Colorado Environmental Coalition • Colorado Mountain Club • Colorado Wild •
• Center for Native Ecosystems • Californians for Western Wilderness •
• Environment Colorado • Grand Valley Citizens Alliance •
• High Country Citizens Alliance • Natural Resources Defense Council •
• San Juan Citizens Alliance • Sierra Club Rocky Mountain Chapter •
• Southern Rockies Ecosystem Project • Southern Utah Wilderness Alliance •
• Western Colorado Congress • Western Organization of Resource Councils •
• Western Resource Advocates • The Wilderness Society • Wilderness Workshop •
• Wyoming Outdoor Council •

January 31, 2006

Transmitted via first-class mail, postage prepaid, return-receipt requested.
Submitted without attachments at http://ostseis.anl.gov.

BLM Oil Shale and Tar Sands Leasing Programmatic EIS Scoping
Argonne National Laboratory
9700 S. Cass Avenue
Argonne, IL 60439

Re: Oil Shale and Tar Sands Resources Leasing Programmatic EIS
SCOPING COMMENTS

Dear Reviewers:

Thank you for this opportunity to comment on the scope of issues to be considered in the Programmatic Environmental Impact Statement (PEIS) on Oil Shale and Tar Sands Resources Leasing. These comments are submitted by and on behalf of the undersigned organizations. These organizations represent several thousand individual members who live in and around the areas to be affected by oil shale or tar sands leasing, and who are actively involved in a variety of energy issues currently facing the Interior West. These organizations have members whose lives and livelihoods would be irreparably affected by commercial leasing or development activities involving oil shale or tar sands resources. As a result, they are intensely interested in the Bureau of Land Management's stewardship of the lands being considered for oil shale or tar sands leasing. Accordingly, the undersigned ask to be included in all future correspondence with regard to this PEIS, as well as future correspondence related to the BLM's promulgation of commercial leasing regulations for these resources. Our contact information is below.

The bulk of this letter focuses on the myriad environmental and social issues implicated by the BLM's proposal to amend Resource Management Plans and adopt regulations designed to facilitate commercial leasing of oil shale and tar sands resources. It begins with a discussion of the resources and the likely methods for their commercial extraction, and then it proceeds to discuss potential impacts. What we have found, though, is that our research in this regard often raised more questions than answers. A great deal of information regarding the nature and potential impacts of oil shale development was generated as a consequence of various inquiries

regarding this topic two or more decades ago. For example, in response to the Prototype Leasing Program, which began in 1969 and culminated in an oil shale lease sale in 1974, considerable public and private study was undertaken over the course of over a decade.[1] However, in neither the Notice of Intent nor at the public scoping meetings on the PEIS was this detailed past study or the lessons learned from it discussed or otherwise made available to the public.

We consider this past research and study invaluable in guiding the preparation of the current PEIS, promulgation of commercial leasing regulations, and holding of any subsequent lease sale. Thus we have attached to this letter several of the publicly-available studies undertaken in the 1970s and 1980s that analyze various important environmental and social issues with regard to development of oil shale and tar sands. We found these studies instructive in preparing this letter and we request that the BLM give them full consideration and include them as part of the administrative record for both the preparation of the PEIS and the promulgation of commercial leasing regulations. A detailed bibliography of these publications follows this letter, including information on their location at the Denver Public Library. We hereby incorporate the contents of the attached documents by reference into these comments. We are also attaching to this letter a compact disc with electronic copies of various studies that we relied on in preparing these comments. Included on the CD is a copy of the Office of Technology Assessment's June 1980 report, "An Assessment of Oil Shale Technologies," as well as a copy of the recent report by the RAND Corporation, "Oil Shale Development in the United States" and other documents. As above, we ask that the documents on the CD also be entered into the administrative record for the BLM's PEIS as well as the commercial leasing regulations. These documents are also incorporated by reference into this letter.

While we focus below on specific environmental and social issues to be addressed in the Programmatic EIS, we also suggest several elements that should be reflected in the BLM's Preferred Alternative, such as deferral of a commercial leasing program for oil shale and tar sands resources pending successful demonstration of commercial technology. Adoption of this measure will best enable the BLM and the public to assess the impacts of a potential development industry for this resource, as well as ensure the fairest return to the federal government by avoiding speculative leasing. We also raise several issues that the BLM must evaluate when amending Resource Management Plans, generally, and we request that the BLM give them full consideration in the PEIS. Finally, we raise several issues that are appropriate subjects for inclusion in the commercial leasing regulations for oil shale and tar sands on which the BLM is now beginning to work, and we ask that the BLM consider these matters in drafting proposed regulations, a process which is apparently now underway.

Thank you for your consideration of our comments. We may be contacted through Bob Randall, Staff Attorney at Western Resource Advocates, at (303) 444-1188 or 2260 Baseline Road, Suite 200, Boulder, CO 80211.

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[1] See Congress of the United States, Office of Technology Assessment, "An Assessment of Oil Shale Technologies, Volume II: A History and Analysis of the Federal Prototype Leasing Program" June 1980. See enclosed CD or http://www.wws.princeton.edu/ota/disk3/1980/9582/9582.PDF. The OTA was a nonpartisan agency created by legislation in 1972 to provide technical assistance to Congress. It closed on September 29, 1995 after the 104th Congress voted to withdraw funding for OTA and its staff. See http://www.access.gpo.gov/ota/.

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I. INTRODUCTION

A. Energy Policy Act of 2005

The Energy Policy Act of 2005 directed the BLM to prepare a Programmatic Environmental Impact Statement in accordance with the National Environmental Policy Act (NEPA) that analyzes a commercial leasing program for oil shale and tar sands resources on public lands, with an emphasis on those prospective lands of Colorado, Utah, and Wyoming. Pub. L. 109-58, Title III, Sec. 369(d)(1), *codified at* 42 U.S.C. § 15927(d)(1). The Energy Policy Act also directed the BLM to promulgate regulations establishing a commercial leasing program for oil shale and tar sands resources. Id. at § 15927(d)(2). The final regulation is to be codified within 6 months of completion of the Programmatic EIS. Id. Following adoption of final regulations, the Interior Department is to consult with affected 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. Id. at § 15927(e). If "sufficient support and interest" is found in a state, then the Department may conduct a lease sale. Id.

On December 13, 2005, the BLM published in the Federal Register notice of its intent to prepare the Programmatic EIS called for in the Energy Policy Act. 70 Fed. Reg. 73791 (Dec. 13, 2005). The Notice of Intent (NOI) also alerted the public that the BLM was intending to amend several resource management plans (RMPs) to open lands for oil shale and tar sands resources leasing in the three states. Notably, the energy bill did not direct the BLM to amend applicable RMPs to open previously-unavailable lands for leasing; this is a discretionary act taken on at the initiative of the agency. The BLM did not specify in the NOI which RMPs it intended to amend, leaving the public to guess which plans are subject to revision.[2] Finally, the NOI informs the public that the PEIS will "inform the development of" commercial oil shale leasing regulations called for in the Energy Policy Act.

Though legislation was proposed which would have deemed this PEIS adequate under NEPA, that provision was rejected by the Congress and did not become law. Thus this PEIS is subject to NEPA, the CEQ and DOI regulations implementing it, and the federal court decisions interpreting it. Other language considered by the Congress subsequent to passage of the Energy Policy Act would have excused any further environmental review by the Interior Department for ten years of lease sales following preparation of this Programmatic EIS, but this too was rejected by the Congress. Thus this PEIS may not authorize multiple lease sales; each sale must be preceded with site-specific NEPA review. Finally, language considered by Congress would have directed the Interior Department to hold a lease sale within a year of its adoption of commercial leasing regulations, in which it would offer 35% of geologically-prospective lands for sale. Again, this language was rejected by Congress, leaving intact the provisions of the Energy Policy Act that leave whether to hold a lease sale, and how much to offer in it, to the discretion of the

[2] At the scoping meetings in January, the BLM staff clarified that it would amend, presumably by including as part of the Preferred Alternative in the EIS, 11 Resource Management Plans covering millions of acres: the Grand Junction, Little Snake, White River, and Glenwood Springs RMPs in Colorado; the Richfield, Price, Vernal, and San Juan RMPs in Utah; and the Green River, Rawlins, and Kemmerer plans in Wyoming.

Interior Department after consultation with local governments, Indian tribes, and Governors of affected states. See 42 U.S.C. § 15927(e). Other provisions that were left intact in the Energy Policy Act are the requirements that the BLM designate requirements and milestones in its regulations "to ensure the diligent development of the lease," id. at § 15927(f), and that royalties, fees, rentals, bonuses, and other payments for leases that "ensure a fair return" to the federal government. Id. at § 15927(o)(2).

Despite all of the current legislative and media hype touting oil shale as the answer to the nation's energy needs, it is indisputable that commercial-scale oil shale development is currently occurring nowhere on the planet. Instead, there are only a few small-scale experimental projects attempting to demonstrate that rock can be turned into oil at a profit, although it appears that each of these is government-subsidized to a greater or lesser degree. Even during the oil shale heyday of the 1970s, commercial oil shale development never even got out of the starting blocks and was abandoned before a single unsubsidized drop of commercial shale oil was shipped to market.

Thus the BLM has a truly Herculean task ahead of it: it is charged with analyzing the environmental, social, and economic impacts of, and all of the reasonable alternatives to, developing a truly vast natural resource, using as-yet unknown technologies, across a geographic region covering thousands of square miles in three states. To make matters more challenging, the BLM is supposed to complete this large-scale review of the impacts of an unknown industry by February 8, 2007 -- just over a year from now. While we are sympathetic with the scale of the task before the BLM, we are also vitally committed to ensuring that the PEIS complies with the law by examining the full range of direct, indirect, and cumulative impacts from and alternatives to commercial oil shale leasing and development, and we hope that the BLM shares that commitment.

B. Scope of Oil Shale Resource

A geologic glossary defines oil shale as "dark-colored shale containing organic material that can be crushed and heated to liberate gaseous hydrocarbons." Specifically, oil shale contains kerogen, a proto-petroleum or bitumen that has not yet been through the geologic cauldron necessary to convert oil to rock. Oil and gas are generally created when organic material like kerogen is subjected to extreme temperatures over a geologic time period of about 50 million years, deep in the Earth's crust. Again, the kerogen in oil shale has not yet been heated and remains merely as potential energy to which heat must be added to create oil. Ironically, all of the development methods currently in existence would involve burning *other* fossil fuels that are mature (coal or natural gas) to convert this immature fuel source. *In this regard, we request that the Programmatic EIS include an analysis of the net energy analysis of the BTU inputs and outputs for various development scenarios and technologies for oil shale and tar sands. This analysis should be used as a basis for the estimates in the PEIS of the secondary impacts of development of this resource, by clarifying how much energy is needed to produce certain quantities of energy from oil shale or tar sands.*[3]

[3] Where, as here, we have asked the BLM to undertake a particular analysis or consider a certain subject, we have endeavored to highlight such a request with *italics*. This is meant to facilitate the BLM's review of these

The kerogen in oil shale can be converted to oil through the chemical process of pyrolysis. During pyrolysis, the oil shale is heated in a retort to about 900° F (450-500° C) in the absence of air, and the kerogen is thereby converted to oil and separated out. The organic material in the rock is converted into a liquid, which can then be further processed to produce a low- to mid-grade oil through refinery processes.

The USGS distinguishes oil shale resources according to their grade -- the gallons of oil that can be produced from a ton of rock. The richest ores yield 25 to more than 50 gallons of oil per ton of ore and are the most attractive to industry. Deposits with less than 10 gallons per ton are usually not counted as resources in place, because the low yields do not justify the costs of development. It appears to be somewhat accepted that resources in place refers to oil shale at a grade of greater than 15 gallons per ton. *The PEIS should evaluate accepted gradations and provide information on the richness of ores and locations throughout the project area.*

That global oil shale resources are immense is not really in dispute, though precise figures are hard to come by and should be provided in the PEIS. According to the U.S. Office of Naval Petroleum and Oil Shale Reserves, there are some 1.6 billion barrels of oil contained in the shales around the world. Elsewhere, the American Association of Petroleum Geologists has estimated total world resources at 2.6 trillion barrels of oil, though it is unclear what grade of ore is included in this extraordinary figure. The U.S. Geological Survey estimates that the United States holds over 50 percent of the world's known oil shale reserves -- all of it within 150 miles of Grand Junction, Colorado. The largest known oil shale deposits in the world are in the Green River Formation, which allegedly contains between 1.5 and 1.8 trillion barrels of oil in an area covering about 16,000 square miles of Colorado, Utah, and Wyoming underlying the Piceance, Uinta, Green River, and Washakie Basins. Again, though, it is not clear whether this amount is rich enough to be commercially developed. According to the Office of Technology Assessment (OTA) in its seminal 1980 Report,[4] "An Assessment of Oil Shale Technologies," "reserves" are those resources that may be developed at a cost that is less than the value of the fuels retained. Thus the OTA concluded that the extent of the oil shale reserves could not be determined, because processes for development them had not yet been shown to be economically feasible. Though no conclusive measures of economic feasibility have emerged to date, potentially recoverable oil shale resources in the Green River Formation are often put at between 500 billion and 1.1 trillion barrels of oil. Federal lands comprise roughly 72% of the shale-rich lands in the Green River Formation. In the Piceance and Uinta Basins, federal lands overlie about 80% of the in-place resources.

The OTA found that raw Green River oil shale contained about 17% organic matter by weight and yielded about 27 gallons per ton. The inorganic material that comprises about 80% of raw Green River shale remains as part of the coke residue after the oil and gas products are removed. As discussed below, this waste rock expands by around 30% after processing in a "popcorn effect" from the heating, resulting in crippling waste-disposal challenges that must be

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comments. It does not, however, waive any suggestion in this letter not in italics as to the scope of matters to be considered in the PEIS.

[4] Congress of the United States, Office of Technology Assessment, "An Assessment of Oil Shale Technologies," June 1980. See enclosed CD or online at www.wws.princeton.edu/ota/disk3/1980/8004/8004.PDF.

evaluated in the PEIS. The Department of Energy's Office of Naval Petroleum and Oil Shale Reserves more recently estimated that the average net yield of oil from shales in the Green River formation is 0.73 barrels per tons of shale mined. Put a different way, RAND estimates that 1.2 to 1.5 tons of waste rock are generated for each barrel of product produced by surface retorting. *In the Programmatic EIS, the BLM should clarify these disparate numbers, providing accurate figures for the scope of the resource, the expected yield for shale from various areas, and the amount of waste rock to be generated for each barrel of product produced by surface retorting for each part of the study area.*

About 1 trillion barrels are estimated to lie in the shale formation of the Piceance Basin of western Colorado. In the Piceance, about half a trillion barrels of oil are in deposits yielding more than 25 gallons per ton. Most of the shale is in deposits more than 500 feet in thickness and located beneath 500 or more feet of sedimentary rock, though the deposits are sometimes more than 2,000 feet thick and covered by more than 1,000 feet of overburden. *In the Programmatic EIS, the BLM should confirm these facts or provide accurate information about the Piceance Basin shales, including the thickness of deposits, the amount of overburden, and the likely formation of surface mines in each area.*

Less is known about shale resources in Utah and Wyoming. Wildly varying estimates have been published for the Uinta Basin in Utah, ranging from 56 billion barrels to 321 billion barrels. Much of the high-grade oil shale in Utah is close to the surface in relatively thick seams. In Wyoming, the Green River Basin is estimated to contain 250 billion barrels and the Washakie Basin 50 billion barrels. About 14 billion barrels in Wyoming are in deposits holding more than 30 gallons per ton, though these rich deposits are in thinner, less continuous layers that present a less favorable development target as compared with Colorado and Utah deposits. *As above, the BLM should in the Programmatic EIS confirm these facts or provide accurate information about the resources of Utah and Wyoming, including their thickness and the amount of overburden.*

Oil shale development is currently taking place to varying degrees in Estonia, Russia, Brazil, and China. Oil sands development is taking place at the huge Athabasca Oil Sands Project in Alberta, Canada, which Shell says can produce 155,000 barrels of oil equivalent per day. Research and development activities with regard to oil shale and tar sands are currently taking place in Jordon, Mongolia, Morocco, and Turkey. The Alberta-Taciuk Processor for surface retorting was tested in Canada the late 1980s, and it has recently demonstrated oil production of 3,700 barrels per day using Australian oil shale. All of the currently-operating oil shale plants are small, with total world production estimated at 10,000 to 15,000 barrels of shale oil per day. Even the RAND Corporation, in its recent analysis of oil shale issues, acknowledges that it is unclear whether any of this global production is profitable, as opposed to being propped up by government subsidies.[5] This paltry amount can be contrasted with today's 84 million barrels of total oil production each day. *The Programmatic EIS should contain an economic analysis regarding whether or not oil shale can be profitable in today's economic and regulatory climate without subsidies.*

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[5] RAND, "Oil Shale Development in the United States: Prospects and Policy Issues," (2005). See enclosed CD or online at http://www.rand.org/pubs/monographs/MG414/.

