United States Department of the Interior
Bureau of Land Management

Environmental Assessment CO-110-2006-117-EA

Finding of No Significant Impact/Decision Record
Site 2 COC-69166
Nahcolite Test Site

Shell Frontier Oil and Gas Inc.
Oil Shale Research, Development, and Demonstration Pilot
Location: Meeker, Colorado

Applicant/Address:
Shell Frontier Oil and Gas Inc.
4582 S. Ulster Parkway
Denver, CO 80237

U.S. Department of the Interior
Bureau of Land Management
White River Field Office
73544 Hwy 64
Meeker, CO 81641

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White River Field Office
Site 2 - Nahcolite Test Site

INTRODUCTION:

The Bureau of Land Management (BLM) has conducted an environmental assessment (EA No. CO-110-2006-117) for a proposed action to address oil shale research, development, and demonstration (RD&D) projects in Rio Blanco County, Colorado in accordance with BLM's Oil Shale RD&D Program announced in the Federal Register (FR, June 9, 2005, Vol. 70, No. 110).

Shell Frontier Oil and Gas Inc. (Shell) will conduct RD&D projects on three separate sites of 160 acres each on land managed by BLM to demonstrate three different technologies to develop oil shale. The sites will be used to test different methods of shale oil extraction that may prove more or less economically or environmentally feasible. All three RD&D projects at the sites would utilize Shell's proprietary In-situ Conversion Process (ICP) to recover oil or kerogen. BLM has determined that the proposed Shell Oil Shale Research, Development, and Demonstration projects will have no significant impact on health or the human environment.

Site 2 (Nahcolite Test site) legal description is as follows:

Sixth Principal Meridian,
T. 2 S., R. 98 W.,
sec. 4, lots 9, 10, 15, 16.

Site 2 lies within the Piceance Basin, which is bounded on the north by the White River, on the east by the Grand Hogback, on the south by the headwaters of the Roan and Parachute creeks in the Roan Plateau, and on the west by the Cathedral Bluffs. The Piceance Basin of northwestern Colorado contains significant oil shale resources. The Department of Interior identified that more intensive research and consequent development of technology is needed to test the availability and practicality of extracting energy fuels from the oil shale resources on public lands. The purpose of the action is to lease parcels of public land for RD&D projects that will inform and advance knowledge of commercially viable production, development, and recovery technologies consistent with sound environmental management.

Shell has proposed research projects to evaluate the feasibility and commercial viability of developing oil shale resources in-situ. The purpose of this proposal is to achieve a "proof of concept." That is, while laboratory experiments and theoretical calculations indicate that various in-situ methodologies are viable commercial options, none have been thoroughly field tested to evaluate the practical application. This proposed project provides the opportunity to practically apply those specific technologies under field

conditions. The project results will advance knowledge of these methodologies regardless of whether or not they prove commercially viable.

Variations of the ICP process will be used at the three sites.

Site 2, the Nahcolite Test Site, will use a Two-Step ICP process. This will be implemented by initially extracting nahcolite by injecting hot water into the shale and then recovering hydrocarbons through ICP once the nahcolite is removed. This process also involves the installation of a freeze wall.

BLM has concluded that initiating steps to facilitate oil shale research and development efforts is worthwhile, and believes that this effort will significantly enhance the collective knowledge regarding the viability of innovative technologies for oil shale development on a commercial scale. The exploration and future development of the oil shale resources will help supply our future domestic energy needs and play an integral part in our nation's energy security. Additionally, Shell is developing technology which will allow extraction of both sodium minerals and oil shale in areas where valuable deposits of these resources are intermingled.

The underlying need for the proposal would be met while accomplishing the objectives of significantly advancing knowledge regarding the commercial viability of in-situ technologies for hydrocarbon recovery from oil shale.

The EA, if not attached, is available at the White River Field Office (WRFO) and incorporated by reference in this Finding of No Significant Impact (FONSI) determination. A Proposed Action, a Subalternative (Proposed Action with Mitigation), and a No Action alternative were analyzed in the EA.

PLAN CONFORMANCE AND CONSISTENCY

The proposed action and alternatives have been reviewed and found to be in conformance with one or more of the following BLM Land Use Plans and the associated decision(s):

The proposed RD&D projects are subject to and have been reviewed for conformance with the following plan (43 1610.5, BLM 1617.3):

> Name of Plan: White River Record of Decision and Approved Resource Management Plan (ROD/RMP)
>
> Date Approved: July 1, 1997
>
> Decision Number/Page: 2-6
>
> Decision Language: "...At the discretion of the Secretary of the Interior, research scale lease tracts will be considered within lands available for oil shale leasing. Approval of research tracts will be based on the merits of the technology proposed."
>
> Name of Plan: White River Record of Decision and Approved Resource Management Plan (ROD/RMP)
>
> Date Approved: July 1, 1997

Decision Number/Page: 2-7

Decision Language: "...Facilitate the orderly and environmentally sound development of sodium resources on public lands...the multimineral zone will be reserved for multimineral leasing."

It has been found to be in conformance with the RMP and with the intent of the Energy Policy Act of 2005.

FINDING OF NO SIGNIFICANT IMPACT DETERMINATION

Based upon a review of the EA and the supporting documents, I have determined that the project will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27 and do not exceed those effects described in the White River RMP/Final Environmental Impact Statement (FEIS). Therefore, an environmental impact statement is not needed. This finding is based on the context and intensity of the project as described.

Context: The study area for cumulative impacts is the White River Resource Area (WRRA). The WRRA is managed by the WRFO. Of the 2.6 million acres of land within the WRRA, the surface of 1,455,900 million acres is managed by the BLM (BLM 1997). The primary human influences on the project area are oil and gas development, historic oil shale and nahcolite mining, and livestock grazing. Existing environmental conditions in the project area reflect changes based on past projects and activities. The project area is rural and relatively undeveloped but is experiencing growth related to energy development.

