2 DESCRIPTIONS OF ALTERNATIVES

2.1 INTRODUCTION

This PEIS examines alternatives for designating public lands managed by the BLM as available or not available for application for future commercial leasing of both oil shale and tar sands resources. The phrase "available for application for leasing" is used above, and throughout the PEIS, rather than "available for leasing" to highlight that, unlike the BLM's practice with respect to oil and gas leasing, additional analysis, including but not limited to NEPA, the National Historic Preservation Act of 1966, as amended (NHPA), and the Endangered Species Act of 1973 (ESA), would be required prior to the issuance of any lease of oil shale or tar sands resources, even in areas designated as "available" through the planning process. For each of the resources, oil shale and tar sands, there are four alternatives analyzed in detail. Alternative 1 (the No Action Alternative) does not amend plans. Management prescriptions in existing plans are not modified. Alternatives 2, 3, and 4 describe different management approaches to amending RMPs to designate certain lands as being available, and certain lands as being not available, for application for future commercial leasing and development. The BLM's approach is designed to ensure that oil shale technologies can operate at economic and environmentally acceptable levels before the agency authorizes full-scale commercial leasing on public lands. Future oil shale and tar sands commercial development on public lands in Colorado, Utah, and Wyoming would be conducted pursuant to regulations applicable to these respective resources.

This chapter presents information on each of the oil shale and tar sands alternatives examined in this PEIS. Specifically, the following sections describe the existing requirements and BLM policies potentially applicable to oil shale and tar sands development, the oil shale and tar sands resources, the suite of technologies included in the scope of this PEIS, the constraints evaluated in each alternative, and the comparison of alternatives. In addition, this chapter discusses the alternatives and issues considered by the BLM in preparing this PEIS that were eliminated from detailed analysis or from further consideration at this time.

This PEIS analyses four alternatives: the No Action Alternative and three land allocation alternatives. Each alternative addresses both oil shale and tar sands resources. Since the resources lie in separate geographical areas and employ difference extraction and processing technologies, separate parallel discussions are presented for oil shale and tar sands. While oil shale and tar sands are discussed in separate sections, the four alternatives analyzed under each resource are defined in the same way with respect to land allocation considerations. Specifically, the types of land exclusions defining the alternatives are the same for each resource.

2.2 EXISTING STATUTORY REQUIREMENTS AND BLM POLICIES POTENTIALLY APPLICABLE TO OIL SHALE AND TAR SANDS DEVELOPMENT

Commercial leasing and development of oil shale or tar sands resources on public lands will be subject to existing federal, state, and local laws and regulatory requirements as well as

established BLM policies. The purpose of including the following information is to convey that management of public lands is subject to a wide array of requirements that are over and above decisions that will be made in the ROD for this PEIS. These requirements are not subject to decisions in the ROD but serve to provide context for those decisions.

2.2.1 Existing Relevant Statutory Requirements

This section discusses, in very general terms, the major laws, E.O.s, and policies that may provide environmental protection and compliance requirements for oil shale or tar sands leasing and development projects on public lands in Colorado, Utah, and Wyoming. Because these projects would vary on the basis of design, size, specific activities, and location, the requirements described here may not apply to all projects. Lists of specific E.O.s and federal and state laws are provided in Appendix D.

The BLM conducts its operations in accordance with FLPMA and with numerous statutes, regulations, and standards regarding environmental protection. In addition, E.O. 12088, "Federal Compliance with Pollution Control Standards" (U.S. President 1978), as amended by E.O. 13148, "Greening of Government through Leadership in Environmental Management" (U.S. President 2000), requires federal agencies (including the BLM) to comply with applicable administrative and procedural pollution control standards established by, but not limited to, the Resource Conservation and Recovery Act of 1976 (RCRA), Toxic Substances Control Act of 1976 (TSCA), Clean Air Act of 1990 (CAA), Noise Control Act of 1972 (NCA), Clean Water Act of 1987 (CWA), and Safe Drinking Water Act of 1974 (SDWA). Other compliance requirements may include the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), hazardous material transportation laws, ecological resources requirements (e.g., ESA), and cultural and paleontological resources requirements (e.g., NHPA, the Native American Graves Repatriation and Protection Act of 1990, as amended [NAGRPA], the Archaeological Resources Protection Act of 1979, and the Paleontological Resources Preservation subtitle of the Omnibus Public Land Management Act of 2009).

In the Energy Policy Act of 2005, among many energy-related provisions, Section 369 titled the "Oil Shale, Tar Sands, and Other Strategic Unconventional Fuels Act," provided direction to the Secretary of the Interior to complete a PEIS for a commercial leasing program for oil shale and tar sands resources on public lands; publish a final regulation establishing a commercial leasing program; consult with the Governors of States with significant oil shale and tar sands resources on public lands, representatives of local governments in such states, interested Indian Tribes, and other interested persons, to determine the level of support and interest in the states in the development of tar sands and oil shale resources; and, if sufficient support and interest exists in a state, the Secretary may conduct a lease sale in that state under the commercial leasing program.

The MLA authorizes the Secretary of the Interior to lease deposits of oil shale and the surface of public lands containing the deposits, or lands adjacent thereto, as may be required for the extraction and reduction of leased minerals. It also authorizes the issuance of right-of-way (ROW) grants for oil and gas, synthetic fuels, and refined products gathering and distribution

pipelines and related facilities not already authorized through a lease. Under the MLA, the lease may not exceed 5,760 acres[1] and may be of an indeterminate period. The Secretary of the Interior may impose conditions on the lease, including requirements relative to methods of mining, prevention of waste, and productive development.

The BLM also conducts its operations in compliance with applicable land use laws, including the Wild and Scenic Rivers Act of 1968, the National Trails System Act of 1968, and the Wilderness Act of 1964. In addition, any leasing of public lands for oil shale or tar sands development that may impinge on NPS lands would require the BLM to analyze potential impacts on the park lands, including the potential to impair park resources addressed in the National Park Service Organic Act of 1916. Under current regulations, issuance of combined hydrocarbon leases within units of the NPS shall be allowed only where mineral leasing is permitted by law, where the lands are open to mineral resource disposition in accordance with any applicable Bureau of Ocean Energy Management Plan, and the Regional Director of the NPS finds that there will be no resulting significant adverse impacts on the resources and administration of the unit or other contiguous units of the NPS.

Several other land use laws may guide development of a leasing plan for commercial oil shale or tar sands development. As discussed in Chapter 1, the BLM has authority pursuant to FLPMA, the Federal Land Exchange Facilitation Act of 1994, and the Federal Land Transaction Facilitation Act of 2000 to exchange public land or interests in it for nonfederal land or interests when the exchange serves the public good.

Oil shale and tar sands development projects may require ROWs on or across public land for project facilities. A ROW grant is the authorization to use a particular parcel of public land for specific facilities for a definite time period. FLPMA authorizes the BLM to issue ROW grants for uses such as roads and electrical power generation, transmission, and distribution systems. The MLA authorizes the agency to issue ROW grants for oil and gas gathering and distribution pipelines and related facilities not already authorized through a lease, and oil and natural gas transmission pipelines and related facilities. ROW grants carry conditions that require compliance with applicable environmental protection standards.

State and county laws and regulations also are applicable to oil shale or tar sands development projects to the extent consistent with federal law. In some cases, states have federally approved regulatory programs that meet or exceed the environmental protections provided by federal statutes and regulations (such as those under the CWA). States and counties also have developed laws to address concerns specific to their locations and resources with which federally approved projects must generally comply.

The potentially applicable laws have been divided into general categories, as described alphabetically below. Although the following descriptions often cite federal laws, state and county laws can also fall into these categories. Appendix D provides a list of federal, state, and county laws and E.O.s by category.

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[1] The acreage limit was increased from 5,120 acres by amendment of the MLA in Section 369 (i)(1) of the Energy Policy Act of 2005.

- *Air quality.* Air emissions from a development project are subject to the CAA, as amended. The CAA provides that each state must develop and submit for approval to the U.S. Environmental Protection Agency (EPA) a State Implementation Plan (SIP) for controlling air pollution and air quality in that state, and that each state must develop its own regulations to monitor, permit, and control air emissions within its boundaries. Under Section 112(r) of the CAA, owners and operators of facilities that produce, process, handle, or store specific hazardous substances above threshold quantities must meet certain requirements for planning and reporting and risk management planning requirements. Although the States of Colorado, Utah, and Wyoming each administer their own SIPs, the EPA has retained regulatory primacy over air quality within the boundaries of the Uintah and Ouray Reservation.