C. Methods of and Timeline for Oil Shale Development

1. *Mine and Retort Method*

The most-studied method of oil shale development is the conventional "mine and retort" method, though commercial examples of its use are rare indeed and little is publicly known about advancements made since oil shale development was abandoned 25 years ago. Generally, in this development method oil shale is mined through either construction of large open-pit mines or through traditional room-and-pillar underground mining techniques. The ore is then trucked to a separate processing area where the retorting takes place. At this retorting facility, the shale is heated to about 900° F and enriched with hydrogen (via the introduction of superheated steam). The resulting oil is then separated from the waste material. The oil product must then be processed in a refinery and the waste must be disposed of, and the site must be reclaimed.

The minimum size of a commercial oil shale retorting plant, according to the RAND Corporation's report, is 50,000 barrels a day -- and more likely well over 100,000 barrels. Presumably anything smaller than that would not be able to generate a return on investment sufficient to render the plant commercially viable. Because the "Prototype" leasing program undertaken in 1974 was for the production of one million barrels per day, it is implied that the current proposals to develop a "commercial" leasing program would be even larger. *The PEIS must clarify what is meant by "commercial" leasing, as well as the size of a plant needed for commercial operations, taking into consideration inflation, the current state of the technology, costs of regulatory compliance, and all other costs.* At a minimum, the mine necessary to serve such plants would need an annual output of more than 25 million tons. *The PEIS should put this amount into context, describing the surface size and likely impacts from such a mine and comparing it to other mines of similar size.*

Room-and-pillar mining may be practical in the southern portions of the Piceance Basin and portions of the Uinta Basin, because it allows recovery of about 60% of the shale in place for seams that are about 100 feet thick. However, room-and-pillar mining to the rich, deep seams in the Piceance Basin will likely result in low levels of recovery -- less than 20%, and in some cases less than 10%. *The Programmatic EIS should evaluate the likelihood and feasibility of room-and-pillar underground mining in the study area, as well as what impacts it and associated activities would have. Specific impacts to be studied are discussed more fully below, but the BLM should examine all known or foreseeable impacts to groundwater sources from mining and mine waste, impacts to surface water runoff patterns and water quality from mining and waste disposal activities, impacts to air quality (from the mine operation and from outside power sources), impacts to wildlife habitat and fisheries, and impacts to existing uses of the land.*

Surface open-pit mining to reach the rich seams in the Piceance basin is made difficult by the thick deposits, the amount of overburden, and the presence of subsurface water. More than 80% of the resources within the Piceance Basin are covered by more than 500 feet of overburden, and some is beneath over 1,000 feet of overburden and are 2,000 feet thick. Reaching this resource would thus require enormous open-pit mines that would be over 2,000 feet deep. Such mines would be comparable in size to the largest existing open-pit mines in the world. *Again, the PEIS should put this into context by describing such a mine in context with*

existing mines of similar size. As discussed more fully below, the PEIS must evaluate the likelihood of such mines being located in the study area, the reasonable alternatives to such mines, as well as the direct, indirect, and cumulative impacts that are likely to result.

Because oil shale must remain in the hot zone of a retort for about 30 minutes, a retort designed to produce 50,000 barrels of shale oil per day would need to be sized to contain more than 1,500 tons of oil shale at a time -- well beyond the current state of the art. RAND estimates that the first commercial-size units would be designed to produce 10,000 barrels per day, though it acknowledges that even these would likely encounter significant difficulties in the beginning. Unocal built a single retorting plant in the 1970s and early 1980s with a design output of 9,000 barrels a day on private land in the Piceance Basin. This plant encountered serious performance problems, resulting in an average rate of 50% of its design capacity, and it was shuttered in 1991 when faced with a high-cost plant modification. Exxon and the TOSCO Corporation began the Colony Oil Shale Project in 1980, which was designed to produce 47,000 barrels per day using room-and-pillar mining. This system, however, was never tested because the project was cancelled during construction in 1982 (allegedly due to falling crude oil prices, increasing costs at the facility, and high interest rates). When Exxon cancelled the Colony Project in 1982, there were reports that costs of the operation would exceed $5.5 billion -- or about $10 billion in 2005 dollars.

Cost information from projects studied in the 1980s can be escalated to give a rough estimate of the anticipated capital costs for mining and surface retorting plants. Using this approach, RAND found that a first-of-its-kind commercial surface retorting complex designed to produce 50,000 barrels a day (including the mine, retorting plant, upgrading plant, supporting utilities, and spent shale reclamation) would incur capital expenditures of between $5 billion and $7 billion dollars. Given these estimates, RAND found that it was unlikely that oil shale production using the mine-and-retort method would be profitable unless crude oil prices are at least $70 to $95 per barrel (in 2005 dollars). RAND also noted that past cost estimates were based on regulatory standards that are likely out-of-date, and that future plants would likely need to achieve much greater levels of pollution control than those that would have been built in the 1980s. *The BLM should study all available sources in its analysis of the cost of all foreseeable mine and retort operations (including costs of compliance with environmental standards and socioeconomic mitigation) and arrive at reliable estimates of the price at which such operations could be profitable.* This information is necessary so that both the government and the public might better evaluate the feasibility of proposals should they arise, as well as anticipate and prepare for the onset of such an industry.

Mine and retort development of shale resources has obvious impacts on the landscape and communities, as discussed further below. It leaves behind huge open pit mines, creates the risk of long-term water pollution, and generates significant amounts of air pollution. It also presents significant waste disposal challenges from a land-use perspective, since oil shale expands by around 30% after processing in a "popcorn effect" from the heating. Simply put, the spent shale will not fit back in the hole. Waste disposal thus becomes a major issue, given the significant amount of ore that must be processed for a commercial shale operation. *Significant study of the challenges and environmental risks of shale waste disposal was undertaken in the*

1970s and 1980s, and the BLM should review all available sources and document its consideration of their conclusions and recommendations.

Finally, the mine-and-retort method is far from efficient and requires a heavy energy subsidy. According to past studies, at least 40% of the energy value is consumed in production, since the oil shale has to be mined, transported, retorted, and then the by-products disposed of. *The PEIS should evaluate the amount of energy required for production of shale oil using the each of the known retorting methods, evaluating both the operations proposed in the 1970s and 1980s as well as those proposed by recent applicants for oil shale R&D leases. For each of these retorting methods, the PEIS should calculate the ratio of energy produced to energy consumed, and it should provide a clear comparison of the resulting energy efficiency of each.*

2. *In-Situ Method*

In-situ retorting involves heating the shale in place, extracting the resulting oil from the ground, and then transporting it to an upgrading or refining facility. A few methods of in-situ production have been tried and abandoned -- burning a portion of the shale underground to produce heat needed for retorting the remaining shale, or detonating explosions belowground to create space to burn rubblized shale.

Shell has conducted small-scale field tests at the Mahogany Research Project of an in-situ process -- "thermally conductive in-situ conversion" -- that slow-cooks the shale underground for a period of 2-3 years via thermal conduction. According to press accounts, this method requires 15 to 25 heating holes per acre, and the shale is heated to 650-700°F (as opposed to 900° F for surface retorting). The released product (about 2/3 of which is liquid, 1/3 of which is a gas similar to natural gas) is gathered in collection wells within the heated zone. According to Shell, the oil produced by this method will be chemically stable and consist solely of distillable oil fractions (i.e. no lo-value residuum content will be created). *The PEIS should evaluate the environmental and social impacts and costs of upgrading in-situ produced oil, including the impacts of transportation to and operation of refineries.* Shell's assertion that its product has a higher API gravity has not been independently verified, as details have not been made publicly available. In fact, very few details of Shell's proposed methods and their environmental impacts have been provided to the public, and the public knows only what Shell has told newspaper reporters. *The BLM in the Programmatic EIS must provide the public with reliable details of Shell's in-situ conversion process so that the myriad risks and impacts may be objectively evaluated.*

Shell contemplates construction of a "freeze wall" by circulating refrigerated fluid through still more wells drilled around the extraction zone, although it does not appear that this effort has been undertaken. This freeze wall is necessary both to prevent groundwater from entering the extraction zone and to keep hydrocarbons generated by retorting from leaving the perimeter during heating, extraction, and post-extraction cooling. *If the freeze wall has not indeed been constructed to date, it is unclear how Shell has isolated its underground operations from groundwater -- a concern that should be addressed in the PEIS.* Post-production cleanup under Shell's method is said to involve steam flushing to remove remaining mobile hydrocarbons, cooling the ground, removing the freeze wall, and reclaiming the site. The

Department of Energy claims that the steam resulting from flushing the area could be used to generate additional electrical power. Again, though, it appears that this scenario is still strictly theoretical, as the company has not reached the post-production stage. *The PEIS should evaluate the feasibility, costs, and impacts of these claims.*

Shell's current operation at Mahogany is too small to establish the technical or commercial viability of its in-situ conversion process, and Shell has said publicly that it cannot decide whether it is commercially viable for at least another 5-10 years. Shell's method could apparently be implemented in the deepest and thickest portions of the oil shale resource, thereby avoiding the massive open-pit mines necessary for traditional mine-and-retort methods. According to Shell, its process requires thick seams of shale for economic reasons, and a few hundred feet of overburden for environmental reasons (to prevent hydrocarbon escape into the atmosphere). *Again, though, these claims are untested and detailed information is not available at this stage but should be fully considered and discussed in the Programmatic EIS.*

When applied to the thickest portions of the deposits in the Piceance Basin, Shell reports that drilling in about 150 acres per year could support sustained production of a half-million barrels of oil per day, and 500 billion cubic feet per year of natural gas. According to the Department of Energy, the thickest regions of the Piceance Basin would yield in excess of 1 million barrels per acre, and an area of 23 square miles could produce 15 billion barrels over the course of 40 years.[6] *The BLM should conduct its own analysis of the potential yield using Shell's in-situ method as well as the other in-situ methods proposed and evaluated in the 1970s, and it should discuss its findings in the Programmatic EIS.*

Shell reports that the heating energy required for this method equals about 1/6 of the energy value of the extracted product (assuming an average deposit quality of 30 gallons per ton, which is above average in the Piceance Basin). As for energy supplies, Shell is using electric power as the source for down-hole heating at the Mahogany Project. About 250 to 300 kilowatt-hours are required for down-hole heating per barrel of oil produced. Assuming electricity at $0.05 per kilowatt-hour, power costs for heating are between $12 and $15 per barrel of oil produced. Thus an operation producing 100,000 barrels per day requires approximately 1,200 megawatts of dedicated electric generating capacity -- essentially its own coal-fired power plant. RAND notes that while coal is the least expensive choice and is available nearby in abundant quantities, it would result in significant emissions of greenhouse gases and other air pollution. If natural gas were to be used to produce electricity, all of the gas coproduced with the shale oil would be consumed in power generation. Viable combustion technology, however, does not currently exist to heat the shale downhole by burning natural gas. Requirements to sequester carbon dioxide produced by power plants could result in power cost increases of 30%, but RAND states that the net impact on shale-derived oil costs would likely be less than 15%. *The Programmatic EIS should evaluate the amount of energy required for production of shale oil using the each of the known or proposed in-situ methods, and it should calculate and compare the environment impacts of each of the available methods of generating the necessary power for various development scenarios. BLM should make this evaluation for each of the in-situ methods considered in the 1970s and 1980s, as well as those proposed by recent applicants for*

[6] U.S. Department of Energy, "Strategic Significance of America's Oil Shale Resource" (March 2004) at 26; see enclosed CD or online at http://www.evworld.com/library/Oil_Shale_Strategic_Significance.pdf.

oil shale R&D leases. For each of these in-situ methods, the PEIS should calculate the ratio of energy produced to energy consumed, and it should provide a clear comparison of the resulting energy efficiency of each.

Shell anticipates that, in contrast to the cost estimates for surface mining and retorting, its in-situ method will be competitive at crude oil prices in the mid-$20s per barrel. To date, however, Shell has provided very little to support this figure and no independent cost estimates are available. RAND theorizes that this cost estimate is lower than for the mine-and-retort method due to lower reclamation costs (though they are still entirely unknown), lower initial capital expenditures (also entirely unknown and unverified), and lower product upgrading costs because the produced liquids are distillable and contain no residual oil. This, of course, does not take into consideration the potential need to treat groundwater in either the short- or the long-term, or to segregate water from the production zone by maintaining freezewalls in perpetuity. *The BLM should provide information in the PEIS concerning the costs of the various in situ proposals. The PEIS should include a detailed study of the cost of all foreseeable in situ operations (including costs of compliance with environmental standards and socioeconomic mitigation) and arrive at reliable estimates of the price at which such operations could be profitable.* As above, this information is necessary so that both the agency and the public might better evaluate the feasibility of proposals should they arise, as well as anticipate and prepare for the onset of such an industry.

The DOE has apparently reviewed Shell's process and reported that while promising, its technical feasibility hinges on two technical issues: controlling groundwater during production and preventing subsurface environmental problems. The structural integrity of the frozen barrier underground is uncertain, raising questions about whether Shell's thermally conductive in-situ method may change aquifer properties and result in increased hydraulic conductivity. Moreover, once the freezewall is removed, changes in aquifer properties could result in leaching and transport of mineral salts and trace metals that are commingled with oil shale deposits. There are also questions about the fate of hydrocarbon gases that may have migrated beyond the retort zone and whether they might interact with groundwater or be released into the atmosphere. RAND notes that while Shell's small demonstration project at Mahogany may resolve some operational issues in the next five years, "more time may be needed for subsurface environmental monitoring and modeling required to support a decision to begin initial commercial operations." *The BLM must fully evaluate and consider these and other concerns, as outlined below.*

3. *Timeline for Oil Shale Development*

The RAND Corporation acknowledges that "questionable commercial readiness and high production costs pose serious problems that currently prevent oil shale development." RAND estimates that an oil shale production level of 1 million barrels per day is probably more than 20 years in the future, and that a 3 million barrel per day industry is likely more than 30 years in the RAND found that no organization with the management, technical, or financial wherewithal to develop oil shale resources has even come close to announcing its intent to build commercial-scale facilities. Even Shell, who has been working for years on research and development activities on its private land, has said publicly that it would not be able to decide whether its in-

situ methods were commercially viable for at least another 5 years. *Because oil shale is unlikely to be commercially developed in the next 15 to 20 years, we urge the BLM to adopt as an element of the preferred alternative in the PEIS deferral of any leasing program, pending successful demonstration of the environmental, technical, and economic feasibility of potential operations.* As one finds upon review of documents prepared in the 1970s, the utility of an environmental review that is 25 years is limited: regulatory and social environments change, and translating old data to current times is often challenging. Because commercial development is present only on a distant horizon, the Preferred Alternative should defer leasing until more information is known.

The RAND Corporation delineated four stages of commercial development of oil shale. The first, "research and development" is where we appear to currently lie. During this period, no oil shale is being produced, but the industry is testing and confirming technologies. RAND does not make a definitive prediction of how long this R&D phase is, though it acknowledges the significant challenges that must be addressed.

The next phase is "scale-up and confirmation," in which a project capable of producing 1,000 to 5,000 barrels a day might be developed (depending on design and construction timelines). This, it is worth noting, is the stage at which the Colony project was mothballed. Exxon failed in its effort to skip the scale-up and confirmation stage and move directly to full-scale commercial phase, running into significant technical and economic difficulties. RAND estimates that industry will deal with this "scale-up" phase for 6-8 years. Since Shell estimates that it won't know whether to pursue its in-situ technology until 2010, this puts the end of the scale-up phase at 2016-2018 at the very earliest.

Next is "initial commercial operations," which is presumably triggered by a decision to go forward with a first-of-a-kind commercial operation. RAND estimates that such a plant would require 6 to 8 years for design, construction, shakedown, and confirmation of performance, whether surface or in-situ retorting. This estimate assumes that permitting work, land acquisition, and geological analysis will commence during the prior stage -- a hefty assumption given substantial existing uncertainties. By the end of this stage, the first few operations could be in place, collectively producing a few hundred thousand barrels per day of shale oil. Remember that using Shell's in-situ method, each 100,000 barrels per day requires 1,200 megawatts of new energy, presenting even further challenges of energy generation that should be addressed in the PEIS.

