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*Testimony on “Protecting Investment in Oil Shale the Next Generation of Environmental, Energy, and Resource Security Act”*

11/15/11

I thank the Committee on Natural Resources and Chairman Lamborn for the opportunity to provide perspective and comments on the reemerging United States Oil Shale Industry -- from the perspective of an industry entrepreneur. I hope my comments will be helpful in guiding reasonable and bipartisan support for what I believe is America's best asset, over 1 trillion barrels of very premium crude oil from oil shale in Utah, Colorado and Wyoming.

For almost 100 years many scientists, engineers and corporations have attempted to extract oil from shale on an economic basis. Despite having produced millions of barrels of oil from oil shale rocks decades ago in the United States, the price of crude oil in global markets was not supportive of this industry. The industry has not flourished for economic reasons and some technical reasons. Most people familiar with oil shale in the Rocky Mountain region understand that it is actually quite easy to produce oil from oil shale rocks using the well known process of pyrolysis which is heat in an oxygen free environment. The problem has been that the capital and operating costs relative to mining, building and operating retorts to extract the oil, and building and operating hydrotreaters to upgrade have been to expensive relative to price of crude oil. But while the economics have failed the resource remains a viable world class asset.

What is now changing is price of crude oil. Over the past six years the price of WTI NYMEX crude oil prices has stabilized above \$85.00 average price per barrel. The price of oil is driven by supply and demand as well as geopolitical constraints. With nationalism on the rise, competition from China and growth in Asia and emerging economies demand is expected to rise and drive prices upward. With an average NYMEX WTI crude oil price of \$85.00 per barrel, the oil shale industry will emerge by the end of 2016 and into 2017 with first production. Just a few weeks ago at the Oil Shale Symposium at Golden, Colorado at least a half dozen companies set forth timelines in presentations showing commercial operations starting between 2016 and 2020. The new price support in the global crude oil market combined with new technology based on much higher volume production and much lower operating costs is the driving new forces that will open this industry. When people ask “What is different now about oil shale?” the answer is simply two main reasons. First, global crude prices have risen to an average of \$85 dollars per barrel, and second, new, outstanding, high volume technology is being developed in a responsible manner that lowers the operating costs from 75 dollars per barrel to about 35 dollars per barrel. It is really that simple.

To the credit of the environmental community, with the rise of the Green Energy movement earlier this past decade, inspiration and guidance was provided to many of us in the oil shale industry who set out to open the industry responsibly. For example, after researching the global energy demand and technologies of the future for liquid energy about ten years ago, I determined that unconventional oil shale would by necessity come to fruition in the United States in my life time. I also determined that the limitations of solar and wind to actually replace petroleum were wishful thinking and that liquid petroleum is an entirely

different industry. Since my decision 8 years ago to participate in the oil shale industry, I have not regretted this decision once. Not only do we now see the failures of economics in solar, wind and ethanol as I predicted 8 years ago, but we now see that America has fallen into a rut of fighting wars in the Middle East over oil. Each day I go to work in the oil shale industry, I feel my efforts to develop responsible environmental technology and economic technology will be a part of not only displacing future emissions but also displacing the need for wars over oil that cost the health and lives of soldiers and their families. Let me say that to all opposing environmental activists willing to fight against the oil shale industry, I implore you, in the name of our military families to cease with unnecessary and frivolous opposition to the industry that otherwise causes these many wars for oil in the Middle East. The anti-oil agenda is futile and green energy cannot and will not replace our need for liquid fuels. I know many environmentalists share an opposition to wars and especially wars over oil and that has been a key driver in promoting an anti oil agenda. We are now in era where environmentalism and regulation is actually causing these wars and green energy cannot offer us a realistic solution to liquid fuels. Its time to do the best we can with the resources and technology we have and that, speaking from my research and point of view has morally lead me to engage in responsible oil shale development. I encourage you and all good Americans to consider your activism and weight it in this context.

The fact is that oil shale industry can help us develop responsibly and inhibit the United States from fighting for oil elsewhere. Tens of thousands of soldiers have been maimed, millions of people have been killed and the United States is on the verge of financial collapse due to spending on these oil wars. We can do better. We have the technology. We simply need the moral judgement and the community working together attitude of beneficial development through responsible planning.