- *Cultural resources.* Cultural resources that may be affected by federal undertakings are subject to the requirements of various laws, regulations, and policies for identification and consideration in consultation with tribal, state, and/or federal entities, and mitigation actions may be required. Under the auspices of the 1997 national Programmatic Agreement (PA) and individual state protocols, the BLM has an agency-specific process for complying with Section 106 of the NHPA.

- *Energy projects.* Project operations and facilities may require construction of facilities such as pipelines, gathering lines, transmission lines, or generation facilities. Depending on the nature of these facilities, siting will be subject to all applicable legal requirements.

- *Floodplains and wetlands.* The locations of project facilities will be subject to statutory requirements and regulations for protection of wetlands or floodplains, such as Section 404 of the CWA.

- *Groundwater, drinking water, and water rights.* The provision of drinking water from wells or surface water to a nontransient noncommunity water system at project facilities would require compliance with the SDWA. In addition, the withdrawal of surface or groundwater for industrial or drinking water purposes may require state and/or local approvals or permits.

- *Hazardous materials.* Hazardous materials may be used in the construction and operation of a project. Storage and use of fuels, petroleum, oils, lubricants, and other hazardous materials at approved project facilities are subject to numerous federal and state regulations.

- *Hazardous waste and polychlorinated biphenyls (PCBs).* Hazardous wastes (e.g., used solvents and paints) generated by a project must be accumulated, collected, transported, and disposed of in accordance with RCRA. If PCBs are used during the construction and operation of a project, they would have to be managed in accordance with the TSCA.

- *Noise.* The EPA issued guidelines for outdoor noise levels that are consistent with the protection of human health and welfare against hearing loss, annoyance, and activity interference (EPA 1974). Such guidelines state that annoyance and undue interference with activity will not occur if outdoor levels of noise are maintained at an energy equivalent of 55 decibels (dB). However, these levels are not to be construed as legally enforceable standards at this time.

- *Paleontological resources.* The new authority for the management, preservation, and protection of paleontological resources on the National System of Public Lands is the Paleontological Resources Preservation subtitle of the Omnibus Public Land Management Act of 2009 (16 USC 470aaa et seq.). The Act requires that (1) paleontological resources collected under a permit remain the property of the United States to be preserved for the public and curated in an approved repository; (2) the nature and location of paleontological resources be kept confidential to protect them from theft and vandalism; and (3) civil and criminal penalties, including fines and imprisonment, be imposed when theft and vandalism to publicly owned paleontological resources occur. Paleontological resources on public lands will continue to be protected under FLPMA for mitigation purposes. Criminal and civil penalties for theft, vandalism, and other charges related to damage, destruction, or trafficking of paleontological resources are now covered under 16 USC 470aaa-5 to 470aaa-7. Supplementary counts may still be issued for Theft of Government property under 16 USC 641 and/or for Destruction of Government Property (18 USC 1361). Other federal acts, such as the Federal Cave Resources Protection Act and the Archaeological Resources Protection Act, protect paleontological resources found in significant caves and/or in association with archaeological resources. Paleontological resources found in context with archaeological resources are protected as archaeological resources.

- *Pesticides and noxious weeds.* Pesticide application during the construction and operation of a project must comply with the Federal Insecticide, Fungicide, and Rodenticide Act of 1974 and equivalent state requirements. In addition, sites will be subject to federal provisions to control noxious weeds and invasive species and may be subject to regulations governing state-established control areas.

- *Solid wastes.* Solid wastes generated during the construction, operation, and decommissioning of a project must be managed in accordance with the Solid Waste Disposal Act of 1976 and state and local requirements for solid waste accumulation, collection, transportation, and disposal.

- *Source water protection.* Under Part C of the SDWA, Protection of Underground Sources of Drinking Water, each state is to establish a wellhead protection program to delineate wellhead protection areas, identify potential

sources of contamination, and establish control measures to prevent contamination of drinking water sources. If hazardous chemicals or materials are used during the construction or operation of a project that is located within a wellhead protection area, reporting or control measures may apply.

- *Water bodies and wastewater.* The discharge of wastewater (e.g., sanitary wastewater treatment systems or rinse/test waters) or the discharge of spent shale leachate into waters of the United States or waters of a state will require a National Pollutant Discharge Elimination System (NPDES) permit or the state equivalent. According to administrative and judicial interpretation, the scope of the federal CWA jurisdiction over waters of the United States depends on technical, site-specific factors. Regulated bodies of water could include, but are not limited to, interstate and intrastate lakes, rivers, and streams, and certain wetlands, playa lakes, prairie potholes, mudflats, intermittent streams, and wet meadows. In addition, the CWA requires an NPDES permit or the state equivalent for certain stormwater discharges. Spill prevention, control, and countermeasure plans may also be required to prevent oil spills from reaching regulated waters, adjoining shorelines, intermittent streams, or wet meadows, but only if these are hydrologically connected to the navigable waters of the United States. States may have their own planning requirements for other waters. Discharges of dredged or fill material into waters of the United States or any work in, over, or under regulated waters will require a Section 404 or Section 410 permit, respectively, from the U.S. Army Corps of Engineers (USACE).

- *Water quality*. The EPA enacted a regulation in December 1974 that set forth a basinwide salinity control policy for the Colorado River Basin. In 1975, the Colorado River Basin Salinity Control Forum (CRBSCF) proposed, the Basin States adopted, and the EPA approved water quality standards to control salinity increases in the Colorado River. These standards, including the numeric criteria and plan of implementation, are to be reviewed every 3 years. Federal, state, and Tribal water quality standards may also be applicable.

- *Ecological resources.* Among the BLM's land management objectives are protection and improvement of habitat for all federally listed species, BLM-designated sensitive species (i.e., the list published by the BLM state office of species occurring on public lands whose populations or habitats are rare or in significant decline), state-listed species, and wild horse and burro herds. The BLM evaluates all projects and activities occurring on public lands to ensure that they will not contribute to the need to list species as threatened or endangered.

In addition to these categories, the construction and operation of an oil shale or tar sands development project on public land with overlapping valid existing mining claims in place must not materially interfere with the mining claimants' rights to mine, remove, or sell the minerals from the claim (30 USC 26). Projects may also be subject to the health and safety standards

of the Federal Mine Safety and Health Act of 1977 and the Occupational Safety and Health Act of 1970.

Requirements to consider impacts of leasing public land for oil shale or tar sands development on local populations may fall under several E.O.s, including E.O. 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (U.S. President 1994), and E.O. 13045, "Protection of Children from Environmental Health Risks and Safety Risks" (U.S. President 1997), depending on the activities, location, and other circumstances of the lease.

2.2.2 Existing Relevant BLM Policies and Mitigation Guidance

In September 2008, the BLM issued a Proposed Plan Amendments and Final OSTS PEIS analyzing the environmental and socioeconomic impacts of amending 12 land use plans in Colorado, Utah and Wyoming to designate public lands administered by the BLM as available for application for commercial leasing for oil shale or tar sands development (BLM 2008a). The November 17, 2008, ROD (BLM 2008b) that followed this PEIS adopted the proposed land use amendments reflecting the allocation decisions analyzed in the 2008 OSTS PEIS. These land allocation decisions, which are currently in effect, were challenged in a lawsuit brought by a coalition of environmental interests in January 2009. As part of a settlement agreement to the lawsuit and in light of new information that has emerged since the 2008 OSTS PEIS was prepared, the BLM has decided to take a fresh look at the land allocations analyzed in the 2008 OSTS PEIS and to consider excluding certain lands from future leasing of oil shale and tar sands resources.

As noted in Chapter 1, the following decisions from the 2008 OSTS PEIS ROD will be carried forward through this planning process and would be applicable regardless of the alternative eventually selected for adoption: the requirement for future NEPA analyses and consultation activities to occur prior to any decision to lease and/or develop oil shale and tar sands resources; and the specific decision that the BLM will consider and give priority to the use of land exchanges to facilitate commercial oil shale development pursuant to Section 369(n) of the Energy Policy Act of 2005.