Finally, 12 to 16 years after the decision to pursue process scale-up and confirmation, industry might hope to reach the "production growth" stage. RAND assumes that once commercial operations are underway, 200,000 barrels per day of increased production capacity can be added each year, which is no small feat -- especially given the significant energy needs. Nevertheless, RAND predicts that total production could reach 1 million barrels per day seven years after industry enters this stage, 2 million barrels per day in 12 years, and 3 million barrels in 17 years. Thus even under RAND's rosy predictions, an oil shale production level of 1 million barrels per day is probably more than 20 years in the future, and 3 million barrels per day is probably more than 30 years in the future.

II. LEGAL FRAMEWORK

A. National Environmental Policy Act (NEPA)

The following discussion is intended to help guide the BLM in its interpretation of its responsibilities to comply with the National Environmental Policy Act (NEPA), as directed by the Energy Policy Act, Pub. L. 109-58, Title III, Sec. 369(d)(1), *codified at* 42 U.S.C. § 15927(d)(1).

The National Environmental Policy Act, 42 U.S.C. §§ 4321-4370d, is "our basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a). Federal agencies are expected to "act according to the letter and spirit of the Act," and they must also read the Act and regulations from the Council on Environmental Quality ("CEQ"), Id. at §§ 1500-1508, together as a whole in order to comply with NEPA. Id. at §§ 1500.1(a), 1500.3. NEPA's purpose is to promote efforts "which will prevent or eliminate damage to the environment," 42 U.S.C. § 4321, to inform the public of environmental consequences, 40 C.F.R. § 1500.1(b), and to "help public officials. . . take actions that protect, restore, and enhance the environment." Id. at § 1500.1(c); see also Northcoast Envtl. Center v. Glickman, 136 F.3d 660, 666 (9th Cir. 1998). NEPA documents are to "concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail." Id. at § 1500.1(b).

NEPA requires federal agencies to prepare a detailed statement on the environmental impacts of a proposed "major federal action" and all of the reasonable alternatives thereto before authorizing any such action. 42 U.S.C. § 4332(2)(C). An agency proposal for major federal action exists for NEPA purposes "at that stage. . . when an agency subject to [NEPA] has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated." Id. at § 1508.23. Such a proposal "may exist in fact as well as by agency declaration that one exists." Id. As the Tenth Circuit and the Supreme Court have recognized:

> NEPA's intent is to 'focus[] the agency's attention on the environmental consequences of a proposed project,' to 'guarantee[] that the relevant information will be made available to the larger audience that may also play a role' in forming and implementing the agency's decision, and to provide other governmental bodies that may be affected with 'adequate notice of the expected consequences and the opportunity to plan and implement corrective measures in a timely manner.

Davis v. Mineta, 302 F.3d 1104, 1114 n.5 (10th Cir. 2002) (quoting Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349-350 (1989)). The overriding thrust of NEPA is to ensure that environmental concerns be "integrated into the very process of agency decision-making." Andrus v. Sierra Club, 442 U.S. 347, 350 (1979). An EIS is intended to accomplish the "objective and thorough evaluation of the environmental impact of a proposed project." Environmental Defense Fund, Inc. v. Andrus, 619 F.2d 1368, 1375 (10th Cir. 1980).

NEPA imposes action forcing procedures requiring agencies to take a "hard look" at environmental consequences of a proposed action and all reasonable alternatives. An EIS must

"study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2)(E). The analysis of alternatives is "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. A federal agency preparing an EIS is required to "[r]igorously explore and objectively evaluate" a full range of reasonable alternatives, including those not within the jurisdiction of the lead agency, and devote "substantial treatment to each alternative considered in detail," while briefly discussing the reasons for eliminating other alternatives from detailed study. Id. "No decision is more important than delimiting what these 'reasonable alternatives' are." Simmons v. U.S. Army Corps of Engineers, 120 F.3d 664, 666 (7th Cir. 1997).

> One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence). The federal courts cannot condone an agency's frustration of Congressional will. If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the agency satisfy the Act.

120 F.3d at 666. Accordingly, "[t]he broader the purpose [of an EIS], the wider the range of alternatives; and vice versa." Id.

A NEPA document must include an analysis of three types of actions and three types of impacts. 40 C.F.R. §§ 1508.25, 1508.7, 1508.8. First, it must consider actions that are "connected," those that are "cumulative," and those that are "similar." Id. at § 1508.25(a)(1)-(3) (definitions). Connected actions are those which are "closely related," including those that "[c]annot or will not proceed unless other actions are taken," or those that are "interdependent parts of a larger action and depend on the larger action for their justification." Id. at § 1508.25(a)(1). Cumulative actions are those that "have cumulatively significant impacts and should therefore be discussed in the same impact statement." Id. at § 1508.25(a)(2). Similar actions include those that have "common timing or geography." Id. at § 1508.25(a)(3). In order to assess "significance," NEPA requires consideration of "[w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts." Id. at § 1508.27(b)(7).

The three types of impacts to be studied in an EIS are those that are "direct," "indirect," and "cumulative." Id. at 1508.25(c); see also id. at §§ 1508.7, 1508.8 (definitions). Direct effects are those that are caused by the action and occur at the same time and place. Id. at § 1508.8(a). Indirect effects are those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." Id. at § 1508.8(b). A project's "cumulative impact," is

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions . . . . Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Id. at § 1508.7. See also Neighbors of Cuddy Mountain v. U.S. Forest Service, 137 F.3d 1372, 1379 (9th Cir. 1998) (stating that with respect to a cumulative impacts analysis, an agency must provide "some quantified or detailed information" because "[w]ithout such information, neither courts nor the public . . . can be assured that the [agency] provided the hard look that it is required to provide.").

Agencies often deal with proposals and alternatives for which necessary information on environmental impacts is incomplete, and NEPA regulations elaborate upon the responsibilities of an agency in such a situation. See 40 C.F.R. § 1502.22. Agencies *must obtain* that information if it is relevant to a reasonably foreseeable significant impact, is essential to a reasoned choice among alternatives, and the overall cost of obtain it are not exorbitant. Id. at 1502.22(a); Colorado Envtl. Coalition v. Dombeck, 185 F.3d 1162, 1172 (10th Cir. 1999). See also, Davis v. Mineta, 302 F.3d 1104, 1114 n.5 (10th Cir. 2002) (NEPA is intended to focus the agency's attention to environmental consequences and to provide relevant information needed for forming and implementing an agency decision); Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208, 1216 (9th Cir. 1998) (impacts analysis under NEPA should be done up front so that an agency "will not act on incomplete information only to regret its decision after it is too late to correct.").

NEPA requires the BLM to conduct an "early and open" process for determining the scope of an EIS, and for identifying major issues related to a proposed action. 40 C.F.R. § 1501.7. The agency is required to respond to comments submitted on the scope and content of an EIS by federal, state, and local agencies, Indian tribes, and the public. See Westlands Water Dist. v. U.S. Dept. of Interior, 376 F.3d 853, 864 (9th Cir. 2004); Colorado Wild, Heartwood v. U.S. Forest Service, -- F.3d __, 2006 WL 122468 (10th Cir. 2006). .

B. Federal Land Policy and Management Act (FLPMA)

Any policies toward the leasing and development of oil shale on federal public lands managed by the Bureau of Land Management must also comply with relevant aspects of the Federal land Policy and Management Act (FLPMA). Congress enacted FLPMA, 43 U.S.C. §§ 1701 et seq., "to provide guidance and a comprehensive statement of congressional policies concerning the management of the public lands." Rocky Mtn. Oil and Gas Ass'n v. Watt, 696 F.2d 734, 737 (10th Cir. 1982). FLPMA establishes a policy of "multiple use" management pursuant to which BLM must "recognize competing values," which is to be done by "using the Act's procedures in a dynamic, evolving manner to accommodate these competing demands." Id. at 738; see also 43 U.S.C. §§ 1701 and 1702(c).

FLPMA directs BLM to manage public lands for multiple uses and sustained yield. 43 U.S.C. § 1732(a). The Secretary is required to "use and observe the principles of multiple use and sustained yield" in developing and revising land use plans. Id. at 1712(c)(1). "Multiple use" is defined as managing the lands so that the various resources (recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values) are utilized in the combination that will best meet the present and future needs of the public, id. at 1702(c), while "sustained yield" is defined as managing to maintain regular renewable resource

outputs in perpetuity. Id. at 1702(h). See also Public Lands Council v. Babbitt, 529 U.S. 728, 738 (2000) (discussing standards); Pennaco Energy, Inc. v. U.S. Dept. of Interior, 377 F.3d 1147, 1151 (10th Cir. 2004) (same).

Congress directed BLM to conduct inventories of the public lands and to incorporate those inventories into management decisions. 43 U.S.C. §§ 1711(a) (inventories), 1712 (resource management planning). Congress also required that BLM "take any action necessary to prevent unnecessary or undue degradation of the lands." 43 U.S.C. § 1732(b). Resource Management Plans must "provide for compliance with applicable State and Federal air, water, noise, and other pollution standards or implementation plans." 43 U.S.C. § 1712(c). Implementing regulations specifically require that BLM ensure compliance with federal and state air quality standards. See 43 C.F.R. §§ 2920.7(b), 3162.5-1.

C. Mineral Leasing Act (MLA)

Provisions of the Mineral Leasing Act of 1920 give the Interior Department the authority to lease deposits of oil shale, as well as areas of the surface necessary for their extraction, 30 U.S.C. § 241(a)(1), though leasing is not required and cannot be compelled. Mecham v. Udall, 369 F.2d 1 (10th Cir. 1966). Nothing in the Energy Policy Act of 2005 changed this structure, and it is important to bear in mind that the conveyance of publicly-owned oil shale resources remains an entirely discretionary activity under the Mineral Leasing Act. See 42 U.S.C. § 15927(e) (Secretary of Interior "*may* conduct a lease sale in that State under the commercial leasing program regulations.") (emphasis added). Oil Shale leases are limited in size under the Mineral Leasing Act to 5,760 acres. Id. at §241(a)(2).

The Department, however, does not have regulations authorizing it to issue federal commercial oil shale leases. Though regulations were proposed in 1983 to establish such a leasing program, see 48 Fed. Reg. 6510 (February 11, 1983), these regulations were never adopted. The Energy Policy Act directed the Interior Department to adopt regulations establishing a commercial leasing program within 6 months of completion of the PEIS. 42 U.S.C. § 15927(d)(2). *This letter contains several suggestions for the content of these regulations, and we request that these suggestions be placed in the administrative record for their consideration.*

D. National Historic Preservation Act (NHPA)

Another statute that the BLM must take into consideration in assessing the impacts of an oil shale or tar sands leasing program is the National Historic Preservation Act (NHPA). The NHPA provides that "a Federal agency shall consult with any Indian tribe. . . that attaches religious and cultural significance" to a historic property when a federal undertaking may affect that property. 16 U.S.C. § 470a(d)(6)(B); 36 C.F.R. § 800.2(c)(2)(ii). Agencies must consider the effect of federal "undertakings" on sites eligible for inclusion on the National Register through detailed consultation requirements. 16 U.S.C. § 470f; 16 U.S.C. § 470a(d).[7]

[7] "Undertaking is defined broadly to mean "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency." 16 U.S.C. § 470w(7); 36 C.F.R. § 800.16(y). "Undertaking" includes Federal land use planning which

Tribal consultation should be conducted concurrently with NEPA analyses, as historic and cultural resources are expressly included among the factors to be considered in an EIS. 36 C.F.R. § 800.8. Agencies are required to make good faith efforts to identify historic properties by conducting "background research, consultation, oral history interviews, sample field investigations, and field surveys." 36 C.F.R. § 800.4. BLM is required to "take into account past planning, research and studies, the magnitude and nature of the undertaking and the degree of Federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties with the area of potential effects." Id.[8] Relatively undisturbed, culturally significant areas of the natural world, such as a mountain peak, butte, body of water, or valley, may be considered traditional cultural properties.[9] "Consultation" on historic properties of significance to Indian tribes includes making the tribe a "consulting party" and providing the tribe "a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects." 36 C.F.R. § 800.2(c)(2)(ii).

III. ISSUES TO BE EVALUATED IN PROGRAMMATIC EIS

The following discussion sets out several of the environmental issues that the BLM should address in the Programmatic EIS in order to comply with current legal interpretation of agency responsibilities for preparation of a Programmatic EIS under NEPA. While commentors have attempted to be comprehensive in raising these issues, public understanding of the resource, the technology needed to produce it, the likely scenarios of its development, and the potential environmental and social impacts that would result is at an all-time low. In conducting research for this letter, commentors researched and reviewed several past studies and discovered that the state of public and scientific understanding of oil shale development and its impacts was actually significantly higher twenty-five years ago than it is today. To facilitate the BLM's identification and consideration of impacts to be evaluated in the Programmatic EIS, commentors have attached several of these past studies. While we have not attempted to repeat all of the findings and conclusions of these studies in this letter, *we do hereby incorporate the issues raised in the attached documents by reference, and we respectfully request that the BLM consider and address the contents of the attached studies in preparing the Draft Programmatic EIS.*

A. The PEIS Must Evaluate and Consider the Environmental Baseline of the Area.

In 1971, the Department of Interior initiated the Prototype Oil Shale Leasing Program, and it completed the final EIS on the Program in 1973. Among other things, the Prototype

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serves to "restrict the subsequent consideration of alternatives to avoid, minimize or mitigate the undertaking's adverse effect on historic properties." 36 C.F.R. § 800.1(c).

[8] Criteria for sites eligible for listing on the National Register of Historic Places is set forth at 36 C.F.R. § 60.4. NHPA explicitly provides that "properties of traditional religious and cultural importance" to American Indian tribes may be eligible. 16 U.S.C. § 470a(d)(6)(A).

[9] See Patricia L. Parker & Thomas E. King, U.S. Dep't of Interior, National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties at 1 (1990); available at http://www.cr.nps.gov/nr/publications/bulletins/nrb38/.

Program was supposed to answer questions regarding the environmental baseline of the oil shale region. Though the program failed when leases were abandoned, the utility of an environmental baseline -- updated to today's on-the-ground reality -- remains a necessary element preceding oil shale leasing.

The PEIS should evaluate the site-specific environmental baseline conditions documented in the 1973 EIS. Specifically, BLM should evaluate and update, if necessary, the hydrological findings made in that and other contemporary documents, especially with regard to the important hydrological findings made and the unexpected quantities of groundwater which would need to be removed prior to mining or in-situ processing. The PEIS should also evaluate and update where necessary the air quality baseline conditions set out in the 1973 EIS, including the finding that baseline conditions potentially violated ambient standards. Because of the Prototype Program's failure to determine actual impacts, and because of likely changes in technology, new baselines, operational and post-abandonment monitoring must be required, and results of such monitoring must be publicly available and accountable. Consistent with our recommendation that the Preferred Alternative defer a commercial lease sale until viable development technologies are proven and tested, we also recommend that BLM postpone holding any lease sales or authorizing development activities until a rigorous baseline air quality dataset can be collected.

Moreover, BLM in the PEIS should establish that any new leasing program for oil shale or tar sands resources would require new site-specific environmental baseline measurements, like those required for the Prototype Leasing Program, as well as operational and post-abandonment monitoring. Because much of the Prototype baseline monitoring is now out of date due to changes in the communities and the increasing prevalence of other oil and gas activities in the region, new baseline information must be gathered and presented to the public. *The PEIS baseline monitoring must include information on air quality (both near communities and in nearby Class I airsheds under the Clean Air Act), water quality (especially with regard to current salinity levels), water quantity (including the status of or availability of water rights for shale development), socio-economic baseline, Wilderness values, scenic and aesthetic values, wildlife habitat, uses of the federal land at issue, and cultural resources present in areas with potential for shale development. In addition to conducting this review of baseline conditions for the Programmatic EIS, the BLM must update other agency planning documents with current baseline conditions, especially in light of widespread recent increases in population and oil and gas activities in oil shale region.*

B. The PEIS Must Evaluate Impacts to Water Resources

The Programmatic EIS must evaluate the direct, indirect, and cumulative impacts of oil shale or tar sands leasing and development on the quantity and quality of surface and sub-surface water resources of the region. Large-scale oil shale or tar sands activities in the Green River Formation would have significant impacts on the scarce water resources of the region. Oil shale and tar sands extraction and processing requires huge amounts of water, leading the RAND Corporation to the conclusion that water availability would be a major constraint on large-scale oil shale development. Moreover, each of the currently-discussed methods of processing oil shale would generate the release of significant amounts of various pollutants, and the disposal of

spent shale has the potential to greatly increase the salinity and other attributes of waters in the region such as chlorides and sulfates. *Impacts to water resources -- both on the quantity and quality of surface and ground waters -- must be a matter of much focus and study as the BLM prepares the Programmatic EIS on oil shale and tar sands leasing.*

1. Impacts to Water Supplies

a. *Water Requirements for Mining and Retorting*

The PEIS must include a comprehensive review of the water requirements associated with the various mining, retorting, and processing technologies that are being considered for oil shale and tar sands. This information should be used in the formulation of alternative leasing programs to be considered in the PEIS.