The Shell RD&D project is a site-specific action directly involving one 160-acre parcel of land administered by the BLM. While the technology advanced by the Shell could have national, regional, and state-wide importance for its contribution to unlocking significant oil resources that could help to supply the Nation's future domestic energy needs, the Shell test site, in and of itself, will not produce oil in quantities that would contribute to domestic supplies.

Estimates of the total past, present, and foreseeable future surface disturbance from oil and gas development and oil shale and nahcolite mining equate to 2.4 percent of the total area of the WRRA managed by the BLM. Five Oil Shale RD&D proposed actions are located in the northern portion of the Piceance Basin, primarily on undeveloped land, all within the WRRA. The 800 acres associated with these five proposed actions equate to 2.3 percent of all past, present, and future proposed actions, and 0.06 percent of the WRRA managed by BLM.

Intensity: The following discussion is organized around the Ten Significance Criteria described in 40 CFR 1508.27 and incorporated into BLM's Critical Elements of the Human Environment list (H-1790-1), and supplemental Instruction Memorandum, Acts,

regulations and Executive Orders. The following have been considered in evaluating intensity for this proposal.

1. Impacts that may be both beneficial and adverse:

The beneficial effects of the RD&D project include the advancement of innovative technologies to explore and develop the abundant oil shale resources within the Piceance Basin to meet the needs of our nation's future energy requirements. Opting for a small-scale, staged approach to oil shale development provides an opportunity to prove the concept of the technologies involved and to field test operations at economic and environmentally acceptable levels. The Shell RD&D projects could add to the collective knowledge regarding the viability of an untested technology for use in oil shale development on a commercial scale.

The in-situ technology proposed on this test site would not permanently modify the land surface, and if the RD&D efforts prove not to be technically, environmentally, or economically feasible, the projects would be dismantled and lands could be reclaimed with minimal adverse environmental impact.

Adverse effects include the potential for impacts to water resources, soils, vegetation, wildlife, recreation, and visual resources that would occur during construction and operation of the Proposed Action with Mitigation.

2. Degree of effect on public health and safety:

The BLM has selected the Proposed Action with Mitigation, comprised of the construction, operation, and maintenance of oil shale RD&D facilities together with supporting access and utility rights-of-way and lease issuance, incorporating mitigations, as the environmentally preferred alternative. The Proposed Action with Mitigation achieves the balance of resource protection and beneficial uses of the human environment envisioned by the National Environmental Policy Act (NEPA).

In contrast to previous oil shale development ventures, the small-scale RD&D projects would have minimal impacts on the socioeconomic infrastructure of local communities. Environmental commitments, and mitigation measures described in Terms/Conditions/Stipulations as part of this decision, would minimize any public safety effects during project construction and operation.

The alternative mitigation measures enumerated in the EA provide sufficient control to reduce or minimize impacts to an insignificant level.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas:

There are no prime farmlands, parklands, floodplains, wild and scenic rivers, wilderness areas, National Landscape Conservation Areas, National Monuments, National Parks, or

Areas of Critical Environmental Concern (ACECs) in the project area. As described in the EA, impacts to wetlands and riparian areas are not anticipated. The Proposed Action with Mitigation requires monitoring of wetlands and water quality to determine if hydrologic interactions lead to potentially adverse impacts.

Cultural resource surveys were conducted in the last few years on this site. There were no cultural resources identified on Site 2. The Proposed Action with Mitigation contains requirements and contingencies in the event that previously unknown cultural resources are identified. Monitoring and environmental commitments included in the Proposed Action with Mitigation will be developed prior to, and implemented during project construction to minimize the potential for adverse impacts to scientifically significant cultural or paleontological resources and will lessen adverse effects to public lands administered by the WRFO.

4. Degree to which the possible effects on the quality of the human environment are likely to be highly controversial:

Public input regarding the proposed RD&D projects has been solicited throughout the RD&D planning process. Representatives of the BLM, Rio Blanco County government, and the U.S. Fish and Wildlife Service (USFWS), met or consulted informally at various times to discuss the potential impacts of oil shale development on the resources under their respective administration.

Public involvement included public scoping meetings held in local communities throughout the region, as well as in open house forums that provided opportunities for the public to view the technologies proposed and to interact with industry representatives. These open houses were held to inform the public of the interdisciplinary team approach to working with the third-party contractors preparing the EAs for the RD&D proposals so as to provide consistency among the EAs and to allow shared impact analysis for regional resources. The open houses also provided additional public comment and Q&A opportunities. During the public comment periods, fifteen written comments were received; eight from members of the general public, two from educational institutions, two from environmental advocacy groups (one of which was a collaboration of comments from ten individual organizations), and the remainder were received from state and federal governmental entities. Many of the comments generally recognized that the Proposed Action with Mitigation offered an opportunity to better understand the oil shale resource without sacrificing important natural resources. Concerns were raised about impacts to surface and ground water resources, air quality, and wildlife resources. These impacts have been reduced to insignificance through the implementation of mitigation measures. Other comments were focused on multiple use management, suitable protective measures, and around concerns that the BLM environmental review be commensurate with the scope of the potential for commercial scale operations and incorporate statements on broad actions concerning the provision for conversion to commercial leasing and subsequent environmental and socio-economic impacts.

During the 30-day review period allowed for the Shell Oil Shale Research RD&D EA, a total of 37 comment letters were received from individuals, federal, state, and local

agencies and various interest groups. In the analysis of these comments, 217 separate comments were identified. Many of the comments were of a technical nature requesting clarification on operations or suggesting parameters to be included in the subsequent mitigation and response plans. The BLM has addressed concerns, modified the EA for clarification, when appropriate, and is committed to developing mitigation and response plans that incorporate appropriate suggestions submitted as part of the review process.