The 2008 OSTS PEIS was prepared simultaneously with the rulemaking process that concluded with promulgation of the 2008 oil shale regulations in November 2008 (73 FR 69469) (Nov. 18, 2008); codified at 43 CFR Parts 3900–3930). The 2008 OSTS PEIS, however, did not analyze those regulations. The regulations were analyzed through a separate NEPA process. Thus the 2008 OSTS PEIS did not pre-judge or try to predict the final regulations or any impact they might have on development of oil shale resources. The final regulations remain in effect, although the Department will be proposing some amendments to them in a separate rulemaking proceeding. Those proposed amendments will be analyzed in a separate document under NEPA and will not be analyzed here.

Similarly, there are regulations in place that govern the leasing and development of tar sands. As explained in Chapter 1, the Combined Hydrocarbon Leasing Act of 1981 (PL 97-78)

amended the MLA to authorize the Secretary to issue CHLs in areas containing substantial deposits of tar sands, which were to be designated as STSAs. This Act further specified that a CHL was the only type of lease that could be offered in these STSAs, provided for the conversion of existing oil and gas leases or tar sands claims in these areas to CHLs, and established the maximum lease size as 5,120 acres. The CHL Act defined oil as all nongaseous hydrocarbons except coal, oil shale, gilsonite, and other vein-type solid hydrocarbons. Eleven STSAs were designated in 1980 and 1981. The BLM published regulations implementing the leasing provisions of this Act in February 1983 at 43 CFR Part 3140. Subsequently, the BLM prepared the Utah Combined Hydrocarbon Leasing EIS (BLM 1984). Tar sands resources located outside of these STSAs were not subject to the requirements of 43 CFR Part 3140 and are available for development under oil and gas leases.

Under the authority of the Combined Hydrocarbon Leasing Act, six CHLs were issued in the mid-1980s within the Pariette and P.R. Spring STSAs in the Vernal Field Office; these leases remain in existence. Also in the mid-1980s, a number of operators holding oil and gas leases or tar sands claims within the designated STSAs applied to convert their leases to CHLs. In most instances, the conversion of these leases has not been completed; thus a number of pending conversion applications remain within the study area, specifically within the Circle Cliffs, Tar Sand Triangle, and P.R. Spring STSAs. The BLM is currently engaged in adjudication of these applications.

On May 18, 2006, pursuant to Section 350 of the Energy Policy Act of 2005, which amended the MLA to allow separate oil and gas leases and tar sands leases in designated STSAs, the BLM issued a final rule on leasing in STSAs (71 FR 28779, codified at 43 CFR Subpart 3141). The final rule authorizes the BLM to issue separate leases for exploration for and extraction of tar sands, separate leases for exploration for and development of oil and gas, and separate leases for CHLs within designated STSAs. Under the rule, all three types of leases would have primary terms of 10 years; CHLs and oil and gas leases would remain in effect as long thereafter as oil or gas is produced in commercial quantities; tar sands leases would remain in effect after the 10-year term as long as tar sands are produced in commercial quantities. The final rule increases the maximum acreage of CHLs or tar sands leases in a STSA from 5,120 to 5,760 acres, establishes the minimum acceptable bid for tar sands leases at $2.00 per acre, and requires that tar sands leases be issued by competitive processes only. In addition, under the final rule, leasing STSAs in NPS units is allowed only where mineral leasing is permitted by law and where the lands are open to mineral resource disposition in accordance with any applicable Minerals Management Plan. The NPS Regional Director also must find that leasing within an NPS unit would not result in any significant adverse impacts on the NPS unit or any contiguous unit.

Decisions in the ROD resulting from this PEIS regarding the availability of lands within the STSAs for future commercial leasing will not affect or be affected by the requirements established for tar sands leasing in the regulations.

In addition to these regulations and policies, the BLM has developed many program-specific policies and guidance documents that establish requirements that may be relevant and/or applicable to oil shale or tar sands development. For example, from 1968 to 1989, the Office of

the Secretary imposed stipulations on oil and gas leases for lands in oil shale areas in Colorado, Utah, and Wyoming (DOI 1968). These policies and guidance documents exist in a variety of forms, including BLM plans, manuals, handbooks, instruction memoranda, technical references, BMPs, standards, directives, and other such documents. The applicability of specific policies and guidance documents is discussed to varying degrees in this PEIS but is best assessed at the project-specific level.

Besides the provisions of the 2008 OSTS PEIS ROD and the regulations governing, respectively, the oil shale and tar sands programs, many elements of existing BLM policies, specifically focused on other resources, establish requirements that are relevant and applicable to these types of development projects. Examples of policies that will be applicable to oil shale or tar sands development include BLM policies regarding the management of sensitive species and visual, cultural, and paleontological resources and BLM's responsibilities for tribal consultation.

Similarly, other existing BLM guidance more general in scope may be applicable to oil shale and tar sands development, because this guidance addresses environmental issues that are relevant to such development and may provide appropriate mitigation measures. Examples of those topics include land use planning, NEPA, oil and gas development, pipeline construction and waterway crossings, road construction and maintenance, wildlife management, wild horse and burro herd management, ACECs, hazardous materials and waste management, pesticide use and integrated pest management, cultural resource management, Tribal consultations, visual resource management, and occupational health and safety. A comprehensive review of these BLM program-specific mitigation policies is beyond the scope of this PEIS, although discussion of many of these policies is included in the impact analyses sections. Readers are advised to obtain the complete guidance documents if they seek more information. Electronic copies of some of the BLM directives, manuals, and handbooks are available at http://www.blm.gov/nhp/efoia/.

2.2.3 Management of BLM-Administered Lands

The BLM manages public lands within the affected field offices for a variety of land uses and values, including, among others, recreation, mining, oil and gas development, livestock grazing, wild horse and burro herd management wildlife resources, visual resources, LWC, communication sites, and ROW corridors (e.g., roads, pipelines, and transmission lines). BLM-administered lands are managed within a framework of numerous laws, the most comprehensive of which is FLPMA (43 USC 1701 et seq.). Under FLPMA, the BLM manages the public lands by using principles of multiple use and sustained yield to provide for the protection and the use of the myriad resources found on the public lands. In accordance with the requirements of FLPMA, the BLM prepares RMPs to identify the resources within each planning area and to establish land use allocations, management goals, and prescriptions for the planning area. The RMPs are prepared to be consistent with the plans of state and local governments to the maximum extent feasible and consistent with federal law. These plans are developed with significant public involvement and are reviewed by the governors of each state for consistency with state and local planning objectives. Under FLPMA, the BLM is required to maintain,

amend, and revise its RMPs to ensure that they reflect the current conditions and management goals within the planning area.

FLPMA, and in many cases specific authorizing legislation or proclamations, guides the BLM in its management of lands included in the NLCS. The NLCS lands include NCAs, National Monuments, Wilderness Areas, WSAs, WSRs, and National Historic and Scenic Trails. Other conservation designations within the NLCS are Instant Study Areas (ISAs), Forest Reserves, National Recreation Areas (NRAs), Research Natural Areas, and Outstanding Natural Areas.

FLPMA directs the BLM to give priority to the designation of ACECs. Designated ACECs include public lands where special management attention and direction are needed to protect and prevent irreparable damage to important historic, cultural, and scenic values, fish, or wildlife resources or other natural systems or processes. ACECs may also be used to protect human life and safety from natural hazards. The BLM designates ACECs through land use plans that outline management objectives and prescriptions for each ACEC. Table 2.2.3-1 identifies all of the existing ACECs that lie within oil shale and tar sands areas.

Wilderness Areas are designated by Congress as part of the National Wilderness Preservation System to ensure preservation and protection of their natural conditions. They comprise at least 5,000 acres or more in size (or of sufficient size to make administration as wilderness practicable); offer outstanding opportunities for solitude or primitive and unconfined types of recreation; and may contain ecological, geological, or other features that have scientific, scenic, or historical value. WSAs are areas identified by a federal land management agency (i.e., the BLM, USFS, NPS, or USFWS) as having wilderness characteristics, thus making them worthy of consideration by Congress for wilderness designation. While Congress considers whether to designate the WSAs as permanent Wilderness Areas, the federal agency managing the WSA does so in a manner to prevent impairment of the area's suitability for wilderness designation.

