportionately to the amount of discretionary funding received from Mineral Lease Funds. In effect, this penalizes counties when mineral impact funds are received. Legislation should be enacted to resolve this discrepancy.

LOCAL PARTICIPATION IN PLANNING

EPACT 2005 calls for the involvement of local communities in the federal oil shale program planning process and for formal participation on the Strategic Unconventional Fuels Task Force. We are participating in the deliberations of the Task Force, and we commend the Committee, and in particular our own Senator Hatch, for the foresight to formally include the local communities in this process. We see this as the beginning of formal mechanisms by which local communities will have a strong voice in the planning and implementation process. We encourage this Committee to continue engaging the local communities as we move forward.

NEEDS AND CONCERNS

There are many issues that local communities face during periods of rapid and unrelenting growth. I could spend much of my time talking about such issues as insufficient and affordable housing, overstretched education and medical services, escalating public service costs, drug problems, inadequate jail space, and infrastructure demands. For example, Uintah County has approximately 1400 miles of maintained roads. We have another 4,589 miles of unmaintained roads. But in the end, it all comes down to a fairly simple matter; *where do the revenues come from to satisfy the public needs and when do they arrive?*

The current lack of adequate mechanisms for providing revenues to meet the public obligations concerns me. Current mechanisms and formulas, revenue flows are insufficient to cope with impacts; and if nothing is done to remedy this problem lack of funds will overwhelm our local communities to cope in the future:

DEFICIENCIES IN CURRENT MECHANISMS

Most of the processes by which rural communities receive funding depend on the state or federal governments to first receive tax or royalty revenues from production or other commerce. The federal and state governments then return a portion of the revenues generated from this production or commerce to the counties.

In times of rapid growth, distribution of these funds comes too late to be of any use during the ramp-up period. Even in times of steady economies, the process does not work very well. Some funds come with restrictions on where the resources can be allocated, tying our hands to addressing pressing issues that may not have been anticipated. Even more problematic is that the portion of wealth that is returned is insufficient to fully mitigate the impacts.

We currently have limited mechanisms to receive up-front funds, ahead of the growth, that can be used for planning, infrastructure development and impact mitigation. If I could leave the Committee with one thought from this hearing, it would

be that *lack of early funds is at the root of the vast majority of socioeconomic impact issues.* Solving this one issue will be the single biggest contribution this Committee could make to the socioeconomic well-being of these sparsely populated communities that find themselves squarely in the impact zone.

CONTEXT OF SOLUTION IS NATIONAL IN SCOPE

To put my suggestions in context, consider that we represent very small communities in a region that will experience unprecedented impacts. By fate of nature the single largest concentration of hydrocarbons found on earth are found within a few hundred square miles of the Green River geologic formation. This area is sparsely populated wherein only about 3% of the US population lives in the tri-state area of Utah, Colorado and Wyoming. The population in the direct impact area is less than 0.1% (one tenth of one percent) of the US population. As a consequence of this low population our states and local communities are highly limited in their capacity to financially absorb impacts from energy growth.

Because the benefits of oil shale development are National in scope, we believe that it is in the broader National interest to help with the extraordinary impact costs that will come with such development. Oil shale development will improve our Nation's energy and economic security and will benefit the country as a whole. Most heavy equipment manufacturing and consumption of the energy will take place outside of the region.

There is some urgency to addressing the issue of domestic energy supply. But in responding to this pressing need our immediate concern is the up-front funding needed for planning and impact mitigation, as well as for major and minor infrastructure projects.

GUIDING PRINCIPLES FOR COST SHARING IMPACTS AND INFRASTRUCTURE

1. Because the federal government owns much of the resource, pre-investment of funds that will directly lead to future federal revenues is consistent with good public policy.
2. To truly share in the extraordinary costs, funds provided should not diminish future funds allocated to states and local communities.
3. States, and especially local communities, should not be asked to take financial risks for the potential failure of projects. Indebtedness of all kinds needs to be avoided.
4. Care needs to be taken that incentives provided to the industry do not have the effect of diminishing revenues at the state and local community level.
5. Mechanisms should be established that give local communities a strong voice in the decision-making process, including program planning and recommendations for administrative and legislative action.

SUGGESTIONS FOR FUNDING SOURCES

- For Counties to fulfill their responsibilities and more formally begin the local planning process Congress needs to provide an appropriation of funds to the Office of Petroleum Reserves (OPR), the lead DOE office in the implementation of the Strategic Unconventional Fuels Program. OPR would use a portion of these funds as grants to facilitate the engagement of communities in the Program Planning process. It is my understanding that such a recommendation is being considered by the Strategic Unconventional Fuels Task Force, and I am encouraging this Task Force to adopt this recommendation.
- We will soon be encountering the need for long-lead time infrastructure development. Water projects, new and improved road systems, upgraded airports, power utilities, and possibly a regional rail spur are examples of big ticket items that we must plan for. One possible source of funds for planning and early implementation, suggested by our colleagues from Colorado, would be to redirect royalty funds from NOSR 3, now totaling nearly $40 million, to the three states on a reasonable formula. These funds have accumulated from current production royalties on oil shale property, for the purpose of reimbursing DOE for property improvements enjoyed by the lessee. These would be one-time funds, but would be substantial enough to fully engage—the communities in the process and initiate some meaningful infrastructure development.
- In anticipation of the need for major infrastructure requirements, we suggest creating an 'investment bank' through the federal Mineral Lease Fund, whereby roads, dams, utilities, airports, possible financing for private railroads, and the like could be funded. This approach would need to be properly structured, but with increasing commodity prices creating increased mineral lease royalties to the federal government, it seems like good policy to use some of these funds to

promote development of additional royalty-bearing projects. This would be truly an investment to provide future income.

- We understand the desirability of reducing royalty costs in the early years of development to assist industry with early project payback. However, we need to caution the Committee that passing those deductions to the States would impact the ability to provide adequate revenues for impact mitigation. If patterned after other such proposals the future federal royalties could be escalated to make up for early royalty forgiveness. But these swings in revenues should apply only to the federal portion; States and local communities need to count on a steady flow of revenues, not less in early years, and not necessarily more in later years.
- Coordinate with the US DOE to develop and implement an integrated local and regional infrastructure plan that will support efficient natural resource development, support university and vocational training to provide a skilled workforce, realize synergies among infrastructure requirements for various conventional and unconventional fuels, and maximize state and local employment opportunities.

RECOMMENDATIONS

PILT payments compensate Counties for the loss of taxing authority over surface acres and surface improvements. PILT does not address the impacts of mineral development. To compensate for mineral development, revenues from mineral lease funds are utilized. However, PILT legislation provides that for every dollar of discretionary funding we receive from Mineral Lease funds we must forfeit a dollar of PILT monies. It is our view that such an offset does not recognize the impacts of mineral development. Legislation should be enacted to resolve this discrepancy.

When sharing of Mineral Lease Funds with the States was set up, *it was intent that all of the funds would go to the area directly impacted by the mineral development.* In Utah, it has been the policy that the entire State is an impact area, and much of the mineral lease funds are used for on-going expenses that bear little relationship to impacts from mineral lease development.

We believe that the on-going impacts of energy development could be substantially mitigated if Congress were to clarify the intent of these Mineral lease funds, so that all, or a greater percentage of these funds would flow to the Counties of Origin. Along with the removal of restrictions in the PILT legislation these two actions would go far to mitigating the long-term impacts of oil shale development.

There may be other legislative action needed at both the federal and state levels to mitigate the extraordinary public costs for oil shale development. I trust that as we move forward that we can offer our suggestions and that the Task Force and this Committee will be receptive to our suggested policy and legislative remedies.

America's unconventional fuels resources, if developed expeditiously and in a sustainable manner that respects our environment and protects the needs and interests of affected communities, can contribute substantially to improving the nation's energy security, stimulate economic activity and growth, and assure adequate and affordable energy supplies for decades to come.

In order to insure timely development of oil shale and tar sands, Congress must provide oversight to insure field offices are adequately staffed and their policies and procedures are supportive of the provisions of the Energy Policy Act.

The CHAIRMAN. Thank you very much.

Next, sir.

## STATEMENT OF CRAIG MEIS, COUNTY COMMISSIONER, MESA COUNTY, CO

Mr. MEIS. Thank you very much, Mr. Chair. First of all, welcome to Mesa County, Grand Junction, and northwest Colorado. I hope you've learned much about oil shale, natural resources, and natural resource development in our community during your trip. And I certainly hope you understood now why it's so special to us.

I was added to your agenda late yesterday, so I'll give you a very quick bio of myself. My name is Craig Meis. I'm a Mesa County commissioner, and currently, the chairman of the Associate Governments of Northwest Colorado and a State-appointed local representative of the Strategic Unconventional Fuels Task Force. I'm

also a professional engineer, a graduate of the Colorado School of Mines in chemical engineering, and have worked with the energy industry for the past 15 years.

I would like to submit for the record this brochure on Mesa County, along with this Socioeconomic Baseline Conditions Report that was commissioned by AGNC and dated November 29, 2005. The purpose of the report was to identify and present socioeconomic indicators that may be used to evaluate the changes that might occur as a result of the development of oil shale resources in northwest Colorado.

The baseline conditions are a benchmark of existing conditions within the geographic area studied. The geographic area encompassed by this report are Garfield, Mesa, and Rio Blanco Counties. Garfield and Rio Blanco Counties contain significant oil shale resources, while Mesa County is the regional trade center and is the location of many industrial support companies that are currently servicing the natural gas industry and will continue to support the oil shale industry.

You have heard from Commissioner Kim Cook from Rio Blanco County about the direct impact concerns of oil shale development such as—you've heard from Commissioner Cook about the oil shale operations and those direct impacts. I want to share with you, quickly, some information about the indirect impacts, such as a potential population explosion of Mesa County, based on my experience, from future commercial oil shale development.

Mesa County has, currently, a population of about 135,000 people. We were one of the top 10 largest counties in the State of Colorado and one of the fastest growing. We are also the only county in the top 10 West of the Continental Divide in the State of Colorado. Our unemployment is at 3.7 percent, a full percentage point better than the national average, and for the first time since the inception of our County Workforce Center, we have been trying to recruit employees from outside our county and even outside our State to fill hundreds of job openings in northwest Colorado.

Anyone who wants a job and is willing to work has a job, currently. Our local wages are increasing, along with housing starts. In short, Mesa County and northwest Colorado are doing very well, and in large part, due to the emerging natural gas development.

This progress, however, has not come to Mesa County and northwest Colorado without its difficulties. Any increased development, whether it is a home, a cell tower, a gravel pit, a gas well, et cetera, causes an impact. But we, in northwest Colorado, have continued to try to address these impacts by finding ways to mitigate them collaboratively with the various industries, mainly through our State and Federal jurisdictional agencies, and even through our own land use planning policy.

We are hopeful considering the development of tar sands in places such as Fort McMurray, Alberta, Canada, that we might learn from their experiences on how to plan for and operate within a potential population boom, and sustain a thriving and diversified economy.

We, in Mesa County, are limited in lands available for private developments; 71 percent of our county is public lands. This is a mixed blessing, but certainly points out the obvious challenges

moving forward with the potential population explosion on the horizon. Supply and demand is going to have a tremendous impact on our local economy.

It is of no surprise to this committee that in northwest Colorado there are many skeptics with regard to oil shale development, as we have been down this road before. However, we do realize that the circumstances behind this journey are much different and we will remain cautiously optimistic, as we recognize that you understand the mistakes that were made in the past, based upon the actions and comments of the Strategic Unconventional Fuels Task Force in this Energy Subcommittee.

In closing, I would like to leave you with one final thought, and one thing that I hope you'll take back to DC. We, in northwest Colorado, are currently playing a key role in our contribution of natural gas, coal, resources to the Nation. and are certainly willing to increase our national contribution with oil shale, presuming that it can be done in an environmentally responsible and mutually beneficial manner. But we must ask this subcommittee that you encourage our coastal States, where drilling bans have been in place since 1981, and our fellow Americans in Cape Cod that oppose wind turbines, to put forth their energy contribution to our Nation. This energy crisis is too big for any one energy resource and certainly too big for any one area of our Nation to carry the burden.

We, in northwest Colorado, will not be a national sacrifice zone for energy development, just so Representative Sam Farr of California can make statements. And I quote, "People don't go to visit the coasts of Florida or the coast of California to watch oil wells." Well, Representative Farr, they don't come to Colorado for that either. Without energy, none of us will be going anywhere.

I appreciate your time, thank you.

[The prepared statement of Mr. Meis follows:]

PREPARED STATEMENT OF CRAIG MEIS, COUNTY COMMISSIONER, MESA COUNTY, CO

First of all, welcome to Mesa County and Northwest Colorado. I hope you have learned much about oil shale, natural resource development and our community during your trip. I was added to your agenda this morning late yesterday so I will give you a very quick bio of myself. My name is Craig Meis, I'm a Mesa County Commissioner, currently the chairman of Associated Governments of Northwest Colorado, and a State appointed local representative of the Strategic Unconventional Fuels Task Force. I also am a professional engineer and a graduate of the Colorado School of Mines in Chemical Engineering with over 15 years experience in the energy industry.

I would like to submit for the record this Socioeconomic Baseline Conditions Report dated November 29, 2005 and commissioned by Associated Governments of Northwest Colorado and suggest anyone else wanting to obtain a copy of this report go to AGNC.ORG. The purpose of this report was to identify and present socioeconomic indicators that may be used to evaluate the changes that might occur as the result of the development of oil shale resources in Northwest Colorado. The baseline conditions are a benchmark of existing conditions within the geographic area studied.

The geographic area encompassed by this report are Garfield, Mesa and Rio Blanco Counties. Garfield and Rio Blanco Counties contain significant oil shale resources while Mesa County is the regional trade center and is the location of many industrial support companies that are currently servicing the natural gas industry and that will support an oil shale industry. You have heard (will hear) from Commissioner Kim Cook with Rio Blanco County about the direct impact concerns of oil shale operations but let me share with you quickly some information about the indirect impacts such as a potential population explosion of which Mesa County might experience from future commercial oil shale development.

Mesa County is currently a population of about 135,000. We are one of the top 10 largest counties and one of the fastest growing in Colorado and the only County in the top 10 west of the continental divide. Our unemployment is at 3.7%, a full percentage point better than the national average and for the first time since the inception of our County Workforce Center we have been trying to recruit employees outside of our County and even our State to fill hundreds of current job openings in Northwest Colorado. Anyone who wants a job and is willing to work has a job. Our local wages are increasing along with housing starts. In short, Mesa County and Northwest Colorado is doing very well and in large part due to the emerging natural gas development. This progress however has not come to Mesa County and Northwest Colorado without its difficulties.

Any increased development whether it is a home, a cell tower, a gravel pit, a gas well, etc causes an impact but we in Northwest Colorado have continued to try and address these impacts by finding ways to mitigate them collaboratively with the various industries mainly through our State and Federal jurisdictional agencies and even through our own land-use planning policy. We are hopeful considering the development of tar sands in places such as Ft. McMurray in Alberta, Canada that we might learn from their experiences on how to plan for and operate within a potential population boom and sustain a thriving and diversified economy. We in Mesa County are limited in lands available for private development since 71% of our County is public lands. This is a mixed blessing but certainly points out the obvious challenges moving forward with a potential population explosion on the horizon. Supply and demand is going to have a tremendous impact on our local economy.

It is of no surprise to this committee, that in northwest Colorado there are many skeptics with regard to oil shale development as we have been down this road before however we do realize that the circumstances behind this journey are much different and we will remain cautiously optimistic as we recognize that you to understand the mistakes that were made in the past based upon the actions and comments of the Strategic Unconventional Fuels Task Force and this Energy Subcommittee.

In closing, I would like to leave you with one final thought and the one thing that I hope you take with you back to DC. We in northwest Colorado are currently playing a key role in our contribution of natural gas and coal resources to the nation and we are certainly willing to increase our national energy contribution with oil shale presuming that it can be done in an environmentally responsible and mutually beneficial manner but we must ask this subcommittee that you encourage our coastal states were drilling bans have been in place since 1981 and our fellow Americans in Cape Cod that oppose wind turbines to put forth their energy contribution to our nation. This energy crisis is too big for any one energy resource and certainly too big for any one area of our nation to carry the burden. We in Northwest Colorado will not be a national sacrifice zone for energy development just so Rep Sam Farr of California can make statements and I quote, "People don't go to visit the coasts of Florida or the coast of California to watch oil wells", well Rep. Fan they don't come to Colorado for that either but without energy none of us will going anywhere.

Thank you for your time and consideration. I would be happy to answer any questions you might have.

The CHAIRMAN. Pretty good. That took a smart engineer to come up with that.

[Laughter.]

The CHAIRMAN. We have another person with us that I failed to introduce. We have Derek Wagner. Derek, could you put up your hand? He represents Senator Allard and he's been with us on the trip. Senator Allard was unable to join us. He had committed himself prior to this trip, but he has genuine interest in the work, and I thought it be appropriate to introduce his representative to you and let you give him an appropriate round of applause. Thank you for being with us.

Now, we're going to ask questions of the witnesses, starting with you, Senator, if you have any questions.

Senator SALAZAR. Sure. Let me just ask a question of Commissioner Cook and Commissioner Meis. Impacts to the communities happen when you have natural resource development, whether it's

mining, whether it's oil and gas development. We see a lot of that happening here in the West, here in Colorado.

Both of your counties are affected a lot by what's happening with the development that is currently underway. Do we have the legal framework in place, that provides the revenue stream to your counties, and is able to deal with the impacts that currently occur?

Let's start with you, Mr. Cook, because you come from one of those very rural, very remote areas that sometimes just doesn't have the kind of wherewithal other larger communities have.

Mr. COOK. The current Colorado statutes in place do allow for some funding to come back to our county. Our county provides a huge percentage of the dollars, the Mineral Royalty and Lease Dollars that flow state and Federal coffers, but we are always making efforts to—we'd always like to see that dollar amount increased, because we believe we have needs significantly greater than the amount that does filter back to us. Fifty percent goes to the Federal level, then it goes down to the State, and by the time the State takes its share, there's not that much, we believe, that filters down to the local level. Where the true impact—the true, on-the-ground impacts are failed.

Senator SALAZAR. So, you'd like to see a re-visitation of how those funds are allocated, so they actually are more connected to where the impacts are occurring; is that correct?

Mr. COOK. That's correct. It would be nice if it would come straight from the Feds to the counties.

[Laughter.]

The CHAIRMAN. Start them there.

Senator SALAZAR. Yes. Commissioner Meis?

Mr. MEIS. Thank you, Senator Salazar, for asking that question. This year, in the legislature alone, there were over 12 attacks on severance tax with regard to special interests. Of course, they're seeing the windfall, if you will, that the State is seeing from the standpoint of Federal mineral leases, as well as severance tax. And so, of course, every special interest out there is trying to grab onto it. We of course, in local governments, are concerned with regard to those moneys being used for what they were intended for when those legislations were adopted, which was for energy impacts. So, we are concerned about that, but we are working diligently.

We're happy to work with our local Department of Local Affairs, which is certainly helping in that cause. We've made some major changes, even within the statute, to change the process. So, hopefully, we will be able to get more of those moneys back to those areas of impact. But we do, I think, recognize that we're hoping to be more proactive in this next legislative cycle to go after more of those dollars versus continuing to fight the battle to defend them.

Senator SALAZAR. OK. For both Mr. Cook and Mr. Meis, just a quick yes or no answer. Would it be fair to characterize that in your position as elected—part of the elected leadership of northwest Colorado and in your positions for the Northwest Council of Governments as well, you are cautiously optimistic with respect to the development of the oil shale resources and we should move forward in the examination of potential with caution, but move forward; is that an accurate position of Rio Blanco County, Commissioner Cook?

Mr. COOK. Move forward with both eyes open.

Senator SALAZAR. OK. Mr. Meis.

Mr. MEIS. Yes.

Senator SALAZAR. OK. Thank you.

The CHAIRMAN. All right. Nothing further. Commissioners, you are——

Senator HATCH. Could I ask one question?

The CHAIRMAN. Yes, indeed, Senator Hatch.

Senator HATCH. I just have one for Mr. McKee that I'd like to ask. The BLM is conducting a programmatic EIS on oil shale and tar sands development. Part of that study is to consider to socio-economic impacts on local communities. Do you believe that Uintah County, which you represent, will have sufficient input on that?

Mr. MCKEE. Yes, we do. Thank you, Senator Hatch. We are at the table. We have cooperating agency status and so we will have definite input. Thank you.

Senator HATCH. Thank you, Mr. Chairman. That's all I wanted to ask.

The CHAIRMAN. Very good. Thank you. Thank you, Commissioners, it's good to have you here. Thank you.

Mr. COOK. Thank you.

The CHAIRMAN. Now we have four witnesses, and we're just about on time, so let's proceed. The first member of the panel is the CEO of unconventional resources at Shell Exploration and Production Company, Denver, CO, Mr. Stephen Mut. Second is Mr. Chris Treese, T-r-e-e-s-e, external affairs, Colorado River Water Conservation District, Lynnwood Springs. Third, John Baardson, B-a-a-r-d-s-o-n, chief executive officer, Baard Energy, LLC, Vancouver, WA. And Mr. Steve Smith, assistant regional director, The Wilderness Society, Denver, CO.

We're going to proceed, starting from the left, with Mr. Stephen Mut. First of all, let me just state publicly, Mr. Mut, you have a very high position with a very powerful American energy company and are spending a great deal of your time on a project here, in this part of the world. And it has been imperative that we get to know you and we get to know your project.

It is not one that is going unattended by many who are observing energy development in the world. It is not possible that you are doing what you are doing and that it not be known and that it not be looked upon and observed from the outside with astonishment at the idea, with the patents, and with the overall approach to the evolution of a potential for tar sands in this region. It is a commitment and a development that, if it reaches maturity, will indeed—could indeed do what I said in my opening remarks: shake the world.

I don't think there's any doubt that you know that, in the depths of your analysis and in the depths of your recommendations to the Corporate Shell, in what they are doing in this area. We hope you will take a few moments to share what you can with the people of this area and, in the future, that on a regular basis you participate as publicly and as openly as possible with local officials about what you are doing, so that they, too, can share in what you perceive to be something very exciting.

Having said that, we will start with you and proceed down the table. The microphone is yours, sir.

**STATEMENT OF STEPHEN MUT, PRESIDENT, SHELL UNCONVENTIONAL RESOURCES ENERGY, DENVER, CO**

Mr. MUT. Thank you, Mr. Chairman, Senator Hatch, Senator Salazar, and everybody else who has taken the time to come and listen today. I'm Stephen Mut with Shell Unconventional Resources Energy. I'd like to thank you all for the opportunity to update on our activities in oil shale, and particularly, for holding this hearing in Grand Junction on what could only be described as a spectacular day.

I think I need one of those t-shirts—it's floating around the room—because Shell has been on a quarter-century journey to slowly and thoroughly investigate a new technology in the in-situ conversion process, a process that will turn oil shale into clean transportation fuels, natural gas, and gas liquids.

We think it's the right technology, at right time, at the right place. The right place, because around here, within 100 miles, is the most concentrated major resource for hydrocarbons on the planet. We think it's the right time, because oil is about $70 a barrel and partially responsible for some of the political strife around the world. And it is the right technology, because it's designed to capture and convert resources. It really couldn't be done in any other method, or using any other technology.

For those of you who are unfamiliar with ICP, oil shale is a very immature precursor to oil and gas. It matures over geologic time with the heat and pressure that's afforded by burial. In a nutshell, what ICP does is advance the clock hundreds of millions—or tens of millions of years by inserting—we do that by inserting electric heaters into the subsurface, and warming the subsurface for 3 to 4 years.

In the process, we crack apart very-long-chained complex-carbon complexes into smaller molecules that can be vaporized at those temperatures, and move them as a vapor through the very small fissures and fractures that exist in the subsurface to a conventional well that can be brought to the surface. Because its material is lighter, it requires much less processing on the surface and has a much smaller carbon dioxide impact.

The material that we do leave in the ground is heavily latent with metals. To bring it the surface would require significant processing and would have a significant carbon dioxide footprint. So we call this smart sequestration, because, quite clearly, the easiest carbon to sequester is the carbon you don't bring out of the ground in the first place.

Because it's under in-situ, or underneath the ground, we have groundwater as an issue. We have to protect the process from groundwater, because a boiling water robs heat. We have to protect the groundwater from the hydrocarbons that are produced. We do that by forming a freeze wall, whereby we pump refrigerant into the subsurface, lowering the temperature, and form a vessel in which we do this work.

For an update, you saw yesterday a significant project designing a—and building, constructing a freeze wall today that is of the size

that can be easily scaled up to commercial size. Our next project, the only one before we'd be able to make a commercial decision, is the oil shale test, something we hope to do on a 160-acre plot, afforded by an R&D lease coming to us, hopefully, from the BLM leasing program sometime later this year. That's where we'll test every part of the technology together as an integrated unit. Again, it is sized to be scaled up.