A review of the literature indicates that there was extensive research on the water requirements of oil shale facilities and on possible sources of water for energy development in the Upper Colorado River Basin done in the 1970s and 1980s, producing myriad reports, including those attached hereto and incorporated by reference. For both surface and in-situ retorting processes, the literature estimates of water requirements vary significantly by technology and even for specific technologies from one researcher to the next. *Because current retorting or development technologies may be significantly different from those previously tested, new research is required in the Programmatic EIS to determine the actual water requirements of oil shale mining and retorting.*

Estimates of the annual water requirements (consumptive use) for retort processing, based upon technologies under consideration in the 1970s, ranged from 3,500 to over 12,000 acre-feet for production of 50,000 barrels per day. This includes water consumption associated with dust control, scrubbing of off-gasses, hydrogenation, evaporative cooling, disposal, cooling and compaction of spent shale, revegetation of spent shale and other miscellaneous plant uses. The U.S. Water Resources Council estimated in 1981 that oil shale development would increase annual consumptive water use in the Upper Colorado River Region by about 150,000 acre-feet per year for each million barrels of oil produced. This comes to about three barrels of water to each barrel of oil produced from shale. Other estimates range from 2.1 to 5.2 barrels of water per barrel of shale oil produced. The OTA's 1980 report on oil shale dedicated 50 pages to water availability issues, finding that production of 50,000 barrels a day would consume 4,900 to 12,300 acre-feet per year of water, and that production of a million barrels a day would require about 170,000 acre-feet per year. The OTA estimated that development of a million barrel a day industry would require construction of new reservoirs and pipelines in the White River basin capable of storing and delivering between 180,000 and 230,000 acre feet of water.[10]

The estimated annual water requirements for in-situ retorting vary from 2,000 to 5,000 acre-feet per year (consumptive use) for production of 50,000 barrels per day. In-situ technologies may consume less water because the disposal, cooling, compaction and revegetation of spent shale would be reduced or avoided. RAND found that for Shell's proposed in-situ method, "reliable estimates of water requirements will not be available until the

[10] Office of Technology Assessment (1980) at 360.

technology reaches the scale-up and confirmation stage." Again, Shell says it will not make this decision for at least five years. Nonetheless, it can be forecast that considerable volumes of water will be needed for extraction, installation and maintenance of the freeze-wall, steam for heaters, post-extraction cooling, product refining, and power production.

Based upon estimates from previous studies of methods being considered in the 1970s and 1980s, it is apparent that the consumption of water associated with production of 50,000 barrels per day could range from a minimum of 2,000 acre-feet to 12,300 acre-feet per year. The EIS for the Prototype Oil Shale Leasing Program estimated that the consumptive water requirements for a one million bbl/day industry at 79,300 – 124,000 acre-feet per year. *The BLM must include, explain, and, if necessary, update these figures in the PEIS.*

Tar sands extraction and processing requires approximately three barrels of water for each barrel of oil produced, indicating that production of 50,000 barrels per day oil would require about 7,000 acre-feet of water. Extrapolation of these water requirements to "commercial" production of one million bbl/day oil from tar sands would require about 140,000 acre-feet of water. Combining this estimate with the mid-range water requirements for production of one million bbl/day shale oil indicates that the total water required for a "commercial" scale production rate of 2 million barrels per day would be about 240,000 acre-feet per year.

b. *Water requirements related to population growth*

Any leasing program that occurs will drive a variety of other water requirements in addition to those associated with mining, retorting, processing and reclamation. Population growth will increase domestic and commercial water demands supplied primarily by municipal water systems. The growth of electricity demands and associated coal mining and power plants will require water for cooling, dust control and possibly for revegetation. Previous studies have indicated that the consumptive use of water associated with these water requirements would be about 15 to 20 percent of the amount consumed by the mining and production related water requirements.

The PEIS must include a comprehensive analysis of the additional water requirements associated with oil shale- and tar sands-related population growth and energy requirements. The location of population centers associated with alternative leasing program configurations must be thoroughly addressed in the PEIS in order to identify the alternative sources of supply for meeting all of these water demands.

It is important to note that the additional 250,000 to 300,000 acre-feet of consumptive use of water in the Upper Colorado River Basin will also result in reduction in downstream hydropower generation which must be replace by other power generation facilities that will also need water. *The impacts of this loss of hydropower and how it will be replaced should be addressed in the PEIS.*

c. *Water supplies of the region*

The previous forecasts of water needed for development of oil shale or tar sands versus water available should be updated in the Programmatic EIS, given the population and industrial growth that has occurred in the region. Demands on the water of the Colorado River Basin have risen considerably since the 1970s and 1980s, with rapid growth in the Southwest, rising demand for electric power, increased recreational use, and increased efforts to understand and restore the river's ecosystems and river-dependent species. Moreover, an extended drought and subsequent drawdown of reservoirs exacerbate the likely conflict between a new oil shale or tar sands industry with other uses downstream. *The PEIS should evaluate current and future demands on water supplies in the region from all existing and future uses, evaluate the amount of water needed for potential methods of shale or sands extraction and development, and provide estimates of the amount of water currently available in the region and the impact on these resources from oil shale or tar sands activities, both research and development and commercial.*

Because of increasing demands and a recent series of dry years with significant declines in reservoir storage, there are at present a variety of studies, discussions and negotiations underway regarding the management and allocation of Colorado River water resources between the Upper and Lower Basins and within the basin states. *Because of their relevance to the availability of water supply for oil shale and tar sands development, the issues under discussion in these negotiations should be described, and their implications for water supply should evaluated in the PEIS.*

Existing demand (without exploitation of oil shale and tar sands) for water within the Upper and Lower Basins of the Colorado River may already be approaching, and possibly exceeding the firm supply in the region. *The PEIS should therefore include a thorough analysis of the remaining water available for development and consumption under the compact entitlements of each of the Upper Basin states. This analysis should address the potential impacts of severe and sustained drought and assess the risks to the oil shale and tar sands development industries associated with such drought. In addition, the PEIS should address the water supply implications of projected decreases in precipitation and changes in precipitation patterns associated with climate change.*

Because 70 to 80 percent of the streamflow in the Upper Basin states occurs during spring snowmelt, the development of surface water sources for oil shale and tar sands development would require construction of large water storage reservoirs. Most of the potential dam sites for such storage reservoir have been identified in previous studies. Development of such water storage and diversion facilities would result in major changes in instream flow and would likely have significant impacts on fisheries and instream flow dependant recreational uses. *These impacts should be quantified and evaluated in the PEIS.*

In the 1996 RMP for the White River Resource Area, the BLM found that oil shale development would result in up to an 8.2 percent reduction in the annual flow of the White River at the confluence with the Green River, with some or all of the water used in oil shale development irreversibly lost to agriculture over the short term. These low flows would concentrate total dissolved solids, increasing salinity contribution to the Colorado River Basin

which is significant with respect to agriculture, public health, recreation, fisheries, and economics (discussed further below). *The PEIS should review these findings and update them given current flows, particularly since the hydrology has changed and "average" flows have dropped accordingly in many places, as well as any growth in communities or other industrial activities that has occurred since 1996. The PEIS should provide reliable estimates of reductions in flows from the White River or other waterbodies, as well as reductions in groundwater supplies, and what effects such reductions would have.*

d. *Effects of decreased flows*

Decreases in water flows would have significant impacts on fisheries of the Colorado River System. The 1996 White River RMP found that developing a large-scale shale oil industry in the Piceance would require significant water resources, which "would result in the permanent loss or severe degradation of nearly 50% of BLM stream fisheries." Thus a critical issue related to the water requirements of a "commercial" oil shale and tar sands leasing program is the potential for impacts on critical habitat for the endangered humpback chub, bonytail, Colorado Pikeminnow and razorback sucker. *The potential water depletions associated with the proposed leasing program would greatly exceed the depletions that are anticipated under the Recover Implementation Program for the endangered fish and must be thoroughly studied in the PEIS. In addition, the development of water supply facilities to serve mining, retorting and production facilities could directly impact occupied critical habitat for these endangered fish in the Colorado River mainstem, the White River, the Yampa River and the Green River. This, too, must be analyzed in the PEIS.*

The federal government, states and water users in the Upper Colorado River Basin have invested over $150 million in the Endangered Fish Recovery Program to improve fish passage, protect and improve bottomland habitat, and enhance streamflows. In the 15-mile reach of the Colorado River, above the Gunnison River confluence, streamflows are already at critically low levels for the endangered fish due to existing upstream diversions and depletions. *The PEIS should thoroughly address the potential impacts of the proposed oil shale and tar sands leasing and development on the endangered fish and the Recovery Implementation Program.*

Moreover, the BLM found in the White River RMP that augmentation of appropriated water reserves would not sustain current fishery conditions, and that mitigation of these impacts would likely entail "off-site compensation strategies," thought it did not purport to predict what those might be or estimate their effectiveness. Surface disturbance, base flow reductions, and long-term aquifer disruption were found to result in the loss of 35% of Colorado River cutthroat trout fisheries. The BLM wrote:

> It is likely that full scale oil shale development would reduce base flows of occupied cutthroat trout streams through surface water diversion or disruption of groundwater systems. Although minimum in-stream flows are protected in most occupied streams, current fisheries potential would likely adjust (i.e., down-size) to diminished stream capacity. This reasoning would also extend to populations of other candidate species with aquatic, wetland, or riparian affinities in the Piceance and Douglas/Cathedral GRAs (e.g., potential western boreal toad populations.

1996 White River RMP/FEIS at 4-45. The Colorado River cutthroat is currently down to about 5% of its historic habitat. *Again, the PEIS should update these findings with current fisheries data, and it should give reliable estimates on the impacts of water withdrawals on fisheries -- including Colorado River cutthroat trout fisheries.*

We urge the BLM to thoroughly evaluate the direct, indirect, and cumulative impacts to both regional surface- and regional groundwater supplies, from known and likely mine-and-retort and in-situ development methods of oil shale or tar sands. The PEIS should evaluate how much water is needed for each of the stages of development for the various mine-and-retort technologies. It should also analyze the likely effects of water withdrawals for surface mining and retorting, as well as water use for construction of and maintenance of the freeze wall for in-situ development, including for cleaning and reclaiming the underground site. In doing so, BLM should consider impacts from research and development as well as commercial activities. The PEIS should also look at impacts to other water uses from withdrawals for shale development (including "secondary" demands for water from, for example, new electric power sources), including communities, agriculture users, instream flows, and in light of projections from future demands from downstream uses and users.

e. *Alternative water supply sources*

Because of the limited local and regional water supplies, and the existing competition for them, consideration of all of the potentially available sources of the water required for primary and secondary purposes associated with oil shale and tar sands development must be a major element of the PEIS. Consideration must be given to both physical and legal availability of water from various sources so that the impacts can be evaluated and disclosed.

Previous studies have investigated many alternative sources of water supply for energy development in the Upper Colorado River Basin including:

1. Development of surface water supplies through the use of original appropriations or the purchase of conditional water rights from others;

2. Purchase of unsold water from existing Bureau of Reclamation reservoirs;

3. Purchase and transfer of surface water rights from existing agricultural water users;

4. Development of groundwater;

5. Improvements in the efficiency of existing agricultural and municipal uses and transfer of the saved water;

6. Weather modification to increase precipitation and streamflows; and

7. Forest clear-cutting and other vegetation management techniques to increase runoff volume.

The PEIS should include a comprehensive review of the availability and reliability of these and any other contemplated water supply sources that may be considered.

The ability to increase local and regional water supplies by weather modification and vegetation management is unclear. Although studies and attempts by various parties to increase streamflow by such methods continue, the results and temporal and regional consequences of such efforts have not been definitively determined. Even if either or both of these methods are demonstrated to be effective, however, there are major institutional and legal issues that must be addressed to clarify ownership, management and allocation of the additional flows that are claimed as a result of weather modification and vegetation management.

A potentially significant water supply source for energy development that has not been previously evaluated is water conservation by existing Colorado River Basin water users, including those users which transfer water out of the basin to the Colorado Front Range for municipal, industrial and agricultural purposes. *The PEIS should evaluate this as a potential water source for oil shale or tar sands activities.* These out-of-basin Colorado River water users include, for example, the Northern Colorado Water Conservancy District, Denver Water, and the Southeastern Colorado Water Conservancy District, each of which could implement more stringent water conservation programs to diminish their demands for Colorado River water. Water not diverted from the basin could then be delivered downstream to help satisfy the new water demands associated with energy development. These deliveries could be managed to enhance water quality and instream flows between the historical points of transmountain diversion and the new downstream points of diversion. This arrangement could serve to mitigate some of the impacts on water resources associated with energy development.

f. *Impacts on surface and groundwater flow patterns*

Ground disturbance associated with the mining of oil shale and tar sands and the disposal of spent shale and sand will cause major topographic changes over vast areas of land. For example, above ground retorting processes for oil shale produce large quantities of spent shale. Using the TOSCO II process, it was estimated that the volume of spent shale from a 250,000 bbl/day industry would cover an area of more than 44,000 acre-feet annually. These topographic modifications will change surface and ground water flow patterns, ground water infiltration, and surface runoff rates. *These changes could adversely impact downstream water rights and water users and should be addressed in the PEIS.*

The potential for groundwater development to supply the large quantities of water required for oil shale and tar sands development should be considered together with the associated hydrological, economic and environmental consequences. Although mine dewatering may, depending upon legal and administrative decisions and considerations, be regarded as a potential source of water, there are a variety of physical and legal consequences associated with mine dewatering. These include surface and subsurface hydrological and water quality impacts on neighboring surface and groundwater resources and the related environment, and related legal issues associated with injury to other water rights holders. *Instream flows, wetlands, and water quality could also be impacted, with consequences for several threatened and endangered species found in the Upper and Lower Colorado River Basin, and these must be analyzed in the PEIS.*

g. *Water rights*

The water required for direct and indirect needs associated with the exploitation of oil shale and tar sand resources in Colorado, Wyoming and Utah are cumulatively large enough so that they could significantly affect the management of water in each of the states in which the deposits are found.

A large proportion of the most reliable surface water sources are owned by existing users. The purchase and transfer of existing surface and subsurface water rights from existing users may lead to significant impacts on both the existing characteristics of the hydrological system, and the existing socioeconomic and cultural values of the area. This is because the water rights may be transferred from existing uses, (such as agriculture, presently the largest use of water in the Upper Colorado River Basin). *The primary and secondary economic, social, environmental and cultural consequences of such transfers should be addressed in the PEIS.*

A number of conditional water rights are owned by interests and parties associated with oil shale development in Colorado for significant quantities of water. *Although additional actions must be taken prior to approval by the water courts to "perfect" these conditional rights before they can be used, it is not clear what the impacts of the perfection and use of such conditional water rights would have on the existing water users in the Colorado River Basin, and this should be investigated as part of the PEIS.* There have been significant changes in the use and demand for water since many of the oil shale-related conditional water rights were decreed. These include the increased use of water for real estate development, tourism, and snowmaking at ski areas, and the establishment of recreational in-stream diversion arrangements for water-based recreation, to name a few examples. *The impact of changes in water supply availability for these users and the local economy that would be associated with the development and use of conditional water rights should be addressed in the PEIS.*

The OTA found that potential oil shale investors claimed in 1968 to own enough water to produce several million barrels per day. Oil companies in Colorado appeared to have acquired conditional water rights for eventual oil shale development, and they have been found to have exercised reasonable diligence and met the "can and will" test regarding these rights. See Municipal Subdistrict, Northern Colorado Water Conservancy District v. Chevron Shale Oil Co., 986 P.2d 918 (Colo. 1999) (en banc); Municipal Subdistrict, Northern Colorado Water Conservancy District v. OXY USA, Inc., 990 P.2d 701 (Colo. 1999) (en banc); Municipal Subdistrict, Northern Colorado Water Conservancy District v. Getty Oil Exploration Co., 997 P.2d 557 (Colo. 2000) (en banc). *The PEIS should evaluate the legal status of any conditional water rights for shale development, and provide estimates not only of water that would be required, but also where that water would be likely to come from and the direct, indirect, and cumulative impacts that its use would have.*

2. Impacts to Water Quality

The potential impacts to water quality from shale development -- from both above- and below-ground mining and retorting and in-situ development of oil shale, and any development of tar sands -- are significant and must be thoroughly analyzed in the Programmatic EIS. The

PEIS must analyze impacts to surface water quality, especially from increases in salinity from water withdrawals and from runoff from spent shale. The PEIS must also analyze impacts to the quality of ground water and drinking water supplies from oil shale or tar sands development, especially from the migration of toxics or hydrocarbons or from changes in the groundwater conductivity patterns resulting from in-situ development.