Since WSAs were established in the late 1970s and 1980s, designation of wilderness lands has been extensively debated, and additional BLM lands have been identified by the public as having wilderness characteristics. In 1996, the Secretary of the Interior directed the BLM in Utah to evaluate such lands to determine whether they possess wilderness characteristics. According to the BLM policy, indicators of an area's naturalness include the extent of landscape modifications, the presence of native vegetation communities, and the connectivity of habitats. Outstanding opportunities for solitude or primitive and unconfined types of recreation may be experienced when the sights, sounds, and evidence of other people are rare or infrequent; in locations where visitors can be isolated, alone, or secluded from others; where the use of the area is through nonmotorized, nonmechanical means; and where no or minimally developed recreation facilities are encountered. A number of areas in the PEIS study area have been recognized by the BLM as having wilderness characteristics. Processes are underway in some of the BLM field offices where such lands have been identified to determine appropriate management requirements, if any, for these areas. For the most part, decisions regarding management of these areas will be made at the field office level as part of the local land use planning process, or as a separate plan amendment, not as part of this PEIS; however, two of the

TABLE 2.2.3-1 Existing ACECs Intersecting Oil Shale or Tar Sands Areas

ACEC	Field Office(s)	ACEC Acres		
		Total	Within Oil Shale Areas	Within STSAs
Colorado				
Duck Creek	White River	3,426	3,426	0
Dudley Bluffs	White River	1,628	1,628	0
East Fork Parachute Creek	Colorado River Valley	6,566	1,289	0
Ryan Gulch	White River	1,436	1436	0
Trapper Creek	Colorado River Valley, White River	2,845	1,419	0
Trapper Creek/Northwater Creek	Colorado River Valley, White River	1,962	1,592	0
Utah				
Copper Globe	Price	124	0	124
I-70 Scenic Highway	Price	33,094	0	3,240
Lears Canyon	Vernal	1,378	0	890
Lower Green River	Vernal	9,353	7,677	0
Nine Mile Canyon	Vernal and Price	74,368	538	22,335
Pariette Wetlands	Vernal	10,657	6,533	2,261
San Rafael Canyon	Price	15,165	0	0
Cottonwood-Diamond Watershed	Moab	35,080	0	3
Lucky Strike	Price	892	0	575
Shepard's End	Price	3	0	3
Wild Horse Canyon	Price	710	0	122
San Rafael Reef	Price	73,229	0	3,807
Temple Mountain	Price	788	0	788
Wyoming				
Greater Red Creek	Rock Springs	175,207	44,847	0
Greater Sand Dunes	Rock Springs	41,648	391	0
Pine Springs	Rock Springs	6,056	6,056	0
Special Status Plant Species	Rock Springs, Kemmerer	1,177	71	0
White Mountain Petroglyphs	Rock Springs	22	22	0
	(All)	496,811	76,924	35,726

alternatives considered in detail in this PEIS include provisions excluding from future consideration of oil shale and tar sands leasing and development any lands identified by the BLM as having wilderness characteristics.

Under Section 201 of FLPMA, the BLM is required to maintain an inventory of public land resources, including LWC.[2] Since the original wilderness inventory is more than 30 years

[2] Wilderness characteristics include: size—roadless areas of at least 5,000 acres of public lands or are of a manageable size; naturalness—the land generally appears to have been affected primarily by the forces of nature; and opportunities—outstanding opportunities for solitude or primitive and unconfined types of recreation.

old, the BLM field offices periodically update the original inventory to identify where LWC are currently found. As RMPs are revised, the BLM is considering whether or not LWC within a particular RMP area will be managed to protect those wilderness characteristics or if those lands will be committed to other uses. The status of the wilderness characteristics inventory for the portion of each field office within the oil shale and tar sands study area is included in Section 3.1.1 of this PEIS.

A river or river section may be designated as a WSR by Congress or the Secretary of the Interior under the authority of the Wild and Scenic Rivers Act of 1968. Land management agencies conduct inventories of rivers and streams within their jurisdictions and make recommendations to Congress regarding the potential inclusion of suitable rivers into the WSR system as part of their land use planning process. These special areas are managed to protect outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values, and to preserve the river or river section in its free-flowing condition. WSR boundaries are established to include a corridor of land along either side of the river as determined to be appropriate for protection of the river's values. The law recognizes three classes of rivers: wild, scenic, and recreational. It is the BLM's policy to manage potentially eligible and suitable[3] WSRs in a manner to prevent impairment of the river's suitability for WSR designation until Congress or the Secretary makes a final determination regarding the river's status. During this interim period, a corridor extending at least 0.25 mi from the "high water" mark on each bank of the river is established.

National Historic and Scenic Trails are designated by Congress under the National Trails System Act of 1968. National Historic Trails follow as closely as possible the original trails or routes of travel with national historical significance. Such designation identifies and protects historic routes and their historic remnants and artifacts for public use and enjoyment. National Scenic Trails are extended trails that offer maximum outdoor recreational potential and provide enjoyment of the various qualities (e.g., scenic, historical, natural, and cultural) in the areas through which they pass.

BLM-administered lands support a wide array of recreational activities important to growing numbers of local, regional, and national users. While unstructured or "dispersed" recreation uses are common on public lands, developed recreation sites, Special Recreation Management Areas (SRMAs), and off-highway vehicle (OHV) areas are all use areas found within the PEIS study area.

A significant portion of the public lands within the most geologically prospective oil shale area is undergoing development of its oil and gas resources. Conflicts in development among resources (e.g., oil shale or tar sands and oil and gas) may occur. Generally, the concept of prior existing rights would prevail, except in some instances when existing stipulations would

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[3] As part of recent revisions of a number of land use plans, WSR inventories have been undertaken. Where a river or river segment is found to be "eligible" for inclusion in the WSR system as part of one of these inventories, the BLM's Land Use Planning Handbook (H-1601-1) (BLM 2005) directs the BLM to protect the lands along the eligible segment until a "suitability" determination has been made as part of the land use planning process. If the river or river segment is found to be "non-suitable," the lands along the river then would be available for other uses.

take precedence; however, it is the BLM's policy to optimize recovery of natural resources in an effort to secure the maximum return to the public in revenue and energy production; prevent avoidable waste of the public's resources utilizing authority under existing statutes, regulations, and lease terms; honor the rights of lessees, subject to the terms of existing leases and sound principles of resource conservation; and protect public health and safety and mitigate environmental impacts. Conflicts among competing resource uses are generally considered and resolved when processing potential leasing actions or evaluating requests for approvals of plans of development (see also Section 4.2.1.1).

As discussed in Chapter 1, Section 369(n) of the Energy Policy Act of 2005 required the Secretary to consider and give priority to the use of land exchanges to facilitate the recovery of unconventional fuels. The Act dictates that any land exchange undertaken shall be implemented in accordance with Section 206 of FLPMA. The BLM's policy for land exchanges under Section 206 recognizes that a land exchange is a common-sense tool that enables the BLM and other landowners to improve land management and consolidate ownership. Therefore, where it can be demonstrated that the public interest will be well served, land exchanges may be considered on a case-by-case basis when the result will consolidate ownership and improve management of natural resources. Land exchanges, however, are not completed on an acre-for-acre basis, but instead are completed on an equal-value basis. One of the more challenging aspects of the land exchange process is developing an exchange proposal where the appraised values of the federal and nonfederal lands are equal. Given the complexities of achieving equal-value land exchanges, especially recognizing the difficulty in valuing a commodity like oil shale or tar sands, a viable exchange proposal may be difficult to achieve. The initial basis for considering land exchange opportunities lies within existing land use plans.