After 8 years in the oil shale technology development business I have a few easy solutions to the environmental concerns that I would like to discuss. The most often cited challenges are relative to

1. Water
2. Emissions
3. Reclamation
4. Wildlife

In regards to water, many environmental alarmists would have America believe there is no water for the oil shale industry. This is patently false. Over the past years I have spent in this industry I have found it humorous to read newspaper article after newspaper article about how much water oil shale will use. There has never been a shortage of conflict-inducing journalists looking to regurgitate this worn out story with arguments on both sides. Seldom however is the real issue of supply and source of water dealt with. Even government sanctioned reports of the industry such as that as from the Rand Corporation have been completely misguided when it comes to water use in oil shale and availability and process volumes. The truth is that water is widely available in the State of Utah for purchase. Anyone worried about the water availability can simply buy the water. For example, my company negotiated a large contract recently that now provides us all of the water rights we need into the foreseeable future for our own process water for oil shale. The water is available and it is in abundance currently in use for corn and alfalfa farming. If the price of oil can support buying that water from farms, it can be used on an industrial basis in the oil shale

industry - its that simple. On a macro level of planning for water consumption in the arid West (for example population growth), for those that are naïve to believe that this is the way we plan the world, there's not much I can say to dissuade someone on water. But even on a macro scale argument of water, it is also true that water can and will be piped to the region from long distance if necessary widely available from Utah Lake, The Great Salt Lake and even as far distant as the ocean itself. Water is not a problem for oil shale. Every comment to the contrary is just environmental activism without the economic understanding of importing the water. Water is not only available now it will be far into the future for the U.S. oil shale industry.

In regards to air emissions I have already mentioned the benefits of using clean burning natural gas to heat up the oil shale in retorting processes. Many of the projects I am familiar with now seeking air permits are actually coming forward as minor source emitters. In other words, the oil shale processes they employ are so low in emissions due to burning natural gas (instead of burning the rock itself as in the old days) that they are not even major sources under the Clean Air Act. Natural gas in abundance will continue as an ideal input for retorting oil shale. America is currently discovering enormous amounts of natural gas from shale formations from the Rockies all the way to New York and beyond. Unlike the Solar and Wind industries which cannot compete with electrical generation from natural gas without subsidies, the U.S. oil shale industry actually benefits from natural gas at low prices and without subsidies. Because oil shale retorting is driven by natural gas, each barrel of oil shale becomes that much cheaper to produce. Further, after production of shale oil from the rocks in the pyrolysis step, oil shale requires the semi-refining step known as hydrotreating or upgrading. The oil is processed at high temperature and high pressure and combined with 2,300 standard cubic feet of hydrogen per barrel. The hydrogen comes from natural gas and therefore the lower cost of natural gas lowers the price of oil shale as well. It should be understood by your committee that this downward pressure on natural gas is foreseeable for the next two or three decades. This is excellent news for oil shale inputs on energy and upgrading relative to hydrogen production.

Further to the discussion of emissions is the overall emissions profile of each barrel of crude oil. While environmentalists have recently attempting to label Canada's oil sands as a "dirty oil" the same cannot be said of U.S. oil shale. Not only does the step of burning clean natural gas for the pyrolysis emit very little emissions but the reality is that oil shale once hydrotreated yields nearly 75% of the barrel as Ultra Low Sulfur Diesel (ULSD). This is not diesel as we have once known this is diesel known as Green Diesel, the same Green Diesel that most of the European automakers have highlighted as highly fuel efficient. I will refer the committee to the Super Bowl TV commercial from Audi from two years ago known as the "Green Police Commercial". The Green Police where depicted policing ridiculous notions of green living including a police barricade on the highway. When the Green Diesel Audi approached the Green Police at the traffic stop, the Green Police noticed the Ultra Low Sulfur Diesel automobile from Audi and allowed it through. Americas Green Police environmentalists need to get the memo and join the Ultra Low Sulfur / Green Diesel movement. The Europeans have gone to this fuel for mileage efficiency and its time we do so here in the United States. In fact, there are several green diesel automobiles that actually get better gas mileage than gas-electric hybrids – most people are not aware of that. I am hoping to see Al Gore drive up to the Sundance Film Festival in Utah in a Green Diesel vehicle

from Germany and not just a Prius each year. When the true story of the potential of oil shale is told relative to Green Diesel, the emission profile looks quite normal to regular crude oil production already refined around our country. This is good news for American families looking to be employed by the oil shale industry and simultaneously provide a secure energy future for our children.

In regards to mining and surface disturbance in the U.S. oil shale industry many environmentalists argue that oil shale lands cannot be reclaimed and that desert land do not grow back. This is also patently false. I wish to direct the committee to look into all of the gas well pads that have been drilled on oil shale surfaces for decades now in Utah and Colorado. All across the Piceance Plateau and in the Uintah Basin thousands of natural gas well pads have been cleared by dozers to flatten a site suitable for drilling rigs to set up and drill for natural gas. It is quite typical that these pads are directly on the outcrop of oil shale and the oil shale is pushed up in large piles around a flat surface. There are now hundreds of well sites that are now reclaimed where once drilling has taken place. The oil shale lands (high desert lands) are now so well reclaimed that it takes a very keen and trained eye to even notice that a well even once been there. There are other examples as well. For instance, in the case of the old Geokinetics oil shale production site in Utah that produced over 100,000 barrels of shale oil, the land that was once disturbed can best be noticed today by looking for wild life. The deer and elk in the area actually prefer to live and graze on these reclaimed oil shale lands which support far better foliage than the undisturbed and unreclaimed lands. This brings me to a few comments about wildlife from an industry perspective.