It is clear that production of oil from oil shale or tar sands will produce substantial quantities of wastewater. This water will arise from mine dewatering, shale retorting and shale oil refining or processing. Potential sources of pollution from the mine-and-retort method include mine drainage; point-source discharges from surface operations associated with solids handling, retorting, upgrading, and plant utilities; and leachate from spent shale. *State of the art waste treatment technology for mining operations and petrochemical processing could be applied to help control emissions from the mine itself, and the effectiveness, availability, and likelihood of such measures must be analyzed in the PEIS.* During the experimental shale oil production efforts of the 1970's and early 1980's considerable research was done on the amount and characteristics of wastewater that would be produced by an oil shale extraction and processing industry. Again, some of this research is attached to this comment letter and incorporated by reference. Because current production technologies may differ substantially from those involved in that experimental industry, this information must likely be updated for design of wastewater handling and treatment processes. *Considerable new research must be done in the PEIS to characterize the waste waters that will be produced by the proposed shale recovery and retorting processes and from tar sands facilities.*

It is important to recognize that in contrast to the situation of conventional industrial waste treatment, there is no body of knowledge and technology that will allow the reliable design of effective waste treatment and disposal processes. The development of a reliable design will require a considerable amount of research and testing. This infrastructure must be developed before an industry of any significant size is allowed to develop and the timing of this development must be considered in evaluating the future impacts of an oil shale industry.

In addition to wastewater directly produced by extraction and processing, significant water quality impacts can result from the alteration of natural surface and groundwater systems associated with mining, dewatering and water supply activities. Another significant threat to water quality is likely the spent shale leachate, which will contain toxics such as arsenic and selenium and will increase salinity in local waters. The 1996 Final White River EIS and RMP likewise found that oil shale development could result in leachates having high levels of inorganic and organic constituents that would be carried by ground water to Piceance and Yellow Creeks, deteriorating the quality of these streams.

In the scoping and preparation of the PEIS, it is critical to recognize the established fundamental fact that energy developers have often found that is economically unsound to implement the measures needed to comply with water quality standards. Energy developers thus often consider themselves exempt from the NPDES permitting requirements that are commonly applied to other industries. *The assessment of water quality impacts in the PEIS therefore cannot be based upon the assumption that existing water quality regulations under the Clean Water Act will be adhered to or enforced.*

The following potential water contaminant sources should be thoroughly evaluated and addressed in the PEIS.

a. *Mine dewatering*

An important source of contaminated wastewater that should be considered in the PEIS is mine dewatering. Previous work indicated that the mine waters may require treatment to remove fluoride.[11] These waters must be collected, treated and properly disposed of or reused. Because of the long-term effects of aquifer dewatering, the impacts of mine dewatering on adjacent aquifers and well water users must be understood. *The PEIS must analyze these long-term effects, and it must analyze available alternatives to mitigate these effects.*

b. *Mine design and reclamation*

Mine excavation for the removal of oil shale and tar sands will have significant impact on surface and ground water. *The PEIS must consider the impact of mine abandonment on the hydrogeology and water quality of adjacent groundwater sources. This should include the long-term effects of oxidation and biological activity in the exposed workings.*

Mine excavation, rock fracturing, in-situ retorting, dewatering, rehabilitation and groundwater resource development all have the potential to alter groundwater flows and characteristics with possible adverse impacts on the water quality of surface and groundwater resources and must be rigorously studied in the PEIS. This is due to the possibility that new flow paths will develop between previously unconnected or poorly connected aquifers and surface waters. Several aquifers have highly mineralized or saline water of low quality, and mixing of this water with surface water resources or other aquifers with water of higher quality could have both short-term and long-term consequences for resource management locally and regionally. *Local surface and subsurface water quality can also be affected by mine reclamation, spent shale disposal and revegetation practices, and these issues should be addressed in the PEIS.*

c. *Above-ground oil shale retorting*

Waters produced by above-ground retorting must be collected and treated prior to discharge. Treatment to high levels will be required if wastewater is discharged or used for reclamation. Intermediate levels of treatment may be appropriate for some types of industrial process reuse. Retort waters are complex solutions of organic and inorganic compounds.[12] Treatment will be difficult and costly, and disposal of the residuals from the treatment process itself (e.g. brines from reverse osmosis or ion exchange regeneration and concentrated organic residuals) will require careful handling and disposal. *The PEIS should thoroughly examine issues surrounding use of waste water from above-ground retorting.*

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[11] See J.EE. Sinor, *Disposal of Mine Water From a Deep Oil Shale Mine*, Proceedings of the Second Pacific Chemical Engineering Congress, Denver CO (August 1977).

[12] B.L. Harding, K.D. Linstedt, E.R. Bennett, R.E. Poulson, *Study Evaluates Treatments for Oil Shale Retort Waters*, Industrial Wastes V.24, No. 5 (1978).

Careful process controls will be required to avoid catastrophic upsets of waste treatment processes and the extreme temperatures that occur in the proposed leasing areas will significantly increase the cost and complexity of measures needed to prevent treatment process upsets. *The PEIS must include a thorough assessment of the adequacy of available and proven treatment technologies and the risks associated with the high likelihood of treatment process upsets.*

d. *In-situ oil shale retorting*

In-situ shale oil production will create two types of wastewater, that which is co-produced with the oil and that which remains as a residual in the production zone. The co-produced water must be handled similarly to retort and industrial process waters, e.g. collected and treated to the degree appropriate for reuse or discharge. Residual retort water cannot be controlled and will remain in the environment indefinitely. The impact of this residual water must be carefully assessed. Even experimental production could lead to long-term impacts on environmentally or commercially valuable water resources.

There are considerable technical questions that must be answered regarding the characteristics of these waters. Farrier and Poulson (1977) analyzed the organic constituents of retort waters. This work was accomplished using HPLC with a UV detector, advanced technology for the time, but markedly inferior to current techniques. Farrier and Poulson do not report the source of the retort waters they analyzed (i.e. above-ground or in-situ.) What can be learned from this work is that retort waters can be expected to be "…extremely complex, being made up of numerous compounds at high concentrations and almost innumerable compounds at extremely low concentrations."

The treatability of in-situ oil shale retort waters was studied thoroughly in the 1970's.[13] Harding, *et al.*, report that the makeup of retort waters is highly variable. Factors that may affect the quality of retort waters include the retorting conditions, the type and grade of shale, the nature of the oil/water separation process and the storage history of the wastewater. This analysis indicated that the retort waters had very high concentrations of soluble and relatively insoluble organic materials, along with very high concentrations of ammonia nitrogen, alkalinity, chlorides and sulfates. *Because of the apparent variability in the characteristics of these waters, research must be conducted as part of the PEIS using the most current techniques to establish their nature on a case-by case basis until a sufficient body of knowledge exists to predict their characteristics reliably.*

There are also technical questions regarding the mobility of the residual contaminants remaining in the in-situ production zone that must be analyzed in the PEIS. The in-situ production process will alter the structure and chemical nature of the shale substrate. The effect of these alterations must be considered in evaluating the mobility of contaminants. It is important to recognize that while low rates of migration may delay impacts on water resources by residuals, that same factor will prolong the impact once it occurs. At sufficiently low rates such impacts could be essentially permanent. It is also important to understand the interaction of

[13] Id.

contaminants with water that enters the aquifer when it re-waters after production is halted.[14] (Amy and Thomas 1977, Parker et al. 1977). These impacts could be further exacerbated by the injection of refrigerated fluid to create freeze walls around extraction zones. The injection wells and freezing and associated fracturing of the shale formation could create pathways for the migration of contaminated water into adjacent aquifers and surface water. *The technical and environmental issues surrounding mobility of contaminants from in-situ retorting must be thoroughly analyzed in the PEIS.*

The potential for adverse long-term water quality impacts to surface and ground water from in-situ retorting is significant and must be thoroughly addressed in the PEIS.

e. *Salinity and selenium*

Salinity concentrations and loadings have long been recognized as a major water quality problem in the Colorado River Basin, particularly in the Lower Basin states and Mexico. Salinity concentration in the Lower Basin cause significant crop losses and economic impacts water users. Irrigation in the upper basin is by far the largest human source of salinity. In the past decade, the federal Bureau of Reclamation has spent many millions to mitigate sources of salinity (i.e. lining ditches) in attempts to improve salinity in the Colorado River Basin.

It is likely that runoff from areas disturbed by mining of oil shale and tar sands and return flows from reclamation will leach salts and selenium from the soils and increase the salt load in the Colorado River. The water depletions associated with the water demand described above and the evaporative losses from new reservoir will further increase the concentrations of total dissolved solids. *These impacts, and related consequences for threatened and endangered species and downstream water quality-related objectives, costs and commitments, should be carefully quantified and analyzed in the PEIS.*

Salinity is undoubtedly a looming issue when it comes to surface disposal of spent shale, partially because the quantity of waste is so huge. An industry producing 3 million barrels of shale oil per day would annually generate over a billion tons of spent shale each year. *The salt content of leachate from freshly-processed shale is significantly higher than that of raw shale. No matter the disposal method (whether mine refill or surface piles), this spent shale is potentially exposed to underground and surface water flows, raising the likelihood of water quality degradation that must be examined in the Programmatic EIS.* The OTA found that a million barrel-per-day industry could increase salinity levels in the Lower Basin by 0.2 to 2.4 percent. At this rate, a 2.44 million barrel a day industry would result in economic losses from damages to agricultural, municipal, and industrial users in the Lower Basin of $5.4 million each year. The Bureau of Reclamation recently estimated that damage in the U.S. portion of the Colorado River Basin from elevated salinity was between $500 million and $750 million annually. *The PEIS must examine all available sources of information about reasonably*

[14] Gary Amy & Jerome Thomas, *Factors that Influence the Leaching of Organic Material from In-Situ Spent Shale*, Proceedings of the Second Pacific Chemical Engineering Congress, Denver CO (August 1977); H.W. Parker, R.M. Bethea, N. Guven, M.N. Gazdar, and J.C. Watts, *Interactions Between Ground Water and In-Situ Retorted Oil Shale*, Proceedings of the Second Pacific Chemical Engineering Congress, Denver CO (August 1977). See enclosed CD.

foreseeable salinity increases from spent shale disposal or from tar sands development, and it must make reliable estimates of the impacts to water quality and compliance with applicable water quality standards.

With regard to in-situ development of shale resources, RAND found that "[c]urrently available information also is not sufficient to predict the transport and fate of salts and other minerals once extraction operations are terminated and groundwater is allowed to reenter the site and contact the spent shale." *This highlights the need for BLM to acquire detailed, reliable information from industry in preparing the Programmatic EIS so that foreseeable impacts to water quality can be anticipated and dealt with, in advance, by lease stipulations. The BLM must disclose methods proposed for controlling groundwater near the in-situ production zone, and it must evaluate the likely effectiveness of such measures. The PEIS must also discuss the likelihood that these measures should prove ineffective, as well as the impacts that would likely result from such a failure.*

f. *Municipal wastewater*

Meeting the large water requirements for mining and production of oil from oil shale and tar sands, combined with the increases in demands for municipal uses and power generation, will cause significant reductions in streamflows and stream assimilative capacities. These flow reductions will necessitate much more stringent waste load allocations for existing and new municipal wastewater treatment plants. *The impacts on existing and proposed wastewater treatment facilities and costs should be addressed in the PEIS.*

g. *Spent shale assessment program*

RAND called for a "spent shale assessment program" that would include mathematical modeling, laboratory tests, and field monitoring so that issues discussed above may be dealt with before the industry proceeds further. RAND also called for modeling and hydrological monitoring to study the effects on groundwater from in-situ retorting. *The Programmatic EIS should consider these suggestions, and adopt them or explain why their adoption is not feasible.* The conclusion reached by the RAND Corporation, however, is not one that is particularly reassuring as we face the tight statutory timeline for the Programmatic EIS on a commercial oil shale leasing program: "a full understanding of risks and appropriate mitigation and control measures will probably not be available within six to eight years after a research program commences." This conclusion lends support to the need to defer leasing in the Preferred Alternative in the PEIS, so that reliable information and "full understanding" is available before irretrievable commitments of federal resources are made.

C. The PEIS Must Evaluate Impacts to and Measures to Protect Air Quality

All of the candidate areas for oil shale development in Colorado and Utah currently enjoy high-quality air and are classified as Class II areas under the provisions of the Clean Air Act for Prevention of Significant Deterioration (PSD). For Class II areas, only moderate increases in ambient air pollutant levels are allowed. Moreover, several areas within close range of the

Piceance and Uinta Basins enjoy even more stringent protection as Class I areas under the PSD Program, such as Flat Tops Wilderness Area (50 miles downwind of the Piceance).

Review of past studies confirms that the mining and processing of oil shale will produce direct emissions of several pollutants for which National Ambient Air Quality Standards (NAAQS) have been established: sulfur dioxide (SO2), particulates, carbon monoxide (CO), ozone (O3), lead, and nitrogen oxides (NOx), as well as various non-criteria pollutants on the list of air toxics such as silica, sulfur compounds, metals, carbon dioxide (CO2), ammonia (NH3), trace organics, and trace elements. *Development of oil shale and tar sands resources could also increase the potential for acid rain, a factor which must be studied in the PEIS. Establishment of air quality baseline data in the Programmatic EIS is thus extremely important to put pollutant releases into context.* Several relevant studies of air emissions and air quality impacts are attached, and are hereby incorporated by reference.