Senator Salazar talked about all three legs of something that's dear to us: sustainable development—profits, planet, and people. We've talked a little bit about the environmental impact, and a lot of discussion today has had to do with people. It'll be a huge impact on all the citizens of the United States, if a meaningful energy development were able to come from the oil shale.

The greatest impacts, however, would be on the residents of Rio Blanco, Garfield, Mesa, and other parts of northwest Colorado, and eastern Utah. For years, we've been meeting neighbors, informing them of what our progress is on our research, and though we're years from making a commercial decision in the near-term, it's going to be time for us to begin talking about and opening a dialog about what the impacts of the commercial development could be.

It's early, but the reasons for doing that are simple. We find that the best way to formulate a good answer is to work together as partners to find the answer, as opposed to presenting a solution and then working around the conflicts. So, in any major project, we find the more energy, the more time and the more money we spend up front, the better the solutions and the more economic the answers.

I'm extremely proud to be part of a team that's working very hard, with patriotism being a driving force from many of the people that are working here. We want to do something meaningful with our careers, to make a real difference for the country. Many of us are making personal sacrifices to do so. We're happy to be a leader and to take on the headwinds that come with that sometimes. And we think that the Senate Energy and Natural Resource Committee is being a leader, too.

I'd like to thank you, Mr. Chairman and Senator Salazar, for your leadership in bringing forth the energy bill last year, without which some of those key provisions we wouldn't have the driving force or the funding to be continuing the research that we have, at least at the pace that we are doing so. We do need to continue to help find a way to streamline permitting, as has been mentioned before, and quite importantly, to work on innovative ways to bring forward the cash-flow into the local communities, so that the infrastructure that's needed before production begins can be brought to the floor.

Again, thank you for the opportunity to update the committee and the residents of this area. We're all partners in this great challenge. I really loved to hear the term partnership today, because that's what is needed. It's a challenge that can change the Nation's energy supply and balance, that can have a great impact on the trade deficit that exists today and spur on economic growth well beyond this three-State area.

I'd be willing to take questions at any time.

[The prepared statement of Mr. Mut follows:]

PREPARED STATEMENT OF STEPHEN MUT, PRESIDENT, SHELL UNCONVENTIONAL RESOURCES ENERGY

Good morning, Mr. Chairman, Senator Hatch, and Senator Salazar. My name is Stephen Mut and I lead Shell Unconventional Resource Energy.

As you know, for about a quarter of a century, Shell has been working to develop and to advance, hopefully to commercial success, an innovative technology which we are increasingly optimistic can open up the vast oil shale resources located in the Rocky Mountain area. This technology, once thoroughly proven, will allow Shell to produce clean, high quality transportation fuels such as gasoline, jet fuel and diesel as well as clean burning natural gas from oil shale in an economically viable and very environmentally sensitive fashion. Because the oil shale resource in the United States represents the largest, most concentrated onshore "hydrocarbon" resource on Earth, Shell's ICP technology holds promise for significantly increasing U.S. domestic energy production. When unlocked, this critical national asset will help to provide an energy bridge to 22nd century clean energy. If these resources are properly managed, there is the potential to reduce price volatility and political turbulence caused in part by tight energy supply-demand balances.

As a diversified energy and petrochemicals company, Shell is investing heavily in a wide variety of energy sources, including renewables such as wind, solar, and hydrogen. We are making progress increasing the role those energy sources will play in the energy mix, but in the meantime America and the world will continue to need oil and natural gas to meet rapidly growing energy demand.

For decades, energy companies have been trying, without success, to transform oil shale resources here in the West into affordable energy products. Oil shale can be found in large parts of the Green River Basin and is over 1,000 feet thick in many areas. According to DOE estimates, the Basin contains in excess of 1 trillion recoverable barrels of hydrocarbons locked up in the shale. It is thus easy to see why this vast resource has remained a target.

In 1982 Shell commenced laboratory and field research on a promising in ground conversion and recovery process. This technology is called the *In-situ Conversion Process,* or ICP. In general terms the ICP process accelerates the natural process of oil and gas maturation by literally tens of millions of years. This is accomplished by slow sub-surface heating of petroleum source rock containing kerogen, the precursor to oil and gas. This acceleration of natural processes is achieved by drilling many holes into the resource, inserting electric resistance heaters into those heater holes and heating the subsurface over a 3 to 4 year period. During this time very dense oil and gas is expelled from the kerogen and undergoes a series of changes that allow the lighter hydrocarbon products that are more mobile to move in the subsurface through existing or induced fractures to conventional producing wells from which they are brought to the surface. The process has the potential to produce a significant proportion of the original carbon in place in the subsurface—substantially more than the normal recovery efficiency of conventional oil and gas production. The carbon that remains in the subsurface resembles a char, is extremely hydrogen deficient, and if brought to the surface, would require extensive energy-intensive upgrading and saturation with hydrogen. We call this process Smart Carbon Sequestration because the easiest carbon to sequester is that which is not brought to the surface in the first place.

Since 1996, Shell has successfully carried out five small field tests on its privately owned Mahogany property in Rio Blanco County, Colorado. In the most recent test conducted in 2004 and 2005, more than 1,500 barrels of light oil plus associated gas were produced from a very small test plot using the ICP technology. We are pleased with these results, not only because oil and gas was produced, but also because it was produced in quantity, quality and on schedule as predicted by our computer modeling.

As an update, Shell has commenced work on the first of two final tests needed to prove the technology commercially viable. The first of these is a purely environmental test of the capacity of our freeze wall technology to protect the groundwater system from the ICP process and the ICP process from the groundwater. We hope to replicate the results from our initial freeze test performed in 2003, this time by building a football field sized freeze wall that will extend down to commercial depths. This larger size and greater depth will give us sufficient information to allow us to confidently scale up to commercial size. Once the freeze wall is created and found to properly contain, we plan to stress test it to failure and then test various repair techniques. Over the next 18-24 months, we will gain sufficient knowledge to validate the adequacy of this technology in a commercial setting.

Secondly, once the BLM completes its ongoing oil shale R&D leasing processes and issues the leases for which Shell has applied, we intend to proceed with permit-

ting and then development of a small oil shale production test in which we would expect to produce 500-1500 barrels of oil and gas per day to validate our 24 years of research again at a size and in an area that would allow us to scale up to a commercial development.

It is important to point out that the cost of all of these past and presently projected field tests has been entirely on Shell's dime and none of the projects have been underwritten by any governmental dollars whatsoever.

When these two field tests have advanced sufficiently over the course of the next several years, we will have gained sufficient technical knowledge to validate the technology as an integrated unit. It is important to remember though, that we are still in a research mode and that any final decision on a commercial development would come near the end of this decade.

Though the DOE estimates that this general part of the tri-state area may contain in excess of 1 trillion barrels of potentially recoverable hydrocarbon resources, or some four times the reserves found in Saudi Arabia, we at Shell say that it contains somewhere between zero and a huge amount of marketable energy barrels. On the upside, it is important to remember that technology and its limits will determine how much of this resource can be economically recovered. On the downside, we remind ourselves that "Zero" barrels is a possibility because no one has yet been able to develop oil shale on a sustainable commercial basis. In order to meet this challenge Shell or any other company must clear three distinct hurdles:

- Demonstrate that its recovery technology would be viable on a commercial basis at oil prices lower than today's levels
- Demonstrate the capability for protecting the environment, and
- Minimize socioeconomic impacts to surrounding communities and their citizens.

These criteria collectively translate into Sustainable Development—-one of Shell's core principles. Stated more simply it means caring for People, the Planet, and Profits.

Relative to protection of the environment, the ICP process has a number of positive attributes. Despite the fact that ICP requires substantial amounts of electricity, the reduced processing required for the lighter cleaner product mix when combined with sequestration of concentrated $CO_2$ streams may result in a carbon dioxide footprint on par with and in some cases better than existing heavy oil production on a life cycle basis. The concentration of the resource leads to a smaller physical footprint and one that can be rather easily reclaimed. The in-situ nature of the process eliminates tailings piles. Process and cooling water needs are reduced relative to past efforts. Though it may not be as economic, we would likely move to air-cooling to reduce project water demand. Groundwater is protected by a robust freeze-wall. We are working to achieve a combination of these ingredients that will create an environmentally attractive package.

Equally importantly, Shell is committed to working closely with the communities in this area first to identify issues and then to develop plans to address, in advance, the potential socioeconomic impacts of a commercial development. Even though Shell is still several years away from making a commercial decision, we anticipate commencing very early substantive discussions with a range of community stakeholders in this area to begin to analyze potential community impacts and to partner together to find solutions. We feel it is critically important to commence this more specific dialogue long before we make any firm decisions as to what a commercial oil shale project might look like. By doing so, we can jointly identify potential infrastructure and socioeconomic impacts that might arise from large-scale development and then jointly move forward to arrive at responsible and practical solutions to satisfy those identified needs. So later this year or early next, we hope to begin this collaborative process with area stakeholders. This will mean publicly identifying in nominal terms the potential size, scope and impact of a commercial operation. It will not mean that Shell has made any specific decisions because those are still years away. But just as in any commercial project, we find that spending more time, effort and money upfront with our stakeholder partners almost always results in a better and more fiscally sound development.

Finally, we feel strongly that government has a significant leadership role to play in the development of oil shale. We feel that the leadership role for government is best channeled in four specific areas including:

- Providing access to Federally owned oil shale bearing lands,
- Removing unnecessary procedural obstacles that could delay oil shale development by streamlining the permitting process chain,
- Working with industry to develop innovative ways to provide front-end assistance to local communities to match their infrastructure investment needs as op-

posed to the back-end loading normally seen for royalty and tax revenue streams, and
- Developing mechanisms as described in the DOE report on the Strategic Significance of America's Oil Shale Resource to help accelerate the establishment of an oil shale industry and to stabilize its operation.

We believe that this type of leadership was clearly evident in the development of last year's Energy Act that was largely authored by the Energy and Natural Resource Committee. Section 369 of that Act, the Oil Shale Section, contained many important provisions, three of which gave much needed guidance and clarity to our efforts in oil shale including:

- Elimination of the antiquated single lease limitation which would potentially have kept companies from achieving critical mass in their operations and which would have rewarded technology followers rather than technology leaders in this area.
- Mandating collaboration by and among various Executive Departments and State and local governments in the planning for oil shale exploitation.
- Establishing an orderly process for development of a regulatory and fiscal regime under which oil shale developers will need to operate.

Mr. Chairman, Senator Hatch and Senator Salazar, we commend you for the bipartisan manner in which you all plus Senator Allard worked to reach a balanced set of legislative provisions to encourage responsible domestic oil shale development, as is included in the Energy Act.

We would also like to commend the Bureau of Land Management for its creativity and leadership in developing the Oil Shale Research and Development Leasing Program which is a small but vitally important step in providing a driving force to companies like Shell to advance their research and technology development efforts.

Mr. Chairman, Senator Salazar, and Senator Hatch, we at Shell thank you for coming to Western Colorado to seek input from the area's community leaders and residents. We are proud to be a partner with the region and its residents in this great effort which has the potential to change this Nation's indigenous energy supply/demand imbalance, to reduce its significant trade deficit, and to spur on economic growth well beyond the boundaries of the three State area.

I will be happy to address any questions you might have.

The CHAIRMAN. Thank you very much.

Mr. Chris Treese, Colorado River Water Commission.

**STATEMENT OF CHRISTOPHER J. TREESE, MANAGER FOR EXTERNAL AFFAIRS, COLORADO RIVER WATER CONSERVATION DISTRICT, GLENWOOD SPRINGS, CO**

Mr. TREESE. Thank you, Mr. Chairman, Senator Hatch, Senator Salazar. For the record, my name is Chris Treese, representing the Colorado River Water Conservation District. It may be of interest to the committee to know that prior to my involvement in the water community, I spent 10 years with Unocal's oil shale project in Parachute Creek. And I was reminded, as I was driving down here today, that it was, in fact, 15 years ago today that I ended that career and started a new one with the Water District.

I do appreciate the opportunity to share the views, concerns, and recommendations regarding the water needs and water interests of western Colorado associated with an emerging, but as yet uncertain, oil shale industry.

The Colorado River Water Conservation District is the principal policy body for the Colorado River within the State of Colorado. We represent all or parts of 15 counties in northwest and west-central Colorado, including all of the oil shale-rich lands in Colorado. We offer our testimony in the spirit of cooperation and partnership with both the emerging industry and the Federal Government to ensure that an adequate and safe water supply is maintained and

developed in a manner that is timely and compatible with other water interests in the arid West.

The best decisions will be made with the best and most timely information. However, the ability to adequately assess, today, the water supply requirements and the water quality implications of an industry without a proven technology is limited at best. Simply put, what we don't know vastly outweighs what we do know. We are dealing with new and emerging technologies with yesterday's studies and information.

Irrespective, however, of the extraction technology employed, significant quantities of water are going to be required. This much we know. Notwithstanding the unknowns and the uncertainties regarding oil shale development, there are actions that can and must be considered by Congress and the administration to ensure a well-planned and locally beneficial oil shale industry that's compatible and sustainable with our local communities.

First, for Federal actions, I would recommend assurance that all environmental assessments include a thorough analysis of the cumulative water-related requirements for oil shale development. This, of course, includes the direct requirements of the oil shale industry on-site, as well as the indirect companion water requirements of the upstream and downstream energy requirements of the industry itself. That would be the electrical power generation and other energy demands, as well as the municipal demands required by a population growth, perhaps population boom, occasioned by the oil shale industry.

Recognizing the limited and changing characteristics of oil shale technology and the related information, mitigation requirements should have a sort of adaptive management policy, such as those advanced in the environmental community on other issues. I think we're going to need that on this socioeconomic and water front, that as information is developed, we have requirements that are flexible and yet responsive.

Congress should clarify that State and local permitting authorities apply equally to activities on projects on Federal land, as well as projects on non-Federal land.

Future oil shale leases should include specific allocations of leased proceeds, including the bonus bid moneys, as you heard Director George comment on, to assist local and regional governments in addressing water shortage and developed storage, and development needs required by the lease, as well as related activities to oil shale development.

Congress and the administration must also please make long term commitment to oil shale research. We expect the private sector's interest in oil shale to largely follow world oil prices. We look to the Federal Government to provide a baseline of investment and research in oil shale, and the related impacts and mitigation associated with those impacts for oil shale.

The lessons learned from the last incarNation of the oil shale industry are vivid in the minds of elected and planning officials. We can and will, as Director George mentioned, prepare for oil shale development in a manner that assures mutual benefit to the industry and the local communities, so long as there is not undue risk to local communities. We have the institutional capacity and the

human resources to accomplish this with appropriate assistance from the Federal Government. However, if the Congress or the administration artificially accelerates our oil shale development before technologies are sufficiently mature or without the sufficient information of the impacts, you have doomed us to repeat the impacts and the dislocations of the previous boom and bust cycles.

I look forward to your questions and an opportunity to discuss these further.

[The prepared statement of Mr. Treese follows:]

PREPARED STATEMENT OF CHRISTOPHER J. TREESE, MANAGER FOR EXTERNAL AFFAIRS, COLORADO RIVER WATER CONSERVATION DISTRICT, GLENWOOD SPRINGS, CO

WATER-RELATED ISSUES REGARDING OIL SHALE DEVELOPMENT

I want to thank Chairman Domenici and Senator Salazar for this opportunity to share the Colorado River Water Conservation District's concerns and recommendations regarding water needs and interests associated with an emerging, but as yet uncertain, oil shale industry. I also want to extend our gratitude to the Chairman for his personal commitment to field hearings and field investigations, thereby providing greater and more cost-effective access to the Senate Committee process and ensuring first-hand committee information on issues of national importance.

The Colorado River Water Conservation District is the principal policy body for the Colorado River within Colorado. We are a political subdivision of the State of Colorado responsible for the conservation, use, and development of the water resources of the Colorado River basin to which the State of Colorado is entitled under the 1922 and 1948 Colorado River compacts. The River District includes all or part of 15 counties in western Colorado, including all of the oil shale-rich lands of northwest Colorado. We offer the following testimony in a spirit of cooperation and potential partnership with both the emerging oil shale industry and the federal government to ensure that adequate and safe water supplies are maintained and developed in a manner that is both timely and compatible with competing water demands in the and West.

The hydrocarbon-rich Green River Formation resides in a region with limited precipitation. Most of the oil shale region of northwest Colorado receives 8 to 14 inches of precipitation annually. Essentially the entirety of the oil shale resource lies within the Colorado River basin, where competition for scarce water resources is well known. Oil shale development will inevitably compete with existing water uses and conflict with the vision of many for the desired water futures in the arid West. The best decisions will be made on the best and most timely information. We must know as much as possible, as early as possible about the water needs of alternative oil shale extraction technologies and their companion water quality implications.

The ability to adequately assess water supply requirements and water quality implications of an industry without a proven technology is limited at best. Simply put, what we don't know vastly outweighs what we do know. This, however, is not an argument in opposition to oil shale development or in favor of diverting resources to other pursuits. Rather, it is a call for research and resource dedication to finding answers to the water supply needs and water quality implications of oil shale development. It is also a plea for a pace of resource development commensurate with the development of reliable information and the ability of the industry and local communities to address their water-related requirements.

Irrespective of the extraction technology employed, significant new water supplies will be required by an oil shale industry. Extraction technologies in the 1970's and 1980's required up to five and six barrels of water for each barrel of shale oil produced. More recent, emerging technologies report significantly reduced water requirements, on the order of a barrel of water required for a barrel of shale oil. However, even under these favorable assumptions, a modest oil shale industry of 500,000 barrels per day would require roughly 25,000 acre feet of water annually. To ensure a reliable annual yield of 25,000 acre feet of consumptive use water would require new storage facilities with 50,000 to 80,000 acre foot capacities, assuming an adequate source of water is legally and physically available.

An emerging oil shale industry with its attendant construction and operating workforces will also require new water supplies for municipal use. This need presents an opportunity for public-private, industry-municipal partnerships for water

resource development. However, this opportunity is tempered by the memory of the recent "bust" of the previous oil shale development boom.

In addition to water availability, water infrastructure funding is a challenge. In the most recent round of oil shale development commencing in the 1970's, the federal government set aside a significant portion of the bonus bid funds from the two federal lease tracts for local impact mitigation. These funds became the highly successful Oil Shale Trust Fund. This fund was distributed to each of the locally impacted counties for their individual and locally-prioritized capital needs. Congress enacted a similar financial allocation mechanism in 1998 in the "Southern Nevada Public Land Management Act" (P.L. 105-263) with specific payment of federal land sale proceeds to the regional water authority for water-related infrastructure development. More recently, analogous water investment allocations have been specified by Senators Reid and Ensign in other southern Nevada legislation and are also currently being contemplated in draft legislation by Senator Bennett and Congressman Matheson for southwestern Utah water development. Specific allocation of oil shale-related federal revenues for public infrastructure requirements, including express allocation of resources for regional water supply development, would significantly assist necessary water resource development.

Conventional wisdom in Colorado holds that a minimum of twenty years is required to plan, design, engineer, permit, finance, and construct even a modest new water storage reservoir. No one can point to the exception to this twenty year minimum, and there are plenty of examples exceeding this twenty year standard, many by decades. The stimulus of oil shale's water need may reduce this standard, but it may not. Accordingly, immediate cooperative efforts should be initiated between would-be oil shale developers and local and regional water authorities to identify public and private water needs and alternatives to their supply.

An additional lesson learned from the previous oil shale "boom" is the need for cumulative impact analysis. If Congress advocates for a vibrant, multi-company oil shale industry operating in the region, the traditional project by project analysis of environmental and socioeconomic impacts will be insufficient. Impact analyses of oil shale development must examine the cumulative impacts of the entire, reasonably foreseeable industry. During the last boom, the industry formed a cooperative, public sector-private sector "Cumulative Impacts Task Force" to mutually assess the socioeconomic impacts of the then anticipated oil shale industry. Additionally, through this, and an allied industry-only group, decisions were made regarding the equitable allocation of impact mitigation. The region and the industry would be equally well served by a similar effort this time.

Finally, the lessons learned from the last oil shale boom and bust are vivid in the minds of the area's elected and planning officials. We can and will prepare for oil shale development in a manner that assures mutual benefit to both the industry and the local communities without undue risk on the latter. We have the institutional capacity and human resources to accomplish this with appropriate assistance from the federal government. However, if Congress or the administration artificially accelerates oil shale development either by rewarding or requiring rapid development before technologies are sufficiently mature or without proper analysis of potential impacts and the time to prepare for those impacts, you will have doomed the local communities to repeat the disastrous and disruptive boom and bust cycle of previous incarnations of the long-promised oil shale industry. Accordingly, this is my plea for a deliberate and thoughtful pace to oil shale development that will ultimately reward all who are party to it, whether by choice or proximity.

## RECOMMENDATIONS

While the unknowns and uncertainties regarding oil shale development will continue to loom large, there are actions that can and must be initiated immediately by Congress and the Administration, as well as by state and local governments, to ensure a well-planned and locally-beneficial oil shale industry compatible with and sustainable for the local community.

*Federal Actions*

- All environmental assessments should include a thorough analysis of water-related requirements of oil shale development. This should include direct water needs of oil shale on-site development, as well as the indirect, companion water requirements of ancillary oil shale activities (e.g., electrical generation or other energy requirements of oil shale production, municipal demands of energy-induced population growth).
- Mitigation measures required by federal agencies should include a sort of "adaptive management" approach allowing for new and emerging technologies

changing information regarding water use requirements and water quality impacts of oil shale development;
- Congress should clarify that state and local permitting authorities apply equally to activities and projects on federal land as on private and non-federal public lands.
- All future oil shale leases should include specific allocations of lease proceeds, including bonus bid revenues, to assist local and regional governments in addressing water storage and development needs occasioned by the lease and related oil shale development.
- Finally, Congress and the administration must make a long-term research and development support commitment to this national resource, one that transcends the wildly fluctuating world oil market. This hydrocarbon resource is simply too substantial and its development too nascent to allow research and development to follow world oil prices, as it predictably will if reliant solely on private funding sources. A successful oil shale industry that is harmonious with local communities requires a long-term federal commitment to developing new technologies, exploring new ways to minimize and mitigate impacts, and entering into new partnerships with state and local agencies to allow us to adequately prepare for and support this new energy industry.

*State and Local Government Actions*

- Regional governmental coordination and cooperation is required to adequately plan for the rapid growth likely with an emerging oil shale industry. This has begun through the Associated Governments of Northwest Colorado and Club 20 but must be broadened and accelerated.
- Watershed planning and water supply development alternatives must be advanced. State and regional water authorities have the capacity to lead these efforts but may require additional funding to expedite the process.
- Development of contingency planning and creative capital financing mechanisms that don't place present and future residents at financial risk of default in case of another "bust" are Imperative.

*Industry Actions*

- The industry should partner with local governments to mutually assess potential impacts and benefits of oil shale development. Considerable time and expense will be spared by a NEPA-like analysis of a potential oil shale industry that meaningfully involves locally-affected communities and interests from the earliest stages of the process (e.g., development of the scope of work, contractor selections, modeling decisions, selection of assumptions). Such early involvement can dramatically reduce the predictable distrust of large volumes of technical documents being presented as fait accompli in long, boring technical public meetings subsequent to the material decisions.
- A functional oil shale trade group focused on the cumulative impacts and their mitigation should be formed. With water resources traditionally requiring the greatest lead time, emphasis should be placed on analysis and planning for adequate water supplies for the industry and the local communities.

The CHAIRMAN. Thank you very much. Please proceed.

## STATEMENT OF JOHN A. BAARDSON, CEO AND PRESIDENT, BAARD ENERGY, LLC, VANCOUVER, WA

Mr. BAARDSON. Thank you, Mr. Chairman. Privileged to be able to be here today, also with Senator Hatch and Senator Salazar. Baard Energy is a privately held firm with offices in Washington, Ohio, and Salt Lake City, Utah. I am John Baardson, the President and CEO of Baard Energy.

Baard Energy is involved in the development of alternative fuels from advanced technologies, including ethanol, biodiesel, coal to liquids, and oil shales. We focus on building plants that can produce ultra-clean fuels made from our own indigenous resources here in the United States.

You know, we're here today to talk about section 369 of the Energy Policy Act and some of the implementations of it. The RD&D program, which was authorized in that bill, is off and running. It's

considered by many to be flawed in that it arbitrarily and severely limited the number of developers and technologies that had access to public lands and those resources. The permanent leasing program and the problematic environmental impact statements have begun and we logged the initial developments that they have made. These are important first steps, but they are not enough.

The Act assumes that industry will step forward without the help of Government to develop the oil shale resources. However, this scenario is contrary to the successful Alberta model and completely ignores the fact that 80 percent of the resource in the United States sits on federally-owned lands.

I recall that offshore drilling was once considered an unconventional source, too risky, and too expensive to pursue. However, with significant Government support, the cost burden was overcome, and offshore oil is now considered a conventional resource.

The same is true with the Alberta tar sands. They were once considered too risky and too expensive, but now, Alberta is producing huge quantities of oil—over a billion barrels a year—from tar sand for less than $20 a barrel. This was largely as a result of a government program that they implemented.