Based on the number and content of the comments received from the public, the effects of the RD&D projects on the quality of the human environment are not considered highly controversial. However, the past oil shale boom and bust cycles, most recently the bust of May 2, 1983 which resulted in significant adverse impact to the social and economic stability of western Colorado, increase the likelihood that a high level of public interest in the implementation, monitoring, and demonstration of feasibility associated with the RD&D leases can be expected.

5. Degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risk:

The Shell projects will use in-situ heating of the shale to convert kerogen to oil and gas. Anticipated effects on the quality of the human environment as a result of the proposed technology have been thoroughly identified, analyzed, and mitigated to an insignificant level.

Due to the nature of the RD&D projects, some degree of uncertainty is to be expected. The small-scale approach of initiating research on 160-acre parcels reduces risk by providing an opportunity to field test operations at environmentally acceptable levels of risk. Shell has developed various response, compliance, and mitigation plans as part of their approved plan of operations. When uncertainty about impacts to the human environment was identified in the analysis of the proposed action, comprehensive mitigation measures were identified and analyzed in the Proposed Action with Mitigation. In addition to project design criteria, BLM-required mitigation, and required monitoring and response plans, the permitting required for operations will also include requirements from regulatory agencies that further mitigate uncertain aspects of implementing the project. The result is a series of built-in checks to address uncertainties associated with implementing the untested technology and incorporates adaptive measures to implement in the event unknown risks are identified.

6. Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration:

The Proposed Action with Mitigation is a site-specific action directly involving a 160-acre parcel of land administered by the BLM. Shell has applied for a lease to be issued for a term of 10 years with the option for an extension not to exceed 5 years upon demonstration to the satisfaction of the Authorized Officer that a process leading to production in commercial quantities is being diligently pursued. The lease is subject to conversion to a 20-year lease upon documenting to the satisfaction of the Authorized Officer that it has produced commercial quantities of shale oil from the lease. The Lessee

has the exclusive right to convert the research and development lease acreage to a commercial lease and acquire any or all portions of the remaining preference lease area up to a total of 5,120 contiguous acres. Additional NEPA analysis, in the form of an Environmental Impact Statement (EIS), would be required prior to commercial development of the preference lease acreage.

If implementation of the Proposed Action with Mitigation results in proving Shell's proposed technologies for in-situ hydrocarbon extraction from oil shale, this could affect future BLM actions with regard to future leasing of public oil shale lands, based on the outcome of the Programmatic Environmental Impact Statement (PEIS). The demonstration of the feasibility of Shell's proposed technologies could result in increased interest in using BLM administered lands for energy production. However, this action does not represent a decision in principle about a future consideration.

The Energy Policy Act of 2005, Public Law 109-58 (H.R. 6), also directs the Secretary of the Interior (the Secretary) to complete a PEIS for a commercial leasing program for oil shale and tar sands resources on public lands with an emphasis on the most geologically prospective lands within each of the states of Colorado, Utah, and Wyoming. BLM will base future decisions with respect to land use planning in three states and regulations for commercial oil shale leasing on that analysis. Those decisions will be made independently of this action, except insofar as results of Shell's projects may add to our information about in-situ technology.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts:

The study area for cumulative impacts is the WRRA. The WRRA is managed by the WRFO. Of the 2.6 million acres of land within the WRRA, the surface of 1,455,900 million acres is managed by the BLM. Estimates of the total past, present, and foreseeable future surface disturbance from oil and gas development and oil shale and nahcolite mining are estimated to equate to 2.4 percent of the WRRA.

A total of five Oil Shale RD&D proposed actions are located in the northern portion of the Piceance Basin, primarily on undeveloped land and all within the WRRA boundary. The percentage of the five proposed tracts currently developed with pipelines, wells, research tracts, or roads was estimated by each of the consultants preparing the EA using aerial photography and site visits. The 800 acres associated with these five proposed actions equate to 2.3 percent of all past, present, and future proposed actions, and 0.06 percent of the WRRA managed by BLM.

The Proposed Action with Mitigation would not individually have a significant impact on any natural resource within the Piceance Basin or within the communities of the region. Cumulative impacts to natural resources could occur as the Proposed Action with Mitigation operates in conjunction with other past, present, or reasonably foreseeable future actions, such as the expanding oil and gas production operations in northwestern Colorado. These impacts would be long-term, but not permanent, would occur over a relatively small percentage of land when compared to the overall size of the WRRA and

would not result in significant impact to any areas of historic, cultural, or biological importance.

Extensive monitoring, pollution prevention, and permitting requirements further alleviate the possibility of any significant cumulative impacts associated with the RD&D projects.

8. Degree to which the action may adversely affect district, sites, highways, structures, or objects listed on the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources:

No districts, sites, or other properties eligible for listing to, or included on, the National Register of Historic Places were identified for the Proposed Action with Mitigation. Cultural investigations have satisfied the Secretary of the Interior's Standards and Guidelines for the identification of historic properties. No eligible historic properties were identified within the area of potential direct or indirect effects. On-site monitoring of excavation activities by qualified archeologists provided by the BLM will minimize the potential for adverse effects to heritage resources. The Proposed Action with Mitigation contains requirements and contingencies in the event that previously unknown cultural resources are identified.

9. Degree to which the action may adversely affect an endangered or threatened species or its critical habitat:

Field surveys were conducted on the 160-acre parcel and surrounding areas by qualified biologists in Spring 2006 and found that no critical habitat for threatened and endangered animal or plant species are present.

A Biological Assessment (BA) was prepared in compliance with Section 7(c) of the Endangered Species Act (ESA) and submitted to USFWS. The analysis, results, and conclusions presented in the BA are based on surveys and research conducted by biologists and botanists contracted by the preparer and the BLM. Based on the analyzed impacts of the subalternative (the Proposed Action with Mitigation), BLM concluded there will be "no effect" on all but five federally-listed endangered, threatened, proposed for listing, and candidate species. For the bald eagle, the BA described that increased activity from implementation of the Proposed Action with Mitigation may increase the incidence of vehicle accidents or disrupted feeding, resulting in a conclusion of "may affect, not likely to adversely affect".