Its amazing to me that we have grown into a society that protects sage grouse more than American soldiers. I think environmentalism and the green energy movement is falling apart these days not only due to the failure of President Obama to negotiate with the Chinese in regards to the Kyoto Protocol and relative to a global carbon trading platform, but also because the American people view with disgust the fact that we are blocking our hydrocarbon resource development domestically actually causing our soldiers overseas to fight wars for oil as a result. Each day I work on oil shale technology and project development I am inspired by American soldiers who sacrifice for our country. I am committed to reducing the impact on wildlife such as sage grouse that environmentalists cite as needing protection relative to our industry. What I believe the American people are seeing clearly now is that perhaps it is our fellow countrymen and countrywomen serving us in the armed forces that are rare, precious and endangered. Blown off limbs, destroyed families to death, disability and loss bring a whole new meaning to an "Endangered Species Act". The good news is that reason is on our side and environmentalists everywhere are recognizing overregulation, unnecessary alarmism and unwelcome damage to our society and our economy by blocking resource extraction. Let me be clear, we welcome reasonable environmental planning to the table of planning the oil shale industry, but I think more emphasis going forward will be placed on American lives, American jobs and stopping our wars overseas for oil. It should already be common knowledge that human beings are far more valuable to this earth than wildlife activism.

In closing, let me say that the key to the industry is volume production. For many years horizontal kilns and vertical retorts have been limited to approximately 5,000 barrels per day. For example, the ATP Process, the Parahoe Process, the PetroSix Process and even the processes developed in Estonia have been stuck at this ceiling of volume. I am aware of at least 3 surface retorting technologies that have the ability to produce shale oil delivering over 25,000 bpd on an economic and environmentally sound basis. I am pleased to report to the committee that there are now full commercial projects in development, including with tens of millions of dollars in mine planning, engineering and development that will put the industry in play by 2016 to 2017. The projects I speak of have nothing to do with federal lands or the Research and Development programs administered by the BLM. My recommendation is that the BLM and the federal government pass laws that keep the bureaucracy of Washington out of the industry and make all federal lands available to the private sector. Since the Energy Policy Act of 2005 was enacted the Department of Interior has leased approximately 30,000 acres of the 1.9 million acres of oil shale. This is pathetic performance – less than 1% of 1%. The federal government has no skill in managing the lands containing oil shale let alone determining what the technology should and shouldn't be. Just as with Solyndra the federal government isn't going to pick a winner in the oil shale industry. The best technologies I am aware of have nothing to do with federal programs.

The fact is that there is a thriving oil shale industry emerging in oil shale in Utah, Colorado and Wyoming. Dozens of the highly respected private equity and hedge funds have invested into start up companies working on technology in this space. For example, in 2006, I authored patents and invented an oil shale process known as the EcoShale In Capsule Process for low cost, high volume production of shale oil. Since that time, my technology has garnered more than \$100 million dollars in supportive investments. Without any subsidies from the federal government, and set in a time and era where trillions have been spent on reviving the economy and fighting wars for oil – virtually no money has been spent or provided to the oil shale industry for assistance. This is a shame on so many levels as this industry holds the key for economic and national security – and industry that directly offsets the hundreds of billions in trade deficit for imported crude oil.

I am hoping to help be a driver of change influencing better technology and also convincing my environmental friends that the time has come to stop catalyzing wars for oil overseas by blocking domestic hydrocarbons. Our war is an economic and creative war here at home. If we win it we can be stewards for the environment and protect the unnecessary loss of life of American soldiers fighting wars for oil. Perhaps the most interesting thing I have learned in development over the past decades is that the very same technology of pyrolysis for oil shale is the same technology for creating biochar. Intellectuals in the Carbon Trading world of Kyoto know and promote the pyrolysis of biomass to create biochar – a carbon capture and sequestration method that is superior to other approved Clean Development Mechanisms – I have attended many of these seminars and have studied Biochar. As the oil shale industry unfolds and new technology in this space emerges, biomass pyrolysis will excel as well as a result. Isn't it interesting that oil shale pyrolysis -- a legitimate potential solution to our problems of wars for oil, trade deficit, jobs, energy security could simultaneously emerge as the same technology for even carbon capture and sequestration. I find that absolutely fascinating, Mr. Chairman. I believe many in the U.S. Congress will find that fascinating as well. Thank you, very much to the committee for this opportunity.

I am available for questions.