If we are to be able to follow the successful Alberta model, we must do more than we have enacted in the recently passed Energy Policy Act. Senator Bunning from Kentucky recently introduced legislation called the Coal to Liquid Fuel Promotion Act of 2006. We helped draft some of that legislation and we were involved in some of the thinking that went behind it. Fortunately, it leaves oil shale off completely. We think a suitable type of bill, either introduced along with this bill or in conjunction with it, should be put forth that would do the same thing that they are trying to do for coal liquids, for oil shale.

In particular, Senator Bunning had a six-point plan. The first one was, he was—and if we were to modify this to apply to oil shale, what we would propose is there would be an authorization to underwrite Federal loan guarantees for up to ten oil shale plants. These plants should have a minimum capacity of 5,000 barrels per day and a maximum of 10,000 barrels per day.

We also believe an authorization to be put forth for a $100 million, to help fund the—cover front-end engineering and design costs for these initial ten plants—and as Senator Bunning had—these would be in the form of grants or non-recourse loans.

The third item was the authorization of a 20 percent oil shale fuel investment tax credit to be made available for those ten plants. Now, a number of these items are already in the existing bill, but we seem to be now getting ready to carve these things for the various technologies.

One thing that coal to liquid has that oil shale does not have was a fifty-cent per gallon excise tax credit, which is being proposed to be extended to December 31, 2020.

We also ask that oil shale fuel be included in the strategic petroleum reserve and that the strategic petroleum reserve units be authorized to be built in either Colorado, Utah or Wyoming and that oil shale-type fuels be stored in those strategic petroleum reserve facilities.

The final act is that they wanted to clarify the authority given in the Act, that the Department of Defense had the right to enter into long-term contracts, such as 25 years. However, in that program, I think they only want to clarify that for coal to liquids.

These programs will help support many important emerging technologies involved with oil shale. Those are: new oil shale retorts are available; they can produce oil with minimal or no water usage; we have upgrading technologies that can directly convert kerogen into a usable, low-sulfur fuel oil; and also, there are many new uses for spent oil shale, which could allow spent oil shale to be used to reduce sulfur emissions from coal-fired plants across the United States and we could largely eliminate the need for disposal on the local level.

For the project we are designing, we have need for a railroad to go to Vernal, UT, to help us to efficiently get this product to market.

I thank you for your time and appreciate this opportunity.

[The prepared statement of Mr. Baardson follows:]

PREPARED STATEMENT OF JOHN A. BAARDSON, CEO AND PRESIDENT, BAARD ENERGY, LLC

Thank you, Mr. Chairman. Distinguished Members of the Senate and guests, I am John Baardson, the President and CEO of Baard Energy, LLC. Baard Energy is a privately held firm with offices in Vancouver, Washington, Cincinnati, Ohio, Cleveland, Ohio and Salt Lake City, Utah. Baard Energy is involved in the development of alternative fuels from advanced technologies including biodiesel, oil shale and Coal to Liquids ("CTL"). My Company is focusing on building plants to produce ultra-clean fuels made from secure sources of abundant feedstock located here in the United States.

I have been asked to talk to you today about implementation of the oil shale provisions of the Energy Policy act of 2005 (the "Act"). The Energy Policy Act established a task force to, among other things, develop a plan to determine the safest and steadiest route for oil shale development, implement a RD&D leasing program and establish a permanent mineral leasing program in the Department of the Interior to provide access to this resource. The RD&D leasing program is off and running but is considered by many to be flawed because the BLM arbitrarily and severely limited the number of developers and technologies with access to federal oil shale resources. The permanent leasing program and the problematic Environmental Impact Statement are critical to the long term success of the program and I laud its initial successes. These are important first steps but this will not be enough.

The Act assumes that industry will step forward without the help of government to develop the oil shale resources. However, this scenario is contrary to the successful Alberta model and completely ignores the fact that 80 percent of the resource in the United States sits on federally owned lands, which poses certain regulatory barriers to major investment in the development of the resource.

I recall that offshore drilling was once considered an unconventional source of oil too risky and too expensive to pursue. However, with significant government support, the cost burden was overcome, and offshore oil is now considered a conventional resource. Similarly, getting oil from oil sands in Alberta was once considered by the "experts" to be too expensive and risky. Now Alberta is producing huge quantities of oil from tar sands at less than $20 a barrel, as a result of government support.

If we are to follow the successful Alberta model on oil shale we must do more than we have enacted in the recently passed Energy Policy act of 2005. Senator Bunning from Kentucky recently introduced legislation called the *Coal-to-Liquids Fuel Promotion Act of 2006* that is an excellent model for us to use to advance oil shale development. I therefore suggest that you consider a six-point plan for oil shale that is similar to what is proposed by Senator Bunning:.

1) Authorization and appropriation to underwrite federal loan guarantees for up to ten oil shale fuel facilities through 2015. These plants should have

a minimum production of 5,000 barrels per day and a maximum of 20,000 barrels per day of ready to use transportation fuels derived from oil shale.

2) Authorization and appropriation of $100 million in deployment funding support in the form of grants or non-recourse loans to cover front-end engineering and design costs for the initial ten plants.

3) Authorization and appropriation for a 20 percent oil shale fuel investment tax credit to be made available to oil shale fuel facilities placed in service before December 31, 2015.

4) Authorization and appropriation for a 50 cents per gallon fuel excise tax credit for oil shale fuels which would expire no sooner than December 31, 2020.

5) Require inclusion of oil shale fuel in the Strategic Petroleum Reserve, authorize the construction of SPR storage facilities for oil shale fuel which could be located in Colorado, Utah or Wyoming and authorize the SPR to hold up to 20% of the reserve in the form of fuels that have been derived from oil shale.

6) Clarification of the authority already given to the Department of Defense and other agencies for Federal government purchasing support of oil shale fuels through long term guaranteed fixed price contracts by specifying that they may purchase up to a term of 25 years.

These programs will help support many important emerging technologies involved in oil shale development which I would like to summarize for the record:

1) New oil shale retorts are available that can process oil shale safely and inexpensively with little or no water usage.

2) Upgrading technologies which convert raw kerogen from oil shale to commercial grade transportation fuels. There are technologies available that will convert the kerogen directly into super-low sulfur fuels. This will avoid having to send oil shale liquids to refineries that are already operating at maximum capacity. In addition, combining the technologies from the coal to liquids industry into the oil shale industry will expand this ability further and help solve certain processing problems.

3) New uses for spent oil shale have been developed that will allow the spent oil shale to be used to reduce sulfur emissions from coal fired power plants more efficiently than the limestone we now use. This innovation alone will help oil shale fuels to continue to be competitive at under $40 per barrel. For the project we are designing, we will need to build a railroad to Vernal, Utah to efficiently get this product to market. The Federal Government and the State of Utah can help us to put this railroad in place.

Oil shale fuels are a win/win scenario. We develop an indigenous secure fuel source from a material that was previously unusable, creating an environmentally friendly fuel supply and generating jobs in economically depressed areas of the nation. To jump-start this process, however, requires the assistance of the Federal Government. It is of the utmost importance to our Country's national security and economic well-being that we work together to accomplish this goal.

Thank you for all that you have already done, and let's keep pushing forward. Thank you as well for your time today.

The CHAIRMAN. We thank you very much for your time. We are fully aware of the legislation introduced by the distinguished Senator from Kentucky and it is being reviewed by the Committee for a number of suggestions that he has put forth.

And we're right back, close to being on time with our last witness, from The Wilderness Society of Denver, CO, Mr. Steven Smith, Assistant Regional Director. We welcome you and look forward to your testimony, sir.

**STATEMENT OF STEVE SMITH, ASSISTANT REGIONAL DIRECTOR, THE WILDERNESS SOCIETY, DENVER, CO**

Mr. SMITH. Thank you, Mr. Chairman, and thank you, Senator Salazar and Senator Hatch, for providing this opportunity to highlight some key environmental issues that must be addressed as Federal land managers consider the possible development of oil shale resources in this region. I especially appreciate the oppor-

tunity of going last, because each of you three Senators have touched on several of the points that are included in my comments. So it's a nice head start.

My name is Steve Smith. I am assistant regional director for The Wilderness Society, but my testimony today reflects the contributions and expertise from an array of conservation and citizen organizations working in coalition on this issue.

I live in Glenwood Springs, CO, 30 miles from one of America's richer deposits of oil shale. Over the past 17 years living there, I have watched the local people, communities and economies slowly recover from what was the disaster of the last oil shale experiment in our country. That boom/bust disaster was the result of attempts to move oil shale too quickly, with artificial acceleration and unsustainable subsidies.

It is essential that Congress and Federal land managers learn from the mistakes of that past and act cautiously, from the innovations of the present, when crafting oil shale policy and activities. As you know, the Energy Policy Act of 2005 directed the Secretary of the Interior to promptly make available public lands for oil shale research, to analyze, by February 20, 2007, through a programmatic environmental impact statement, the environmental, economic and social impacts of potential commercial oil shale development in three Western States and to consider possible leasing of public lands for commercial oil shale production some time after that. This is a very ambitious schedule, especially considering that attempts to develop oil shale have been initiated and have essentially failed in each case, many times over the past century and that no energy company has yet indicated that it is close to being ready for commercial production. That is why it makes sense, as each of you have described in various ways, to take the time needed for a thoughtful review of the research results from the preliminary leasing program and to take that review and to pursue that review of the research program before considering any public lands for leasing for commercial oil shale production.

This will allow Federal managers, local citizens and their leaders and the industry itself to evaluate not only how well the technologies work, but also how those technologies could affect local economies and communities and the natural environment so key to both.

The public lands in question in northwest Colorado and northeast Utah and southwest Wyoming certainly have energy potential and already are producing unprecedented volumes of oil, natural gas and coal. Those same public lands also include integrated and critical wildlife habitat, popular hunting, fishing and recreation opportunities, water supplies for local agriculture and for communities and astounding scenic wonder. For all its energy potential, the oil shale country must be considered in the larger context of those of natural and public values.

Specific areas of concern include the direct impacts to the land, energy input needs, and water and air quality. I'll touch on each of those very briefly with more detail in my written statement.

Both the research leasing and the EIS analysis of potential commercial leasing should include protection for the more sensitive, ecologically important and scenic portions of the lands involved, in-

cluding lands with wilderness potential, key habitat for imperiled species and other wildlife, productive agricultural land and important watersheds and streams. These concerns are especially important in the context of the 100 percent surface disturbance that results from the new in-situ production techniques. The analysis of potential impacts to the land itself must also consider and avoid the auxiliary effects from new roads, traffic, worker camps and the general influx of dramatically increased industrial and recreational activity on lands that now enjoy a relative state of solitude and minimal disturbance.

The amount of energy needed to make oil shale production work is immense, as you have heard. The Rand Corporation's oil shale report notes that production of 100,000 barrels per day, using the in-situ technique, would require 1.2 gigawatts of dedicated electric energy capacity. That equates to construction of a power plant equal in size to the largest coal-fired powered plant now operating in Colorado. A 500,000 barrels per day industry would need 6 gigawatts of new electric power, an amount equal to that generated from all of Colorado's existing coal-fired powered plants.

The region underlain by oil shale is notably arid, with relatively low annual rainfall, and an existing over-commitment of water supplies and facilities. The Rand report notes that traditional oil shale techniques require between two and five barrels of water to produce one barrel of shale oil product and that the in-situ process may also require considerable volumes of water. How we get that water for oil shale without drying up productive ranch land or compromising the health of our streams is a key question.

The Rand report also noted that no studies of the immediate or cumulative impacts of oil shale development on air quality, let alone the potential impact from additional electric generation for that production, have been reported since the 1980's. Additional air quality study and modeling focused especially on sulfur dioxide, greenhouse emissions and particulates, both from the oil shale production itself and from the power plants, must be completed before making decisions about commercial oil shale production.

Oil shale may some day make a contribution to meeting the Nation's energy needs. Researched carefully, developed methodically and considered in the important context of communities, recreation and the beauty and natural environment of these wondrous States, it can make that contribution without destroying longer-term resources and values. Congress and Federal managers should, in careful concentration with States and local communities, learn from the oil shale research leasing program before beginning any commercial leasing or commercial production on public lands.

The oil shale will be there when we are ready to develop it in a truly sustainable and environmentally-sound manner. We should not venture too fast until we are.

I have included with my testimony, for the hearing record and for your review, a copy of comprehensive comments we submitted earlier this year as part of the oil shale programmatic EIS process. I invite your questions on that document, on my comments today and on any other opportunity we may have to help with your work and consideration. Thank you again for this opportunity.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF STEVE SMITH, ASSISTANT REGIONAL DIRECTOR, THE WILDERNESS SOCIETY

Thank you, Mr. Chairman and members of the committee, for this opportunity to highlight some key environmental issues that must be addressed as federal land managers consider the possible development of oil shale resources in this region.

My name is Steve Smith. I am Assistant Regional Director for The Wilderness Society's Four Corners States Office. My testimony today, however, reflects thoughtful research and recommendations compiled by staff and volunteers from an array of conservation and citizen organizations working in coalition to better understand this potential energy resource and to contribute to discussions about it future.

I am especially grateful for very able advice and assistance from Bob Randall and Jim Martin of Western Resource Advocates, Randy Udall of Community Office for Resource Efficiency, air quality expert Robert Yuhnke, and Kevin Markey, who was among the conservation community's leading experts during the ill-fated oil shale boom of the 1970's and 1980's.

I live in Glenwood Springs, Colorado, 30 miles from one of America's richer deposits of oil shale. Over the past seventeen years living there, I have watched the local people, communities, and economy slowly recover and revive from what was the disaster of the last oil shale experiment in our county.

That boom-bust disaster was the result of attempts to move oil shale too quickly with artificial acceleration and unsustainable subsidies. It is essential that Congress and federal land managers learn both from the mistakes of that past and, cautiously, from the innovations of the present when crafting oil shale policy and activities.

PERSPECTIVES

Other witnesses appearing before you today are far better qualified than am I to assess both the quantity of shale oil that is potentially recoverable and the quantity that may prove to be economically recoverable. While considering their presentations, however, it seems important to recall that producers and their investors sank five billion dollars into oil shale last time around, and then abandoned the field on May 2, 1982.

Similarly, it is important to put today's oil and gasoline prices into perspective. As the last oil shale venture in northwest Colorado was coming apart in 1980, the Office of Technology Assessment projected that the production of oil from oil shale might be economically viable at a market price of $61 per barrel, and an internal Exxon memo pegged the number at $108 per barrel, both those numbers in 1980 dollars. Even our current prices of $60 dollars per barrel, adjusted for inflation, do not come close to those levels.

Additional perspective is found in comparative opportunities for helping match our energy supplies to our energy needs. An increase in the fuel efficiency of the nation's automobile fleet by just one mile per gallon, for example, would save 400,000 barrels of oil per day, more than oil shale is likely to produce in the next decade or more, even by the most optimistic projections.

OIL SHALE, AN IMPORTANT POTENTIAL RESOURCE

Even so, energy supplies are needed, and oil shale contains at least the potential of a very large total volume of new oil replacement. This possible source of fuels warrants careful consideration, both of its potential contribution and of its potential effects on other important values and resources.

As you know, the Energy Policy Act of 2005 directed the Secretary of the Interior, that is to say the Bureau of Land Management (BLM), to make federal lands available for research and development activities for oil shale and tar sands resources, a process that the BLM has already begun. The Act also directed the BLM to analyze, through a programmatic environmental impact statement, the environmental, economic, and social impacts of potential commercial oil shale and tar sands development in three western states, to be completed by February 2007.

The Act also directed the BLM to adopt new regulations for commercial leasing of oil shale and tar sands six months later, mandating that these regulations be finalized by August 2007. Further, the Act told the BLM to gauge interest in development of oil shale and tar sands resources among state and local governments, Indian tribes, and members of the public and, if sufficient interest is found, gave the BLM the authority to hold a first-ever commercial lease sale for these resources in the spring of 2008, just short of three years after the Act was approved by Congress.

This is a very ambitious schedule, especially considering that attempts to develop oil shale have been initiated, and have failed, many times over the past century—

and considering that a leading company working on perhaps the currently most innovative approach to oil shale production announced last year that it was five to ten years away from even making a decision whether it can take on commercial production.

It makes sense, therefore, to take all the time needed for a thoughtful review of the research results from the preliminary leasing program before considering any public lands leasing for commercial oil shale production. This allows federal managers, local citizens and their leaders, and the industry itself to evaluate whether and how well the new oil shale extraction technologies work and how they could affect local economies, communities, and the natural environment so key to both.

As part of the interest-and-support standard described in the Energy Policy Act as threshold to commercial oil shale leasing, that leasing should begin, if it begins at all, only when technical difficulties of oil shale production are solved and when negative environmental and social effects of commercial development are fully understood and will be avoided or mitigated.

Oil shale failures of the past all have been financial and technical failures; either we have been physically unable to transform rock into liquid fuel or the expense of doing so far outweighed the market value of the product. Today, new and very innovative technologies are evolving that may crack the physical barriers for producing fuel from oil shale. You have heard much about that technical progress even in today's hearing.

CAREFUL RESEARCH BEFORE COMMERCIAL DEVELOPMENT

Even those innovations, however, include many very new ideas and accompanying unknowns. The BLM is currently evaluating five *in-situ* oil shale research and development proposals in Colorado, each using technology that is the first of its kind. Nowhere on the planet has large-scale oil shale development occurred using the *in-situ* techniques being considered in Colorado's Piceance Basin. For all the effort and investment it has expended, the oil shale industry is in its infancy, and these are one-of-a-kind operations.

The BLM should let companies conduct extensive, and long-term, research and development activities—and carefully evaluate the results of that research—before it considers holding a commercial lease sale.

This sound, cautious approach to—indeed, strategic postponement of—commercial oil shale leasing on public lands does not mean foregoing oil shale energy production. In fact, the potential resource recovery from the BLM research-and-development leases themselves is very large. According to the Plans of Operations submitted with the research lease nominations, the estimated in-place oil shale resources for the 160-acre Colorado tracts are 284 million barrels, 280 million barrels, 300 million barrels, 274 million barrels, and 356 million barrels, respectively. Thus the total resource to be conveyed in the research-and-development leasing program is approximately 1.5 billion barrels in place.

We note that this number does not represent the amount of oil that will be recovered, but rather the "resource in place". Because we do not yet know the potential recovery rate for the development methods proposed by research lessees, it is difficult to estimate the number of barrels that could actually be recovered. Whereas room-and-pillar mining resulted in recovery of only about 10% of the resource in place, *in-situ* methods are likely to recover much more. At a 70% recovery rate, for example, these research leases stand to deliver over 1 billion barrels of oil over their life, which would represent a substantial domestic supply.

If such rates of recovery actually result from the research leases, that would suggest that commercial leasing may make sense. Conversely, until experimental leases can definitively demonstrate high rates of recovery, larger tracts should not be offered for what would be speculative commercial leasing.

Commercial leases offered later in time also will be likely to generate greater returns to the federal treasury. This view was supported by the Congressional Budget Office (CBO) when it evaluated legislative proposals to mandate large-scale oil shale and tar sand leasing in the next five years. The CBO found that because the technology to successfully develop shale has not yet been developed, bonus bids for commercial leases would be insignificant over the next five years.

In addition, CBO found that any increased receipts from early lease sales would be offset by forgone receipts from sales that would otherwise occur later, when the technology has been developed, as well as by administrative costs. Leases will simply be more valuable when potential lessees know what they will be able to do on them.

PROTECTING THE ENVIRONMENT

Even as technological improvements advance, however, researchers and policymakers must fully consider and integrate into the oil shale equation the protection of our communities, our water, our wildlife, our clean air, and the scenic beauty of this region.

The public lands in question, in northwest Colorado, northeast Utah, and southwest Wyoming, certainly have tremendous energy potential. Those lands already are producing unprecedented volumes of oil, natural gas, and coal for regional and national energy needs, and they contain a very large theoretical volume of additional energy from oil shale.

Those same public lands also include integrated and critical wildlife habitat, popular hunting and other recreation opportunities, water supplies for local agriculture and communities, and astounding scenic wonders. For all its energy potential, the oil shale country must be considered in the larger context of natural and public values. Correspondingly, any energy policies affecting those lands must protect those other, more enduring and more complex values and the region's tourist-and recreation-dependent communities that relay on those natural features.

*Direct surface impacts*—Some threshold considerations, for both a limited research program and the possible commercial leasing program on federal public lands (including conversion of research leases to commercial scale), include:

- Leasing should be offered only for research and development of clearly new technologies and not for continued use of old technologies or minor variations on them;
- Leasing must not be a license for speculation. Potential lessees should be required to demonstrate, in advance, how their proposed activities in the particular areas proposed for leasing reduce the environmental impacts of oil shale development or how their technologies or processes improve energy efficiency, contribute to resource conservation, make development of oil shale more economic, or reduce waste outputs;
- No leases should be offered or issued on any lands in Colorado, Utah, or Wyoming that any federal agency has identified as having wilderness characteristics wilderness study areas, wilderness inventory areas, or lands with a reasonable probability of wilderness characteristics;
- No leases should be offered or issued on any lands proposed for wilderness designation in legislation pending before Congress (examples from past Congresses include America's Redrock Wilderness Act, Colorado Wilderness Act, Northern Rockies Ecosystem Protection Act, and Wyoming Wilderness Act);
- No leases should be offered or issued on any lands designated as Area of Critical Environmental Concern;
- No leases should be offered or issued on any lands that provide critical habitat to game animals, imperiled species, or recovering species;
- The Bureau of Land Management (BLM) and other federal agencies involved in oil shale research leasing should fully consider new information supplied by citizen groups or generated by the agencies themselves regarding potential wilderness values before leasing any lands for oil shale research;
- Leases for oil shale research or for commercial development should include strictly enforced non-waiveable stipulations mandating that lessees submit a reclamation plan to the appropriate state and federal agencies prior to authorization of any ground disturbing activities. Those stipulations should include the requirement that reclamation activities begin promptly upon lease expiration, termination, or relinquishment. Leases should be issued only in exchange for genuinely adequate bonding or other advance mechanism to ensure the completion of reclamation;
- Leases should contain stipulations requiring lessees to conduct air quality monitoring to establish baseline conditions, modeling to anticipate impacts from lease-based activities, and continuing monitoring to measure and control impacts on air quality, visibility, and human health.
- Similar monitoring and precautions should be required relative to water quality, watersheds and streamflow, wildlife habitat, and the protection of plants and plant communities.

Most of the considerations listed above relate to surface disturbance, that is, direct damage to the land and its vegetation. These points are particularly important when analyzing the new *in-situ* production techniques, which employ well bores (for down-hole heaters, water and gas recovery bores, coolant injection, and monitoring) every 10-12 feet, in effect, 100% surface disturbance over individual production

tracts of 640 acres or more and single company leases that may ultimately range from 5,240 to 40,000 acres.

The analysis of potential impacts to lands and water, and means of avoiding and mitigating those impacts, must also consider the auxiliary effects of new roads, traffic, worker camps, and influx of dramatically increased industrial and recreational activity on lands that now enjoy a relative state of solitude and minimal disturbance.

In addition to these precautions related to public and natural values found directly on the lands in questions, decisions about oil shale leasing and development must consider the broader contexts of energy inputs and their sources, water supplies and their sources, regional air quality, extended wildlife habitat, agricultural economies, and regional scale cumulative effects of a potential oil shale industry.

*Energy inputs*—The amount of energy needed, as an input, to make oil shale production work is immense. Traditional, above-ground retorts must heat mined and pulverized oil shale to 900 degrees Fahrenheit, consuming 40% of the energy value produced from the shale itself. Even in the new *in-situ* heating technique, underground electric heaters must bring the ore to 700 degrees Fahrenheit and hold there for up to four years!

The Rand Corporation's report, *Oil Shale Development in the United States, Prospects and Policy Issues,* prepared for the U.S. Department of Energy last year, notes that oil shale production of 100,000 barrels per day (less than one half of 1% of U.S. daily oil consumption), using the so-far most advanced *in-situ* underground heating retort technique, would require 1.2 gigawatts of dedicated electric generating capacity. That equates to construction of a dedicated power plant equal in size to the largest coal-fired plant now operating in Colorado.

For a 500,000 barrel-per-day industry, the scale projected by some oil shale enthusiasts, that equates to need for 6 gigawatts of new electric power, an amount equal to that generated from all of Colorado's existing coal-fired power plants.

Although some small amount of that electric generation might be fueled by natural gas, a by-product of the *in-situ* process, most of it likely would be fueled by the abundant coal supplies in the vicinity, prompting additional technological challenges in providing carbon sequestration and particulate air pollution control.

*Water*—The region underlain by oil shale is notably arid, with relatively low annual rainfall, and existing over-commitment of existing water supplies and facilities. Against that dry backdrop, the Rand report cites the Office of Technology Assessment's projection that traditional oil shale operations require between 2.1 and 5.2 barrels of water to produce one barrel of shale oil product. While the new in-situ processes may require relatively less water, the Rand report notes that "considerable volumes of water may be required for oil and natural gas extraction, postextraction cooling, products upgrading and refining, environmental control systems, and power production."