2.3 OIL SHALE

Oil shale is a term used to cover a wide range of fine-grained, organic-rich sedimentary rocks. Oil shale does not contain liquid hydrocarbons or petroleum as such but organic matter derived mainly from aquatic organisms. This organic matter, kerogen, may be converted to oil through destructive distillation or exposure to heat. The most prospective oil shale deposits in the United States are contained within sedimentary deposits of the Green River Formation in the greater Green River Basin (including Fossil Basin and Washakie Basin) in southwestern Wyoming and northwestern Colorado, the Piceance Basin in northwestern Colorado, and the Uinta Basin in northeastern Utah. As discussed in Section 1.2, the analyses in this PEIS focus on the most geologically prospective oil shale resources in these basins (i.e., the oil shale study area) shown in Figure 2.3-1. In Colorado and Utah, these are defined as those deposits that are expected to yield 25 gal/ton or more of shale oil and that are 25 ft thick or greater. In Wyoming, where the oil shale resource is not of as high a quality as it is in Colorado and Utah, the most geologically prospective oil shale resources are those deposits that yield 15 gal/ton or more of shale oil and that are 15 ft thick or greater. Figure 2.3-1 shows the Green River Formation basins and the most geologically prospective oil shale resources within those basins. Table 2.3-1 lists the total size in acres of the Green River Formation basins and the most geologically prospective oil shale resources by state, along with the total number of acres of BLM-administered and split estate lands within the most geologically prospective area within each state.

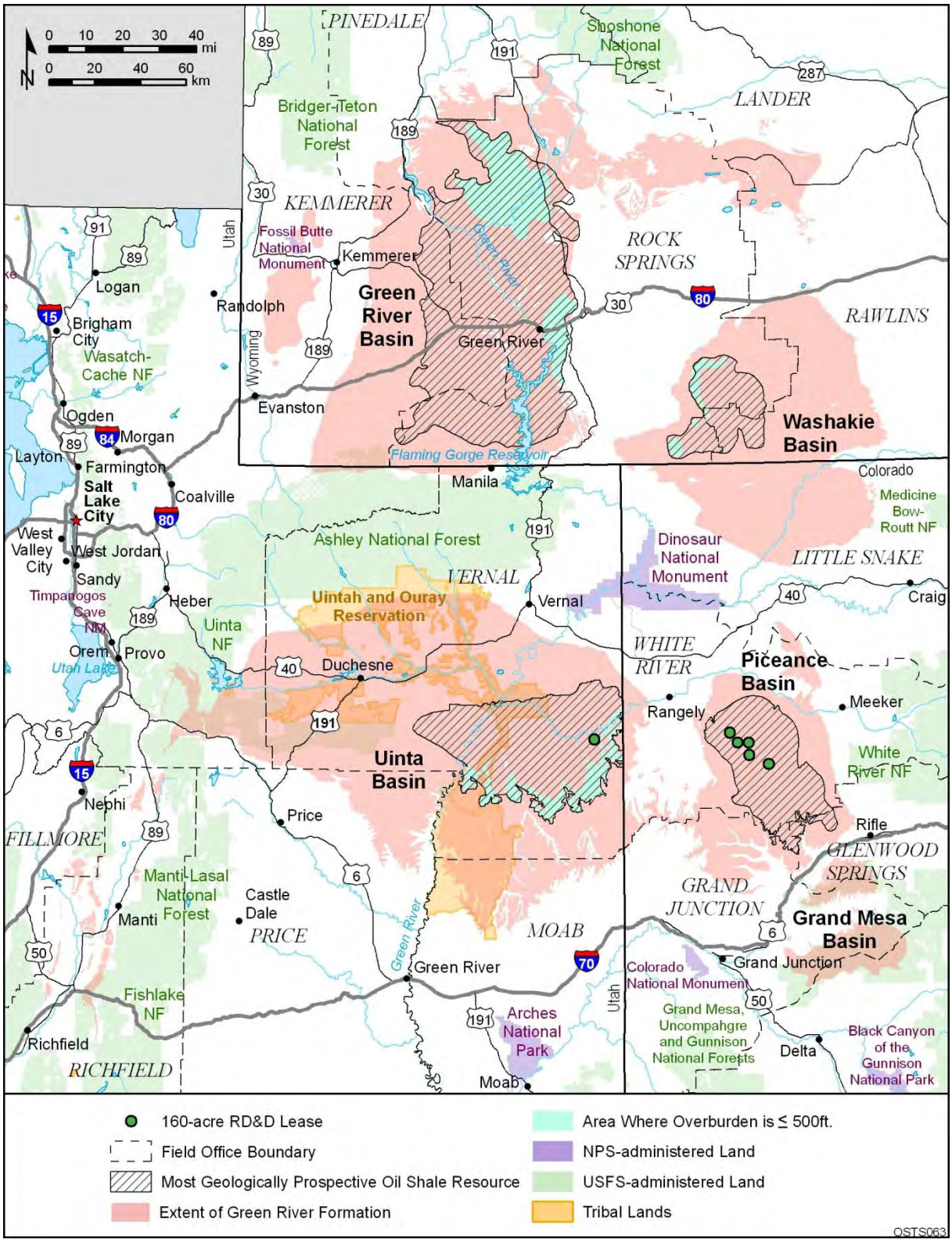

FIGURE 2.3-1 Green River Formation Basins in Colorado, Utah, and Wyoming; the Most Geologically Prospective Oil Shale Resources; the Areas Where the Overburden above the Oil Shale Resources Is ≤500 ft; and Locations of the Six RD&D Projects

TABLE 2.3-1 Total Size in Acres of the Green River Formation Basins, Most Geologically Prospective Oil Shale Areas, and Acres of BLM-Administered and Split Estate Lands within the Most Geologically Prospective Areas in Each State[a,b]

State	Total Size of Basin	Total Size of Most Geologically Prospective Area	Total BLM-Administered Lands in Most Geologically Prospective Area	Total Split Estate Lands in Most Geologically Prospective Area
Colorado				
Piceance Basin	1,185,700	503,342	307,165	39,886
Utah				
Uinta Basin[c]	2,977,900	840,572	560,870	76,820
Wyoming				
Green River and Washakie Basins	4,506,200	2,194,483	1,244,162	38,219
Total	8,669,800	3,538,297	2,112,197	154,926

[a] Totals may not be exact because of rounding. These estimates were derived from geographic information system (GIS) data compiled for the PEIS analyses. The GIS data may contain errors; therefore, these estimates should be considered to be only representative of the size of the oil shale resources and the distribution of BLM-administered and split estate lands.

[b] Split estate lands include areas where the federal government owns, and the BLM administers, the subsurface mineral rights, but the surface estate is owned by Tribes, states, or private parties.

[c] The split estate lands in the Hill Creek STSA include 57,705 acres of split estate lands within the Hill Creek Extension of the Uintah and Ouray Reservation on which the surface rights are owned by the Ute Indian Tribe.

Oil shale is actually the rock marlstone, which contains kerogen, a precursor to oil. The kerogen must be heated to more than 750ºF to convert it into oil because it was never buried deeply enough for nature to convert the kerogen to oil**.** Oil shale should not be confused with shale oil. In shale oil, the strata were buried deeply enough that the temperature was sufficiently high to naturally convert the kerogen into oil. Currently, a major exploration effort is being carried out in Colorado to produce oil from the Niobrara shales, primarily in eastern Colorado. In shale oil plays such as the Bakken in North Dakota and Montana, the objective is to find brittle layers in the shale, drill horizontal holes along those brittle layers, artificially fracture the rock, and produce the resulting oil.

Currently, there is no commercial production of oil from oil shale being undertaken in the United States. However, several companies, including Red Leaf Resources and Enefit American

Oil Company, are planning commercial production in the near future in the Unita Basin. Considerable interest exists, however, as reflected by the numerous R&D efforts underway, including the BLM's ongoing oil shale RD&D program. As discussed in Section 1.4.1, under the BLM's oil shale RD&D program, five RD&D leases have been issued in the Piceance Basin of Colorado (one each awarded to Chevron Shale Oil Company and American Shale Oil, LLC, and three awarded to Shell Frontier Oil & Gas), and one RD&D lease has been issued in the Uinta Basin, Utah (awarded to OSEC, which was purchased by Enefit American Oil in 2011). The locations of the six RD&D projects are shown in Figure 2.3-1 and, in greater detail, in Figure 2.3-2. In the PEIS, these leases are recognized as prior existing rights, and development will proceed under the lease terms under all alternatives being considered. For purposes of this analysis, it was assumed that all of the sites could reach full commercial development and may utilize the full acreage available to them under their leases. The very limited decisions being considered in this PEIS regarding the areas included in the RD&D leases are described in Sections 2.3.2 and 2.3.3. Table 2.3-2 briefly describes the six RD&D projects; more detailed descriptions of these projects are contained in Appendix A.