For the four endangered Colorado River fish species, water depletions of up to 19 acre-feet per year for each of the three sites in total may adversely affect endangered Colorado River fish species. The water depletions constituting the 19 acre-feet per year are to be used during drilling and construction and from boiler makeup water during project operation.

New projects involving a depletion of less than 125 acre-feet per year are required to pay a one-time fee to cover the annual depletion. The estimated depletion for each site is significantly less than 125 acre-feet per year, and depletions are offset in part by augmentation to Yellow Creek during initial dewatering of the process area and reinjection outside of the process area. The project would result in estimated maximum

water depletions of 19 acre-feet per year at each test site. Water would be used in drilling, operational, and reclamation phases of the project.

Based on the determination that implementing the subalternative (the Proposed Action with Mitigation) is likely to adversely affect endangered Colorado River fish species, consultation between the BLM and USFWS has occurred as agreed under the minor water depletions Programmatic Biological Opinion, which addresses water depletions less than 125 acre-feet per year.

The USFWS reviewed the BA to assess the potential impacts of the Proposed Action with Mitigation on federally-listed endangered, threatened, proposed for listing, and candidate species. In a letter, dated September 12, 2006, the USFWS responded to the BA for the five oil shale RD&D projects. In its biological opinion (ES/GJ-6-CO-94-F017), the USFWS concurred with the conclusions of the oil shale RD&D BAs for all federally-listed endangered, threatened, proposed for listing, and candidate species. The USFWS additionally determined that the five RD&D projects fit under the umbrella of the Programmatic Biological Opinion for small water depletions caused by BLM authorized activities. The three companies have been notified of their responsibility to make annual payments to the National Fish and Wildlife Foundation as specified in the USFWS Biological Opinion.

10. Whether the action threatens a violation of federal, state, or local environmental protection law:

The Proposed Action with Mitigation violates no federal, state, or local environmental protection laws.

Potential violations will be avoided through environmental commitments and monitoring stipulations defined in the Proposed Action with Mitigation. These commitments and stipulations were developed during project planning involving all participants in the RD&D program and during ongoing consultations with the Colorado Department of Wildlife, USFWS, and the Rio Blanco County government.

To continue to meet air quality standards the BLM would require the operator to continue to cooperate with existing atmospheric deposition and visibility impact monitoring programs. The need for, and the design of, additional monitoring could include the involvement of the EPA Region 8 Federal Leadership Forum (EPA 2001) and applicable air quality regulatory agencies.

To maintain water quality compliance the BLM will require the operator to install monitoring wells and collect surface water data, to develop a water monitoring and response plan for both surface and groundwater.

A Mitigation Summary Table is provided at the end of the EA. The table summarizes the Proposed Action Design Mitigations and the Subalternative additional mitigations.

Based on the above analysis of the context and intensity of potential impacts resulting from the Proposed Action with Mitigation, BLM has determined that the proposed Shell RD & D projects will have no significant impact on health or the human environment.

Approved by:

C. Stephen Allred
Assistant Secretary
Land and Minerals Management

11/9/2006
Date

Decision Record
Site 2 - NahcoliteTest Site
COC-69166

DECISION:

It is my decision to authorize issuance of an Oil Shale Research, Development, and Demonstration lease for Site 2 – Nahcolite Test Site (COC-69166) to Shell Frontier, Inc. along with any supporting rights-of-way, for the demonstration of their shale oil extraction technology. This decision is contingent upon Shell fulfilling all applicable environmental commitments, including terms, conditions, stipulations, and certain monitoring commitments described in the Proposed Action with Mitigations of the EA.

Rationale for Decision:

The EA considered the following: the No Action Alternative, the Proposed Action, and the sub-alternative, Proposed Action with Mitigation. The subalternative, Proposed Action with Mitigation is the preferred alternative and is recommended to ensure that impacts to health and human environment are reduced or minimized to insignificant levels. The Proposed Action with Mitigation incorporates all practicable means to avoid or minimize impacts to health and the human environment.

The No Action Alternative was not selected because it would not fulfill the purpose, need, and requirements of the RD&D program, or Congressional intent declared in the Energy Policy Act of 2005. The Proposed Action was not selected because BLM identified environmental impacts from the proposed action that may have been significant in both context and intensity.

Among other factors, the Proposed Action with Mitigation helps to:

- Preserve important historic, cultural, and natural aspects of our national heritage and maintain, whenever possible, an environment that supports diversity and variety of individual choices;
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.

Authorities:

Department of Interior, Bureau of Land Management

Monitoring and Enforcement:

Potential resource conflicts were resolved through environmental commitments and monitoring stipulations integral to the Proposed Action with Mitigations. These are fully described in the subject EA. These commitments and stipulations were developed during project planning involving all participants in the RD&D program and during ongoing consultations with the Colorado Department of Wildlife, US Fish and Wildlife Service, and Rio Blanco County government.

Monitoring and enforcement of these commitments will be incorporated as special lease stipulations that will ensure the right of the BLM to inspect the leased lands, including surface and underground improvements, equipment, books and records; and require the lessee to monitor environmental affects. Failure to comply with lease terms could result in suspension of operations or forfeiture and cancellation of the lease.

Terms/Conditions/Stipulations:

The following terms, conditions, stipulations, and other mitigation measures are incorporated in the Proposed Action with Mitigation as outlined in the subject EA, and are comprised of BLM specifications and guidelines, industry imposed measures, and environmental commitments put forth by Shell Frontier, Inc. These measures were designed for site-specific and regional mitigation so as to lessen the potential for adverse effects to public lands administered by the White River Field Office BLM.