The BLM projected in 1996 that oil shale (by traditional methods) would reduce the annual flow of the White River by up to 8.2 percent and "would result in the permanent loss or severe degradation of nearly 50% of BLM stream fisheries."

*Air quality*—The Rand report notes that there were no publicly available analyses regarding how-modern pollution control systems could be incorporated into oil shale production facilities, and that further studies would be needed to determine the extent to which nonpoint-source air emissions (i.e. dust and off-gassing) from both surface and in-situ operations could be prevented or controlled. Rand also found that no studies of the cumulative impacts of oil shale development on air quality had been reported since the 1980's. Because so much has changed in terms of air-quality regulations, mining and process technologies, and pollution-control techniques, the earlier air quality analyses were found to be no longer relevant. Elsewhere, Rand characterized available studies on air quality effects of oil shale development as "so out of date, it is not possible to provide an analytically based estimate of the extent to which air quality considerations will constrain the technology profile, pace of development, and ultimate size of an oil shale industry."

Additional air quality study and modeling must be completed before making decisions about commercial oil shale production.

Some earlier experiences provide some perspective on this important question. Primary among pollution types is the inevitable generation of sulfur and, once that element is exposed to air, the generation of sulfur dioxide. That was an important issue in 1980, when the court held that oil shale operations must comply with direct and regional incremental degradation of air quality. The technologies for control of sulfur dioxide has improved in the past two decades, but not all sources of the pollutant, primarily electric power plants, have taken measures to use them. If oil shale operations add sulfur dioxide to the regional mix, oil shale operators may be able to mitigate those additions by investing in pollution control technologies at ex-

isting power plants. Such exchanges of so-called pollution credits must, however, be investigated and integrated into any expanded oil shale program.

All of these factors must be thoroughly and thoughtfully analyzed in the pending programmatic EIS *and* used as the basis for decisions about where oil shale activities will be allowed, and where they would not be appropriate and so will *not* be allowed.

CONCLUSION: GO SLOW, GO CAREFULLY

Oil shale holds a tremendous potential contribution to our energy supply. Researched carefully, developed slowly, and considered in the important contexts of communities, recreation, and the beauty and natural environment of these wondrous states, it can make that contribution without destroying longer-term resources and values.

Congress and federal land managers should, in careful consultation with states and local communities, learn from the oil shale research leasing program before beginning any commercial leasing or commercial production on public lands.

The oil shale will be there when we are ready to develop it in a truly sustainable and environmentally sound manner. We should not venture too fast until we are.

I have included with my testimony, for the hearing record and for your reference, a copy of comprehensive comments submitted earlier this year as part of the oil shale programmatic EIS process. I invite your questions on that document, on my comments today, and on any other opportunity that we may have to help with your work and consideration.

Thank you again for this opportunity to address the committee.*

The CHAIRMAN. Thank you very much, Mr. Smith. We greatly appreciate your remarks. The attached document will be reviewed carefully.

Mr. SMITH. Thank you.

The CHAIRMAN. I have no questions. I have reviewed your testimony, yours will be reviewed and I thank you for yours. Yours needs a lot of review before I can understand it, so it will get reviewed.

Senator, we now yield to you before we close, and then Senator Hatch, and then I will close. Please proceed. Questions and closing, please.

Senator SALAZAR. Let me just make a comment and then move to the closing. First, with respect to Shell Oil and Mr. Mut and what Shell Oil has been doing at the Mahogany Project, let me just reiterate what I have communicated to you and other officials of Shell, and that is, the great urgency of assuring that there is community involvement as you move forward with the research and development project and on to hopefully what will be the next steps. As I indicated to you yesterday, I visited an oil and gas company, which was drilling out in Garfield County. I was very pleased with the kind of collaboration that they had with the community, because mayors and council members and others were very supportive of that kind of a collaboration and I would encourage you to move forward with that process as your development moves forward.

Let me just make a concluding comment here, briefly. First, in terms of acknowledgement, let me just say once again that I appreciate Senator Domenici holding this hearing here in Colorado today. He has contributed greatly to our country for many years in the U.S. Senate and I think the U.S. Senate was at its best last year when Senator Domenici and Senator Bingaman led an effort to bring Democrats and Republicans together so we could pass the

*The attached report has been retained in committee records.

first comprehensive National Energy Policy Act in more than a decade. I know there are some people who have criticized that National Energy Policy Act. It wasn't perfect. It didn't answer everybody's questions or everybody's concerns, but at the end of the day, it was a comprehensive statement that said that a national energy policy for the United States was no longer something that we were simply going to disregard. I think all of us who were on that committee felt that what had happened is that the long neglect of a national energy policy had left the United States in a very dangerous national security situation. So I again applaud Senator Domenici and Senator Bingaman for their leadership on that effort, as well as on so many other issues.

I want to also thank Senator Hatch, our neighbor to the West, for having attended this hearing and for watching and participating in oil shale development, not only in his State, but in our State.

Let me just give you my conclusion on this. I think it would be wrong for us, as a Nation, to just say no to oil shale, to look at what has happened historically and say, we tried it before and we ought not to look at it again. I think that the amount of oil that is estimated to be locked up in oil shale tells us that we need to seriously examine the potential of developing oil shale in a strategic manner as part of the national agenda. I think, equally, it would be wrong for us to say that we have all of the answers to some of the questions that have been raised here today, in terms of impacts to the community or how we will address the impacts to water or to the environment. I think it is important that all of those questions are questions that we address as we move forward.

So, as we move forward with looking at the potential for oil shale development, I think that the agenda that was crafted by this Energy Committee last year is a thoughtful agenda and one that we ought to pursue. When I look at that agenda, it requires three sequential steps. Most of you in this audience may be familiar with those steps, but just to remind you what those steps are, No. 1, we are engaged in a research and development phase. That is exactly what Shell Oil is doing, spending millions and millions of dollars looking at whether or not the technology that they are exploring can, in fact, work. And there are other companies, both in Utah and in Colorado, that are in this phase. It is a research and development phase and I think it would have been a mistake for us, as a Congress, not to move forward in that direction.

Second, section 369 says we will conduct a programmatic environmental impact statement. That programmatic environmental impact statement is underway and it will continue to conclusion. That is a very important part of this sequential program that we are undertaking.

Then, finally, assuming that we go through those first two steps, then you get to the third step, and that is then the commercial leasing of public lands for oil shale development. I think the way that we set it out in that legislation is a thoughtful and orderly process. I think it allows us to move forward, as Commissioner Cook says, in a manner that we move forward with cautious optimism, but with our eyes open.

And with that, Mr. Chairman, I once again thank you very much. I respect you very much for who you are and what you've done and for holding this hearing here in Colorado today.

The CHAIRMAN. Senator Hatch.

Senator HATCH. Well, thank you, Mr. Chairman. The Nation is in your debt for the leadership you've provided in getting that bill through. As somebody who has been there almost as long as you have, I've watched people flail around trying to get a comprehensive energy bill through for years and you're the one who's done it. So I really appreciate being here with you and being invited to talk with you on where we stand, but if you—back to the comments of the—and I can only speak in the ranges, as well. The range supplied by the Rand Report, I believe the in-situ conversion process, complete with all the bells and whistles, the power generation, the upgrading, et cetera, will be at the low end of that scale.

One of the reasons that it's not below the low end of that scale is the fact that most of the very concentrated resource that we'll be going after is located below the water table. So, eventually, water will take its place to fill the void spaces of the hydrocarbons that are removed, about half of what we think our total water usage will be. So the—you know, I'd say a range of probably more than two barrels of oil and less than three—two barrels of water per—let me start again. A range of between two and three barrels of water per barrel of oil, over one of which is used to fill the void space.

And the importance of that last comment is that the timing of the filling of voidage is discretionary, so we can bring in that water in times of plenty and don't have to fill the void in the times of sparse oil.

Senator SALAZAR. OK, OK. Mr. Baardson?

Mr. BAARDSON. The retort—the oil tag retort, which me and Senator Domenici are going to visit with later this afternoon, uses no water at all. It actually creates water. There's water inherent in oil shale and as you go through the process, we extract water.

The secondary process, though, does use water and we believe between the amount of water that we can get from the mine—the actual mining operation—and from the water that we extract from the oil shale itself, it will be completely self sufficient in water, and we'll need no outside source of water at all.

Senator HATCH. That's great. Mr. Chairman, thank you so much for inviting me. I appreciate being with you. I have such admiration for you. And Senator Salazar, it's great to be in your State. I appreciate all the work you did.

The CHAIRMAN. We're just about on time. Friends, it's been my pleasure to come to your State, although I'm very close at hand, and some of you see me frequently on television, because you can't avoid it.

[Laughter.]

The CHAIRMAN. It isn't that you enjoy it, but one of your channels covers me and so many of you think that I'm your Senator, but I'm really not. I'm representing New Mexico as best I can and sometimes I have trouble even doing that, much less spilling over onto you.

In any event, I want to tell all of you the honest truth. I am a technology man. I borrowed that slogan and I wear it proudly. I am a technology man. The United States of America is built on technology and if there's anything I can wish as a legacy, it is that I participated and contributed a little bit to an environment that genuinely created innovativeness, that permitted people and institutions to apply technology, so that they became technology institutions or technology men.

In addition, we live in a very strange, and difficult, and different times when, every now and then, it is nice to add to that that I am also a patriot. My kids think I'm a patriot and that's nice. They always give me things that remind me that I'm a patriot. They like to give me a shirt that has an American flag on it. You know, even at this age, they give me a white shirt for the Memorial Day recess with an American flag on it.

We're caught in a bind in the world today, when it's kind of good, it seems, to be both a patriot and a technology man. That's kind of exciting. And whether you all like it or think it, what's happening right now, up here in your part of the world, is you going through a great technology evolution. Along with a lot of other things, this fantastic resource, which may not be enough for America's energy needs, but may carry us through and change our relationship to the countries that sort of have us by the throat, that resource that's up here may be sufficient to do that over the next 10 to 15 years. And what's going to be involved is patriotism and technology. And I'm beginning to sort of see that in the evolution of events here.

You want to be sure that all these new breakthroughs are measured properly, so that the outcomes will be known. I'm hopeful that we have a model in place, by coincidence, that the companies who are developing the technology are also going to be motivated by whether or not the marketplace dictates its worth to them. If it isn't worth it, they're not going to do it. If it's not working, they're not going to proceed. And I am seeing it, as I get to learn. Sorry, sir, I don't know about yours. I hope I learn. I hope I learn. But I am learning about shales and there's a lot written about the old-fashioned on-site retort process, which is not a lot of new technology, but a lot of intuition and people wanting to succeed.

So, in any event, you are part of something big happening and you just want to make sure that it goes slow enough that we don't get carried away. I don't think we're going to get carried away this time. There are too many doubters and there are too many who don't want us to do it at all.

And you are over there, maybe I don't know it well enough to say that, but the pressure will be kind of right. But what will come out of it will be what's good, it seems to me and from what I can tell, and I hope that's the case. And I hope that in about 10 years, you've got a big mark from on high on this part of the geography saying it's a very important part of this great United States.

With that, we're in recess. Thank you for being here.

[Whereupon, at 11:57 a.m., the hearing was adjourned.]

# APPENDIXES

## APPENDIX I

## Responses to Additional Questions

### RESPONSES OF LIEUTENANT GOVERNOR GARY HERBERT TO QUESTIONS FROM SENATOR DOMENICI

The Energy Policy Act of 2005 directed the Department of Energy and the Department of the Interior to establish a task force to make recommendations on oil shale and tar sands development.

*Question 1.* What has been the State's involvement in this process?

*Question 2.* Has the State been satisfied with its opportunities to be involved in BLM's research leasing process and the programmatic EIS?

In your testimony you described having 13 applications on file for tar sands development.

*Question 3.* Can you expand on what types of tar sands activity are anticipated?

*Question 4.* Are these on State lands or Federal lands?

Answer. Thank you for affording me the opportunity to represent the State of Utah at a recent field hearing in Grand Junction, Colorado. It was a pleasure to visit with you and a wonderful opportunity for me to express the views of my state to the United States Senate.

As a supplement to my testimony, I would like to add that Utah is generally encouraged with our integral involvement as a member of the Oil Shale Task Force mandated by the Energy Policy Act of 2005. Thus far, the state's involvement in the Research Development and Demonstration (RD&D) Leasing and Environmental Assessment (EA) as guided by the Bureau of Land Management has also been acceptable. However, as with the Programmatic Environmental Impact Statement (PEIS), the EA is an ongoing work in progress. There are a number of future steps in the PEIS preparation to accomplish until there exists a smoothly functioning and integrated process that utilizes the best of state and federal resources.

One of the most critical steps to be taken will be the development of a Memorandum of Understanding (MOU) so that Utah can accomplish "cooperating agency" status in working on the preparation of the PEIS. In essence, we are hopeful on the workings of the leasing process for oil shale. The next few months will be critical in determining that all concerns are accounted for in the preparation of the document.

Current tar sand operations in the State of Utah consist mostly of small test (pilot) and exploration projects recently permitted. There are also a couple of County road departments that use the material for road building. The Division expects to see several of the small tar sands pilot mining operations (< 5 acres) currently permitted, expand to large mines (> 5 acres). In fact, one application currently under review is for an 80-acre mining operation. We also expect to continue to receive additional mining notices with fee (private) and Utah State School and Institutional Trust Lands Administration (SITLA) mineral ownership. Although state mine permitting notice is required on federal lands, OGM does not expect to see any applications for tar sands operations on federal lands until the Oil Shale and Tar Sands Leasing PEIS is completed by the BLM.

The table below shows the distribution of activity by land ownership (surface/mineral). The majority of the projects are located on SITLA (state) lands.

Ownership of surface/mineral estate of current (June 12, 2006) tar sands operations.

| | Fee/Fee | SITLA/ SITLA | Federal/ Federal | Total |
|---|---|---|---|---|
| Large Mine | 2 | [1]1 | 0 | 3 |
| Small Mine | 1 | 7 | 0 | 8 |
| Exploration | 0 | 2 | 0 | 2 |
| | | | | 13 |

[1] One current small mine has an application for a large mine.

Again, I thank you for time and willingness to accept my testimony on behalf of the Great State of Utah. If you have any questions or if there is anything further information you or the committee requires, please do not hesitate to contact me.

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RESPONSES OF RUSSELL GEORGE TO QUESTIONS FROM SENATOR DOMENICI

*Question 1.* The Energy Policy Act of 2005 directed the Department of Energy and the Department of the Interior to establish a task force to make recommendations on oil shale and tar sand development.

What has been the State's involvement in this process?

Answer. The State of Colorado has been represented on the Strategic and Unconventional Fuels Task Force as required by the Energy Policy Act.

The Task Force has held three meetings, to date, including a kick-off meeting on March 22, 2006 in Denver, Colorado, a conference call on April 7, 2006, and a formal meeting held in Salt Lake City, Utah on May 11, 2006. A fourth meeting to finalize the interim report to Congress will be held the third week of June in Lexington, Kentucky.

Colorado representatives have attended all of the Task Force meetings and have participated fully in the drafting of the report.

*Question 2.* Has the State been satisfied with its opportunities to be involved in BLM's research leasing process and the programmatic EIS?

Answer. The state has been active in both the Research, Development and Demonstration project as well as a cooperating agency in the Programmatic Environmental Impact Statement. The BLM has shown a sincere desire to involve us in these two processes and we will look forward to continued cooperation and participation in the future development and implementation of these programs.

The timeframes established in the Energy Policy Act of 2005 have resulted in immediate additional demands on Department of Natural Resource staff. We are committed to providing our expertise and technical resources to the BLM as we cooperatively move forward with these programs. We will have to continue to make adjustments as we evaluate the requests from BLM in the coming years. Undoubtedly there will be increased human resources needed to participate at the level we believe to be appropriate but BLM has shown that they are willing to include us at every step and we are confident that this approach will continue in the future. The state's ability to competently perform its committed obligations will inevitably be affect by budget timing and funding constraints.

*Question 3.* In your testimony you spoke of Colorado's Coordinating Council.

Please explain what this council does and how it will help the permitting process.

Answer. To fully understand the socioeconomic and environmental impacts of oil shale development, a coordinated and integrated permitting process is essential. The environmental and land use permitting process can be complex and time-consuming when all the local, state and federal requirements are considered. For the permit requirements in place 20 years ago, the average timeframe to permit an oil shale project was about 42 months. Some processes have become more complex since then—and certainly public interest is more organized and focused.

As a reminder, the Colorado Joint Review Process—the predecessor to the Colorado Coordination Council—grew out of the concerns raised over the 1970's concept of an Energy Mobilization Board. That Board would have had the power to preempt local and state regulatory requirements in the national interest. The reaction in the West was to coordinate and streamline, not dismantle, the existing process. Attempts in recent years to truncate the process have been met with public criticism and lawsuits. Such efforts have proven to be counterproductive to the goal of developing these important resources.

Today's Colorado Coordination Council is an option that the federal government should consider fully funding, or partially funding along with industry, to assure a rigorous regulatory and environmental review process with adequate public input and consultation. A coordinated permitting process will reduce uncertainties by

clarifying technical requirements, timeframes, lead regulatory agencies and public input. The overall coordination of the effort could allow for the application of several permits for an individual project to occur simultaneously.

The Colorado Coordination Council, located in the Department of Natural Resources, statutorily incorporates the Joint Review Process. There are numerous governmental requirements and approvals that must be complied with and obtained by the sponsor of a natural resources development project. The jurisdictional integrity of each entity of local, state, and federal government must be maintained. The role of the Council is to coordinate relations between sponsors of natural resource development projects, the public, and local, state, and federal government entities, to make the permitting process more efficient while insuring maximum public, governmental, and sponsor input. Effective coordination should reduce costs for state and local governmental entities and project sponsors and minimize the delay for sponsors of projects that comply with the terms and conditions of participating local, state, and governmental entities. Participation is voluntary.

Upon receipt of a written request from a project sponsor, the Council would initiate project coordination procedures that would result in a commitment by the sponsor to pay for the specified costs of the governmental participants prior to the commencement of the process. The Council would transmit such fee to the State Treasurer for deposit in the Coordination Council cash fund. Moneys in the fund would be appropriated solely to the Council to pay for its costs in providing project coordination procedures.

Project coordination procedures require the sponsor to provide a project statement; develop a list of all local, state, and federal governmental entities that the sponsor reasonably expects to be involved in a process requiring public input; and provide the project statement to those identified parties.

The Council shall outline to the extent possible a list of all applicable requirements identified by the sponsor that will be the subject of the agreement between the sponsor and the Council; establish a timetable for completion of the public input, permit compliance, and approval requirements in coordination with the governmental entities involved; organize and manage meetings involving the sponsor and all involved governmental entities; and take any other action that will facilitate the timely approval or denial of permits, approvals, or licenses required of the sponsor for the commencement of the project.

Community acceptance is the only way to avoid what could be well organized and sophisticated opposition to oil shale development. Seeking, tracking and addressing stakeholder concerns and encouraging participation are essential for project implementation in the timeframe contemplated by Congress.

RESPONSES OF RUSSELL GEORGE TO QUESTIONS FROM SENATOR SALAZAR

*Question 1.* Has the state evaluated the likely social and economic impacts of oil shale development in northwestern Colorado? In your judgment, how can we avoid the "boom and bust" cycle that has accompanied oil shale development efforts in the past?

Answer. A procedure must be established to evaluate economic impacts at the local level. The federal government should fund, or require to be funded, a process to analyze the cumulative financial impacts of multiple and simultaneous resource development. This analysis will guide the timing of needed permanent and temporary community services and infrastructure and provide critical planning information for those impacted communities.

To assess the fiscal impact to individual communities and counties in high development areas, it is essential to model the budgets, revenues and expenditures of affected jurisdictions in Northwest Colorado. The key task would be to determine what projects would cause what economic impacts to what jurisdictions in what years based on different population and development scenarios.

Given the scope of this effort, and based on our experience in the early 1980's with the Cumulative Impacts Task Force, we believe that such an analysis should be funded by federal or industry funds as it was then.

Another component of socioeconomic impacts is the financial burden to local economies to mitigate those impacts. Along with an oil shale lease process that generates production royalties for the federal government, the 1970's concept of front-end bonus bids should be applied to any oil shale leases.

The federal government leased two tracts in each state—Colorado, Utah, and Wyoming—in the early 1970's. Bonus payments accompanied each of these leases—that determined the winning bid for the lease. Half of those bonus payments were distributed back to the state. The Colorado General Assembly established the State Oil Shale Trust Fund and Program which developed planning and coordination mecha-

nisms for federal, state, and local governments and provided funding for designated local government services and projects ($100+ million). This economic cushion was essential to community stability, and the ability to withstand the economic shock of a project termination.

The federal leasing program should include front-end financing for infrastructure needs and impact mitigation with a goal to mitigate the "boom town" syndrome. It should not subsidize private investment by foregoing revenues that would mitigate financial impacts at the state and local level. If favorable tax and royalty terms in the early years are necessary, the federal government must identify the alternative source of state and local impact mitigation funds. The cumulative economic assessment will determine the necessary amount.

This analysis would identify major infrastructure requirements, including roads, sewer, water supply and storage, schools and key government services—like planning and permitting requirements. The investment of industry funds to mitigate these impacts should coincide with the project development schedule. Such funds should also include the financial reserves necessary to maintain the services, facilities and infrastructure before industry-generated revenues are available.

*Question 2.* Has the state analyzed the potential impacts to air, land and water as a result of oil shale development? If so, please describe.

Answer. The state of Colorado is in the process of participating as a cooperating agency in the development of the

Programmatic Environmental Impact Statement in coordination with the BLM. During this process we expect the issues of air, land and water impacts to be fully addressed and for those agencies (federal, state and local) with expertise and jurisdiction over these subjects to be fully involved in this evaluation. The state will evaluate each of these elements during this process. The state does have some background and baseline information relating to oil shale relating to the development that took place in the 1970's and early 1980's. This information is dated and somewhat obsolete because of the new technology that is being utilized in the current era of development.

It should be noted that the streamlined time frame for commercial leasing availability could result in a less than comprehensive evaluation of these impacts. This issue is further complicated by the fact that industry has not completed and presented their evaluation as to which extraction methods will be utilized during the commercial development. It is imperative, therefore, that the Programmatic Environmental Impact Assessment be a high level overview of potential impacts and that the site specific Environmental Impact Statements fully evaluate the specific impacts each commercial lease will have based on its ultimate location and method of operation. The state expects that at the completion of these two critical steps, impacts to air, land and water will be comprehensively addressed prior to development.

*Question 3.* What additional policies, if any, do you think the federal government should pursue with respect to potential development of Colorado's oil shale resource?

Answer. The cumulative fiscal impact analysis should identify both on-site and offsite impacts by a development project. Mitigation funds paid by industry or the federal government for these impacts should be a condition of the lease. Such funds could be held by the State Treasurer for distribution to specific entities as expenses are incurred for specific projects.

If an upfront payment is made in one unrestricted lump sum, the cumulative fiscal impact analysis and the project specific EIS could be used to prioritize the allocation of the funds to mitigate financial and environmental off site impacts. Such allocation should be driven by a public process.

To the extent possible, mitigation of on-site impacts should be a condition or stipulation of the permit by the appropriate oversight agency.

*Question 4.* How has the State of Colorado participated in the Oil Shale Task Force?

Answer. The State of Colorado has been represented on the Strategic and Unconventional Fuels Task Force as required by the Energy Policy Act.

The Task Force has held three meetings, to date, including a kick-off meeting on March 22, 2006 in Denver, Colorado, a conference call on April 7, 2006, and a formal meeting held in Salt Lake City, Utah on May 11, 2006. A fourth meeting to finalize the interim report to Congress will be held the third week of June in Lexington, Kentucky.

Colorado representatives have attended all of the Task Force meetings and have participated fully in the drafting of the report.

RESPONSES OF KIM COOK TO QUESTIONS FROM SENATOR DOMENICI

*Question 1.* You testified primarily to the need for "up front funding assistance" to counties.

How well has the State shared it mineral receipts to counties?

Answer. I can't speak to how other states such as Utah and/or Wyoming share such receipts as compared to how Colorado structures its distribution to counties. There are problems which have surfaced as the total value of the receipts have increased and the Colorado Department of Local Affairs (DOLA) has seen the need to alter the manner in which receipts are distributed. Based on a 2005 opinion by the Colorado Attorney General's office, Colorado's so-called 3rd Tier distribution dollars have been redirected from the county of origin of the Federal Mineral Lease (FML) operations to the counties in which the FML workers reside. While there are significant impacts associated with the place of residence there are still significant impacts in adjoining low population counties such as Rio Blanco County. Further, this redirection of FML dollars to counties-of-residence results in many counties receiving significantly more FML dollars than were ever generated within those counties while other counties, such as Rio Blanco County, receive less than 10% of the FML dollars generated within their jurisdictions. Rio Blanco County strongly objects to Colorado moving away from the "County-of-origin" concept in the distribution of FML dollars. Rio Blanco County would need more than double our current share of the FML dollars generated within our county to be able to mitigate the impacts which are currently occurring. The attached document describes the distribution of Colorado's share of FML dollars.