Because the quantities and the chemical properties of air pollutants emitted vary with retorting technologies, it is difficult at this stage for the public to estimate the amount of actual emissions from either above-ground retorts or from in-situ processing. Even during the oil shale boom twenty-five years ago, the OTA found itself unable to precisely estimate the quantities of air contaminants that would be produced by a commercial-size oil shale facility, because the only numbers available were from small-scale, short-term pilot plants. Nonetheless, the OTA sought to create reliable estimates by applying pollutant-generation factors to the mass flows of material through a plant. See OTA at 262-63. The calculations were meant to give an approximation that could estimate the scope of the problem. *The Programmatic EIS must analyze currently-available pollutant-generation data to undertake a similar analysis, leading to reliable current information about the pollutants that would be generated from development of oil shale or tar sands and the technologies that could be required to control their emission.*

Note that the OTA's tables show the levels of pollutants that would be generated, not the levels that would be released. OTA at 262-63. *The Programmatic EIS must also put the OTA's findings as to pollutants likely to be generated into context with the Clean Air Act, particularly since the Act was significantly amended in 1990 to address, inter alia, particulate emissions, visibility, and the PSD program. The Programmatic EIS should apply current provisions of the Clean Air Act to the OTA's figures as well as current data in order to reliably estimate the types and amounts pollutants that would be released to the environment and the impacts that would result from oil shale or tar sands leasing and development activities.*

The RAND Corporation found 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 1980s. 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." *Thus it is vitally important for the BLM to undertake baseline studies as well as studies of air quality effects of oil shale or tar sands development in the Programmatic EIS.*

In attempting to identify ways to address protection of air quality, RAND found the task impossible until modern plant designs are made available, so that anticipated pollutant loadings could be used in regional air quality modeling studies and in establishing pollutant limits. Moreover, Shell has stated publicly that its in-situ process requires "a few hundred feet" of overburden to prevent escape of hydrocarbons into the atmosphere; BLM must analyze and disclose the likelihood of such escape, the measures that might be required to control it, and the impacts such gaseous emissions could have. *The BLM must obtain accurate information about all available plant designs and the likely pollution-control measures that could be implemented, so that it can accurately address protection of air quality. Should BLM be unable to obtain reliable, detailed information about plant designs, then the Programmatic EIS cannot support a commercial oil shale leasing program at this time.*

RAND also found that traditional application of the PSD program could operate to shut out latecomers to the industry, because early plants would use up the allowable PSD increments of pollution. If emissions for oil shale facilities are based solely on application of Best Available Control Technology (BACT), RAND found, the first few facilities may exhaust the total available PSD increment for the region. *The Programmatic EIS should scrutinize this proposition and arrive at accurate estimates of the PSD increments and the rate at which they would be consumed by new oil shale or tar sands development activities in the study area.*

Oil shale and tar sands activities would also cause significant indirect impacts on air quality from the generation of electricity -- especially that needed to power in-situ heaters -- and these impacts must be thoroughly examined in the Programmatic EIS. As discussed above, the production of 100,000 barrels of shale oil a day using Shell's in-situ process would require 1,200 megawatts of power. See RAND at 21. This would call for a power plant as large as any in Colorado history, large enough to serve a city of 500,000 people (equal in size to the coal-powered plant in Craig, Colorado). Such a plant would likely cost $3 billion, consume five million tons of coal each year, and emit ten million tons of greenhouse gases. To produce a million barrels of oil a day as predicted by RAND and others would require ten new power plants -- and five new coal mines. Not only would the generation of this energy through the burning of coal or natural gas create its own emissions, but so would the use of this energy to produce and process shale oil, as would the end-use of the shale oil itself. Thus production of oil from shale would generate no fewer than three emission points. *The Programmatic EIS must fully analyze the effects of generating power for any of the potential methods of producing oil from shale or tar sands, and it must do so for each of the various development scenarios found to be foreseeable. The PEIS should utilize the net energy analysis called for above to gauge the relative CO2 production levels under various development scenarios for oil shale and tar sands, as well as all of the alternatives studied in the PEIS. Moreover, the Programmatic EIS should analyze available coal resources and transmission corridors and capacities to give estimates of the foreseeable location of new power plants and transmission infrastructure.*

Producing shale oil also results in significantly higher emissions of carbon dioxide than conventional crude oil production and refining, primarily because fossil fuels must be burned to produce the energy necessary to create shale oil. The high temperatures associated with surface retorting can also cause a release of carbon dioxide from mineral carbonates contained in the shale. RAND noted the potential availability of "market-based approaches" to deal with greenhouse gas emissions, such as carbon taxes or "cap and trade" programs, although it did not estimate the effectiveness of such programs to curb carbon dioxide production. *The Programmatic EIS must look at the direct, indirect, and cumulative CO2 emissions that would result from oil shale or tar sands leasing, research and development, and commercial development activities. It must also look at the likelihood and effectiveness of carbon taxes or "cap and trade" programs.*

The dismal state of knowledge with regard to likely impacts to air quality from oil shale or tar sands development demonstrates the need for BLM to conduct in the Programmatic EIS sufficient baseline studies over which a reasonable forecast of likely emissions may be layered. It also demonstrates that the BLM may not simply rest on the research of the past: it must analyze past reports as well as demand detailed information from industry as to levels of pollutants likely to be generated, emission controls that could be applied, and the likely levels of pollutant emissions from the variety of potential methods of generating and processing shale oil. *In compliance with NEPA, the BLM must scrutinize this information critically, providing accurate and reliable information on the multiple direct, indirect, and cumulative impacts to air quality from foreseeable shale development activities.*

D. The PEIS Must Analyze Impacts to Land Use and Communities.

Of vital concern to commentors, their members, and residents of the oil shale region is the potential for significant negative impacts to communities from the onset of a new industry like oil shale. Again, significant study of the potential socio-economic effects was undertaken in the 1970s and 1980s, some of which is attached and incorporated herein by reference. Each source consulted acknowledges the likely significant impacts on the landscape, the users of the public lands, and the local communities. Oil shale and tar sands development present the threat of a new and intense occupation of the land, which would preclude all other uses. They also present the threat of a labor-intensive industry, which would bring significant numbers of new residents to the region and require accommodation in the local societal infrastructure. The landscape in which oil shale or tar sands may be found is largely wide open and comprised of multiple-use federal lands, and it is used extensively for hunting, fishing, grazing, oil and gas drilling, and recreational hiking. The communities in the area are small and rural. The introduction of oil shale will thus undoubtedly cause significant disruptions, as discussed more fully below. *The BLM should review this and other available historic information to arrive at reliable estimates of these impacts to hunting, fishing, social services, and housing opportunities, and to consider the effectiveness of various mitigation measures.*

1. Impacts to Existing Land Uses

Surface mining and retorting of oil shale or development of tar sands resources will result in significant and permanent changes in the topography, whether it is from mining, shale or

sands processing facilities, or waste disposal. Roughly 1.2 to 1.5 tons of spent shale must be disposed of for each barrel of oil produced by surface retorting. Thus an industry producing 100,000 barrels of oil a day would require disposal of up to 150 thousand tons of waste rock each day, or about 55 million tons per year. An industry producing 3 million barrels of shale oil per day would generate over a billion tons of spent shale each year. Moreover, crushing and retorting increases the volume of the spent shale by 15-25 percent, compared with the raw shale prior to mining. For those operations using surface mining, spent shale will likely be used to reclaim the mine site, leaving the landscape elevated from its original contour due to this expansion. Regardless of the method of disposal, though, the waste generated by surface retorting will cause significant changes to the landscape and present considerable challenges. *The Programmatic EIS must analyze available data and provide information on the volume, nature, and various disposal methods of the waste material to be expected from each of the potential commercial-scale operations for development of oil shale and tar sands, and how that waste will be dealt with under various scenarios.*

Though in-situ retorting appears initially to be less disruptive than surface mining and retorting, surface drilling and support operations will still cause at least a decade-long displacement of all other land uses in these areas. According to Shell, its procedure requires 15 to 25 heating holes per acre, plus the wells needed for recovery of the produced oil and natural gas as well as those needed to construct and maintain the freeze wall. Thus while this method avoids large open-pit mines, it is indeed disruptive of the ground that it occupies, precluding any other use. *The Programmatic EIS should examine the direct, indirect, and cumulative effects on land uses of commercial implementation of in-situ development methods. This analysis should include direct and cumulative impacts from actual in-situ operations as well as indirect impacts from power generation activities.*

Moreover, significant new industrial infrastructure will be needed for either mine-and-retort or in-situ methods of development. Surface facilities will be needed to upgrade, store, and transport produced materials such as shale oil or natural gas. Roads, power plants, power distribution systems, pipelines, water storage and supply facilities, construction staging areas, hazardous materials handling facilities, and buildings (residential, commercial, and industrial) will impose additional demands on the landscape. *The Programmatic EIS must analyze the foreseeable facilities required for the various methods of oil shale or tar sands development, as well as resulting impacts to local community infrastructure and land uses.* Moreover, the OTA found a 3- to 5-year lag between the time increased infrastructure and services were needed, and the time additional revenues could be generated. This demonstrates the need for advance planning, and raises questions of who will bear the costs of the new social infrastructure. The Programmatic EIS should examine the ability of nearby local communities to cope with new shale development activities. *The Programmatic EIS should also estimate the costs for the services needed to accommodate oil shale or tar sands development, and it should set forth alternative methods for paying for such services.*

There are considerable challenges inherent in relying on 25-year old data concerning impacts to land use patterns, particularly in a region where significant growth has taken place. Thus RAND called for early development and implementation of an "ecological research plan" that would update the knowledge base and management practices that have evolved since oil

shale was being considered 25 years ago. RAND also called on the Departments of Energy and Interior to develop an analytic framework that would allow consideration and weighing of multiple attributes and uses of specific lease sites and the relative benefits and costs of developing them. These measures, if adopted, would present opportunities for citizens and local governments to participate and raise issues of local and regional importance. *We encourage the BLM to conduct a full analysis of the feasibility, costs, and benefits of these measures and consider implementing them as part of a commercial leasing program.*

2. Socioeconomic Impacts

The likely socioeconomic impacts of a significant new industry in a relatively rural area of the West are undeniable, though they are difficult to quantify in the absence of any real plans for development. *The Programmatic EIS must evaluate past studies of socioeconomic impacts and currently-foreseeable levels of oil shale or tar sands development in conducting its review of foreseeable direct, indirect, and cumulative socioeconomic impacts from a new commercial leasing program.*

Because the areas of the Green River Formation are relatively sparsely populated, boom and bust cycles associated with oil shale could have disastrous effects on the communities, stressing existing infrastructure with increased population and associated needs. Recognizing this, the 1987 Piceance Basin RMP set a carrying capacity threshold of 5-15% annual growth rate in communities. See Piceance RMP, ROD at 2-3. A project that would result in growth exceeding this threshold would not be leased or approved as proposed. The RMP called for continual monitoring as any development occurred so that the agency could refrain from authorizing additional oil shale leasing if thresholds may be exceeded. *The Programmatic EIS should retain this carrying capacity provision in the White River RMP, and it should expand it to apply to other RMPs in the study area as well. We also request that the BLM consider alternatives that strengthening this carrying capacity provision to protect communities by capping annual growth at 5%.*

The OTA included a discussion of local organizations, private-sector contributions, and state programs set up in the 1970s to deal with the financial and technical questions posed by new oil shale development. It is unclear to what degree some of these institutions or programs continued to exist after the collapse of the oil shale industry in the 1980s, and the Programmatic EIS should update this information. The OTA found that rapid population growth in the region would likely stretch the financial ability of local communities to provide the necessary public services and amenities, including fire, police, water and sanitation, roads, health care, housing, schools, and recreational opportunities. *Again, the Programmatic EIS should update these OTA findings, based on current population and community-service data as well as foreseeable development scenarios.*

The OTA also forecast projections of significant growth in communities near oil shale development sites. For instance, assuming an industry producing 500,000 barrels per day of shale oil, Rio Blanco County was projected to have almost 8 times the number present in 1977; Garfield County was forecast to have 3.5 times its 1977 count. Mesa County's population was seen as growing to almost 3 times the 1977 figure with a 750,000 barrel-per-day industry. For

the communities of Rifle, Meeker, and Rangely, population was predicted to jump from around 2,000 to 22,000 with the onset of industry, with a net increase of 18,860 residents for Rifle. Much of the rest of the data in the OTA report with regard to community impacts seems to be of limited utility, since it is based on the status of infrastructure and land availability present in the late 1970s. Nonetheless, its message is clear: with the oil shale industry comes significant numbers of people and attendant demands on government, communities, and infrastructure. The OTA concluded that "social and personal distress would occur unless active measures were taken for their prevention." *As above, the Programmatic EIS should consider this information and update it with current information on population and available services, and it should provide the same information and analysis for tar sands development.*

The OTA predicted that an oil shale industry producing 200,000 barrels a day would be accompanied by between 41,200 and 47,200 new workers. For comparison, Garfield County is the most populated of the counties near the piceance Basin, and its 2000 population was 43,791. Notably, RAND found that oil shale would add to the trend of local population and economic growth caused by recent extensive oil and gas development in much of northwestern Colorado and northeast Utah. No one, to date, has attempted to quantify the compound effects that oil shale would add to this existing new industrial use and associated growth. *This is an analysis that should be undertaken in the Programmatic EIS, to provide information on the cumulative effects that oil shale or tar sands development would add to recent regional growth in industrial activities. The Programmatic EIS should also evaluate various levels of bonus payments that the BLM could require be paid to affected communities to deal with the new industry, as well as the effectiveness of these payments to actually mitigate impacts.*

E. The PEIS Must Analyze Impacts to Wildlife and Vegetation and Their Habitat.

As with other extractive endeavors on public lands, oil shale and tar sands leasing and development activities could have significant negative impacts on wildlife and plant populations due to harassment of wintering large mammals, loss of critical habitats, fragmentation of habitats, and obstruction and/or elimination of migration routes. Impacts to wildlife populations resulting from extraction of oil shale and tar sands resources would arise from direct surface disturbance associated with mining activities and facilities, infrastructure associated with development which includes roads, transmission lines, pipelines and housing facilities, and areas for disposal of residuals from retorting oil shale and tar sands. The onset of this new industry would result in negative cumulative effects such as direct habitat loss due to infrastructure construction, increases in air pollution, decreases in water supplies, degradation of water quality, increases in population from onset of the new industry, and expansion of the transportation network. *The Programmatic EIS should examine the effects of each of these factors on plant and animal species in the study area.*

Depending on the exact sites for oil shale and tar sands extraction in the Piceance, Washakie, Green River and Uinta Basins, pronghorn antelope, mule deer and elk will be the major species of large wild mammals potentially impacted from energy development activities. Impacts to these species must be thoroughly studied in the PEIS. In some portions of these basins there are also populations of moose and bighorn sheep that must be considered. In addition to these herbivores, mountain lions and black bears reside in all these basins. Grizzly

bears and gray wolves, species afforded protection under the Endangered Species Act, currently reside in portions of the Green River Basin, triggering procedural and substantive safeguards of the Endangered Species Act.

A thorough analysis of the impacts on wildlife and vegetation does not appear to have been done in the 1970s and 1980s when oil shale was last in vogue, and the landscape has changed significantly since that time with the addition of more oil and gas development infrastructure and the growth of local communities and associated transportation networks. *Neither RAND nor the OTA conducted a detailed study of the direct, indirect, and cumulative impacts of commercial oil shale or tar sands development on habitat for plants or wildlife, and this analysis must be included in the Programmatic EIS.*

The Piceance RMP acknowledged the potential for significant effects on wildlife habitat, imposing a carrying capacity threshold for wintering mule deer. The RMP imposed on the BLM the obligation to preserve the habitat needed to maintain 24,900 mule deer (24,650 AUMs). This figure was found to be 83% of the actual wintering Piceance Basin herd of 30,000 on all lands, and to represent the minimum acceptable herd size agreed to by BLM and Colorado Division of Wildlife. *The BLM should retain or strengthen this carrying capacity threshold.* The Programmatic EIS should analyze data on current populations of wintering mule deer and update, if necessary, the number of mule deer that local habitat must be able to support.

The Piceance RMP also found that "[s]tringent wildlife habitat mitigation" could be imposed instead of prohibiting leasing, depending on actual site-specific and cumulative impacts to mule deer, although it neglects to set out any potential mitigation measures. *If the BLM hopes to rely on the possibility of habitat mitigation to avoid the detrimental effects of leasing, then the Programmatic EIS must set out in detail what measures would be required and where.* The BLM also found in the Piceance RMP that the mitigation necessary to keep impacts from exceeding this threshold would be the responsibility of the mineral lessee, not the BLM. Though the RMP neglects to say how this self-policing by industry would work, it would appear necessary to require monitoring and reporting, at the very least, to ensure that the carrying capacity threshold was not being surpassed. *Should similar measures be relied on in the Programmatic EIS, the BLM should set out the monitoring and reporting that would be required and it should assess the likely effectiveness of such measures.*

The 1996 White River RMP found that oil shale and surface coal-mining operations in the area would predispose 5-7% of affected blue and sage grouse range (including 5-11% of available nest and brood range) to long-term loss. Should open pit mining occur on 12,800 acres of sage grouse range that was made available for open pit mining (including about 6,400 acres of production/nesting areas), the BLM found that sage grouse overall range and production areas in the Piceance GRA would be reduced by about 15% in the short term. *Given increased energy development in the area as well as increasing information about the fate of the sage grouse and the effects they suffer from industrial activities, the Programmatic EIS must update this information. The BLM should analyze the effects of commercial oil shale or tar sands exploration and development activities on blue and sage grouse range. In doing so, it should consult with the U.S. Fish and Wildlife Service as well as the Colorado Division of Wildlife.*

With regard to habitat for plants, BLM found in the Piceance RMP that impacts from oil shale would be similar to those from oil and gas: it would destroy vegetation locally, with site-specific impacts varying from moderate to significant. The agency concluded that an estimated 400 acres of BLM land would be taken from forage production during the long term. The BLM also found there that oil shale development would have the potential to impact two oil shale endemics listed as threatened: Dudley Bluffs twinpod (*Physaria abcordata*), and Dudley Bluffs bladderpod (*Lesquerella congesta*). BLM found that 90% of the potential habitat for both species occurs within the likely oil shale development area, and that the potential for impact to these species from oil shale development is high. As to the possible cumulative impacts to these species, the BLM wrote:

> The most significant threat to the two federally-listed plant species in Piceance GRA is from mineral development. All the known habitat for both species lies within or is immediately adjacent to the area with greatest potential for development of oil shale, sodium and multimineral resources. This area is also high potential for oil and gas development. Known and discovered populations of these plants would be protected from any direct loss resulting from surface disturbance of known habitats. However, indirect impacts from mineral development has the potential to impact and could destroy some populations of these species. Because of the extremely limited distribution of these species, it could be possible to affect the survival of either or both species. These species are located nowhere else in the world. A significant loss of either species could result in its eventual extinction.