In addition to design criteria and mitigation identified in the Proposed Action and Plan of Operations, the BLM will require Shell to adhere to the following mitigation measures as shown by resource topic:

Air Quality

Shell will minimize construction impacts to air quality by acquiring Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (APCD) construction emissions permits, complying with permit stipulations, and implementing emission control measures. In addition, Shell will:

- Surface roads and well locations on soils susceptible to wind erosion to reduce the amount of fugitive dust generated by traffic or other activities.
- Use dust inhibitors to prevent fugitive dust problems.
- Establish and enforce speed limits (15 to 30 miles per hour [mph])
- Continue to cooperate with existing atmospheric deposition and visibility impact monitoring programs.
- Mitigate fugitive dust emissions using erosion control measures, and control dust during construction, wind events, and stockpiles, as necessary.

Cultural Resources

Shell will minimize impacts to cultural resources by implementing the following measures:

- Inform personnel that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts.
- Stop activity in the area if historic or archaeological materials are uncovered and immediately notify the BLM Authorized Officer (AO).
- Notify the BLM AO by telephone and with written confirmation, immediately upon discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Stop activities in the immediate area of the find, and protect the discovery for 30 days or until notified to proceed in writing by the BLM AO.

Invasive, Non-native Species

Shell will minimize impacts caused by invasive, non-native species by implementing measures to treat existing infestations, prevent introduction/expansion of infestations during construction, and monitor and treat infestations after construction is complete. Shell will:

- Monitor distribution and density of noxious weeds and control and/or eradicate any new or expanded populations.
- Keep disturbed areas as free of noxious weeds and undesirable species as practicable.
- Conduct pre-construction field surveys each spring to identify existing noxious weed infestations within the project area.
- Consult with BLM and local weed agencies to develop treatment strategies for any identified noxious weed infestations.
- Require vehicles and equipment to arrive at the site clean, power-washed, and free of soil and vegetative debris capable of transporting weed seeds or other propagules.
- Install wash stations at designated infestation areas if any are identified in Spring 2007. Wash water will be contained and grease traps will be added as required.
- Seed disturbed areas.

Migratory Birds

Shell will minimize impacts to migratory birds by implementing the following measures:

- Conduct follow-up surveys if construction activities do not begin prior to February 1, 2007.

- Minimize, where possible, vegetation clearing while migratory birds are nesting (February 1 through August 15).
- If reserve pits are deemed necessary on site, ensure that pits are lined, fenced on all four sides with net-wire, and covered with plastic barrier to exclude both large and small animals and netted to prevent birds from accessing these pits. Plastic flagging has proven to be ineffective at deterring migratory waterfowl from using reserve pits for foraging, resting or as a source of free water. The Operator will notify the BLM via Sundry Notice of the method that will be used to prevent impacts to migratory birds two weeks prior to the date when completion activities are expected to begin. The BLM-approved method will be applied within 24 hours after completion activities have begun.
- All lethal and non-lethal events that adversely affect migratory birds will be reported to a WRFO Petroleum Engineer Technician and Wildlife Biologist immediately.
- If surveys reveal special status species to be present:
    - No development activities allowed within l/2 mile of identified nest sites of listed, candidate, or BLM sensitive raptor species (except bald eagle and ferruginous hawk) from February 1 through August 15, or until fledging and dispersal of young. Development activities are allowed from August 16 through January 31.
    - No development activities allowed within l/4 mile of identified nests of other special status raptor species from February 1 through August 15, or until fledging and dispersal of young. Development activities are allowed from August 16 through January 31.
    - No development is allowed within 1 mile of identified nests of ferruginous hawks from February 1 through August 15, or until fledging and dispersal of young. Development activities allowed from August 16 through January 31.
    - No surface occupancy within l/4 mile of an identified nest of an ESA listed, proposed, or candidate raptor species.
    - No surface occupancy within l/8 mile of an identified nest of other special status raptor species.

These mitigation measures can be exempted, modified, or waived by BLM if conditions warrant and the decision is documented through an environmental analysis. An exception will suspend the stipulation on a one time basis. Modifications will temporarily or permanently change the language or provision of a stipulation. Waivers are utilized to permanently remove the stipulation due to changed circumstances. Conditions for granting an exception, modification, or waiver are described in the Appendix A of the White River Resource Area RMP (1997).

Threatened, Endangered, and Sensitive Animal Species

Shell will minimize impacts to Special Status Animal Species by implementing the following measures:

- Conduct follow-up raptor surveys if construction activities do not begin prior to February 1, 2007.
- Conduct special status species surveys prior to construction activities if construction is planned to begin after April 1, 2007.
- If reserve pits are deemed necessary on site, ensure that pits are lined, fenced on all four sides with net-wire, and covered with plastic barrier to exclude both large and small animals and netted to prevent birds from accessing these pits.
- Reclaim reserve pits as soon as possible after use.
- Adhere to the requirements of USFWS Biological Opinion dated September 12, 2006 and the Colorado River Fish Species recovery program.
- If surveys reveal special status species to be present:
    - No development activities are allowed within 1/2 mile of identified nest sites of listed, candidate, or BLM sensitive raptor species (except bald eagle and ferruginous hawk) from February 1 through August 15, or until fledging and dispersal of young. Development activities are allowed from August 16 through January 31.
    - No development activities allowed within 1/4 mile of identified nests of other special status raptor species from February 1 through August 15, or until fledging and dispersal of young. Development activities are allowed from August 16 through January 31.
    - No development is allowed within 1 mile of identified nests of ferruginous hawks from February 1 through August 15, or until fledging and dispersal of young. Development activities allowed from August 16 through January 31.
    - No surface occupancy within 1/4 mile of an identified nest of an ESA listed, proposed, or candidate raptor species.
    - No surface occupancy within 1/8 mile of an identified nest of other special status raptor species.
- Mitigation for endangered and sensitive Colorado River fishes has been determined by USFWS to address proposed water depletions that will adversely affect Colorado River fishes. Section 7 consultation applies and Shell will pay USFWS.
- USFWS Migratory Bird Office will be consulted if any nests of threatened and endangered species or raptors occur in the project site, access road, or adjacent to the facilities.