*Question 2.* What do you think is needed for impact mitigation planning?

Answer. For impacts to the tri-state region (Colorado, Utah, & Wyoming), the scope of such planning needs to include the geographical extent of the Green River Formation.

Planning efforts tend to focus on specific features, such as socioeconomics, and be focused within a specific state. I think that regional infrastructure needs to be studied from a perspective which transcends state boundaries, especially in terms of the transportation, water, and electrical power grid. A regional transportation plan linking the Green River Basin of Wyoming with the Piceance Basin of Colorado and the Uinta Basin of Utah as well as the links from them to the outside national transportation network. Adequate water storage doesn't exist and needs to be developed on a similar scale. Finally, the electrical power grid of the region needs to be developed, perhaps utilizing unconventional technologies, to the point that adequate power to develop the oil shale resources can be provided while maintaining air quality standards. Such study and the funding can only come from the federal level and FML dollars from oil shale lands could, now that the DOE oil shale funding requirements from the last boom are met, be accrued for such studies and the mitigation of the anticipated impacts. It is hoped that the current PEIS will provide an adequate start toward identifying needs and possible mitigation strategies.

*Question 3.* There is no question that local governments should not be forced to pay for these costs alone. But States have been receiving significant amounts of new federal royalty receipts generated from increased energy production and higher energy prices.

Do you see a need for States to step up as well in providing funding for these needs?

Answer. Rio Blanco County does see such a need. We are deeply concerned that the state's share of FML and mineral severance tax dollars will be diverted toward more populous and politically powerful areas of the state. As you may well know, Colorado, as a result of rapid growth along its I-25 and I-70 corridors, has many needed but unfunded projects. As it struggles to find adequate funds for these projects the leasing and severance revenues being generated in the more rural parts of the state are tempting targets for misappropriation.

RESPONSES OF KIM COOK TO QUESTIONS FROM SENATOR SALAZAR

*Question 1.* How can we avoid the "boom and bust" cycle that has accompanied oil shale development efforts in the past?

Answer. Possibly we could model the effort on the manner in which the immediate past Federal Reserve Chairman, Mr. Greenspan, has managed to avoid the worst of the inflation-recession impacts during his tenure. Such an effort would require careful monitoring of the amount of federal dollars available for the research and development phase of our unconventional energy resources. Making more dollars available, in the manner of the Fed lowering interest rates, can accelerate R&D projects but at the danger of local economic growth so large that local government cannot manage its impacts even with significant mitigation funding. While the cur-

rent rate of R&D is probably too low to meet our current and future energy needs, federal funding for R&D and impact mitigation could be limited to only a few promising technologies in each of several forms of unconventional energy and spread over a wider geographic region than has occurred in the past. We favor this "go slow" approach seen from this perspective as compared to the massive influx of federal dollars in a very limited geographic region which sparked the last oil shale boom.

*Question 2.* How are efforts on the programmatic environmental impact statement being received locally?

Answer. The PEIS has a pretty low profile in western Rio Blanco County. There are concerns that this locality will have an adequate hearing of its concerns and that, in the broad scope of this effort, local concerns will bear much weight.

*Question 3.* From your point of view, are any of the proposed development technologies preferable for local governments in Colorado? Are there advantages to in-situ processes as compared to surface retorting in the eyes of local governments, or vice versa?

Answer. An in-situ process has a couple of real advantages. The extraction of petroleum from the shale via an in-situ process looks like it will take less water per produced barrel than mining techniques. With water in short supply in the west, this is important. In-situ seems like it will be easier to meet air quality standards, especially if a clean coal technology is used to generate electricity for the heaters. In-situ processes avoid the need to dispose of spent shale which now occupies a larger volume than the cavity from which it was extracted.

In-situ will, however, eventually disturb the surface of the entire oil-bearing region. This means that special care will need to be taken to protect the unique species which occupy the surface exposures of the Green River Formation. Since several of these plant species exist nowhere else in the world, a special effort will need to be made to re-establish them in areas which are reclaimed after extraction of the petroleum is complete.

*Question 4.* How would you describe Shell's working relationship with Rio Blanco County?

Answer. Rio Blanco County feels it has an excellent working relationship with Shell Frontier Oil & Gas. Shell has worked hard at establishing and maintaining strong, open communications with the county. We have negotiated on mitigating potential problems based on each other's activities and actions. Shell has been forthcoming with impact assistance, information, and their plans for the future. They rank among the best, if not the best, of the energy extraction industry operators in our county.

*Question 5.* What kinds of federal assistance are necessary, from the point of view of Rio Blanco County, before oil shale can be developed commercially?

Answer. As mentioned in our response to Senator Domenici's questions, Rio Blanco County sees a need for federal assistance in the area of regional infrastructure planning. As we move closer to the commercial extraction of shale oil, funding assistance for the infrastructure needs will become necessary. It is to be hoped that oil shale leasing revenues and severance taxes can be retained in a fund to assist local governments with these impacts. We see little or no need for major incentives to industry now that we are again in an era of high oil prices.

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RESPONSES OF MIKE MCKEE TO QUESTIONS FROM SENATOR DOMENICI

*Question 1.* You testified primarily to the need for "up front funding assistance" to counties.

How well has the State shared it mineral receipts to counties?

Answer. Out of the State's mineral receipts 40% return to the county of origin. This 40% must be receipted into county established Special Service Districts, not into the impacted county coffers. If the money were to come directly to the county, Payment in Lieu of Taxes (PILT) money would be forfeited. Some of the mineral receipts are allocated to the State's Permanent Community Impact Fund Board (PCIFB). The state's mineral producing counties make application to the PCIFB to fund various county projects. PCIFB awards are in the form of grants or low interest loans.

The only improvement to this system desired by this County would be to allow the mineral receipts to come back directly to the county of origin, by passing the Special Service Districts, without forfeiture of PILT funding. If the purpose of the mineral receipts is to assist the county of origin in reducing those impacts resulting from oil and gas production, the State has created an unnecessarily burdensome process.

*Question 2.* What do you think is needed for impact mitigation planning?

Answer. Mitigation planning is difficult, at best, for an industry that is here today and could be gone tomorrow. A mechanism must be established for working with industry to do future forecasting. Uintah County has previously been a victim of the volatile oil and gas "boom/bust" cycle. We need a survey or study to collect information from industry and establish their plans for the next ten years. In addition, we need to bolster our economic studies to track community needs and impacts. The County needs the assistance of a planning professional, possibly brought in on a consulting basis, to do this forecasting. The County needs funding, in addition to the mineral receipts it already receives, to pay for this planning.

The County is a willing participant in energy production. Some of this country's premiere oil and gas fields are right here in Uintah County. This production is helping to alleviate a national shortage and the County should not be called upon to bear the impact burdens alone.

*Question 3.* There is no question that local governments should not be forced to pay for these costs alone. But States have been receiving significant amounts of new federal royalty receipts generated from increased energy production and higher energy prices.

Do you see a need for States to step up as well in providing funding for these needs?

Answer. Yes. The State of Utah's position has been that even though a large portion of the production (68%) is in the Northeastern portion of the State, the whole State is being impacted. Consequently, the other non-mineral producing portions of the State wish to benefit from those mineral receipts. The State prefers not to acknowledge that the mineral receipt money is being generated in predominately one area of the State and, accordingly, receipts should be returned to mitigate the impact.

The non-mineral producing portions of the State are not dealing with over 400 miles of unpaved roads, providing access to the production fields, in desperate need of repair. Nor, do they have an abysmal lack of low income and temporary stay housing as a result of transient workers moving into the area. This County is in desperate need of a new jail due to the increased population and number of workers abusing alcohol and methamphetamines. The number of law enforcement officers must be quickly increased to handle the extra burden. Housing construction has increased, along with the need for building inspectors and planning personnel. The areas workers are flocking to the high paying oil and gas production jobs leaving behind minimum wage jobs that cannot be filled. An area that reported 150 available jobs a year ago now is reporting over 400 available jobs. The impacts that result from an unanticipated time of prosperity are innumerous.

In addition to the mineral receipts, the State of Utah collects a severance tax. Outside of a small percentage that goes to a revitalization fund, the State does not share any of the severance tax collected with the counties of origin. We believe that since the minerals are severed from the County's natural resources the County should receive a portion of the severance tax returned to the State.

Federal statute directs the State to give "priority to those subdivisions of the state socially or economically impacted by development of minerals." Unless the federal government steps in and provides additional direction, the counties of impact will not get the help they need.

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RESPONSES OF CRAIG MEIS TO QUESTIONS FROM SENATOR DOMENICI

*Question 1.* You testified primarily to the need for "up front funding assistance" to counties.

How well has the State shared it mineral receipts to counties?

Answer. The State of Colorado receives revenues from energy development via Federal Mineral Lease and Severance Tax. The largest beneficiary of Federal Mineral Lease is the State School Fund with 52% of all revenues going to the State's School Districts with only 14% of all revenues going back to local counties or cities of origin via direct payments. Some additional dollars do make it back to local governments via energy impact grants through the Colorado Department of Local Affairs however these grants have historically required significant local matching dollars and have had caps on grant limits therefore the use of them in energy impacted regions has not been as great without these limitations.

Severance Tax is the primary source of energy related revenues that the State receives outside of property taxes. Severance Tax dollars have been increasing very rapidly over the past three years due to significantly increased natural gas production and rising energy commodity costs. The distribution of severance tax in Colorado is also a very complicated formula of which 7.5% of total severance tax reve-

nues are paid to local governments via a direct payment based on energy employee residency reports and 40% of total severance tax revenues is used to fund the State's Energy Impact Assistance Fund. I stated earlier the limitations that currently preclude local governments from taking full advantage of these energy impact grant funds. The remaining 52.5% of severance tax collected by the State is used to fund State operations such as Department of Natural Resources and Department of Local Affairs.

The formulas that allocate these dollars for both Federal Mineral Lease and Severance Tax within the State of Colorado are very complicated so rather than try to explain these I will submit for the record the Colorado Department of Local Affairs presentation attached that outlines specifically the revenues paid and the distributions made throughout the State. This presentation also illustrates the formulas used to allocate the distributions.

*Question 2.* What do you think is needed for impact mitigation planning?

Answer. An allowance for a prepayment on royalties or equivalent that flows in large part directly to the cities and counties were the impact of energy development will be the greatest. These revenues would allow for planning and capital improvements to be made in these areas prior to impacts taking place. All the counties in Northwest Colorado are experiencing major impacts on our roads, law enforcement, human services and other public services and infrastructure currently due to the rapidly growing natural gas industry in our region. Should we add oil shale to the already fragile services and infrastructure in place in the region we are destined for failure. While we are certainly up for the additional challenge in providing additional reliable and affordable energy to our nation, we would respectfully request that assistance be given to help plan for and pay for the impacts associated with any future development.

*Question 3.* There is no question that local governments should not be forced to pay for these costs alone. But States have been receiving significant amounts of new federal royalty receipts generated from increased energy production and higher energy prices.

Do you see a need for States to step up as well in providing funding for these needs?

Answer. While I will certainly not argue that I think the State of Colorado should allocate a higher percentage of funding to areas of the State impacted by energy development based upon the figures I presented earlier. I will point out that it is certainly the perception of Northwest Colorado that a much smaller percent of Federal revenues received from energy development are returned back to the States or Counties of origin. A greater emphasis by this Committee would be to review whether Federal revenues received by energy development are actually being used to support and enhance future energy development in these impacted regions for the benefit of the nation. Colorful Colorado certainly does not want energy development in our back yard no more than the California Coast does but we are certainly willing to do our part if the Federal assistance is available to do it with and do it right.

RESPONSES OF CRAIG MEIS TO QUESTIONS FROM SENATOR SALAZAR

*Question 1.* In April 2005, Jim Evans of Associated Governments of Northwest Colorado testified in front of this committee that the best advice from local governments to industry was: "communicate, communicate, communicate." Have the finalists for BLM R&D leases in Colorado (Chevron, EGL Resources, and Shell) heeded this advice?

Answer. Certainly some more than others. If I were to place them in order it would be very easy. Shell the best with Chevron second and EGL last. Shell has certainly set the standard but they have also been working on their Mahogany Project for quite sometime and been very good about advising local government all along on their progress. All three have been a part of the public presentations held throughout NW Colorado by the BLM as part of the information sharing aspect of the upcoming RD&D leases being issued.

*Question 2.* What level of participation have the local communities had in the Oil Shale Task Force established by section 369 of the Energy Policy Act of 2005?

Answer. Since I am the designated local representative for the State of Colorado, the participation and the involvement in the task force has been very good. I have certainly been sharing any and all information from the task force meetings with my fellow electeds in Northwest Colorado to make sure that I am representing their questions and concerns as the member of the task force. I have been pleased with the outcomes of the task force to date and with all the participants of the task force. The members of the task force are very engaged and productive. We are all saying very similar things and have like concerns. Everyone on the task force wants any

activity that comes from future oil shale development to be successful and mutual beneficial.

*Question 3.* As a representative for Colorado communities on the Oil Shale Task Force, how have you sought to best represent Colorado's local communities on the task force?

Answer. I have been providing updates and sharing any of the information received as part of the task force activities with Associated Governments of Northwest Colorado which is made up of the five Counties and their respective Municipalities of Northwest Colorado. Any feedback received from the members of AGNC is relayed to the subcommittee.

*Question 4.* Are there any barriers preventing meaningful participation by local communities in the task force?

Answer. Not to my knowledge at this point. Both the applicable State and Federal agencies associated with the oil shale proposals have been very receptive and proactive about local input. I am unaware of any negative comments or feedback at this point with regard to any local community feeling like they are not being listened to or heard.

*Question 5.* From your point of view, are any of the proposed development technologies preferable for local governments in Colorado? Are there advantages to in-situ processes as compared to surface retorting in the eyes of local governments, or vice versa?

Answer. At this early stage, I feel most in local government and the surrounding communities are simply waiting in anticipation for the outcome of the RD&D activities. We are all very aware of energy development in this region and the ever changing technology associated with energy development. We are certainly hopeful that oil shale development technology will also be something that is exponentially increased to minimize any adverse environmental impacts while maximizing resource recovery. Whether surface retort, in-situ or another as of yet undiscovered technology may be found for developing and processing oil shale, all certainly have their challenges and all very much have significant impacts. I would hope that we as policy makers will let the scientists do their jobs to let us know about the feasibility of oil shale production before we condemn anything based solely on the emotion of the issue. This should be an issue based on science rather than politics and emotion.

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RESPONSES OF STEPHEN MUT TO QUESTIONS FROM SENATOR DOMENICI

*Question 1.* I understand from the Department of Energy that, if any technology becomes commercially viable, it is conceivable that the state area of Colorado, Utah, and Wyoming could produce around three million barrels per day from oil shale.

What would this mean for the nation and American consumers?

Answer. In the case where oil shale were to produce a 3 million barrel per day increase in both US and world oil and gas supply, there would be significant changes that would be readily felt by both the economy and the average consumer. Among those impacts would be a lowering of world oil and gas prices (assuming that no offsetting reduction was applied elsewhere), a reduction in gasoline prices at the pump, and a reasonable increase in the US economic growth as a result of those lower energy prices and a simultaneous reduction in the trade deficit. Different macroeconomists would calculate these precise impacts differently of course. But directionally, there is little doubt that these specific impacts would be seen, along with the difficult to calculate geopolitical value of reducing US dependence on foreign producing nations while at the same time showing them that alternatives to their products were readily available.

With approximately two-thirds of our nation's current energy demand coming from imports, and estimates that our energy demand will double or more by 2050, developing our domestic oil shale resources is an important and perhaps critical step in bolstering domestic energy security. Meeting our future energy needs will involve a diversity of energy sources including: conservation, conventional, unconventional, alternate and renewable energy sources. Additionally, changes in consumer habits and improvements in technology can further reduce our national energy demands.

*Question 2.* What about the pace of oil shale development? Are we going about this along the right time frame?

Answer. There are no quick fixes to our nation's energy supply and demand problem. If the U.S.'s unconventional energy resources, including oil shale, can be prudently developed in an economically, environmentally and socially sound manner, companies should be encouraged to proceed at a pace to allow for commercial production to commence by the early-to-middle part of the next decade.

*Question 3.* What are you doing to ensure that the environment is protected as you plan for oil shale development?

Answer. Developing oil shale in an environmentally responsible manner is a foundational element of Shell's sustainable development policy. Throughout our ten-year history of field-testing (that was preceded by almost 15 years of laboratory research), we have been studying the environment extensively to understand how best to develop the resources in a responsible manner. Environmentally related studies performed to date, and ongoing, include: groundwater, surface water and aquatic resources; plants and noxious weeds; wildlife, wild horses and threatened & endangered species; meteorology and air emissions modeling; cultural resources; and soil, reclamation and remediation. Additionally, we are cooperating with the BLM as it prepares the Environmental Assessments that are needed to evaluate and support implementation of the RD&D leasing program. Shell will also support a comprehensive site specific Environmental Impact Statement as a pre-condition to any commercial-scale project development.

RESPONSES OF STEPHEN MUT TO QUESTIONS FROM SENATOR SALAZAR

*Question 1.* How well do you think the R&D leasing program is working?

Answer. BLM's RD&D leasing program will open the door to prudent demonstration of viable oil shale recovery technologies. Shell is supportive of the process and is anxious to receive issuance of the three leases with which to initiate the next, and hopefully last, stage in our 24-year R&D efforts leading to commercial development. So far BLM's process seems to be working well, as it was thoughtfully developed to assure that only applicants providing adequate proposals would be given the opportunity to demonstrate their research. Shell feels that it is important to develop oil shale resources in a cautious, methodical manner to assure economic viability, environmental responsibility and social sustainability.

*Question 2.* When will Shell make a determination whether to commercialize production?

Answer. Shell hopes to make the decision whether to commercialize oil shale production around the end of this decade. However, we anticipate proceeding with long-term preliminary activities over the next several years such as: NEPA compliance, permitting and comprehensive impact assessment in partnership with potentially impacted communities in order to have those steps completed in advance of a commercial development decision.

*Question 3.* What would be the likely consequences of a commercial leasing program if BLM offers commercial leases before the technology can be proven?

Answer. A regulatory program needs to be put in place as part of the regulatory segment of a commercial leasing program to assure that operators' projects are environmentally and socially responsible and that also provide specific criteria to define maximum economic recovery, require diligent development, adequate bonding and other environmental protections plus a multitude of other operational criteria before commercial leasing commences. These regulatory provisions are an important step that need to be completed before commercial leases are actually issued. So long as these regulatory safeguards are installed at the front to protect the land and the environment, the question of whether or not a technology is yet "proven" is more a function of a company's decision-making process.

*Question 4.* Would speculative oil shale leasing be counterproductive to the potential development of the resource?

Answer. Any commercial oil shale program should provide specific diligent development requirement to discourage speculative oil shale lease acquisitions.

*Question 5.* Please describe the total life-cycle energy inputs for your in-situ conversion process. Given these inputs, what net energy production can we anticipate?

Answer. Shell is still very much in a research and development mode and will continue to be in such a mode for several years. Our first fully integrated, commercial-depth test is still ahead of us on an RD&D lease we anticipate receiving this summer from the BLM. So in this very preliminary stage, our energy balance predictions are still only best-calculated estimates. Our preliminary modeling calculations indicate that in a commercial operation each unit of energy going into the ground will yield approximately 7 units of energy from produced shale hydrocarbons. However our analysis of the energy balance from more of a full life cycle perspective, considering the energy required for electricity generation and transmission, should result in a net energy balance more on the order of 3 to 3.5 units realized per unit input.

Although this is an important parameter, one must put it in perspective, considering that the entire oil shale industry is in its fetal stages. If one considers the advancement of airplanes, computers or telephones from their inception to today,

vanguard industries inevitably drive themselves toward improvements, efficiencies and cost reductions. Oil shale development should be no different. Shell is strongly driven to advance our process toward being more efficient and less cost and resource intensive. An example is our third RD&D lease application, in which we are proposing to test an advanced-generation heater, which if successful, will significantly reduce the energy and capital demands of the ICP process.

*Question 6.* Have you estimated the amount of electric power that will be required to produce and refine oil from shale?

Answer. As stated in Response #5 above, our power consumptive numbers at this point are order-of-magnitude-type calculated estimates, which we believe will improve over time. After we have obtained initial results from the Oil Shale Test on the RD&D lease, we should know more specifically. At this point, we have not performed a full-scale integrated test from which we can scale-up our data to answer this question with greater precision.

*Question 6a.* How much electric power is required per barrel of recovered oil?

Answer. Per the previous response, this information is not yet developed.

*Question 6b.* Have you identified a source for that electric power?

Answer. We are considering several power supply scenarios and have not yet finalized our plan. There are many factors involved in this decision, including fuel type, location, construction costs and timing, air emissions increment availability, project permitability, $CO_2$ emissions, transmission issues, and land availability, among others. Also, as the answer to our nation's energy security will involve a diversity of energy sources, the supply to our project may also involve a mix of sources.

*Question 7.* How much water is required to produce oil from shale using your ICP technology?

Answer. Again, considering that we have not yet performed an integrated Oil Shale Test, we do not have accurate estimates that we could scale-up to answer this question. Our current calculated estimates are in the range of one barrel of water used for processing plus another barrel of water which will merely be displaced in the subsurface to "refill" the area from which shale oil and gas were produced, per barrel of oil produced—a number less than half of the demand of the prior retort technologies.

*Question 7a.* Have you estimated the quantity of water that would be required to reclaim the property after completion of Shell's in-situ conversion process?

Answer. We are working on such a determination, along with the broader answers regarding water balance. We plan to optimize the conservation of water resources by treating, storing and reusing water whenever possible. Recognizing the sensitivity of water supply in the region, we have already decided to use air rather than water cooling in our surface facilities. Although this decision will add significantly costs to a commercial project, it will correspondingly reduce the amount of water consumption needed.

*Question 7b.* Have you estimated the quantity of water that would be required to support commercial development of oil from shale, including municipal and other consumptive uses associated with growth in the communities of northwest Colorado required by that development?

Answer. Please refer to the prior two responses. Additionally, we are already beginning to assess socioeconomic baseline conditions and anticipated project impacts on the region's communities. Our community development planning process will identify such impacts, and we will work in partnership with affected communities to address and appropriately mitigate project-related impacts on their infrastructure.

*Question 8.* Does your company have water rights to support oil shale commercial production in Colorado? What is the quantity of water to which you have currently have rights?

Answer. Answering this would reveal, and perhaps jeopardize ongoing commercial and proprietary negotiations. Once we are able to respond, we will reveal such information publicly.

*Question 9.* Have you or anyone acting on your behalf filed applications which are now pending for additional water rights in Colorado?

Answer. Please refer to the previous response.

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RESPONSES OF CHRIS TREESE TO QUESTIONS FROM SENATOR DOMENICI

Your testimony spoke to the need for conducting new research. I assume much of this research would need to be funded by industry.

*Question 1.* Who is best suited to conduct this research?

*Question 2.* Can this research be completed in a timely manner?

Answer. My recommendation regarding the need for a long-term commitment to oil shale research recognized that the industry has a vested interest in this research. But I also intended to recognize that private industry's commitment to and investment in oil shale research will inevitably wax and wane with world energy prices. I intended to stress the need for a long-term federal commitment to research that ideally would run counter-cyclical to the industry's research thereby providing a steady level of combined public and private research into the oil shale resource. Or, at a minimum, the federal government should provide a steady, baseline level of research that the industry could augment as energy prices and related business plans dictate.

Regarding the timing of this research, again I would like to stress the need for a long-term commitment to this resource. If, in fact, a viable and sustainable industry emerges from this most recent round of interest in oil shale, then this research could be discontinued. However, as a, former member of the oil shale industry and student of the boom-and-bust cycles occasioned by past interest in oil shale, I caution against premature cessation of this research. Very few would have predicted the sudden collapse of oil shale development in the late 70's and early 80's. World energy prices were rising faster than ever before in history. Proven supplies of traditional oil reserves were declining world-wide and domestic reserves shrinking even faster. The world's largest energy companies were investing in oil shale development in sums that no one could imagine they could walk away from. Yet on May 2, 1982 they did just that. Accordingly, some mechanism to ensure on-going research into safe and sustainable technologies to develop this vast, domestic hydrocarbon resource is vital.

*Question 3.* You spoke to the need for new water storage. Is there potential for new storage in this region?

*Question 4.* Are there any projects currently in the works?