1996 White River RMP/FEIS at 4-21. At this point, it is unclear to what extent habitat for these plants has already been affected by oil and gas development, if at all. The BLM has already designated several Areas of Critical Environmental Concern for the Dudley Bluffs plants, and oil shale and tar sands leasing and development should be prohibited in these areas. *This is yet another matter to be addressed in the Programmatic EIS, both with regard to oil shale and tar sands activities.*

Moreover, the BM must study the presence of habitat for Graham's beardtongue (Penstemon grahamii), recently proposed for protection as a "threatened" species under the Endangered Species Act by the U.S. Fish & Wildlife Service, in the area. See 71 Fed. Reg. 3158 et seq. (January 19, 2006). Graham's beardtongue is an oil shale endemic, native to Utah's Uinta Basin and also found in Colorado, that was an original candidate for protection when Congress enacted the ESA in 1973. In its proposed determination, the Fish & Wildlife Service specifically found that oil shale development was among the threats to the species' survival, due to habitat occupation or destruction, and that the Green River Region includes the entire range of Graham's beardtongue. Id. at 3158, 3161. The Service stated that the species' habitat is a "discontinuous series of exposed raw shale knolls and slopes," and that "[m]ost populations are associated with the surface exposure of the petroleum bearing oil shale Mahogany ledge." Id. at 3160. The Service concluded that the species growth on the richest oil shale bearing strata in the Mahogany ledge "mak[es] the species highly vulnerable to extirpation consequent to exploitation of oil shale strata." Id. at 3161. In its announcement, the Fish & Wildlife Service also proposed critical habitat for the plant, setting aside more than 3,500 acres in Utah and Colorado. Under Section 7(a)(4) of the Endangered Species Act and implementing regulations, the BLM must

confer with the Fish & Wildlife Service on both the proposed listing and the proposed designation of critical habitat prior to offering oil shale or tar sands leases or amending RMPs to allow for commercial oil shale or tar sands leasing. See 16 U.S.C. § 1536(a)(4) and 50 C.F.R. § 402.10. This conference process is designed to assist the BLM as well as interested companies in identifying and resolving potential conflicts at an early stage in the planning process, so that the Service may make recommendations on ways to minimize or avoid adverse effects of proposed species. See 50 C.F.R. § 402.10(c). Should the Graham's beardtongue or any other species be listed or the proposed critical habitat designated prior to completion of this EIS process, the BLM will likely have to undertake formal consultation with the Service. See 16 U.S.C. § 1536(a)(3).

The BLM has designated the Raven Ridge Area of Critical Environemental Concern to protect Graham's penstemon, White River penstemon (*Penstemon scariosus* var. *albifluvis*, Candidate for Endangered Species Act protection), and other oil shale endemics, and oil shale development should be prohibited throughout this ACEC, and throughout the proposed Critical Habitat Designation for Graham's penstemon. In addition, the BLM must assess potential impacts of oil shale development on the listed *Schoenocrambe* (reed-mustard) species, and any other oil shale endemic plants that could be affected. Finally, the BLM must ensure that actions it authorizes do not contribute to the need to list Graham's, White River, or Parachute penstemon (*Penstemon debilis*) or any other Candidates for Endangered Species Act protection (BLM Manual § 6840.06(C)).

The BLM has specific duties toward special status species, and it must offer them at least the level of protection afforded Candidate species, including "ensuring that BLM activities affecting the habitat…are carried out in a manner that is consistent with the objectives for managing those species." See BLM Manual § 6840.06(C). The BLM is required to "carry out management for the conservation of State listed plants and animals." Additionally, "State Directors will develop policies that will assist States in achieving their management objectives for those species." BLM Manual § 6840.06(D). The BLM must also ensure that state management goals for white-tailed prairie dogs, sage grouse, and other species are not undermined by oil shale or tar sands development.

The Programmatic EIS must also look at the cumulative impacts to plant and wildlife habit from oil shale or tar sands leasing and development activities. Specifically, the BLM should look at the effects these activities could have in light of other activities presently occurring and likely to increase. Considerable habitat has already been compromised due to increased oil and gas exploration and development activities in the study area. Furthermore, the cumulative impact analysis has to consider the concomitant effects of current land management practices such as grazing and habitat treatments. *Extensive demands are already placed on wildlife and plant habitats, and the BLM must put the impacts from yet another intensive use in perspective with what is currently ongoing and predicted to occur in the future.*

F. The PEIS Must Analyze Foreseeable Impacts to Cultural Resources.

The areas of Colorado, Wyoming, and Utah where oil shale and tar sands leasing may take place include some of the highest concentrations of cultural resources in the nation. Unlike

conventional oil and gas activities, in which lease stipulations may operate to protect cultural resources by requiring that facilities be sited so as not to disturb them, all of the oil shale or tar sands proposals currently being discussed result in 100% surface disturbance over a large area. *The BLM should analyze the direct impacts on cultural resources from facilities and associated infrastructure, as well as the indirect impacts to such resources from population increases and expansion of the transportation infrastructure.* Historic and cultural resources are expressly included among the factors to be considered in an EIS. 36 C.F.R. § 800.8.

Because amending RMPs to allow for commercial leasing of oil shale and tar sands resources is an "undertaking" which may affect resources to which Indian tribes attach religious or cultural significance, the BLM should undertake full consultation with Indian tribes under the National Historic Preservation Act. Preparation of the Programmatic EIS must include performance of a site investigation of the project area to identify areas in which historic properties are present. Tribal consultation must be an integral part of the identification and designation process. 16 U.S.C. §§ 470a(d)(6)(A) & (B). "Consultation" on historic properties of significance to Indian tribes includes making the tribe a "consulting party" and providing the tribe "a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects." 36 C.F.R. § 800.2(c)(2)(ii). The BLM's efforts in this regard must be thorough, undertaken in good faith, and designed to facilitate meaningful participation of interested tribes and identification of historic properties and cultural resources. Cf. Pueblo of Sandia v. United States, 50 F.3d 856, 860-62 (10th Cir. 1995) (requests for information in form letters and at tribal meetings did not constitute "a reasonable effort to identify historic properties" or satisfy agency's consultation requirements).

G. The PEIS Must Analyze the Likelihood and Effectiveness of Potential Mitigation Measures.

As discussed above, the BLM must in the Programmatic EIS examine various mitigation measures to reduce the various impacts of a new oil shale or tar sands leasing and development program. The Programmatic EIS should evaluate potential mitigation measures to deal with likely harm to the air quality, water supplies, water quality, groundwater, wildlife habitat, plant species, existing uses of the land, and local communities. In doing so, the Programmatic EIS should consider and evaluate the likelihood that specific mitigation measures would be imposed on individual leases, or in leasing regulations. The Programmatic EIS should also evaluate the effectiveness of the various potential mitigation measures.

H. The PEIS Must Analyze Impacts to Scenic Values.

Because of the potentially enormous scale of commercial oil shale or tar sands development that could result from a leasing program, the Programmatic EIS should conduct a viewshed analysis to evaluate the effects of this new industry on the scenic values of the region. There are currently very few landscape-scale operations in the study area, and introduction of commercial activities for the development of oil shale and tar sands resources -- including those

necessary for generation of the power required by this new industry -- could dramatically change the scenic qualities of the region.

Impacts to visual resources can be major if they substantially change or degrade the character of the landscape as seen from sensitive viewsheds or if the allowable viewshed modifications exceed pre-planned classifications. In this regard, the BLM should conduct a Visual Resource Management (VRM) analysis to assign classes to the various parts of the project area based on visual characteristics. These generally range from preserving a natural landscape and existing characteristics (Class I) to providing for management activities that allow major modification of the landscape (Class IV). While existing topography can allow for some landscape modifications, many types of disturbance (such as roads, retorting facilities, open pit mines) can dominate the landscape due to their size, distance, topographic position, presence or absence of screening, and contrast with existing conditions. *Because the study area is presently largely open, the Programmatic EIS should evaluate the impacts to viewsheds and scenic values from the onset of an oil shale or tar sands leasing and development program.*

I. The Programmatic EIS Must Fully Evaluate Cumulative Impacts of New Oil Shale or Tar Sands Leasing and Development Activities.

Inherent in the discussions above is the suggestion that the Programmatic EIS needs to thoroughly consider cumulative impacts of amending RMPs and promulgating regulations to allow for commercial oil shale or tar sands leasing and development. Nonetheless, the overwhelming importance that the BLM do its job in this regard warrants brief focus on this subject.

The study of cumulative impacts arises from NEPA's requirement that the agency study connected, cumulative and similar actions, as well as the direct, indirect, and cumulative impacts. Thus the BLM's task in preparing this Programmatic EIS is to "think big," and to look at the onset of a new large-scale industry in the region with a wide lens that includes all foreseeable sources of change: environmental, social, and economic.

In this regard, the BLM must conduct a thorough analysis of the indirect impacts of RMP amendments and foreseeable leasing and development activities. 42 U.S.C. § 4332(2)(C); 40 C.F.R. § 1508.8. These impacts are those which are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." 40 C.F.R. § 1508.8(b). They include "growth inducing effects. . . and related effects on air and water and other natural systems, including ecosystems." Id. Here, that would include impacts on the various resources described above from actual development activities as well as those from the necessary power generation, workforce influx, infrastructure changes, etc. *The BLM must cast a broad net to evaluate the indirect impacts that would be caused by the introduction of this new industry.*

BLM must also conduct a thorough analysis of the cumulative impacts of its preferred alternative and reasonable alternatives. A project's "cumulative impact," is

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and

> reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.7 (emphasis added). "Both connected actions and unrelated but reasonably foreseeable future actions may result in cumulative impacts that can trigger an EIS." Inland Empire Public Lands Council v. Schultz, 992 F.2d 977, 981 (9th Cir. 1993) (citing Save the Yaak, 840 F.2d at 721). *In this regard, the BLM should look at the impact of oil shale when added to past development activities and growth in the region, the impact when added to currently increasing oil and gas activities, and the impact when added to other future resource development (oil and gas, mining, forestry, etc) and growth activities. In evaluating secondary impacts, the PEIS should utilize the net-energy analysis requested above to estimate the secondary impacts of oil shale and tar sands in relation to other energy sources available in the study area.*

It bears repeating that it is incumbent on the agency to evaluate impacts of its proposed action and reasonable alternatives with an extremely broad lens. This is especially important in a case such as this, where an entirely new use -- with unknown and/or misunderstood impacts -- is being evaluated. As the Tenth Circuit has held, "[a]s an overall regional pattern or plan evolves, the region-wide ramifications of development will need to be considered at some point." Park County Resource Council, Inc. v. U.S. Dept. of Ag., 817 F.2d 609, 623 (10th Cir. 1987).

In this Programmatic EIS, the BLM must look at the various impacts of its foreseeable decisions to amend RMPs, adopt commercial leasing regulations, offer parcels for commercial oil shale and tar sands leasing, and future leasing proposals, and authorize commercial development.

J. The PEIS Should Evaluate the Costs and Feasibility of Compliance with all National, State, and Local Environmental Standards.

Leasing and development of oil shale and tar sands resources would be a major new use of the landscape of the study area, and it would be subject to myriad requirements of national, state, and local law and regulation. Under NEPA, and agency must consider all other relevant laws, standards, and authority. 40 C.F.R. § 1500.2(a). In amending RMPs to open areas to commercial oil shale or tar sands leasing, the BLM must "provide for compliance with applicable State and Federal air, water, noise, and other pollution standards or implementation plans." 43 U.S.C. § 1712(c). Implementing regulations specifically require that BLM ensure compliance with federal and state air quality standards, as well as applicable provisions for the protection of public health, safety, and the environment. See, e.g., 43 C.F.R. §§ 2920.7(b).

In the Programmatic EIS, we request that the BLM analyze the measures required for compliance with statutes and regulations that would be required for oil shale or tar sands leasing and development. Specifically, we request that the BLM evaluate the costs of compliance with these measures, for direct shale or sands development activities as well as for connected actions such as power plants. We also request that the BLM evaluate the feasibility of industry

achieving compliance with today's standards. For instance, what is the range of air quality controls that could be required for retorting plants and for power plants supplying the electricity needed for in-situ development? How much would compliance cost, what is the likelihood that it would be effective at controlling air pollution, and how many operations could exist in the project area before air quality would degrade significantly?

As set forth above, this analysis is required under NEPA. *We hereby request that the BLM analyze compliance with the following provisions by potential oil shale and tar sands leasing and development activities as well as connected, indirect activities such as power generation: Mineral Leasing Act; National Environmental Policy Act; Clean Air Act and its amendments (including PSD and application of Best Available Control Technology to direct and indirect (energy generation) development; Non-Attainment Permit; New Source Performance Standards (including requirement of Best Available Control Technology) and Visibility Impairment limits); Clean Water Act; Safe Drinking Water Act; Toxic Substances Control Act; Resource Conservation and Recovery Act & Amendments; Occupational Safety and Health Act (OSHA) and/or MSHA; Endangered Species Act of 1973; Antiquities Act of 1906; Federal Mine Safety and Health Act; National Historic Preservation Act; Forest Rangeland Renewable Resources Act; Federal Land Policy and Management Act; National Pipeline Safety Act; Emergency Planning and Community Right to Know Act; Pollution Prevention Act; and all State and Local permitting requirements (including stormwater permits, zoning requirements, etc.). This information on requirements that would be imposed on a new oil shale or tar sands industry, as well as the costs and likelihood of achieving compliance, is necessary so that both the government and the public might better evaluate the feasibility of proposals should they arise, as well as anticipate and prepare for the onset of such an industry.*

IV. ALTERNATIVES TO BE EVALUATED IN PROGRAMMATIC EIS

The Programmatic EIS must "study, develop, and describe" all reasonable alternatives to the agency's proposed action. 42 U.S.C. § 4332(2)(E). The analysis of alternatives is "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. A federal agency preparing an EIS is required to "[r]igorously explore and objectively evaluate" a full range of reasonable alternatives, including those not within the jurisdiction of the lead agency, and devote "substantial treatment to each alternative considered in detail," while briefly discussing the reasons for eliminating other alternatives from detailed study. Id. "No decision is more important than delimiting what these 'reasonable alternatives' are." Simmons v. U.S. Army Corps of Engineers, 120 F.3d 664, 666 (7th Cir. 1997).

This requirement to study alternatives is related to the purpose and need of the EIS. An environmental impact is to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. The BLM must define the purpose of the EIS accurately, lest it thereby skew both the range of alternatives studied and the Preferred Alternative that results from the analysis. Here, the impetus to which the BLM is responding in preparing this EIS is the Energy Policy Act of 2005, as discussed above. With regard to the PEIS, the Energy Policy Act of 2005 directed the BLM to prepare a NEPA analysis of a commercial leasing program for oil shale and tar sands resources on public lands, and nothing more. Pub. L. 109-58, Title III, Sec. 369(d)(1), *codified at* 42

U.S.C. § 15927(d)(1). The Energy Policy Act also directed the BLM to promulgate regulations establishing a commercial leasing program. Id. at Sec. 369(d)(2). The final regulation is to be codified within 6 months of completion of the Programmatic EIS. Id. Importantly, while the Energy Policy Act gave the BLM the authority to hold a lease sale after promulgation of final regulations, it did *not* tell the BLM to actually undertake a leasing program.

Thus the mandate from Congress for this Programmatic EIS is very broad -- analyze the impacts of a commercial leasing program -- and we urge the BLM to keep this in mind. The BLM should not define the purpose restrictively so as to render the Preferred Alternative a foregone conclusion favoring leasing.

> The "purpose" of a project is a slippery concept, susceptible of no hard-and-fast definition. One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence). The federal courts cannot condone an agency's frustration of Congressional will. If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the agency satisfy the Act.

Simmons v. U.S. Army Corps of Engineers, 120 F.3d 664, 666 (7th Cir. 1997); see also Muckleshoot Indian Tribe v. U.S. Forest Service, 177 F.3d 800, 814 n.7 (9th Cir. 1999) (agency cannot "narrowly define its purpose and need so as to winnow down the alternatives until only the desired one survives."). Accordingly, "[t]he broader the purpose [of an EIS], the wider the range of alternatives; and vice versa." Simmons, 120 F.3d at 666.

A. Deferred Leasing Alternative

With this legislative backdrop in mind, and given the substantial uncertainties concerning whether commercial development of oil shale or tar sands resources is at all likely to occur in the next decade as well as the likely impacts that it could cause, we urge the BLM to adopt, as an element of its Preferred Alternative, a deferred leasing program in which a decision to offer commercial leases will not be made until the completion of the ongoing R&D program.