These mitigation measures can be exempted, modified, or waived by BLM if conditions warrant and the decision is documented through an environmental analysis. An exception will suspend the stipulation on a one time basis. Modifications will temporarily or permanently change the language or provision of a stipulation. Waivers are utilized to permanently remove the stipulation due to changed circumstances. Conditions for granting an exception, modification, or waiver are described in the Appendix A of the White River Resource Area RMP (1997).

Threatened, Endangered, and Sensitive Plant Species

If threatened, endangered, or BLM sensitive plant species are identified on-site during future field surveys, impacts to those species will be minimized or avoided. Measures will be species-specific and will be applied on a site-by-site basis, depending on the results of field surveys. Shell will coordinate with BLM to determine conservation measures and the need for USFWS consultation for threatened, endangered, candidate, and BLM sensitive plant species and will consult with USFWS to determine measures for federal listed threatened, endangered, or candidate species.

Shell will minimize impacts to Special Status Plant Species by implementing the following measures:

- Avoid plants that occur outside the project area and install exclusion fencing to prevent disturbance from construction activities.
- Conduct source population surveys in areas where plants could not be avoided to determine the magnitude of impact on the entire population.
- Evaluate the potential for site design modifications in areas where plants occur.
- Conduct pre-construction surveys for special status plants during the flowering period.
- Consider the effectiveness of collecting seed from mature plants to be replanted following construction activities.

Wastes, Solid or Hazardous

Shell will minimize solid and hazardous waste impacts by implementing the following measures:

- Watch for signs of hazardous or solid wastes during excavation activities; if found, report and mitigate.
- Use, store, transport, and/or dispose of hazardous materials in accordance with applicable federal and state laws.
- Implement spill prevention measures, inspection and training requirements, and spill response and notification procedures.
- Maintain sanitary conditions in the project area at all times.

- Provide adequate trash containers on-site, and dispose of trash at an appropriate disposal site.
- Provide portable toilets on-site, removing and properly disposing of contents in accordance with applicable laws and regulations.

Best Management Practices (BMPs) will be required to ensure that wastes will not be released to the outside environment. The appropriate Spill Prevention Control and Countermeasure (SPCC) Plans will be designed so that each facility has the appropriate containment and countermeasures in place. All spills must be reported to the CDPHE environmental release and incident reporting line. Solid or hazardous waste will be removed from the test sites according to the necessary procedures associated with the type of waste. Any unforeseen waste exposure to the outside environment will need to be addressed and proper mitigation will be implemented, but at this time no waste exposures are anticipated.

Water Quality, Surface and Ground

Shell will obtain necessary federal and state permits, and will comply with the Corps of Engineers Nationwide Permit 12 conditions, CDPHE Water Quality Control Division (WQCD) Minimal Industry Discharge Permit conditions, Stormwater discharge permit, and all other applicable water quality permitting requirements to minimize impacts to water quality. Shell will minimize impacts to water quality, surface and ground, by implementing the following measures:

- Obtain permits and comply with applicable water quality requirements.
- Develop a groundwater monitoring and response plan consistent with groundwater monitoring programs undertaken at the other Colorado oil shale RD&D tracts.
- Continue groundwater monitoring as long as needed to determine that the site is acceptable for abandonment.
- Obtain a stormwater discharge permit and submit its stormwater management plan to the WRFO.
- Prepare and implement a SPCC plan for BLM approval.
- Adhere to "Gold Book" 4th edition *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (2006) for all surface disturbing activities.
- Submit a water monitoring and response plan to the AO prior to project implementation.

Wetlands and Riparian Zones

Shell will minimize impacts to wetlands and riparian areas by obtaining and complying with the Corps of Engineers Nationwide Permit 12 conditions and by implementing measures to lessen the duration of disturbance, reduce the soil disturbance, and enhance restoration. Shell will:

- Install monitoring wells on the tracts and collect surface water data from Corral Gulch and Stake Springs Draw to determine hydrologic interactions.
- Obtain a Section 404 permit from the COE for impacts to waters of the U.S. for removal or modification of intermittent stream channels.
- Install and maintain erosion control structures.
- Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils, concrete coating, and refueling activities within 200 feet of wetland or riparian areas.

Soils

Shell will minimize impacts to soils by implementing measures for the proper handling of topsoil and spoil, erosion control, and reclamation procedures. Shell will:

- Strip topsoil to a depth of 6 to 12 inches, depending on its depth. Store any subsoil stripped during grading separately from topsoil to prevent mixing. Seed soil stockpiles and cover. During reclamation, return soils to their pre-construction locations.
- Install and maintain temporary erosion and sediment controls immediately following clearing and grading of the site to control erosion. Remove during reclamation, as appropriate.
- Return the site to pre-construction contours. Seed disturbed areas with BLM-recommended seed mixes. Install permanent erosion control measures where needed.
- Prepare and implement a SPCC plan for BLM approval aimed at reducing the potential for adverse impacts associated with spills and leaks.

Vegetation

Potential impacts of the Proposed Action from disturbances to vegetation could include soil erosion, increased potential for invasive non-native species, and indirect impacts to wildlife resulting from reduction of habitat. To minimize these effects the BLM will require Shell to implement the following measures:

- Minimize vegetation removal to the extent necessary to allow for safe and efficient construction activities.