Answer. There are no water projects currently in development or in planning that either intend to supply a future oil shale industry or rely on a future industry for financing. Indeed, as you heard from industry representatives at the hearing, commercial development of oil shale remains a future and uncertain decision. Oil shale is simply too speculative, especially given the most recent experience of the would-be industry's incarnation, to be a viable source of water project financing. Therefore, the industry must assume the responsibility of developing its own water supply requirements, both that directly required by the industry as well as water requirements of ancillary services (e.g., electrical supply) and municipal demands created by energy-related in-migrants. I believe local water districts, including ours, and state water agencies are willing to partner with the industry to develop necessary water resources but only under terms and conditions that do not place financial risk on local constituencies.

Additional water storage will be required. The amount, timing, and location obviously will be dictated largely by location of the oil shale development. Generally, there is water storage potential in the greater Colorado River basin. Again, location will be a key consideration.

Dating back to the 1950's, the energy industry has invested in water rights in the Colorado River basin. Most of these rights are "conditional rights" under Colorado water law and remain undeveloped to date. New filings for junior water rights are also possible in many areas, but water availability for such rights are correspondingly less certain.

As the Chairman knows, the upper basin states of the Colorado River face considerable uncertainties concerning the exact amount of developable water under the 1922 Colorado River Compact. Under current hydrological assumptions, Colorado has not fully developed its allocation of Colorado River water under the 1922 and 1948 Compacts. However, Colorado, like New Mexico, is nearing full development along with the attendant risks and uncertainties that accompany full development. For this reason and others, I suggested in my written and oral testimony to the Committee that

- "All environmental assessments should include a thorough analysis of water-related requirements of oil shale development. This should include direct water needs of oil shale on-site development, as well as the indirect, companion water requirements of ancillary oil shale activities (e. g., electrical generation or other energy requirements of oil shale production, municipal demands of energy-induced population growth).
- Watershed planning and water supply development alternatives must be advanced. State and regional water authorities have the capacity to lead these efforts but may require additional (federal) funding to expedite the process.

- Development of contingency planning and creative capital financing mechanisms that don't place present and future residents at financial risk of default in case of another "bust" are imperative.

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RESPONSES OF STEVE SMITH TO QUESTIONS FROM SENATOR DOMENICI

*Question 1.* What impacts do you anticipate to air, land, and water resources from oil shale development?

Answer. *100% surface disturbance*—Most recent emphasis in recent oil shale research has been on in situ techniques that heat the ore underground—in place. These techniques, while avoiding mining and hauling of mined material, result in complete surface disturbance in the production area.

With wells drilled for inserting heaters, for water monitoring and removal, for extraction of gas and oil shale product, and, in at least one version, for establishing and monitoring freeze walls to contain ground water, the land surface is perforated with wells every 10 to 12 feet. The accompanying equipment and the drilling activity itself completely alters the surface, removing all vegetation and grading the land to an unnatural flatness.

Certainly, such techniques will necessitate elaborate surface reclamation, including storage and reuse of topsoil, replanting of vegetation, and recontouring the land and waterways. Reclamation of such scale has seldom been completely effective in the type of arid landscape under which oil shale is found.

With or without effective reclamation, the period of surface disturbance—four years or more, and the extent of surface disturbance—640 acres to 1,920 acres at a time, severely alter wildlife habitat and migration areas (particularly that for mule deer, pronghorn, and sage grouse), disturb scenic values, and threaten streams with siltation.

In particular, such disturbance to such an extent would destroy essential values in Areas of Critical Environmental Concern, areas with wilderness characteristics, and delicate habitat for rare or imperiled plant and animal species.

*Water supplies*—The best current estimates of water needed for *in situ* oil shale production project a ratio of about 4 units of water needed for each unit of oil shale fuel product produced. Commercial scale development, as contemplated by the departments of Energy and the Interior, this would require construction of new water diversion and storage capacity rivaling that of all the reservoirs already existing in northwest Colorado.

Even if such water facilities can be built for oil shale, the competition for actual water supplies would intensify, putting new expense and burdens on ranches and community water supplies in the area.

*Water quality*—Virtually nothing is known about the impacts of the in situ process on groundwater and surface streams. The basic components of this approach—heating strata to very high temperatures for several years—suggests that threats to groundwater quality would be significant.

*Air quality*—According to the Rand report on oil shale potential, very little is known about the potential impacts of oil shale development on air quality. With the region already experiencing significant air quality damage from natural gas production operations, the potential impacts from oil shale will be a key topic for additional research and modeling before commercial leasing is considered.

The necessity of constructing and operating new coal-fired power plants for electrical power for oil shale operations (see below), and the concomitant impacts on air quality in the region from new power plant emissions, also need to be taken into account.

Those power plant emissions and emissions oil shale operations themselves are likely to add significant and unhealthy levels of sulfur dioxide ($SO_2$), carbon monoxide (CO), ozone ($O_3$), nitrous oxides ($NO_X$), and lead, as well as greenhouse gas carbon dioxide ($CO_2$), to the air in the region.

*Electric power plants*—The best current calculations anticipate very large electric power needs for oil shale production, primarily for operating underground electric heaters in the *in situ* method. At projected commercial scale production (500,000 barrels per day), new electric power generation equal to that from all existing coal-fired power plants in Colorado.

Even if such new capacity could be built and exclusively dedicated to oil shale use, the impacts on fuel supplies, generation and transmission capacity, and air and water quality would be tremendous, both adding direct environmental damage, adding to global warming emissions, and competing with public and municipal energy suppliers,

*Question 2.* What is your impression of how well the PETS process [environmental review, mandated in the Energy Policy Act of 2005, of potential for commercial production of oil shale] is proceeding?

Answer. The federal agencies' approach (led by the Department of the Interior) has, so far, been conducted in an open and accessible manner. The only public aspect of that approach has been the issues scoping phase, in which citizens had opportunity to outline the issues that should be reviewed in the PETS,

Once a draft PEIS is issued, we will be better able to evaluate whether the scoping phase was effective, that is, whether the agencies have prepared an thorough and fair analysis of the range of issues that must be evaluated, and the impacts that must be avoided or mitigated, prior to any public lands leasing for commercial production,

One key flaw is the PETS schedule, especially when considered in combination with other provisions in the oil shale section of the Energy Policy Act. It may be possible to complete an accurate and effective PETS by the due date 18 months after enactment (approximately the end of 2006), but that is a highly accelerated pace for an analysis of such magnitude. Congress should anticipate the need to extend the PEIS study period lest the document end up incomplete or inaccurate.

This sense of undue haste is compounded by the Act's requirement that the Department of the Interior issue, within six months after completion of the PSIS, regulations for leasing federal public lands for commercial scale oil shale production. Regulations issues on such a hasty schedule will be carefully scrutinized and may well fall short of the level of protection needed for other, more enduring public lands values.

Meanwhile, the Research, Development, and Demonstration oil shale leasing program (as mandated in the Act and as previously initiated by Interior) proceeds. Once the research leases are issued, experimental and demonstration work on those lease tracts will continue for up to 15 years. Contemplation of a commercial leasing program before results, conclusions, and mitigation techniques are provided from those research leases is unwise and premature. No commercial leases should be issued on public lands before that research is completed. Certainly, no commercial leases should be issued in mid-2007, even if commercial leasing regulations are in place by then.

[Responses to the following questions were not received at the time the hearing went to press:]

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
*Washington, DC, June 6, 2006.*

JOHN BAARDSON,
*Chief Executive Officer, Baard Energy, LLC, Vancouver, WA.*

DEAR MR. BAARDSON: I would like to take this opportunity to thank you for appearing before the Seante Committee on Energy and Natural Resources on June 1, 2006 in Grand Junction, Colorado to give testimony regarding the implementation of the oil shale provisions of the Energy Policy Act of 2005.

Enclosed herewith please find a list of questions that have been submitted for the record. If possible, I would like to have your response to these questions by June 20, 2006.

Thank you in advance for your prompt consideration.

Sincerely,

PETE V. DOMENICI,
*Chairman.*

[Enclosure.]

QUESTIONS FROM SENATOR DOMENICI

*Question 1.* You spoke of technologies for converting oil shale to commercial grade transportation fuels and super low sulfur fuels.

What are these technologies and how do they benefit the oil shale industry?

*Question 2.* Many of your proposals for loan guarantees and tax credits fall outside the jurisdiction of this Committee, but it's been my impression that there is a considerable amount of private investment being made in these proposals.

With the large profits that the energy industry is benefiting from today, why should Congress be putting tax payer dollars into this process?

# APPENDIX II

## Additional Material Submitted for the Record

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[Due to the large amount of material received, only a representative sample of statements follows. Additional documents have been retained in committee files.]

*June 1, 2006.*

Hon. PETE DOMENICI,
*Chairman, Committee on Energy and Natural Resources, U.S. Senate, Washington, DC.*

DEAR SENATOR PETE DOMENICI, SENATOR KEN SALAZAR AND THE SENATE ENERGY AND NATURAL RESOURCES COMMITTEE: We, Northwestern Colorado elected officials, want to sincerely thank-you for coming to the Western Slope of Colorado to discuss the issues that local communities have concerning the Federal oil shale program. Unfortunately, many of us will not be able to attend in person. We have drafted this letter to give you a sense of the common concerns of many of the elected officials in Northwestern Colorado. We do hope this is the beginning of a long and thorough dialogue.

The Bureau of Land Management's oil shale Research and Development Demonstration program is an important first step towards determining the potential for developing oil shale commercially. There are some basic questions that we simply cannot answer without the R&D program.

1) Is there a method to extract oil shale that is commercially viable?
2) Are there new technologies (such as the in-situ process) that can bring shale oil to market without the many environmental impacts associated with mining and retort?
3) What is the maximum amount of oil shale production that can be allowed before air quality, water quality and quantity, social impacts and our infrastructure meet their limits?

These questions should be answered before public land is leased for commercial oil shale production.

The local Bureau of Land Management (BLM) has stated that the 2005 Energy Policy Act requires commercial leasing of our public lands at the conclusion of the Programmatic Environmental Impact Statement scheduled for completion by February 8, 2007. That is not how we read the Act. The Act states (at § 15927(e)) that following adoption of final regulations, the Interior Department must consult with the Governors of Colorado, Utah, and Wyoming, representatives of local governments, interested Indian Tribes, and the public to determine the level of support in the development of oil shale and tar sands resources. If "sufficient support and interest" is found in a state, then the Department may conduct a lease sale. We believe that commercial leasing should not occur until. the success of the Research and Development Demonstration program has been measured.

Additionally, we believe it is a mistake to direct the BLM to complete the oil shale Programmatic Environmental Impact Statement before the Research and Development Demonstration program is complete. Because of the timeline placed on the completion of the oil shale PEIS, the BLM has been—placed in the impossible position of having to estimate the environmental effects of technology still being developed. This analysis also must consider all the possible social and economic effects of oil shale development for a large part of Utah, Colorado and Wyoming. This analysis would better serve the region if conducted in tandem with the R&D Demonstration program.

The R&D demonstration program should be allowed to run its course before commercial leasing of public land is allowed. There are thousands of acres that are *privately* owned by oil and gas industry that can and will be developed for oil shale

if a feasible technology is discovered. Our public lands provide many of our communities with our most important and sustainable industry—hunting and tourism. We believe that the Federal government has the responsibility to answer our very basic questions before allowing wholesale leasing of our public lands.

When oil shale is mentioned on the Western Slope of Colorado it is discussed as an industry that brought our economy and communities to their knees. In the earliest part of the boom lack of housing and infrastructure had communities reeling and left people sleeping under bridges and in tent cities. Then, just as towns and counties were able to provide the needed infrastructure for the industry we experienced the bust. May 2, 1982, the day Exxon closed down its oil shale operations and sent home over 2,000 workers, is still referred to as "Black Sunday" in our communities. Local governments had created housing and infrastructure that was no longer needed. People walked away from their homes and mortgages. There was even a bank closing by FDIC. These are not the experiences of past generations. This is the experience of community leaders and people who hold elected office *today.*

Colorado is already playing a large role in supplying energy to meet the needs of our country. Western Colorado is a national leader in natural gas production. But this boom has certainly created its own problems. Housing is at critical levels and worker's "man-camps" are being set up. Many of our communities are stretching to meet current needs.

Imposing the additional environmental and social impacts of oil shale development should only be done in a slow, systematic manner such that the needs of our communities are fully met. We hope that you will not allow mistakes of the recent past to be repeated. We urge you to not rush into oil shale leasing until more is known about the technology and the impacts a new oil shale industry will bring to our state.

Sincerely,

Tresi Houpt, *Garfield County Commissioner,* James R. Bennett, Ph.D., *Trustee, Town of Palisade,* Keith Lambert, *Mayor of Rifle, CO,* Townsend H. Anderson, *City Councilor, City of Steamboat Springs,* Tod Tibbetts, *Mayor Pro-tem, Town of Silt,* Michael Hassig, *Mayor, Town of Carbondale,* Frank Breslin, *Mayor, Town of New Castle,* Alice Hubbard-Laird, *Trustee, Town of Carbondale,* Judy Beasley, *Trustee, Town of Parachute,* Patricia S. Hanna, *Trustee, Town of Palisade,* Mick Ireland, *Chair, Pitkin County Board of County Commissioners on behalf of the entire BOCC,* Ken Brenner, *City Councilor, City of Steamboat Springs,* Dr. Teresa Coons, *City Council, City of Grand Junction,* Scott Chaplin, *Trustee, Town of Carbondale,* Doug Edwards, *Mayor, Town of Palisade,* Bruce Christensen, *Mayor, Glenwood Springs,* J. Russell Criswell, *Trustee, Town of Carbondale,* Roy McClung, *Mayor, Town of Parachute.*

Note: Unless otherwise stated, elected office is noted for identification purposes only.

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STATEMENT OF OIL SHALE ALLIANCE, INC.

Chairman Domenici, Senator Salazar, and Senator Hatch: We would like to remind you of the American entrepreneurial spirit, and smaller companies, which seem to have been somewhat forgotten in the news over a very large company like Shell being involved in oil shale R&D.

It was not a large corporation that led the pioneers across the prairies in covered wagons. And no large corporation was present in the bicycle shop of Orville and Wilbur Wright or in the garage of Bill Hewlett and Dave Packard. Many, many world-changing innovations come from small companies.

It was a major oil company, Exxon, which pulled the plug on Black Sunday, and caused economic devastation throughout the Rocky Mountain Region. You see, major companies have difficulty doing small things efficiently. It has to be a very large project, or it has virtually no impact on their annual financial statements, and therefore is not worth the trouble. When people suggest "Go Slow on Oil Shale" they are really protesting against giant company mega-projects with their associated environmental impact.

Most of the remaining undiscovered oilfields in the U.S. are now smaller in size. The giant oil companies have pulled up stakes, and taken their very large projects elsewhere. As a matter of fact, at present, all of the major oil companies combined, have very little role in exploring for, and producing oil in the United States. The

majors are off looking for greater profits in places like Kazakhstan and Nigeria, or are simply looking for oil on Wall Street

Small, independent oil companies are presently the backbone of the U.S. oil industry. Independent producers develop 90 percent of domestic oil and gas wells, produce 68 percent of domestic oil and produce 82 percent of domestic natural gas. Most independents have fewer than 20 employees. Yet, collectively, independent producers are the key to future domestic energy exploration and production. (Source *www.ipaa.org*).

In this same spirit, three small, entrepreneurial companies have banded together to form Oil Shale Alliance, Inc. and intend to commercially develop oil shale quickly and efficiently. The three companies are Independent Energy Partners Inc., Phoenix Wyoming Inc. and Petro Probe Inc. The three companies will be using three different in situ technologies: solid oxide fuel cells, borehole microwave, and hot gas injection. All three technologies have significant advantages in oil shale development.

Petro Probe Inc. plans to field test their hot gas injection process in six months. Since their patented technology injects and produces from the same well, they will be producing hydrocarbons within days, or even minutes, of their first field tests.

Phoenix Wyoming plans to field test their borehole microwave technology in 12 months. In prior, smaller scale, field tests, their borehole microwave approach (radiation) heated the ground 50 times more quickly than electric heating rods (conduction).

Independent Energy Partners Inc. plans to field test their patented solid oxide fuel cell process in 18 months. Since electricity is produced from the fuel cells, and all the (normally waste) heat is used to usefully heat the ground, their approach results in an outstanding Net-Energy-Ratio of 7.0, which is twice as good as the 3.5 NER of other proposed processes.

Smaller companies, like those in the alliance, do not have the capital to initiate mega-projects that may have a large environmental impact or whip-saw the economic future of thousands of western Colorado residents. Our approach is much more environmentally benign. We plan to get small plants working commercially, and then build additional small plants. It will be a slow and gradual ramp-up, with plenty of opportunity to improve, and make innovations, in the first few small plants.

Smaller companies seem to have been forgotten in the oil shale RD&D process put in place by President Bush to make BLM leases available. Among the winners were three Shell companies, Exxon and Chevron. There was only one company who won a test area in Colorado who did not have revenues in excess of $10 billion per year.

The companies who could really have used test areas were members of the Oil Shale Alliance, whose technology passed BLM scrutiny, but who were denied test areas because they did not have all of their funding in place, and they did not have their BLM bonds in place. It would have been good to actually have a test area, before having to put up a bond, and it would have been good to actually have a place to test before having to raise all of the necessary investment capital. Instead, the winners of test sites in Colorado were all extremely large corporations, with just one exception.

Do remember us in BLM leasing processes or in any other pending legislation. Many exceptional innovators prefer a small company, or entrepreneurial environment, over that of a very large corporation. Small companies innovate, make Herculean efforts, burn the midnight oil, and get the job done.

Yours very sincerely,

WILLIAM H. PELTON, PH.D.,
*President, Phoenix Wyoming, Inc.,*
ROBERT T LEISEN,
*Chairman, Phoenix Wyoming, Inc.,*
ALAN FORBES,
*President, Independent Energy Partners, Inc.,*
LARRY VANCE,
*Chairman, Petro Probe, Inc.*

EXXONMOBIL CORPORATION,
PUBLIC AFFAIRS,
*Washington, DC, May 26, 2006.*

Hon. PETE V. DOMENICI,
*Chairman, Committee on Energy and Natural Resources, U.S. Senate, Washington, DC.*

DEAR SENATOR DOMENICI: I am pleased to forward to you the written testimony of Stephen Cassiani, who is President of ExxonMobil Upstream Research Company. We would ask that this testimony be incorporated into the record for the proceedings for the June 1, 2006 hearing on U.S. Oil Shale Resource and Research, which is to be held in Grand Junction, Colorado.

ExxonMobil has a strong interest in the development of the Department of Interior's Research, Development and Demonstration program. As yet we have not been selected to participate in this program. As Mr. Cassiani's written testimony states, ExxonMobil's oil shale development technology has several favorable differentiating attributes—and, as the leading American energy company, we very much hope to be able to play an active role in the RD&D initiative.

Thank you for your ongoing leadership on energy issues and best wishes for a successful hearing in Colorado.

Sincerely,

R.D. NELSON,
*Vice President.*

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STATEMENT OF STEPHEN M. CASSIANI, PRESIDENT, EXXONMOBIL UPSTREAM RESEARCH COMPANY

Chairman Domenici, Senators Hatch and Salazar. My name is Stephen Cassiani and I am the President of ExxonMobil Upstream Research Company, located in Houston, Texas. I am pleased to submit for the record, these prepared remarks on what we at ExxonMobil believe to be a very important issue for the long-term energy security of this country. It is a pleasure to have the opportunity to submit these comments regarding shale oil research and development.

Let me also thank you, the Senate Energy and Natural Resources Committee and the Department of the Interior more broadly for ongoing efforts to promote environmentally-responsible shale oil development. The technology development goals of the Energy Policy Act of 2005 are clear with respect to the need to improve access to additional domestic energy supplies. Your efforts are and will continue to be important so that we can stay on this path and that promising technologies are developed and applied to recover shale oil from areas of high resource density.

The scale of this resource is too large to be ignored. Commercial and environmentally responsible development will provide a significant very long-term direct benefit to the American economy and consumers by diversifying our nation's sources of energy supply and increasing energy security. This is also consistent with DOE's mission of advancing U.S. energy security, including promoting scientific and technological innovation.

In order to achieve this vision, companies that have promising technologies must be allowed access to high-grade oil shale deposits in the United States in order to optimally test oil shale extraction technologies and realize potential large-scale oil production for the country. For our part, ExxonMobil has been working on shale ail recovery technology at the research company. We and others are now prepared to move into a field research phase, so the current DOI Research, Development and Demonstration (RD&D) lease program is very timely. It is premature to ascertain which technology or technologies will ultimately prove commercial and which will maximize environmental protection and resource recovery. But it is time for us to get out of the lab and into the field. We believe that ExxonMobil is one of a very few companies that has the world-class technology and the financial strength to effectively pursue this significant yet challenging resource.

As you may be aware, ExxonMobil applied for a Research, Development and Demonstration lease in September 2005 to test our oil shale development concepts under the Bureau of Land Management's Oil Shale Leasing Program as announced in the Federal Register dated June 9, 2005.

Our technology, which we have been testing in our labs, is potentially more efficient, effective and low impact than other proposed approaches. This can be explained by four differentiating attributes of our approach.

*First,* our technology would deliver heat to the in situ oil shale more effectively than other approaches by creating a planar heat source, maximizing the heat trans-

fer contact area. The importance of more effective heat delivery is that we expect to be able to accomplish the necessary oil shale heating with far fewer wells, leaving a *significantly smaller footprint* than other techniques.

*Second,* with respect to multi-mineral development which would occur in this area, our researchers believe our approach should make it possible to develop oil shale first and in the process, *increase sodium mineral recovery.* We have applied for a patent on a technology to maximize sodium mineral production and allow nahcolite to be produced as soda ash subsequent to oil shale production. This concept would advance the nation's interests in speeding production of shale oil and is consistent with the BLM/DOI requirement as a steward for the nation's resources to maximize protection and production of important minerals.

The *third* point is the subsurface environmental benefit of producing the shale oil first. The solution mining process of the subsequent sodium mineral recovery phase entails flushing the recovery zone with water. This will *sweep residual free oil out of the formation* mitigating any future aquifer contamination concerns.

*Fourth,* we can do some of the necessary field work at our privately owned acreage at Colony, which *will reduce surface disturbance to the newly leased federal lands.* Initial work at Colony outcrops would afford us the opportunity to test and observe our subsurface development technologies in a more controlled and accessible environment. This recovery technology is not commercially applicable to Colony resources, but it provides an ideal technology development opportunity.

We strongly suggest that it is in the best interest of the country to test all potentially viable shale oil recovery technologies. We are disappointed that our oil shale development proposal was not accepted by the DOI, but we are continuing to work to become part of this important domestic initiative. We believe ExxonMobil has the technological and financial strength to further the country's interests for energy security and independence and remain committed to that objective. We look forward to participating in the United States' oil shale resource challenge and appreciate your continued leadership and support for technology development to help this country find a way to exploit this important resource for the benefit of the American people.

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STATEMENT OF GARY D. AHO, SAGE GEOTECH INC., RIFLE, CO

Dear Chairman Domenici:

My name is Gary D. Aho and I have an office in Rifle, Colorado, long referred to as the "Oil Shale Capital of the World".

MY BACKGROUND

I've spent my entire 37-year career in the mining and mineral processing industry. I spent the first 34 years with The Cleveland-Cliffs Iron Company (CCI), one of the pioneers in oil shale and essentially the only mining company in the business. Though initially stationed in the Michigan iron mining operations, I began assisting the CCI Rifle, Colorado office on oil shale projects in 1975. I then moved to Rifle in 1979 as Chief Engineer of the Western Division and became responsible for CCI's oil shale activities. The company is an owner of oil shale lands and has cost-shared in many of the retort pilot plant projects. The company also completed mine designs and feasibility studies for other oil shale projects and clients. We worked on both western and eastern oil shale projects. I became VP and General Manager of Cliffs Engineering Inc., a subsidiary organized to conduct the consulting work. I worked closely with many of the major energy companies and served on advisory committees to government groups and trade associations. I eventually became President of Cliffs Oil Shale Corp. and Cliffs Synfuels Corp., two CCI subsidiaries.

Since October 2003, I've been President of Sage Geotech Inc., a privately-owned company that provides oil shale consulting services to industry and government clients. I am currently Chairman of the Oil Shale Association. I also serve as an advisor to DOE's Office of Naval Petroleum and Oil Shale Reserves, which is part of DOE's Office of Petroleum Reserves. This office serves as support to the Task Force on Strategic Unconventional Fuels, which was established by the Energy Policy Act of 2005.

I lived through the Colorado and Utah oil shale boom and bust of the 1970's and 1980's and learned many lessons first hand along the way. Besides being involved with engineering, construction and operations for many of the projects, I lived, and still do, in the region impacted by the rapid startup and then termination of oil shale projects. I personally had to reduce the Cliffs Engineering staff of fifty-five to just one after the bust in the 1980's and know exactly how people and communities were hurt by the rapid shutdown of projects.

There were plenty of mistakes made during those days that led to the shelving of oil shale at that time. I feel oil shale a very important domestic resource that can be developed to meet the needs of our nation. However, we must not repeat the same mistakes this time around. I believe there is a right way to develop oil shale and I believe we can do it commercially today. I'd like to share some of my thoughts on how it can be done.