Because oil shale is unlikely to be commercially developed in the next 15 to 20 years, we urge the BLM to adopt as an element of the preferred alternative in the PEIS deferral of the decision to hold any leasing program, pending successful demonstration of the environmental, technical, and economic feasibility of potential operations. As one finds upon review of documents prepared in the 1970s, the utility of an environmental review that is 25 years is limited: regulatory and social environments change, and translating old data to current times is often challenging. *Because commercial development is present only on a distant horizon, the Preferred Alternative should defer the decision to undertake a leasing program until more information is known. Specifically, the BLM should include as an element of the Preferred Alternative delay of commercial leasing until technologies and economics are proven through small-scale research and development activities. Should this measure not be included in the Preferred Alternative as requested, it must be fully evaluated in the Programmatic EIS.*

Commercial leases offered later in time will be likely to result in greater understanding about the various economic and environmental impacts that could result from the development of this resource, as well as greater returns to the BLM. This view was supported by the Congressional Budget Office 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.

B. Other Elements of Preferred Alternative

In addition to deferred commercial leasing, we request that several other elements be included in the Preferred Alternative.

First, we request that the Preferred Alternative include a requirement that no leases for federal lands be offered until oil shale development has been proven to be a viable industry. This would involve proof that technology has been proven on private lands or on limited R&D leases. Significant shale-rich lands are already in private hands, and industry should be willing to develop its own lands first. *Moreover, we request that leasing be delayed in the Preferred Alternative until oil shale development efforts provide the basis for a feasible industrial development which would benefit the public. In addition, we request that the Preferred Alternative include no subsidies by the Federal or State governments.* Feasibility of this industry on the federal lands may be attained when the technology makes it possible to extract the deposits in full with the least impact on the environment and provides the means to rehabilitate the environment -- on its own, without handouts. *We request that the Preferred Alternative assume no subsidies.* Possible forms of subsidy that we would NOT like to see include:

- *Cheap water* -- Waters to be used for oil shale industry should not be imported into the development areas at taxpayer expense or without adequate environmental evaluation.
- *High land purchase investment v. low leasing costs* -- Leasing contracts on the public lands should be let at reasonably high competitive rates, not at unreasonably low rates. This is related to our request to defer leasing until technology has been proven, because to do otherwise would result in low rates.
- *Feasibility definition on the public lands* -- economic feasibility should be defined with the social cost built into the cost of the operation. This means that the environmental quality standards for environmental protection (a quantitative estimate) and reclamation becomes a part of the cost for the developer.

Simply put, the Preferred Alternative should require those wishing to develop oil shale or tar sands resources to do so without subsidies. Energy companies are among the most profitable in the world, and they stand to reap huge rewards by developing these resources. The Preferred Alternative should reflect this by requiring that industry develop its own lands or limited R&D leases first, by delaying development until it can be shown to benefit the public, and by assuming no subsidies.

Next, we request that the PEIS include as an element of the Preferred Alternative a requirement that leasing and development of oil shale or tar sands not occur until it is shown to rank above other potential energy sources. This requires that the BLM conduct a comparative review of potential future energy sources in the PEIS. Assuming that the development of oil shale or tar sands energy might one day be economically and environmentally feasible, the public and state and federal agencies must have a comparative and comprehensive review of all energy sources in order to put the potential development of oil shale and tar sands into perspective. For instance, how does oil shale compare with solar, wind, tidal, nuclear, geothermal, magnetohydrodynamic, and fusion energy, or even with other fossil fuel sources. What are the relative costs of each of these sources of energy, what are the relative environmental impacts and risks associated, what are the long-term effects, and how long will each resource likely provide energy. *The net energy analysis called for above in the PEIS should include a comparative analysis of the net-energy ration of oil shale or tar sands in comparison to these other energy sources.* If the oil shale resource is mainly to come from the public lands, the public must understand the role of oil shale within the broader energy picture.

Similarly, we request that the PEIS include as an element of the Preferred Alternative a requirement that leasing and development of oil shale or tar sands not occur until it is shown that it can occur only after appropriate environmental quality standards are designed and agreed upon at the citizen level. Essential elements of setting these standards is conduct of thorough baseline study, similar to those required for the Prototype Leasing Program, as well as operational and post-abandonment monitoring. Current baseline information must be gathered and presented to the public. *The PEIS baseline monitoring must include information on air quality (both near communities and in nearby Class I airsheds under the Clean Air Act), water quality (especially with regard to current salinity levels), water quantity (including the status of or availability of water rights for shale development), socio-economic baseline, Wilderness values, scenic and aesthetic values, wildlife habitat, uses of the federal land at issue, and cultural resources present in areas with potential for shale development. In addition to conducting this review of baseline conditions for the Programmatic EIS, the BLM must update other agency planning documents with current baseline conditions, especially in light of widespread recent increases in population and oil and gas activities in oil shale region. Once the baseline has been established, the BLM must establish environmental standards that eventual shale or sands development must meet. Existing law and regulation would form the floor for such standards, but we encourage the BLM as an element of the Preferred Alternative to set its own, more restrictive standards for the protection of the environment and communities.*

C. Other Alternatives to Be Evaluated

In addition to the measures discussed above that should be elements of the Preferred Alternative, we request that the BLM evaluate alternatives containing the following elements:

No Action Alternative -- NEPA requires that the BLM give rigorous analysis to the "no action" alternative. 40 C.F.R. § 1502.14(d). In requiring consideration of a no-action alternative, the CEP intended that agencies compare the potential impacts of its proposed actions to the known impacts of maintaining the status quo. Custer Cty. Action Ass'n. v. Garvey, 256

F.3d 1024, 1040 (10th Cir. 2001). Here, the no action alternative would mean that the BLM would refrain from amending RMP to authorize oil shale or tar sands leasing and development, and it would refrain from authorizing a commercial leasing program for oil shale or tar sands resources. Consideration of the no action alterative here would also provide an important baseline by which leasing alternatives could be judge. For example, the BLM should look at energy and water demands that are likely to result in the next 20 years from current and future activities in the absence of oil shale or tar sands leasing. The agency can then compare this to the foreseeable demands for energy and water in each of its leasing scenarios. *We urge the BLM to give the No Action Alternative serious consideration.*

Off-site processing of shale -- Mined shale need not be processed in a retort on site. *We request that the BLM examine an alternative that would involve processing mined shale elsewhere, where the environmental impacts may be mitigated due to location.*

Alternative uses of the land -- Because the BLM is undertaking RMP amendments in this PEIS, it should analyze all of the alternative uses of the land that may be developed for oil shale or tar sands. This would include the full range of alternate uses analyzed in most Resource Management Plans, such as conventional oil and gas development, land ownership adjustments, off-highway vehicle use, specially-designated areas, and fire/fuels managementetc. *Moreover, the PEIS should evaluate each proposed amendment to an RMP for its affects on minerals, roads and access, public land health, visual resource management, soils and water, air quality, invasive weed management, special status species, wildlife and its habitat, riparian values, wilderness values, forestry uses, fire management, rangeland resources and their use, cultural resources, affects on tribal properties, paleontology, recreation, hunting and angling, and law enforcement.*

Alternative fuels -- Congress called for an analysis of the impacts of commercial leasing oil shale and tar sands resources largely in response to high fuel prices. *Recognizing that oil -- be it from conventional petroleum reservoirs or from oil shale or tar sands -- is a finite resource, we request that the PEIS analyze the alternatives laid out in a document included on the enclosed CD, Winning the Oil Endgame.* This report lays out alternative ways to displace the nation's oil dependence through market- and innovation-based strategies. *We request that it be the basis for one of the alternatives studied in the PEIS.*

Federal subsidies -- When analyzing alternatives, the PEIS should include an analysis of the potential federal subsidies that could be offered to facilitate oil shale or tar sands development. As discussed above, we request that this not be an element of the Preferred Alternative. However, given the existence of substantial subsidies in the 1980s with the SynFuel Corporation, substantial subsidies may some day be offered. *The PEIS should examine the level of federal subsidy which oil shale and tar sands leasing could require, as well as the feasibility of such measures in facilitating leasing and development activities.*

V. COMMERCIAL LEASING REGULATIONS

The Energy Policy Act directed the Interior Department to promulgate regulations establishing a commercial leasing program for oil shale and tar sands resources within 6 months

of completion of this PEIS. 42 U.S.C. § 15927(d)(2). Though the agency has yet to publish notice of its intent to prepare these regulations, it stated at PEIS scoping meetings that the team writing these regulations has been assembled and is beginning work on them. *Given that the PEIS is not a site-specific analysis of any development proposal, the leasing regulations must require that specific lease proposals be proceeded by preparation of an EIS -- including conversion of an R&D lease to a commercial lease on preference right areas.* Below are several other issues that are appropriate subjects of analysis as the BLM develops commercial leasing regulations for oil shale and tar sands resources, and we ask that they be entered into the administrative record for the promulgation of these regulations.

The regulations for commercial leasing should contain measures to encourage the payment of minimum bonuses for the use of community planning or infrastructure to mitigate expected socio-economic impacts, and the PEIS should analyze the impacts of the various alternative bonus-payment measures that might be included in the commercial leasing regulations. Adequate bonus payments are also necessary to ensure diligent development. Bonuses paid in 1974 by winning lessees were $210 million, $118 million, and $121 million respectively for each of the 2 Colorado tracts and the combined Utah tracts. *The PEIS must also evaluate the impact of potential methodologies that would ensure at least comparable bonuses in the future, and it should also analyze the establishment of minimum amounts for bonus payments. Similarly, the PEIS should evaluate the impacts of requiring that potential lessees cooperate with local and state government for community planning, including requirements that they provide accurate information needed for planning and adjust construction plans to mitigate environmental and social impacts. Such measures, we feel, are appropriate subjects for the commercial leasing regulations and for study in the PEIS.*

The PEIS should also evaluate the implications of various policies with regard to competitive leasing. We feel that the regulations should provide for commercial oil shale or tar sands leasing only by competitive bid. The regulations should also provide for lease provisions requiring lessees to exercise diligence in preventing waste of leased federal resources. Thus the PEIS should evaluate the impact of different policies that may be implemented to require the exercise of diligence on commercial leases. The PEIS should also evaluate the impacts of various lease terms. We feel that the regulations should provide for a maximum lease term of 10 years, but we request that the BLM evaluate other potential lease terms in the PEIS. We feel that leases should sunset if not held by production of commercial quantities after ten years. We feel that the regulations should define "commercial quantities" by which a lease may be held as at least .005 of the recoverable resource. Even so, the PEIS should evaluate the impacts of other potential measures of commercial quantities. Such provisions are necessary to ensure timely and diligent activities on the lease. If a lessee is not able to proceed to commercial production in 10 years, then the government should give another party the opportunity to do so by reoffering the lease for competitive bid if nominated. *Because bonuses and diligence requirements are so important for mitigating community impacts, the socio-economic analysis of the PEIS should evaluate the effect of different leasing provisions on community impacts.* Even if leases are provided through noncompetitive preference right or bypass methods, they should be offered competitively and any preferred lessee given the right of first refusal at the offered bid.

The commercial leasing regulations should also provide for reasonable royalties of 12.5%, and the PEIS should evaluate the environmental impacts and likely development scenarios of other royalty levels. While the Mineral Leasing Act appears to give the Interior Department the authority to waive the payment of rents and royalties for the first five years of any lease, see 30 U.S.C. § 241(a)(4), this measure is inappropriate at this time and should not be adopted in the commercial leasing regulations. As discussed above, legislation was introduced and debated in Congress which would have significantly reduced royalties for the initial period of commercial oil shale and tar sands leases, but this measure was rejected. A commercial oil shale industry, if it is to get off the ground and thrive, must be able to do so on its own accord, without subsidies in the form of reduced royalties. *We thus urge the Department to include royalties at 12.5%, the level applicable to conventional oil and gas activities.* See 30 U.S.C. § 226(b). *The regulations should also provide for payment of minimum royalties and for the enforcement of this provision, with these minimum royalty rates set sufficiently high to act as an incentive not to lease if only for speculation.* Such minimum royalties should only be waived if the lessee is legally unable to produce at that rate. These measures are in furtherance of Congress' requirement in the Energy Policy Act that commercial leases contain measures meant "to ensure the diligent development of the lease," id. at § 15927(f), and that royalties, fees, rentals, bonuses, and other payments for leases that "ensure a fair return" to the federal government. Id. at § 15927(o)(2). Diligence is enforced by collection of royalties on commercial quantities whether they are produced or not. Such a fair return pays the public for resources lost by the shale's extraction, as well as the loss of some of the other public resources such as clean air, clean water, wildlife, and recreational opportunities. The PEIS should evaluate the various alternative scenarios for a minimum-royatly

Commercial leasing regulations for oil shale and tar sands resources must include measures to ensure adequate baseline and ongoing monitoring of air and water impacts. As discussed above, the PEIS should evaluate the impacts of various baseline and monitoring scenarios. As this is a new activity with heretofore unknown impacts, thorough information-gathering must be required at every stage. *The PEIS should also evaluate the impacts of regulatory provisions which would prohibit the ancillary use of leased lands.* During the Prototype Leasing Program, several lessees sought and ultimately obtained changes in the Mineral Leasing Act to allow acquisition of surface rights for disposal of spent shale on federal land. Allowing such a practice on a regular basis would not conserve the resource, further reducing recovery rates and the return to the federal government. *Leasing regulations should provide for planned and phased leasing, such that surface disposal must be balanced by a lessee against its own long-term resource recovery rates, and various scenarios for this provision should be analyzed in the PEIS.* This is especially true in light of changes made by the Energy Policy Act increasing the lease acreage that a company can hold in a state.

Finally, we believe that commercial leasing regulations should make clear that oil shale or tar sands leases must contain several terms found in leases for conventional oil and gas resources. For example, commercial oil shale and tar sands leases should provide for reasonable rentals, as set forth in the Mineral Leasing Act, and the PEIS should evaluate the impacts of setting rentals at various levels. See 30 U.S.C. § 241(a)(4). *The regulations should also provide specific measures to ensure adequate bonding for all operations to be undertaken on a lease, and the PEIS should evaluate the impacts of various bonding mechanisms.* The bond

should cover the costs of both short- and long-term reclamation of the lease site, including revegetation and recontouring as well as ongoing monitoring and treatment of waste water or other waste.

VI. CONCLUSION

Thank you, in advance, for your consideration of these comments. Again, we urge the BLM to utilize a broad focus as it looks at a potential commercial oil shale and tar sands leasing program. The impacts of this new industry must be fully evaluated to ensure protection of the environment and way of life of the study area. Both the BLM and the public will be best served if, before conducting a commercial lease sale, it is known that the technology works, it is economic in a variety of price scenarios, and its environmental risks can be addressed and impacts mitigated. Only after a thorough analysis of all the impacts of leasing and connected activities can such assurances be made. We look forward to participating in this process.

Respectfully submitted,

Elise Jones, Executive Director
Colorado Environmental Coalition

Mike Painter, Coordinator
Californians for Western Wilderness

Erin Robertson, Staff Biologist
Center for Native Ecosystems

Vera Smith, Conservation Director
Colorado Mountain Club

Ryan Demmy Bidwell, Executive Director
Colorado Wild

Matt Baker, Executive Director
Environment Colorado

Duke Cox, President
Grand Valley Citizens Alliance

Sandy Shea, Public Lands Director
High Country Citizens Alliance

Johanna H. Wald, Senior Attorney
Natural Resources Defense Council

Mark Pearson, Executive Director
San Juan Citizens Alliance

Kirk Cunningham, Conservation Chair
Sierra Club, Rocky Mountain Chapter

Monique DiGiorgio, Executive Director
Southern Rockies Ecosystem Project

Steve Bloch, Staff Attorney
Southern Utah Wilderness Alliance

Brad Bradway, Executive Director
Western Colorado Congress

Kevin Williams, Field Organizer
Western Organization of Resource Councils

Mike Chiropolos, Lands Program Director
Western Resource Advocates

Steve Smith, Assistant Regional Director
The Wilderness Society

Sloan Shoemaker, Executive Director
Wilderness Workshop

Bruce Pendery, Program Director
Wyoming Outdoor Council

*** *** ***

The full contact information for the submitter of these comments is:

Bob Randall, Staff Attorney
Western Resource Advocates
2260 Baseline Road, Suite 200
Boulder, Colorado 80302
(303) 444-1188 ext. 249
Fax: (303) 786-8054
bob@westernresources.org

We will furnish contact information for other signatories who wish to be on the contact list to receive information, updates, and documents related to development of this Programmatic EIS or commercial leasing regulations.

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