- Cut trees with a chain saw and/or mechanical shears and cut brush close to the ground.
- Leave stumps and root balls in place (except in areas requiring topsoiling, or as necessary to create a safe and level workspace).
- Shred or chip brush and salvage with topsoil.
- Salvage and replace topsoil.
- Improve revegetation potential by preparing a seedbed prior to seeding.
- Control noxious weeds.
- Use certified weed-free seed purchased from and blended by qualified producers and dealers.
- Seeding methods should be drill or broadcast to ensure proper seed placement. Drill seeding is preferred and will be used wherever soil characteristics and slope allow effective operation of a rangeland seed drill. Drill seed perpendicular to the slope. Place seed in direct contact with the soil at an average depth of 0.5 inch, cover with soil, and firm to eliminate air pockets around the seeds. Employ broadcast seeding only in areas where drill seeding is unsafe or physically impossible. Apply seed uniformly over disturbed areas with manually operated cyclone-bucket spreaders, mechanical spreaders, or blowers. Broadcast application rates should be twice that of drill rates. The seed will be uniformly raked, chained, dragged, or cultipacked to incorporate seed to a sufficient seeding depth.
- Complete drill and/or broadcast seeding prior to redistribution of woody material.
- Comply with BLM Instruction Memorandum No. 2006-073 entitled *Weed-Free Seed Use on Lands Administered by the BLM* and as listed in the Table in the Vegetation Section.
- Redistribute large, woody material salvaged during clearing operations in order to meet fire management objectives and provide wildlife habitat and seedling protection.

Wildlife, Aquatic

Aquatic wildlife in down-gradient perennial stream sections may be impacted because of dewatering. Impacts of the Proposed Action will be mitigated by maintaining water quality through the use of conveyance and containment structures to detain water until it is clean enough for release (Shell 2006a). Additionally, impacts to aquatic wildlife will be minimized by obtaining and complying with the COE Nationwide Permit 12 conditions.

To mitigate potential impacts to aquatic wildlife, BLM will require Shell to:

- Conduct a comprehensive groundwater monitoring program to evaluate hydraulic connection.

- Monitor stream flow and water quality in nearby streams and springs.
- Install and maintain erosion and sediment control measures.
- Prohibit storage of hazardous materials, chemicals, fuels and lubricating oils, and prohibit concrete coating and refueling activities within 200 feet of any waterbody or wetland.
- Minimize erosion from upland areas by restoring and seeding disturbed areas.
- Install temporary equipment bridges across flowing waterbodies.
- Place topsoil and spoil at least 10 feet from waters edge.
- Cross streams during periods of low flow and complete the crossing within 24 hours, as feasible.

Wildlife, Terrestrial

The Proposed Action identifies potential impacts to terrestrial wildlife, such as loss of habitat and disturbance during breeding season. In order to mitigate potential impacts, BLM will require alternative mitigation measures. Wildlife impacts will be minimized through mitigation as described below.

- Redistribute large, woody material salvaged during clearing operations so as not to exceed 3 to 5 tons per acre, and mulch excess woody materials.
- Limit fencing on the tract to facilities that otherwise will present a hazard to humans and/or wildlife.
- Use wildlife friendly fencing.
- Seed disturbed areas according to BLM recommendations.
- Support carpooling and establish a policy of reduced vehicular speed, especially at night.
- If reserve pits or cutting management pits are deemed necessary on site, ensure that pits are lined, fenced on all four sides with net-wire, and covered with plastic barrier to exclude both large and small animals and netted to prevent birds from accessing these pits.

Access and Transportation

The Proposed Action identifies potential impacts to terrestrial wildlife such as increased numbers of wildlife fatalities. In order to mitigate potential impacts, BLM will require alternative mitigation measures. Wildlife impacts as a result of increased traffic and other impacts to the roads will be minimized through mitigation as described below:

- Encourage carpooling programs to minimize vehicle travel to the site. Maintain site access roads.

- Consider providing temporary overnight accommodations at the site to reduce travel.
- Control dust along unsurfaced access roads and minimize tracking of soil onto paved roads.
- Comply with county weight and load restrictions.
- Maintain unsurfaced roads during construction and operations of the project.
- Restore unsurfaced roads to equal or better condition than pre-construction condition.

Fire Management

BLM will require standards and practices that will minimize the risk of fire danger and, in case of fire, provide for immediate suppression if possible. Prior to beginning construction activities, Shell will be responsible for developing a fire management plan as an integral part of the overall safety plan that will include evacuation procedures and designate escape routes. This plan will be consistent with the WRFO fire management plan in relation to suppression tactics and accepted practices.

Specifically, to minimize the risk of accidental fires and achieve fire management objectives by Shell will:

- Coordinate with BLM and county Emergency Response teams for fire suppression priorities, management restrictions, and fire suppression strategies.
- Equip construction equipment operating with internal combustion engines with approved spark arresters.
- Carry fire-fighting equipment on motor vehicles and equipment.
- Take immediate action to suppress accidental fires.
- Construct a fire break around each test sites. Construct power lines with defensible space.
- Comply with BLM fire management requirements in all activities.
- Redistributing large, woody material salvaged during clearing operations on WRFO-administered lands.
- Implement appropriate mitigation identified in the BLM Fire Management Activity Plan (FMAP).
- Develop and provide to all employees on site, and county and BLM officials an evacuation plan.

Forestry Management

In order to mitigate potential indirect impacts that could affect vegetation, forage, and nesting habitat, BLM will require alternative mitigation measures:

- Cut trees with a maximum stump height of 6 inches.
- Dispose of trees by:
  - cut into 4-foot lengths, down to 4 inches in diameter
  - place trees along the edge of the disturbance
  - remove trees from federal land for resale or private use; or
  - chip and scatter.
- Acquire a fuel woods permit and compensate the BLM for trees.

Noise

In order to minimize potential impacts from noise, BLM may require alternative mitigation measures:

- Install and maintain appropriate mufflers and silencers on construction equipment and facility machinery as necessary.
- House or cover noise producing sources with appropriate insulated facilities as necessary.
- Comply with Rio Blanco County noise level standard of 65 dBA.