WHAT IS OIL SHALE?

Oil shale is a fine-grained sedimentary rock that contains a solid organic material known as kerogen. When heated to a pyrolysis temperature (700-900 °F), kerogen decomposes to produce hydrocarbon vapor and residual carbon. The vapor is then partially condensed in secondary treatment to produce shale oil. The liquid shale oil can be treated and refined to produce premium transportation fuels.

HOW IS OIL SHALE PROCESSED?

The heating of the oil shale, referred to as retorting or pyrolysis, can either be done in a surface vessel (a retort) after the shale is mined or the heating can be done underground with the shale left in place (in situ). In either case, the shale oil liquid product needs to be upgraded and then refined to produce marketable transportation fuels.

WHY ISN'T SHALE OIL BEING PRODUCED IN THE UNITED STATES TODAY?

The United States has made a number of attempts to develop oil shale, some dating back to the early 1800's in the eastern U.S. In the early 1900's the vast oil shale resources of Colorado, Utah and Wyoming were discovered and there was a period of excitement over the prospects, especially since conventional oil production in the eastern U.S. was declining. However, huge discoveries in Texas flooded the country with oil and shale activities were halted. This start and stop process occurred a number of times in the decades to follow when new oil discoveries thwarted oil shale projects. So, plentiful oil at reasonable prices has always been a major hurdle for oil shale. Why develop this expensive, less attractive resource when the world had plenty of oil and international relations fostered trade?

But, times are changing and oil shale needs to be reconsidered as a strategic fuel for the United States. The DOE's Office of Naval Petroleum and Oil Shale Reserves published two key reports that point to the need to develop U.S. oil shale resources and that make recommendations on how the nation might go about developing an oil shale industry:

1. "Strategic Significance of America's Oil Shale Resource", two volumes, March 2004.
2. "America's Oil Shale, Findings and Recommendations of the Steering Committee", Final Report, June 2005.

In my opinion, there are a number of reasons we don't have a shale oil industry in U.S. today. *First,* this is a capital intensive, high risk business. Developing a commercial project will take a long lead time, perhaps 10 years, to design, permit, construct and startup the mine and plant. A 50,000 BPD plant will cost at least $2.0 billion. A conventional oil shale project entails a mine and process plant and in most aspects resembles a very large mining operation, not a petroleum project. Mining projects typically require long lead times, are capital intensive, and have long payback periods over a life of operations that often exceeds 30 years. Oil companies have not done well in their previous efforts at entering the mining business; the two cultures are extremely different. I frequently refer to oil shale as a mining, pyroprocessing and material handling problem; then, the product, crude shale oil, is something the oil companies know how to handle.

*Second,* the retorting technology is a big question in the minds of many. Many retort designs have been developed but only a few have been tested at a pilot plant scale and even fewer at a near commercial scale. It is crucial that we build and demonstrate a number of retorting technologies, both surface and in situ. It is this research, development and demonstration (RD&D) work that will answer critical questions related to (1) project capital and operating costs and potential return on investments, (2) which first generation retorts, both surface and in situ, perform best and what needs to be modified on each to enhance that performance, (3) what the environmental emissions and how can they be mitigated, (4) what are the infrastructure requirements, including power, water, pipelines, etc, (5) what are the shale oil properties and what needs to be done to upgrade, refine and market the product, and (6) what are the requirements for skilled labor, local infrastructure,

and related project needs, and (7) can we mine the shale or process the shale in situ without damaging ground water or other natural resources.

A mistake of the 1970's and 1980's was that commercial projects were initiated and construction was started well before retorts were even tested at a pilot or demonstration scale. The technology issue had not been adequately addressed. We need to go slow and be sure the technology works this time.

While the technical issues listed above need to be answered before huge capital investments will be made with confidence, my *third* crucial question relates to the project economics. No one is able to forecast what the price of oil will be in 10 years when the first commercials project might come on line. It is extremely risky making a multi-billion dollar investment when the cash flow projections are so uncertain. It so important that industry and government participate together in developing a program to reduce the investment risk in first generation oil shale plants and, by so doing, accelerate the construction of these initial plants.

WHAT SHOULD THE GOVERNMENT BE DOING?

I concur with the recommendations presented in the two DOE studies I referenced above. Most specifically, I recommend the following as being crucial Federal actions to accelerate the development of oil shale in the United States.

1. The Federal government should foster construction and operation of many surface and in situ pilot plants and demonstration plants. Actual sustained operations at this scale are imperative for answering crucial technical, environmental, social and economic questions. This program will identify the most promising technologies for initial commercial ventures.

2. The Federal government should promote leasing of Federal resources so worthwhile projects, both large and small, have a place to test and then commercialize their plans. The federal government controls about 80% of the western oil shale and access to these lands is key to industry's long term planning and investment decisions. Along these lines, the Anvil Points Mine near Rifle, Colorado should be considered as a research center to provide shale to pilot plants in a nearby research park. A separate oil shale and tar sand research center could be tied to the Utah State University campus in Vernal, Utah. By centralizing research facilities, common infrastructure can be employed by many pilot plant projects, resulting in less expense and waste for everyone working on oil shale.

3. Establish a Federal cost-sharing program that puts the government in a position to partner and share the risks with the industry. This program should entail numerous incentive options. Some of the most obvious ones for consideration are the following:

a) Provide outright grants or 50% cost share in pilot and demonstration plants

b) Allow R&D tax credits for pre-commercial research, pilot and demonstration programs

c) Allow accelerated depreciation and/or expensing of capital in the year spent

d) Provide price guarantees or price floors for first generation plants

e) Provide loan guarantees for qualified applicants

f) Establish a shale oil purchase program to assure a market for first generation projects

g) Provide royalty relief for projects on public lands

IN CLOSING

The United States has the richest oil shale deposits in the world and we should be taking a lead role in the research and development activities required to bring this resource to commercialization. We lost the past 20 years without a domestic oil shale program; we don't have the leisure to wait now. We need to immediately begin pilot and demonstration programs to prove up the technologies and answer the numerous questions related to economics, environment, socioeconomics, infrastructure, marketing, and transportation. The Federal government must make the commitment to develop this resource and then design the programs needed to foster industry involvement and investment. These programs must be a joint effort of government and industry if oil shale is to be developed in the foreseeable future. I believe we can do it and I believe we must.

I am optimistic that the Task Force on Strategic Unconventional Fuels, with the assistance of DOE's Office of Petroleum Reserves, will present strong recommendations along these lines in their future reports to Congress.

STATEMENT OF ENSHALE, INC.

EnShale, Inc is one of several businesses pursuing the significant opportunity represented by the resource that is available in oil shale in the Western U.S. We are concerned that a number of misconceptions are being perpetuated by the press and some government representatives. We'd like to briefly address them here and suggest that additional work be engaged to make sure the public is fully aware of the facts of the current state of the art for extracting oil from oil shale:

- The RAND report states that processing oil shale requires about 3 barrels of water for each barrel of oil extracted. EnShale has been reviewing a number of the processes being proposed and does not see any evidence that this amount of water will be required. Certainly any process development needs to take water consumption into account and minimize the consumption in order to be economically viable.
- A Deseret News editorial from Sunday, May 28, 2006 refers to the RAND report and a reference to the mines being as large as the largest open pit mines in operation. The suggestion is that the mines will be open pit and visible from space. With hundreds of feet of overburden, these mines will not be open pit. The mines will be underground and will require the use of known technologies to develop. The disposal of the spent shale will require careful evaluation of disposal sites. When the oil has been extracted, the spent shale is not toxic. Tests have shown that natural regional flora are compatible with the disposed material. EnShale is also investigating the possibility of using the spent shale in cement operations.
- Much publicity has been given to Ethanol as a means of freeing the country from foreign sources of oil. We have seen quotes of production costs between $1.00 and $1.50 per gallon or between $42 and $66 per barrel. Those production costs will only be acceptable with price supports like the federal government created with the SynFuels Corp. in the 70's and 80's. We hope the government will not repeat those mistakes and cause the economic and community hardships experienced by this area when those price supports were removed. Several of the processes being considered for oil shale are quoting production costs in the $30 per barrel range. We think it will be much better for the country to use oil shale as an energy resource than ethanol.
- The emissions of toxic vapors has been suggested as a draw back to processing of oil shale. EnShale's experience has shown that the vapors created during the heating of the kerogen are valuable and must be captured in order to have an economic model that will work. The successful oil shale process will find ways to capture all valuable byproducts and turn them into useful materials.
- Some have suggested that the BTU content of oil shale is too low to be a profitable source of energy. The weight by percent of kerogen in oil shale is typically 10%. While this is much lower than other sources of petroleum like coal, it is still plenty of energy content to pursue profitably. EnShale's parent company, Bullion Monarch Mining, has experience in the mining of precious metals where the measure of valuable material in a ton of ore is one one-thousandth of a percent. In dollar terms, the value in a ton of oil shale is between $47 and $70. For various precious metals like gold, silver, and copper, it is common for the value per ton to be in the same range or less.

EnShale believes that the efforts of many different groups will be needed to realize the potential in the resource that is available to the United States and looks forward to being part of that effort.

EnShale represented by Merrill Fisher and Wayne Pearce

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STATEMENT OF LARRY F. VANCE, CHAIRMAN, EARTH SEARCH SCIENCES, INC., KALISPELL, MT

A NEW OIL SHALE PROCESSING TECHNOLOGY ESTABLISHES OIL SHALE AS A HEDGE FOR LONG TERM OIL & GAS SUPPLY

*The Prospects of Oil Shale*

Petro Probe, Inc. (PPI) is a Nevada corporation with its current business address at #6-306 Stoner Loop Rd., Lakeside, MT, 59922 , phone number (406) 751-5200. PPI is a private company, majority owned by Earth Search Sciences, Inc.

PPI is a development stage company, ready to implement a patented technology for the recovery of hydrocarbonaceous products (oil, natural gas, specialty gases and hydrogen) from oil shale. Oil shale deposits exist in proven domestic basins within the U.S.A. and from many world-wide locations. The Company is responding to the

market's demand and the strong energy message coming from the U.S. Government, for more innovative exploration strategies and new domestic hydrocarbon supplies. It has an unrestricted license to develop a patented system for the recovery of commercial products from oil shale.

The technology is focused on an "in situ" (meaning in its original place or form, i.e. not disturbed) process using super heated air to gasify the oil shale in its original state underground, followed by a condensation process to recover the products.

The target is oil shale, a 40-50 million-year-old sedimentary rock, which contains a solid hydrocarbon, Kerogen, within its structure of clay minerals. Kerogen is basically "fossilized algae" which has been formed during the deposit of sediments in ancient lake environments. The effects of time, pressure and temperature have transformed these sediments into a hydrocarbon-bearing rock, known as oil shale. In its natural state oil shale contains no liquid hydrocarbons. The hydrocarbon component is an organic solid which can only be liberated by the application of heat, in the order of 350 °C or more. The extraction of the hydrocarbon component is carried out by the heat under a physics law known as "black-body radiation" which forces the decomposition of the Kerogen and release of hydrocarbons as a vapor. The vapor has no escape except through the exits provided by drilling and when cooled, becomes liquid oil and gas.

The organic matter in oil shale has been studied extensively and most deposits in the world are well classified. It is estimated that nearly 62% of the world's potentially recoverable oil shale resources are concentrated in the U.S.A. The largest of the deposits is found in the 42,000 $km^2$ Green River formation in north-western Colorado, north-eastern Utah and south-western Wyoming. The richest and most easily recoverable deposits are located in the Piceance Creek Basin in western Colorado followed by the Uinta Basin in eastern Utah and San Juan Basin in New Mexico.

Although oil shale represents a significant source of fossil energy, the most predominant reason extraction has not been generally successful is that most approaches focused on rubilization and above ground retorting. Where surface bound deposits have been rich on the average, there is not enough of that easily attainable resource to economically mine; and there is too much overburden to use the technique of lifting the overburden by blasting to produce permeability and rubilization. All rubilization methods tend to do considerable damage to the environment and have now been generally regulated and avoided.

PPI's technology avoids all these problems and can still bring oil and gas in at reasonable cost levels in the $8 to $10 per barrel range.

The invention provides a process and system for recovering hydrocarbonaceous products from an in-situ oil shale formation at potentially any depth to which a hole can be drilled in the oil shale formation. Thus, oil shale as deep as 3,000 feet or deeper may be treated using the present invention. The initial test results indicate the process will be economical for recovering these products from all regions of an oil shale formation.

Further, by eliminating the need for rubilization, expensive and time-consuming procedures are avoided, and the structural integrity of the ground and surrounding terrain are preserved. The shale formation itself retains 94%—99% of its original structural integrity once the Kerogen has been altered. All surface support structures are built and installed in such a manner that they are easily moved from one location to another without leaving permanent scars on the landscape. The—process is compact and self-sustaining.

The highly marketable and value-added products are: Natural Gas (scrubbed and pipeline ready); Crude Oil of high specific gravity; Specialty gases, Methane, Butane, Propane, Ethane, Hydrogen and a Mineral water as a by-product of the process.

*Key Features*

*Self-perpetuating feedstock*—A major cost saving feature of the PPI process is its self-perpetuating burner feedstock. After the warm-up phase, enough combustible gas product is collected to not only feed the system but also produce commercial quantities of a high BTU gas. This is unique in the oil industry where traditionally one method of extraction is used for gas and another for oil.

*Relatively low risk exploration*—Oil shale bearing regions of the world are well known. Exploration is a matter of choosing areas where oil shale averaging 25 gallons per ton has a specific gravity of around 2.15, and a density of 134 pounds per cubic foot. The final selection is determined by test drilling a small core sampling to find oil content about 1.675 gallons per cubic foot over a pay zone depth of 500 feet or more. The PPI planned well field is drilled on 50 foot spacing. Each processing hole will have a 20″ diameter and work an area of 5261 square feet (based on the "black body radiation" law of physics) for effective thermal conductivity. The

volume of such a hole, given a 500-foot pay zone, will be on the order of 2.6 million cubic feet with an oil content of 4.4 million gallons. This will yield 3.5 million gallons (approx. 80%), or 83,000 barrels of recovered oil. The end design sixteen holes in the prototype plant is calculated to yield 1,328,000 barrels of recovered oil over the life of the field.

*Multiple products are produced*—Based on a 500′ long pay zone the heat input of each input hole would be sufficient to gasify 2300 pounds of oil shale per hour. According to studies, oil shale heated in situ to appropriate temperatures will produce a substantial volume of high quality combustible gas as a co-product with the oil. For oil shale averaging 25 gallons per ton, tests show the non-condensable gas available to range from a minimum of 575 cubic feet per barrel of oil to a maximum 1,370 cubic feet per barrel (dependent on circumstances, ambient BTU, kerogen qualities, etc.) At a minimum the prototype plant will have the capacity to produce (575 × 83,000 × 16) 763,600,000 cu ft. of gas although the actual operating results may exceed this figure.

*Expectation*

This overview uses recent public data produced on the oil shale recovery process. PP1 must stress that it presents this data and the overview with the understanding that the actual prototype plant will undertake to establish clear and specific results that will show and support substantial improvements of cost and production over those presented.

It is also expected that there will be additional sources of revenue through utilization of the steam produced by the PPI process (production of co-generated kilowatts). The gas composition tables also represent that hydrogen and other specialty gases will be available for commercial production.

The expectation is that the new gasification technology will produce oil, gas and associated valuable products in a simple, cost effective manner. The capital costs to construct fields and plants are minimal compared to other hydrocarbon recovery methods. The process is environmentally safe and acceptable.

The potential is as great as the tar sands have proven to be in northern Alberta.

An opportunity exists to be an entry level investor in the technology and a series of plants in North America.

*U.S. Oil Shale Resources*

- Nearly 60 percent of the world's potentially recoverable shale oil resource. is concentrated in the United States
- The minable western and eastern oil shales of the United States have been estimated to contain an in-place oil resource of some 1,670,000,000,000 barrels.
- Using a 50% allowance for unrecoverable shale and a 25% allowance for conversion to synthetic fuel, the production potential for shale oil in the United States is estimated to be 626,000,000,000 barrels.

THE RECOVERABLE SHALE OIL RESOURCES OF THE UNITED STATES [1]

| Deposits | Recoverable Resources [2] |
|---|---|
| Piceance Basin (Colorado) | |
| Mahogany Zone | 59 |
| Shales above Mahogany Zone | 90 |
| Shales above Mahogany Zone | 231 |
| Uinta Basin (Utah) | 51 |
| Other western basins | 131 |
| Eastern oil shales (Kentucky, Indiana, Ohio) | 64 |
| Total | 626 |

[1] Recovery factor = 37.5 percent of estimated in-place resource.

[2] In billion barrels

Figures adapted from *Oil & Gas Journal,* U.S. Geological Survey, and American Association of Petroleum Geologists.

# HIGH POWER MICROWAVE EXTRACTION OF OIL FROM SHALE DEPOSITS IN COLORADO, WYOMING AND UTAH

A WHITE PAPER

SUBMITTED BY PETER M. KEARL, GEOSCIENCE SERVICES, GRAND JUNCTION, CO; GEORGE CARYOTAKIS, STANFORD LINEAR ACCELERATOR; AND CPI INC., PALO ALTO, CALIFORNIA

*Abstract:* Current and past experiments for producing oil from shale have employed low radio frequency (RF) that resulting in an inefficient heating mechanism, potential negative environmental impacts, and unacceptable delays in the production of oil. Recent theoretical and experimental research strongly indicate that microwave heating results in an controlled expansion of the area heated by a microwave source placed in a bore hole yielding oil and gas in a fraction of the time required by low frequency heating. A proposed field demonstration will prove that the use of microwave heating for-shale oil production is feasible, economical, environmentally sound, and will open the way for the construction of a demonstration production facility financed by an interested oil company.

*High Power Microwave Technology:* As project manager for the High Power Microwave (HPM) program developed in cooperation with Oak Ridge National Laboratory and private industry, Peter Kearl oversaw the development of theoretical, experimental, and laboratory testing of an innovative method for the in-situ removal of hydrocarbons combining technology developed during the Star Wars program and recently available Russian radar technology. Theoretical and modeling studies proved the viability of the HPM technology and large-scale laboratory tests demonstrated the concept.

The HPM technology involves a phased array antenna placed into a bore hole via wave guides and connected to a surface power source that includes a 500 KW klystron tube that generates 2.45 GHz microwave energy. From the phase array antenna, a phase boundary is launched into the subsurface material selectively heating oil and water in the shale to pyrolysis. The phase boundary gradually expands into the surface creating a bubble in permittivity space that controls the movement of hydrocarbon migration. Gas and oil migrate to the same bore hole containing the antenna and are recovered at the surface. Impacts to potential groundwater resources and the surface environment are minimized.

*Application of HPM Technology to Oil Shale Deposits:* The Green River Formation covering parts of Colorado, Wyoming, and Utah are estimated to contain over 2 trillion barrels of oil—enough oil to allow the United States to become energy independent. A major problem with extracting oil from shale deposits is the energy required to remove the oil. However, the location of the oil shale deposits provides a unique opportunity to transform a clean renewable energy source into valuable petroleum and gas products. Colorado is rank 11th in the nation in the ability to produce electricity using wind power. The area of the oil shale deposits has the highest wind index rating in the state and allows wind generated power for as little as 3.6 cents a kilowatt hour. Wind generators can be used to power the HPM system to produce oil with minimal impact to the environment. Basic thermodynamic calculations indicate that 500 kilowatts delivered to subsurface oils—shale deposits will yield 4 barrels of oil per hour. At a price of $70 per barrel, a single HPM installation will produce approximately $2.5 million of oil per year. This means that capital costs for the HPM system will be paid off within two years of initial operations. The problem of transmitting wind energy from remote areas where wind is a viable resource to distant consumers via transmission lines is overcome by the simple fact that the wind turbines will be located adjacent to the oil producing sites.

*Comparison of HPM with Existing Low Frequency Heating:* A simply comparison of HPM heating and low frequency heating can be illustrated by comparing the efficiencies of microwave and conventional ovens. A sample of oil shale placed in a 700 watt microwave oven can be heated to an internal temperature of 103 degrees C in three minutes. The same oil shale sample placed in a conventional oven where 10,000 watts of energy are applied requires 22 minutes to achieve the same temperature. While there are several losses in a conventional oven, this simple experiment shows that at one-tenth of the power, microwaves heat oil shale seven times faster than a conventional oven. This difference in heating efficiencies can be explained by fundamental differences in the physics of power delivery to the oil shale. Low frequency heating utilizes charge carriers, ions in the groundwater, to transmit energy from the source into the rock. Once the temperature reaches 100 degrees centigrade, water evaporates and the charge carrier pathway is broken. From this point on, low-frequency RF heating relies on inefficient heat conduction to propagate energy in the subsurface. This is why it requires three years of heating before any oil can be produced. Microwaves, on the other hand, provide rapid efficient heating

where oil will be produced immediately upon application of power to the subsurface. Because microwave frequency heating (above 1 GHz) relies on the turning of polar molecules in an alternating electrical field (dielectric heating), the limitation of ionic heating are eliminated. Most soils and rocks are composed of aluminum silicates similar in composition to a ceramic dish used to heat food in a microwave oven. Microwave power passes through the ceramic dish and preferentially heating water in the food. Using this analogy for subsurface microwave heating, the rock will attenuate only a minor portion of the microwave power while coupling energy to the oil and water in the rock. As oil and water are removed from the rock, microwave energy efficiently passes through the dry oil-free rock and continues to heat and remove oil at greater distances from the antenna. Another significant advantage of microwave heating is the enhanced permeability created in the rock by microwave heating. Rapid microwave heating will fracture the rock creating a preferential pathway—in the region between the phase boundary and the borehole resulting in the rapid egress of oil from the subsurface to the bore hole. Permeability enhancement has important implications in increasing oil production from existing wells in the United States. The Rand Corporation predicts a 2 to 1 ratio of energy extracted compared to energy usage. For the HPM system, this energy ratio exceeds 8 to 1 over a ten-year period.

*Scientific and Economic Viability:* The HPM microwave program funded by the DOE was peer reviewed by the Robert Haupt of the Lincoln Laboratory at MIT, Harold Olsen at the Colorado School of Mines, Thomas Rabson of Rice University, and R. Claude Woods at the University of Wisconsin, Madison. The principle conclusion of the panel was that the concept of the HPM system is based on sound scientific principles. A government funded field demonstration of the HPM system provides the opportunity to develop a viable, economic, and environmentally sound technology that combined with sensible conservation methods will allow the United States to become energy independent within the foreseeable future. In addition, royalties paid to state and federal governments would provide a substantial revenue stream allowing state governments to mitigate local economic impacts and the federal government to mitigate impacts of rising energy prices for all Americans.

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## STATEMENT OF OIL SHALE EXPLORATION COMPANY, LLC, MOBILE, AL

### WHAT THE OIL SHALE INDUSTRY NEEDS FROM THE FEDERAL GOVERNMENT TO SUCCEED

#### I. BACKGROUND

OSEC and other experts estimate that 2 trillion barrels of shale oil occur within the Green River Formation in portions of Utah, Wyoming and Colorado.[1] This domestic oil source represents more than triple the known oil reserves of Saudi Arabia. Once commercial production levels are achieved, it is estimated that the direct domestic benefits derived from development of this energy source would be several hundred billion dollars annually, which would accrue, in part, to federal, state and local governments in the form of leases, royalties and income taxes. In addition, it is estimated that the industry and its by-products will create more than a hundred thousand new jobs, enhance national security, and depress global oil prices.[2]

Currently, several promising oil shale technologies are being investigated and field-tested both in the United States and abroad. OSEC is among those companies that possess the technical and project management experience necessary to develop one of the more promising technological options, and was recently selected as the nominee for a BLM lease for Research, Development and Demonstration of Oil Shale Recovery Technology at the White River Mine site in Uintah County, Utah.[3]

The costs and risks involved, and the long development and start-up period (up to eight years) prior to commercial production, present significant barriers for industry pioneers. For these reasons, government participation and meaningful government incentives are needed to induce research, promote technology demonstration, and attract the necessary capital investment. OSEC proposes several incentives that

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[1] *Strategic Significance of America's Oil Shale Resource, Vol. I, Assessment of Strategic Issues,* Office of Naval Petroleum and Oil Shale Reserves, DOE, March 2004 (the "2004 DOE Report"). For purposes of this discussion, the geological formation will be referred to as "oil shale" and the oil extracted from the formation will be referred to as "shale oil."

[2] The 2004 DOE Report

[3] OSEC will be demonstrating technology known as the Alberta Taciuk Processor, which was recently used in a semi-commercial scale demonstration facility in Australia to successfully extract approximately 1.5 million barrels of shale oil between 1999 and 2004.

promote front end investment in technology demonstration, as well as other cost offsets that will help assure a minimum return and thereby encourage the private sector to make critical upfront investments.

II. PROPOSED INCENTIVES FOR DEVELOPMENT OF OIL SHALE PRODUCTION CAPABILITIES

Below is OSEC's preliminary list of incentives that would help mitigate risks and encourage companies to accelerate oil shale research and development activities in the United States.