A second round of solicitations of interest in RD&D leases was issued by the BLM on November 3, 2009. Three nomination packages were submitted; all three were selected for further consideration, including preparation of EAs under NEPA. The projects that were selected include two projects in the Piceance Basin, Colorado (one from ExxonMobil Exploration Company and one from Natural Soda Holdings Inc.), and one project in the Uintah Basin, Utah, submitted by Aurasource. These projects are undergoing NEPA analysis. Table 2.3-2 briefly describes the three new RD&D projects; more detailed descriptions of these projects are provided in Appendix A.

The BLM, under the direction of the Energy Policy Act of 2005, completed regulations that would be used to authorize commercial oil shale leasing. The BLM published a final rule for the management of a commercial oil shale leasing program in the *Federal Register* on November 18, 2008. In 2009, a consortium of plaintiffs filed two lawsuits in the federal District of Colorado, each now captioned *CEC v. Salazar*, against the BLM and the Department of Interior. The first suit challenged the BLM's 2008 oil shale regulations. This suit was settled. Under the settlement agreement filed with the U.S. District Court in Colorado, the BLM agreed to purpose changes to the rule and to publish a final rule by November 18, 2012.

2.3.1 Potential Commercial Oil Shale Development Technologies

This section briefly describes the oil shale development technologies that the BLM believes may be used commercially in the 20-year time frame assessed in this PEIS. The BLM has chosen a 20-year time frame because that is the customary time frame used in resource management planning cycles. Appendix A provides a more detailed discussion of potential technologies that may be used over the next 20 years, along with a brief history of oil shale development. Information presented in this section and Appendix A regarding technologies that could be used is taken from the best available published data. Because commercial oil shale development technologies are still largely in an R&D phase, many details regarding the specific technologies that may be used in the future to produce oil from oil shale are unknown. In the

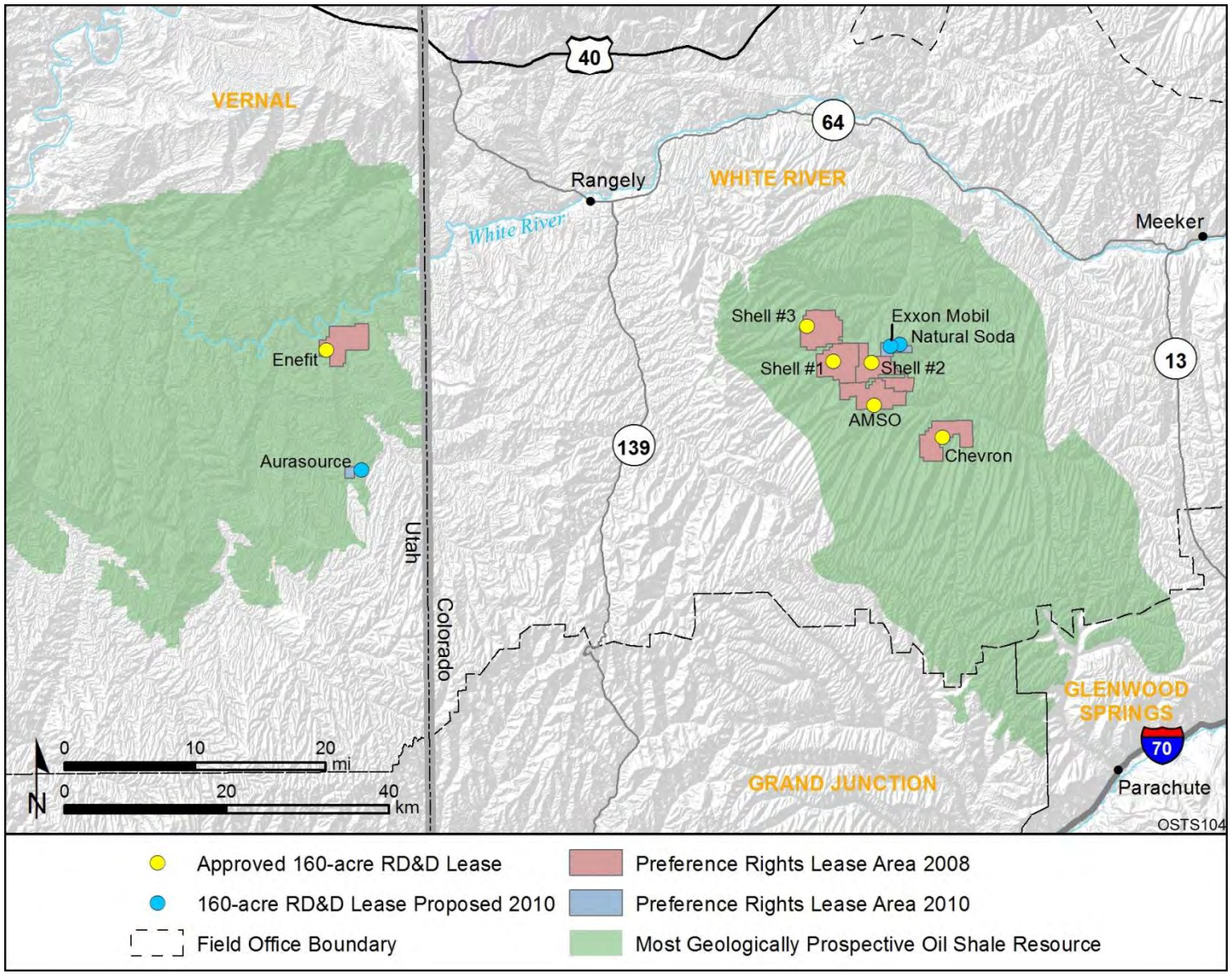

FIGURE 2.3-2 Locations of the Six RD&D Tracts and Associated PRLAs

TABLE 2.3-2 Summary Information for the Six Existing and Three Proposed Oil Shale RD&D Projects[a]

Project[b]	Technology	Design Basis for Facility (bbl/day)[c]	Total Annual Production (thousand bbl/yr)	Total Acreage Impacted
First Round				
AMSO	In situ processes	240	87.6	90
Chevron	In situ processes	20–50	7.3–18.25	100
Enefit[d]	Underground mine with surface retort	60–3,900	23–1,400	120
Shell Project 1	In situ conversion process (ICP)	500–1,500	180–550	160
Shell Project 2	Two-step ICP	500–1,500	180–550	160
Shell Project 3	Electric ICP	500–1,500	180–550	160
Second Round				
Aurasource	NA[e]	NA	NA	160
ExxonMobil[f]	In situ processes	400–700	NA	160
Natural Soda[f]	In situ processes	NA	NA	160

[a] RD&D projects in Round 1 are current approved projects. RD&D projects in Round 2 are pending proposed projects as of 2010.

[b] Chevron = Chevron U.S.A., Inc.; AMSO = American Shale Oil LLC; Enefit = Enefit American Oil; ExxonMobil = ExxonMobil Exploration Company; Natural Soda = Natural Soda Holdings Inc.; Shell = Shell Frontier Oil and Gas.

[c] bbl = barrel; 1 bbl oil = 42 gal.

[d] Enefit (formerly OSEC) is currently proposing to build a 57,000-bbl/day facility.

[e] NA = data not available.

[f] Sources: ExxonMobil 2011; Natural Soda Holdings 2011).

absence of reasonably complete information about the technologies that may be deployed, a number of assumptions have been made. These assumptions are discussed in Section 4.1.

Development of oil shale resources occurs in three major steps: (1) recovery or extraction from the natural setting, (2) processing to separate organic and inorganic constituents, and (3) upgrading the organic components in anticipation of further refining into conventional fuels. The physical and chemical features of oil shale deposits and other circumstantial factors associated with their deposition dictate the most appropriate development schemes. Typical development schemes always involve each of the above major steps, although many different combinations of these steps are possible, and many interim steps may also be necessary. In addition, all oil shale development projects also must stabilize and properly dispose of wastes and by-products. For mining technologies, spent shale is a significant waste management concern.