Hydrology and Water Rights

Shell will minimize potential impacts to hydrology and water rights by implementing the following measures:

- Shell is required to acquire the necessary water rights required for the project prior to the startup of the operation. The applicant will need to document that the water was obtained from a legal source, or the water was diverted in priority under a water right decreed for such use.
- If out-of-priority depletions must be replaced, a plan for augmentation (or a State Engineer approved substitute water supply plan) may be required to replace all water depletions in time, place, and amount such that no injury will occur to the vested water rights of others.
- Jurisdictional size dams must be approved by the State Engineer prior to construction. For non-jurisdictional size dams, a Notice of Intent to Construct a Non-jurisdictional Water Impoundment Structure must be filed 10 days prior to construction.

Additionally, BLM will require alternative mitigation measures:

- Up-gradient and down-gradient multi-level monitoring wells will be installed along the edges of the tract to characterize the structure and properties of local aquifers, establish pre-development baseline groundwater conditions, better define the geology of the oil shale resource, and monitor water quality.

Additionally, the stream flow in nearby streams and springs will also be monitored. All monitoring data will be submitted to the BLM for further review.

- Design of the de-watering and re-injection program will be submitted to the BLM for review.
- Water that cannot be recycled or otherwise used will be treated to appropriate discharge standards in the process water treatment plant and released to a surface drainage under a Colorado Discharge Permit.

Paleontology

Impacts to any paleontological resources will be minimized by implementing BLM mitigation measures as follows:

- Require a paleontologic monitor to be on-site prior to any ground-disturbing activities.
- Train personnel that collection of paleontological specimens is not allowed.

Rangeland Management

Shell will minimize the impacts to rangelands by implementing the following measures:

- Seed disturbed areas as discussed in the Vegetation section.
- Control noxious weeds as discussed in the Invasive, Non-Native Species section.
- It may be necessary to install cattleguards where heavy traffic is expected.

Realty Authorizations

Impacts to realty authorizations will be minimized by implementing BLM mitigation measures as follows:

- At Site 2, a mutually acceptable agreement concerning the CSU R&PP lease (COC34329) has been negotiated. Shell is committed to preserving the necessary portions of the reclamation plots and has downsized their project at Site 2 to fit the constraints agreed to by BLM and CSU.
- Make the Conditions of Approval for the site a part of any ROW grant stipulations, along with compliance with all applicable regulations contained in 43 CFR Part 2800.
- Use the "One Call" system to locate and stake the centerline and limits of underground facilities in areas of proposed excavation.

Socioeconomics

Shell will initiate discussions with local municipalities to determine the appropriate mitigation measures to offset the demands that the Proposed Action may place on community resources beyond the scope of the Colorado Local Government Energy Impact Program.

Measures to offset demands on local law enforcement and emergency response services could include:

- Implement a health and safety program that will include training on-site supervisory personnel in first aid and cardiopulmonary resuscitation (CPR).
- Provide site security for the protection of the public, site personnel, and property.
- Implement a fire prevention and control program as discussed in the Fire Management section.
- Encourage employees and contractors to carpool to and from the site to cut down on traffic on state highways and county roads.

Visual Resources

In order to minimize potential impacts, BLM will require alternative mitigation measures. Visual contrast impacts will be minimized by implementing the following mitigation measures:

- Paint above ground facilities in accordance with BLM-recommended color schemes.
- Recontour disturbed land to conform to natural contours as closely as possible.
- Reseed disturbed areas using BLM-approved seed mixes as quickly as possible.
- Reduce fugitive dust. Establish and enforce speed limits on gravel roads in and adjacent to sites.
- Monitor and cleanup litter and other debris.
- Where feasible:

  -site structures off ridge lines,

  -use low-profile structures,

  -site slash/debris piles in low visibility areas,

  -feather and thin edges of cleared areas outside the site buffer zone, and inside the facility,

  -co-locate utility services in combined ROW.

Wild Horses

Shell will meet with BLM prior to construction of the project to discuss BLM's requests for the protection of the horses. Several techniques may be used to minimize impacts to the wild horses. These include:

- Keep operation equipment and materials within each of the 160-acre test sites using adequate fencing to keep horses out. Appropriate portions of the test sites will be fenced to exclude large game, wild horses, livestock, and the public for safety purposes.
- Maintain and repair fences as necessary.
- Avoid construction during recognized foaling season between March 1 and June 15.
- Replace water sources with equal sources of water in locations determined by BLM specialists.

CONCLUSION:

Based on the above analysis of the context and intensity of potential impacts resulting from the Proposed Action with Mitigation, BLM has determined that the proposed Shell Oil Shale Research, Development, and Demonstration project will have no significant impact on health or the human environment.

To continue to meet air quality standards the BLM will require the operator to continue to cooperate with existing atmospheric deposition and visibility impact monitoring programs. The need for, and the design of, additional monitoring could include the involvement of the EPA Region 8 Federal Leadership Forum (EPA, 2001) and applicable air quality regulatory agencies. In addition, extensive pollution prevention and permitting requirements alleviate the possibility of any significant air quality impacts associated with the RD&D projects.

To maintain water quality compliance the operator will install groundwater-monitoring wells and collect surface water data. Using this data, a detailed water monitoring and response program will be developed in cooperation with BLM, USGS, CDPHE, and industry. The monitoring and response plan will address monitor well locations, water-bearing units to be monitored, monitor well design, analytes, water level measurements, frequency of sampling and analysis, sampling techniques, analytical methods, QA/QC processes, and reporting requirements. The water monitoring and response plan will not be restricted to groundwater, but will address surface water upstream and downstream from the RD&D sites, springs, seeps, and groundwater-surface water interactions.

The decision to grant an Oil Shale RD&D lease for Site 2 – Nahcolite Test Site (COC-69166) to Shell Frontier, Inc. has been made in consideration of the factors described above. The Proposed Action with Mitigation represents an opportunity to develop

domestic energy sources and to inform and advance knowledge of commercially viable production, development, and recovery technologies consistent with sound environmental management.

Approved by:

C. Stephen Allred
Assistant Secretary
Land and Minerals Management

11/9/2006
Date