*A. Price Floor for Domestically Produced Shale Oil*

Oil prices rise and fall quickly. As recently as 1998, the average world crude price was less than $13 per barrel; in recent weeks the price of crude exceeded $75 per barrel. The amount of investment needed to produce and refine shale oil is significant: approximately $1-2 billion for a plant to produce 20,000 to 30,000 barrels per day and approximately $100-200 million for modifications to an existing refinery to process an equivalent amount of shale oil into refined petroleum products.

We believe that banks, investors and energy companies will not put their money behind commercial shale oil production facilities and refinery modifications based on today's high crude prices. Rather, the private sector bases its investment decisions on conservative assumptions about how far the price of crude could fall during the period needed to repay such large capital outlays.

To enhance domestic energy security and to facilitate the development, financing, and construction of a core group of initial shale oil production facilities and to make refinery modifications necessary to process domestic shale oil resources, the government should set a floor price for domestically produced shale oil. This floor should be initially set at $55 per barrel (adjusted for inflation); it should cover at least ten years of production (to provide comfort to banks and investors that initial investments would be repaid); and it should cover an initial number of plants sufficient to establish this new domestic energy source (e.g., the floor could be provided to all shale oil plants and associated refinery modifications constructed until total industry capacity reaches at least 1 million barrels per day).

*B. Production Tax Credit*

OSEC proposes a production tax credit of $6 per barrel of shale oil produced.[4] In combination with the price floor incentive described in Part A above, this production tax credit would provide the incentive needed to develop and demonstrate oil shale technologies and invest in extraction and processing facilities by assuring a minimum return on the sale of shale oil when oil falls below a certain price. It would provide important protection for investors against production costs that exceed those for producing oil from conventional sources. The credit would go to the owner of the facility (which does not have to be the operator). The credit could phase out when oil reaches a certain price and it also could sunset.

*C. Other Proposed Incentives*

In addition to the tax and pricing incentives described above, additional financial assistance should be provided in support of pioneers of oil shale technology, to enhance scientific understanding for the benefit of multiple parties, and to assist local communities in responding to opportunities presented by first generation pilot, demonstration, and commercial oil shale plants.

*1. Grant Program and/or Direct Assistance for RD&D Projects*

In order to offset costs for initial site deployment and for development of technologies beneficial to multiple parties on a broad scale, a federal program of direct financial assistance and grants should be provided, and include (a) federal grant assistance of up to $10 million for opening and reopening oil shale mines on public lands; (b) $50 million in direct grants for development of methods and technology for carbon dioxide capture and sequestration; and (c) up to $25 million in other direct financial assistance and/or competitive grants for eligible commercial enterprises.

These funds would be used to offset research, development and demonstration ("RD&D") costs for pilot and demonstration plants. Such programs could be modeled on the existing demonstration grant program for enhanced oil and natural gas production described in Section 354 of the En-

[4] Oil shale was included in the production tax credit found in section 29 (now section 45K) of the Internal Revenue Code, but the credit, as applied to oil shale, expired at the end of 1992 (it applied to oil sold before 2003 from wells drilled from 1980 through 1992). Prior to its expiration it provided a set credit per barrel of oil produced and was phased out when oil hit a certain price (it is at or near the phase out point now).

ergy Policy Act of 2005, and/or modeled on the financial assistance program under the Clean Coal Initiative of the Energy Policy Act of 2005.

*2. Government Funding for Research Related to Extraction Processes*

In order to promote applied research in relevant oil shale processes, there should be a federal program of research grants for public and private universities and institutions (preferably in Colorado, Utah and Wyoming), as well as for federal agencies to study extraction processes, shale formation characteristics, surface impact mitigation techniques, spent shale use and disposal, and air quality modeling. Such research would assist the industry in optimizing its production facilities, and minimizing environmental impact, and could help reduce production costs and/or promote earlier commercial production. This program could dovetail with the "State Technologies Advancement Collaborative" envisioned in Section 127 of the Energy Act of 2005.

*3. Training Assistance for Oil Shale States*

The U.S. Secretary of Labor could make grants to relevant state labor departments for programs focused on training the affected populations in the skills necessary to construct and operate oil shale extraction and processing facilities.

*4. Loan Guarantees*

In order to attract the necessary level of investment in oil shale extraction and development technologies federal loan guarantees are required. Such guarantees provide a critical incentive for early capital investments.

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PREPARED STATEMENT OF STEPHEN COLBY, COLORADO DEPARTMENT OF LOCAL AFFAIRS

COLORADO DISTRIBUTION OF FEDERAL MINERAL LEASE REVENUE

Federal Mineral Lease revenues are collected by the federal Minerals Management Service in the U.S. Department of Interior. These revenues come from the leases of federal lands for mineral production. Roughly 50% of the revenues collected on federal leases in Colorado, are transferred by the U.S. Government to the Colorado State Treasurer. These receipts at the State Treasurer have ranged from $30 to $60 million annually.

From the State Treasurer, the distribution of these funds is conducted under state legislative statute C.R.S. 34-63. This statute operates on a formula basis to distribute funds to the counties, cities, and school districts through a number of different programs.

The largest share of the funds goes to the State School Fund for distribution to school districts throughout the state under the School Finance Act. Counties, cities and school districts in counties with federal mineral leases receive significant direct payments from the State Treasurer on a quarterly basis. A like share gets to local governments through the Department of Local Affairs grants program. Finally, 10% goes to the Colorado Water Conservation Board for funding of local water supply development.

The formula for these distributions is complex, as the chart attached below demonstrates. It was crafted by the legislature in a cascade format, which provides a first cut share to the parties and then allocates any residuals in a second and third cut. This approach was crafted over the years as the amount of money distributed by the statute varied widely from $30 to $60 million. The cascade method was used to hold harmless the existing recipient amounts while allocating the increased totals.

The third table shows the actual calculation of payments for Calendar Year 2003 by county. The percent distributed to school districts and towns is set by statute at a minimum which can be increased by the county commissioners and therefore varies from county-to-county and year-to-year. The payments to school districts are then split among school districts in a county on the basis of reported enrollment. The payments to towns within a county are distributed proportional to population within towns. Specific local government payments are listed on the State Treasurer web site at: *http://www.treasurer.state.co.us/transfers/fed_funds.html.*

FEDERAL MINERAL LEASE DISTRIBUTION

*Federal Mineral Leasing Act*

- Net of administrative charges, returns 50% of rentals and royalties from federal lands in the state of origin.
- Directs that such funds be used by the states for planning, construction and maintenance of public facilities and services in areas of the state socially and economically impacted by mineral development.

*Colorado Mineral Leasing Fund*

- Colorado statute (C.R.S. 34-63-102) directs that in the distribution of these funds priority shall be given to school districts and political sub-divisions socially or economically impacted by the development or processing of the federal minerals.
- Distributes the amounts originating in each county as reported by the Federal government under the following "cascade" type of formula:

*First Cut*

*10%*

To the Water Conservation Board

*15%*

To the Department of Local Affairs

*25%*

To the State School Fund

*50%*

To the county area of origin up to $200,000

*Spillover*

All funds from counties whose 50% share went over $200,000

*$10.7M Fill-In*

State School Fund gets all the spillover up to $10.7 million

*Balance*

Funds in the spillover in excess of $10.7 million

*Second Cut*

All county areas who contribute to the SPILLOVER get what remains of their 50% in the BALANCE up to a total limit of $1.2 million per county area. To avoid PILT deductions the county can elect to have all these receipts given to school districts and towns in a 50/50 split or share the funds as follows

*School Districts*

Get at least 25% of each county's total distribution

*Towns*

Get at least 37.5% of each county area total distribution above $250,000

*County*

Gets the residual

*Overflow*

All funds from counties whose 50% share went over $1,200,000

*The Overflow Split*

50% of the overflow goes to the State School Fund
50% of the 1overflow goes to the Department of Local Affairs

*Direct Distribution*

25% of the DLA 50% is distributed to cities and counties on the basis of employee residence reports.

DESCRIPTION OF THE CALCULATION OF THE FEDERAL MINERAL LEASE CASCADE DISTRIBUTION UNDER C.R.S. 34-63.

*First Cut*

Every quarter the State Treasurer totals up the receipts from the federal government, including interest earnings, which have been identified by county of origin.

25 percent of these receipts are transferred to the State School Fund in the state's Department of Education, 10 percent to the Colorado Water Conservation Board in the state's Department of Natural Resources, and 25% to the Local Government Mineral Lease Fund in the state's Department of Local Affairs. The remaining 50% is then calculated for each county and an amount up to $200,000 is prepared for distribution.

*Spillover*

Any amounts over $200,000 in each county is pooled in a "spillover" calculation which is distributed to the State School Fund until the total in this "spillover" calculation reached $10.7 million.

*Second Cut*

Once the $10.7 million spillover requirement is fulfilled, any funds left in those counties which had reached the $200,000 threshold on their distributions in the first cut are set aside for the county up to a second threshold of $1.2 million.

This county allocation is then divided up into three portions: one for the school districts in the county, one for towns in the county and the remainder for the county government. The percent distributed to school districts and towns is set by statute at a minimum of 25% and can be increased by the county commissioners out of the portion that would have otherwise gone to them. Similarly, the portion to towns is set as at least 37.5% of the amount of the county allocation above $250,000. Again, this percent can be increased by the county commissioners out of the share that would have otherwise gone to them.

The resulting payments to school districts are then split among school districts in a county on the basis of reported enrollment. The resulting payments to towns within a county are distributed proportional to population within towns.

*PILT Offset (obsolete)*

A provision is made in the statute C.R.S. 34-63-102(3)(c)(II) for the diversion of the county commissioners share of the federal mineral lease payment to school districts and towns in order, it was assumed, to increase in like amount the payments of the federal BLM PILT (Payments In Lieu of Taxes) program to the county. Experience has shown that the increase in BLM PILT payments falls short of the amount diverted. As a result, this option is no longer being used.

*Overflow*

After the county allocations in the Second Cut have been fulfilled, there can remain funds above $1.2 million in some counties, which funds are allocated to the "Overflow". The Overflow is split evenly between the State School Fund and the local government grant fund in the Department of Local Affairs.

*Direct Distribution*

Finally, statute instructs that 25% pf the Overflow distributed to the local government grant program in the Department of Local Affairs shall be distributed to the towns and counties on the basis of the taxpayer employee residence reports. In practice the reports provided under the severance tax statute C.R.S. 39-29-110(1)(d)(1) are used for this distribution.

DISTRIBUTION OF FEDERAL MINERAL LEASE RECEIPTS TO THE STATE OF COLORADO

[in $]

| Calendar Year | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Total Colorado Receipts .. | 64,583,766 | 41,797,845 | 62,841,190 | 89,860,158 | 114,791,773 |
| from Oil and Gas ..... | 29,046,563 | 15,074,411 | 29,805,841 | 46,106,713 | 68,203,036 |
| from Coal ..... | 17,770,850 | 16,459,014 | 11,038,6801 | 20,642,753 | 18,222,512 |
| from other Production ..... | 6,195,7972 | 2,743,600 | 7,772,371 | 8,178,139 | 10,46,931 |
| from Bonus & Rents | 11,570,557 | 7,520,819 | 14,224,297 | 14,932,553 | 17,902,294 |

DISTRIBUTION OF FEDERAL MINERAL LEASE RECEIPTS TO THE STATE OF COLORADO—Continued

[in $]

| Calendar Year | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Distribution | | | | | |
| Counties | 5,378,931 | 4,005,099 | 5,246,746 | 5,595,223 | 6,158,485 |
| School Districts | 3,095,017 | 2,103,826 | 3,044,457 | 3,391,473 | 3,724,617 |
| Towns | 3,053,696 | 1,959,186 | 2,914,985 | 3,401,548 | 3,815,160 |
| Colo Water Cons Bd | 6,458,434 | 4,156,885 | 6,307,167 | 11,479,169 | 8,986,021 |
| State School Fund | 31,878,061 | 22,214,867 | 31,167,501 | 44,085,957 | 55,896,755 |
| DoLA Grant Program | 13,461,633 | 7,077,318 | 12,985,438 | 21,669,710 | 29,592,878 |
| DoLA Direct Distribution | 1,257,994 | 280,663 | 1,174,896 | 2,730,2261 | 4,124,708 |

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STATEMENT OF DAN MCCLENDON, GENERAL MANAGER, DELTA-MONTROSE ELECTRIC ASSOCIATION, MONTROSE, CO

Dear Senator Pete Domenici, Senator Ken Salazar and the Senate Energy and Natural Resources Committee:

Delta-Montrose Electric Association (DMEA) represents over 30,000 members on the western slope of Colorado. Our mission is to energize and serve our community. DMEA is a leader in promoting innovative technologies to our members, which are designed to reduce our member's energy consumption. We promote efficient lighting through such programs as the "Brightening Our Communities Campaign" and high efficient heating and cool systems through our award winning "Co-Z Program". DMEA's commitments to our member's energy needs are summed up in our corporate goal of reducing our member's overall energy consumption by 25% by 2025.

This letter has been drafted to inform you about our collective concerns over the potential growth in population and hence demand for our product, electric power.

Delta-Montrose Electric Association is fully aware of the potential growth in demand and consumption of electric power associated with the development of our oil shale resources in western Colorado. With a potential extraction process such as the in-situ method, which requires heating the ground to 700 degrees Fahrenheit for several years, the demand for our product associated with this extraction process could seriously impact our existing members and our community.

Equally centered in the collective memory of our members is the collapse of the oil shale programs of the 1980's. The sudden loss of jobs in neighboring communities caused many locals and their businesses to become bankrupt. It took almost 18 years for our communities to fully rebound from the economic devastation associated with the oil shale industry bust.

An equally difficult problem is the demand for our product imposed by the natural gas industry. The natural gas industry is requiring the electric industry to provide electric power in remote areas. This will require a substantial investment in infrastructure by our association and hence our existing members. The natural gas industry's demand for our product is typically shorter than the traditional life of electric power infrastructure. This can and likely will result in stranded investment that existing members will be required to pay.

All this growth comes at a time when our energy provider (Tri-State Generation and Transmission Cooperative) is faced with exponential growth. Capital requirements to construct new power plants and associated infrastructure is projected to be $5 billion over the next 15 years. These projections do not include potential increases in electric power demand imposed by both the oil shale industry and the natural gas industry.

Based on the potential impacts associated with the fossil fuel energy industry, Delta-Montrose Electric Association requests your legislative support protecting our desire to creatively implement tariffs that will place the economic burden for electric power on the corporate shoulders of the energy industry.

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STATEMENT OF ROBERT A. LOUCKS, GRAND JUNCTION, CO

Thank you for scheduling a hearing on oil shale in Grand Junction. Your foresight and determination are greatly appreciated

The campaign to reduce our dependence on unstable foreign oil supplies leading to an oil free economy should include shale oil development along with encouragement of conservation and development of renewable resources. The use of the exten-

sive shale oil energy supply will be an important component of the process to get us through the coming transition from non-renewable hydrocarbons to other resources.

However, we must not repeat the mistake of prior energy crises and assume that shale oil is ready for commercial development. Despite all the attempts to develop a shale oil industry in the U.S. over the past 100 years, the fact remains that no proven method exists for efficiently removing the oil from the rock. There are a number of candidate processes possible, but none has demonstrated a practical capability to produce oil.

For this reason, it is imperative that the next step in shale oil development be a demonstration and test phase. It is possible that the BLM RD&D leasing program may serve this purpose, but I am unconvinced because it seems to be essentially a duplication of the failed 1970-80 prototype leasing program. Another possibility is a government center to provide the proper conditions for test activities. There have been previous efforts in this direction in the past, e.g., the Bureau of Mines and Colorado School of Mines work at Anvil Points. Also, a thorough analysis of the merits of government and industry partnerships is available in the report DOE/EIS-0068 dated September 1980. Other proposals include a "Proof of Concept" facility at the federal Cb site by Occidental Oil Shale in 1990 as discussed by Russell George of the Colorado Department of Natural Resources at your recent hearings on shale oil. Additionally, Federal legislation was passed in 1992. See U.S. Code: Title 42, Section 13412.

An attractive alternative was outlined 30 years ago. Little has changed in the past 3 decades.

> *June 1976* "Robert McClements, Jr., president of Sunoco Energy Development Co., a subsidiary of Sun Co., Inc., said his firm advocated a jointly-funded government-industry program to support oil-shale efforts through the stage of technology development. Mr. McClements expressed concern about several things:
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> First, technology, which has been demonstrated only at the pilot plant or semi-works level; thus the scale-up to commercial-size units carries with it a high technological risk.
>
> Second, the operational risk involved with a commercial oil-shale facility. For a large-scale plant to successfully maintain design production levels, it has to be on-stream—working as a unit—a high percentage of the time. Another operations concern relates to labor. Oil-shale plants will be built in areas where there is presently no reservoir of people to operate and maintain them.
>
> Third, the environmental aspects. Since we don't know what the final environmental regulations will be for oil-shale plants, we simply don't have a good grasp on how to design a plant.
>
> Fourth, the highly uncertain public policy climate that exists today and which restrict the operation of market forces.
>
> Fifth, timing. Enormously long lead times are involved in synfuels facilities and when you are talking about an expenditure of $1 billion (as assumed in 1976) per plant, the orderly, coordinated timing of capital investment is essential. But that's impossible with the present uncertainties.
>
> Sixth, economics. Even under the most optimistic assumptions for capital investment and operating performance, the required selling price for synthetic oil may still exceed the market price for conventional oil. A loan-guarantee program does not deal with the basic difficulty. That is, the size of the investment required, coupled with existing policy, technical and financial uncertainties, effectively forecloses the initiation of commercial oil-shale undertakings. An alternative approach can be a program that will assure the demonstration of a wide range of existing infant technologies on a broad scale. Such a program should provide for the construction of a number of modest-sized operating modules. But, since each module would cost about $100-$200 million (in 1976 $) on which no return can be expected this program could not be initiated solely by private industry. The most realistic approach could be to pattern it on a joint government-industry demonstration plant concept. Such a program could be initiated by a clearly identified governmental sponsor, which would solicit specific proposals from private companies for a variety of joint efforts. Government financing would then carry the projects through the stage of demonstrated technology. Thus, if a module(s) successfully demonstrates a technology, and if economic conditions permit, the government's interest could be acquired by the program's industry partner under previously agreed-upon terms."

Irrespective of the outcome of the debate on the real status of 'peaking' oil, shale oil process testing must happen. I have no doubts of our ability to make the transition.

Our country has proven time and again that we can meet enormous challenges and succeed.

Please let me know if you would like any of the above referenced materials or if I may be of assistance to you.

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STATEMENT OF PEGGY RECTOR, PAST MAYOR AND RIO BLANCO COUNTY COMMISSIONER, RANGELY, CO

I am Peggy Rector. I am a resident of Rangely, past Mayor and Rio Blanco County Commissioner. A member of the Rio Blanco Water District, member of Club 20 and a Rangely Chamber member. I was unable to attend the sessions provided by Associated Governments and Club 20 in Grand Junction with our Congressional Delegation.

I would like to request the region look at how we might disperse the population influx that has and will come, with the energy this area will provide for our county. I think it important we all begin to work together. I read today that Grand Junction Housing Authority is going to help provide housing in different ways for people moving to Grand Junction. My comment would be for the region to truly look at trying to move the people to different areas on the western slope so no one community is truly overcome with population explosion. There are smaller communities needing growth. However, due to not having larger population base, they lack the retail amenities that most people desire. However, if we could get the companies to request their employee's live in certain areas this would begin to help. Our community of Rangely has dealt with energy. Unfortunately, we have recently had to close one of our schools because of lack of students. We have the infrastructure, water, sewer, gas, electricity to deal with an influx of people plus the schools to accommodate. We also have a Community College for training needs etc. The interesting part to me about Grand Junction encouraging more people to come there is that the roadways in Grand Junction presently cannot truly accommodate the people they have. I would, in light of this, suggest the total region have the discussion with the companies about location of their employees and how this would best work. I think if we plan this in a proper way, all will benefit and be able to handle the influx in a very good way.

If small communities such as Rangely know they have people coming in, we will then have contractors ready to come and build houses for their needs, manufactured housing people will also be on the doorstep.

I further desire discussion on the assessment of the water needs for the total energy together with what the local communities needs are going to be in conjunction. I believe this is something the Water Basin Roundtables can accomplish with the help of the State Legislature. I also believe the Federal Government needs to play a role in helping in whatever way is possible since the Western Slope of Colorado and Eastern Utah will be providing the necessary energy needs for our nation. We need water storage for the dry years. This storage needs to be in the overall planning process. We need to plan to grow our communities in a positive way with the help of the Locals, State and Federal agencies.

In the smaller communities we need retail services for the people coming, it is the chicken and the egg situation. The people will come, then the retail services. We need to also think about recreational needs for the citizens of the area. They will need parks, walkways, bike paths etc.

Once the infrastructure for the energy is completed the workforce will dwindle down. The need will be to leave these rural communities whole. We should have learned over the years with boom and bust how to address the situations in a positive way for all. We need a forum that brings communities, counties, energy companies, big and small together to truly discuss the true impacts gas, oil, coal gasification, electric energy, oil shale collectively are having and will continue to have on this area. Roadways are critical to getting people to work and home in a safe manner. Travel time to and from work. Where new roads can cut time and direct population we need to take a very serious look.

In conclusion we need to truly be aware of the overall impacts to the areas and try to make those impacts positive in nature. I believe by directing that population through employer location is an ideal way to do this.

Thanks so much for being able to present my views on the total energy package.

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STATEMENT OF GLEN A. MILLER, GRAND JUNCTION, CO

Re: U.S. Senate Energy Committee meeting on Oil Shale, Grand Junction, Co, June 1, 2006

Thank you for holding this meeting and taking the opportunity to learn more about this truly huge resource.

My concern with the current efforts come in part from spending more then a decade in Interior's Prototype Oil Shale Lease Program office (1978-1986) here in Grand Junction.

My brief comments in general refer to Piceance Basin, Colorado.

1. BLM has no criteria for "qualifying" an R&D lessee to obtain a "Commercial Lease" on 5000+ acres. Note that each proposed Commercial Lease would contain about the equivalent of a "Prudhoe Bay" in resources (10-14 Billion BBL's ±). The give-away aspects of this makes "Teapot Dome" look teeny by comparison. All proposed leases are where shale is very deep and hundreds of feet below the water table, thus making R&D more expensive.

2. Of most importance, I am not aware of any requirement of a "Minimal Percentage" recovery so long as the "Economical Viable" and "Environmentally Acceptable" goals are met. Thus, a lessee presumably could meet these goals at 10% recovery, produce 1-2 billion barrels, but greatly increase the difficulty of recovering the remainder by our future generations (who will be in a true oil-short era). This 10% assumption may be low, but wasting huge amounts of resources is not acceptable.

3. Sodium-Aluminum resources in the oil shale. There is some recognition by BLM of the value of Sodium (Nahcolite, 29 million tons), but nothing I've seen addresses the conservation or recovery of the 3.5 billion tons of Aluminum (Dawsonite). This is 20 times the metal in our Bauxite resources, and research suggests that Aluminum can be recovered from Dawnsonite with a fraction of the energy required to process Bauxite.

These resources are unusually large and unique, and recovery is complex, but they are of critical importance to our Nations future, and must not be wasted merely because much R&D is needed to achieve near-100% recovery.

An academic researcher during the 1970-1980 period remarked that "This oil shale resource is our Nation's perfect 'bridge' fuel. It can fill in for centuries when conventional oil is near-depleted and buy time to develop other energy sources." Think about it.

Thank you.

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STATEMENT OF PENNY AND JIM CREASY, GRAND JUNCTION, CO

We have watched the administrations wholesale giveaway. Instead of opening up more lands to energy exploration and development, it would seem better to find alternatives.

We would like to see much better stewardship of our national treasures. It is my understanding that good stewardship should be the BLM's mission. I also understand that agency takes orders right from the top. We are now in a land grab and abuse that is unequaled in the history of this country. The "liquidation sale" mentality should come to an end.

I believe government should come FROM the people to the politicians, not the other way around. It is my belief that there is hope there if we are listened to. Please do a lot more studying and preparation—that will take at least 3 years. The oil shale project could turn out to be a huge boondoggle.

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STATEMENT OF ART GOODTIMES, COUNTY COMMISSIONER, SAN MIGUEL COUNTY, CO

Although San Miguel County is not directly affected by the oil shale proposals currently being developed for Western Colorado, the previous oil shale bust had significant negative effects on the economies of the entire Western Slope.

I urge you to take careful precautions before moving towards the kind of boom climate that pushed many citizens into overextending, only to be caught when the boom went bust.

Oil shale also needs to be developed with careful environmental controls, particularly regarding our precious water resources. To that end, I strongly support the kind of efforts that Sen. Ken Salazar has been making to balance our economic needs around developing our own energy resources in this country with the long-term needs of the environment—upon which San Miguel County's booming tourist economy so completely depends.

Thanks for the opportunity to comment.

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