The recovery or extraction technologies can be divided into direct and indirect recovery methods. Direct recovery methods include both surface mining and underground mining

technologies wherein the oil shale is removed from its physical location for processing for recovery of the hydrocarbon constituents. Indirect recovery methods recover the hydrocarbon constituents from the oil shale without requiring the excavation of the oil shale inorganic (rock) matrix. Such processes can include in situ processing technologies, as well as some other enhanced oil recovery technologies developed primarily for the recovery of conventional oil and gas, in varying combinations that may be used in commercial oil shale development. Appendix A provides a detailed discussion of each of the individual technologies and some of the possible combinations of technologies that may be used in commercial oil shale development.

Processing technologies to separate the organic and inorganic constituents typically use retorting technologies that apply heat to the oil shale to pyrolyze (break down with high temperature) the kerogen. Chemical treatment processes also may be applied. Aboveground retorting (AGR) technologies are used to process mined oil shale; the retorting processes are typically preceded by a variety of pretreatment activities, including crushing, sizing, and sorting. A number of AGR technologies have been designed in the past and are considered to be potentially applicable for future commercial oil shale development. These technologies include the Union B retort, The Oil Shale Corporation (TOSCO) II retort, Paraho retort (both direct and indirect modes), Lurgi-Ruhrgas process, Superior Oil's circular grate retort, and the Alberta Taciuk Process (ATP) technology. These technologies are discussed in Appendix A. The indirect recovery methods mentioned above involve in situ processing to separate the organic and inorganic constituents of the oil shale. These processes typically involve the application of high temperatures to achieve pyrolysis of the kerogen and allow its in situ recovery. Information from the BLM's ongoing oil shale RD&D projects that involve in situ processes is one possible source for defining the potential in situ technologies that may be used in the future.

Irrespective of the resource recovery and retorting technologies employed, kerogen pyrolysis products are likely to require further processing or upgrading before becoming attractive to oil refineries as feedstocks for conventional fuels. Upgrading crude shale oil at commercial project sites could consist of any or all of the following steps: separation of extraneous materials from the feedstock (e.g., water, suspended solids); separation of the crude oil fractions according to boiling points in atmospheric and/or vacuum distillations; coking or cracking to thermally decompose large molecules into smaller molecules; chemical treatment (e.g., catalytic or thermal hydrocracking, hydrotreating, desulfurization, or hydrogenation); and removal of other contaminants. These processes are discussed in Appendix A.

This PEIS evaluates the potential impacts of commercial oil shale technologies in three primary categories:

- Surface mining projects with surface retort facilities;
- Underground mining projects with surface retort facilities; and
- In situ processing projects.

While many hypothetical development scenarios could be constructed for each of these three technology categories, it is not possible to project or analyze all of them in this PEIS. Instead, the PEIS considers the components of current technologies that could be implemented in

order to analyze the range of potential impacts that could occur. It is likely that operators would consolidate a number of systems, such as power generation facilities, equipment maintenance, product storage and load-out facilities, steam and hot water production, water and wastewater treatment and recycling, and waste management, to achieve greater efficiencies and economies at a given project location.

In this PEIS, the BLM has limited its evaluation of the impacts of surface mining to those areas within the most geologically prospective oil shale areas where the overburden ranges in thickness from 0 to 500 ft. This limitation was based, in large part, on the assumption that 500 ft is about the maximum amount of overburden in which surface mining can occur economically, using today's technologies. As shown in Figure 2.3-1, the areas within the most geologically prospective oil shale areas where the overburden is 0 to 500 ft thick are limited to part of the Uinta Basin in Utah and parts of the Green River and Washakie Basins in Wyoming. In Utah, about 133,194 acres of land within the most geologically prospective oil shale area have an overburden thickness of 0 to 500 ft; all of these lands fall within the Vernal RMP planning area. In Wyoming, the corresponding area includes about 380,220 acres within the Green River RMP planning area. Within the most geologically prospective oil shale area defined in the Piceance Basin in Colorado, the most geologically prospective areas where the overburden is 0 to 500 ft thick are very limited, and it would be difficult to assemble a logical mining unit.[4] In Alternatives 1, 2 and 4, the PEIS considers making land available for lease for surface mining only in Utah and Wyoming, in those areas shown in Figure 2.3-1.

This PEIS is being developed to analyze the proposed action to amend 10 existing land use plans to designate certain public lands as available or not available for future oil shale and tar sands leasing. It includes descriptions and analyses not of particular levels of development, but of the possible impacts of each of the three primary categories of technology currently under consideration and research, so far as this information is available to the BLM at this time. Analysis of this information will allow the BLM to determine how best to allocate certain public lands where the resources are known to be located as available or not available for application to lease in the future.

If and when the BLM receives applications to lease oil shale as well as the additional information to make such a decision, the BLM will conduct additional NEPA and other required analyses, including consideration of direct, indirect, and cumulative effects, reasonable alternatives, and possible mitigation measures appropriate to the anticipated development. On the basis of that NEPA analysis to be conducted at the lease stage, the BLM will consider further amendment of one or more plans, if necessary, including, but not limited to, the establishment of general lease stipulations and BMPs.

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4 The areas within the most geologically prospective oil shale areas where the overburden is 0 to 500 ft thick were mapped on the basis of a variety of sources of information. In Colorado, the area was defined on the basis of data published in Donnell (1987). In Utah, the area was mapped on the basis of data provided by the Utah Geological Survey (Tabet 2007). In Wyoming, the area was mapped on the basis of data provided by Wiig (2006a,b).

2.3.2 Alternative 1, Oil Shale No Action Alternative, No Change to 2008 Decision

Under Alternative 1, the No Action Alternative, no existing land use plans would be amended. In 2008, the BLM designated a total of 2,017,714 acres[5,6] available for application for commercial oil shale leasing and 430,686[6] acres available for commercial tar sands leasing (Figures 2.3.2-1, 2.3.2-2, and 2.3.2-3 for Colorado, Utah, and Wyoming, respectively). Table 2.3.2-1 lists the approximate number of acres of BLM-administered lands available for application for commercial oil shale leasing under Alternative 1 by state.[7]

The lands available for lease under the 2008 land use plan amendment decisions would remain available for future leasing consideration under the No-Action Alternative. These public lands comprise the most geologically prospective oil shale and tar sands areas administered by the BLM, including split estate lands where the federal government owns the mineral rights, but excluding lands that are exempted by statute, regulation, or E.O., as described in Section 2.3.3. Other exempted lands include: the mechanically-minable trona area in Wyoming; lands within incorporated towns and within city limits; historic trails; the Monument Valley Management Area; Management Area 3—the Jack Morrow Hills Planning Area in Wyoming; and expansion areas around Rock Springs and Green River, Wyoming. Split estate lands within the Hill Creek Extension of the Uintah and Ouray Reservation would potentially be available for leasing. These lands total approximately 57,657 acres.

Under the 2008 OSTS ROD (BLM 2008b), which forms the basis for the No Action Alternative, ACECs are treated in the following manner. Those ACECs that were closed for mineral development would be closed to oil shale/tar sands leasing; those ACECs open for mineral development would be open to oil shale/tar sands leasing. With respect to LWC, no specific decision was made in the 2008 ROD. Rather, as noted in the 2008 OSTS PEIS, the decision as to how to manage these areas was left to the discretion of the individual BLM field offices, which would determine the management of such areas through additional planning and NEPA processes (2008 Final OSTS PEIS, pp. 4-21, 4-22). Similarly, with respect to the management of sage-grouse habitat, the 2008 ROD made no specific decisions; rather, the 2008 Final OSTS PEIS included a text box discussing BLM's policies and general practices, including specific frequently used mitigation measures that might be applied to any development, as warranted by analysis at the lease and/or development stage (2008 Final OSTS PEIS, pp. 4-78 to 4-80). More recently, the BLM has issued nationwide and state-specific guidance recommending the consideration of certain management practices to address the appropriate management of sage-grouse habitat in the context of land use actions, and this information is presented in a text box in Section 4.8.1 of this PEIS. Under this No Action Alternative, as well as all of the other alternatives presented for analysis, field offices would need to take this guidance into account and incorporate protective measures in any authorizations, as warranted by

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5 This amount includes the total potential RD&D lease acreage of 30,720 acres.

6 In the 2008 OSTS PEIS, the corresponding acreages were estimated as 1,991,222 acres for oil shale and 431,224 acres for tar sands. These estimates are slightly revised here after recalibrating the geospatial data on which they are based for the current analysis.

7 The maps and acreage estimates were constructed by applying the leasing restrictions discussed in the text to the best available geographic information system (GIS) datasets available to the BLM.

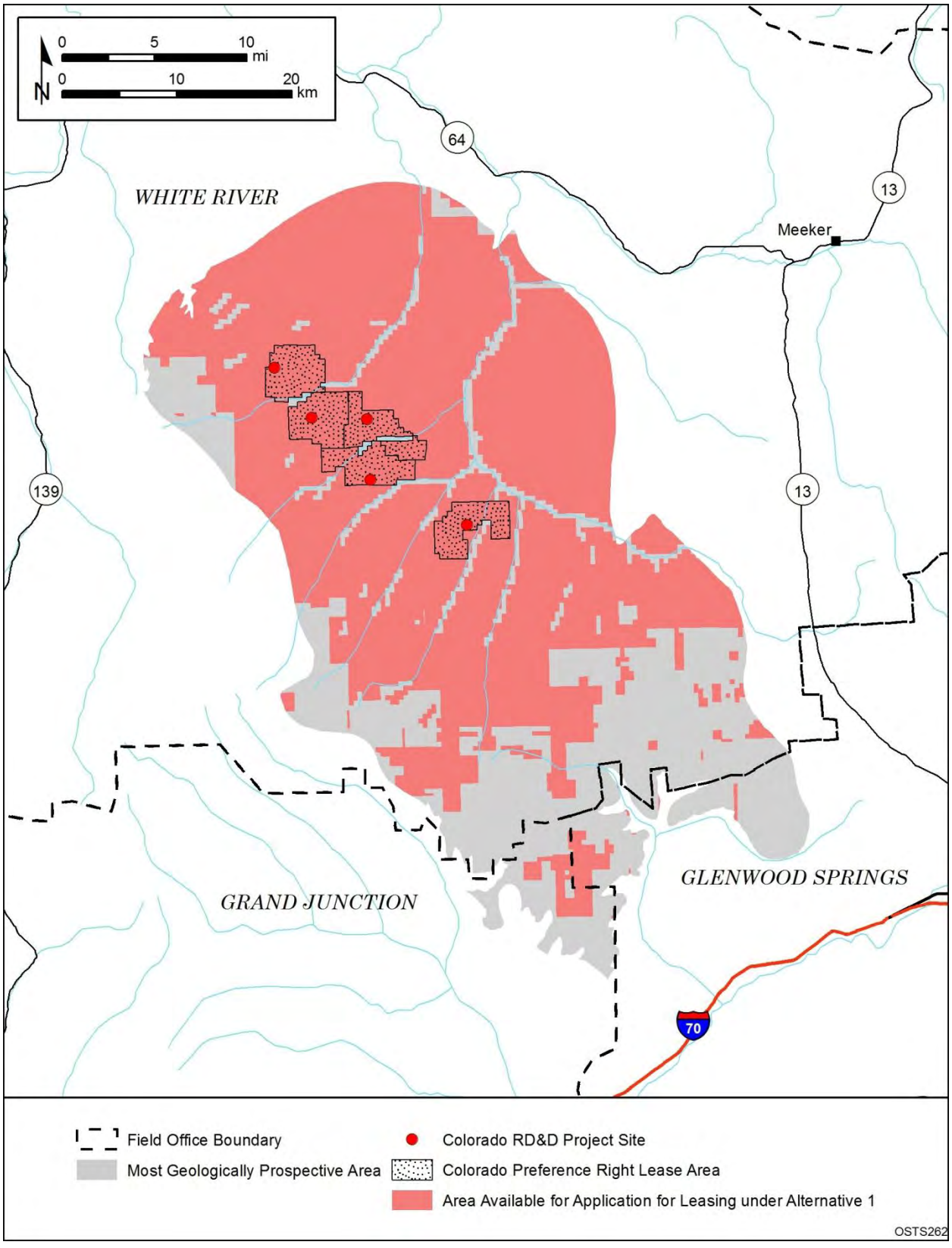

FIGURE 2.3.2-1 Lands Available for Application for Leasing under Alternative 1 in Colorado

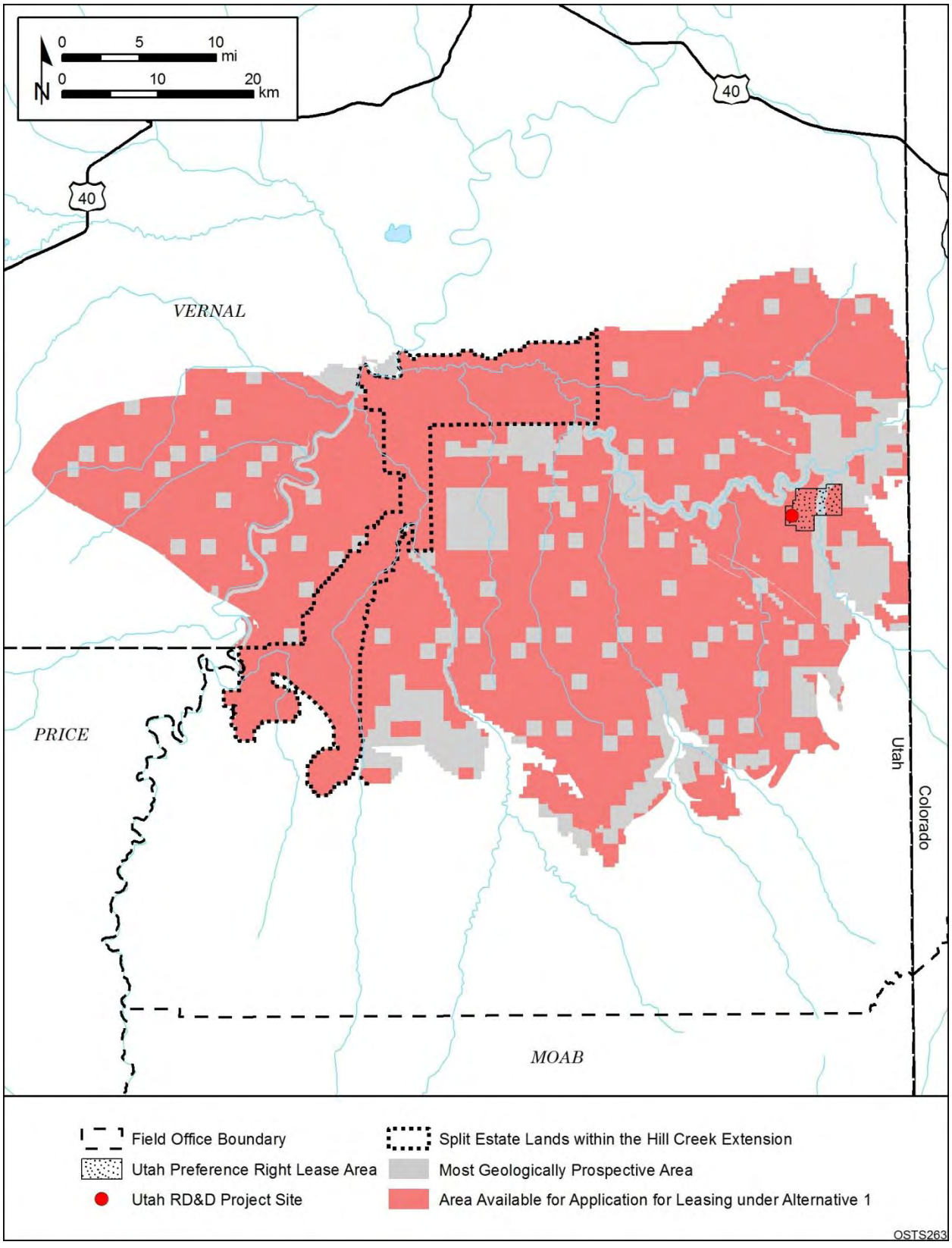

FIGURE 2.3.2-2 Lands Available for Application for Leasing under Alternative 1 in Utah

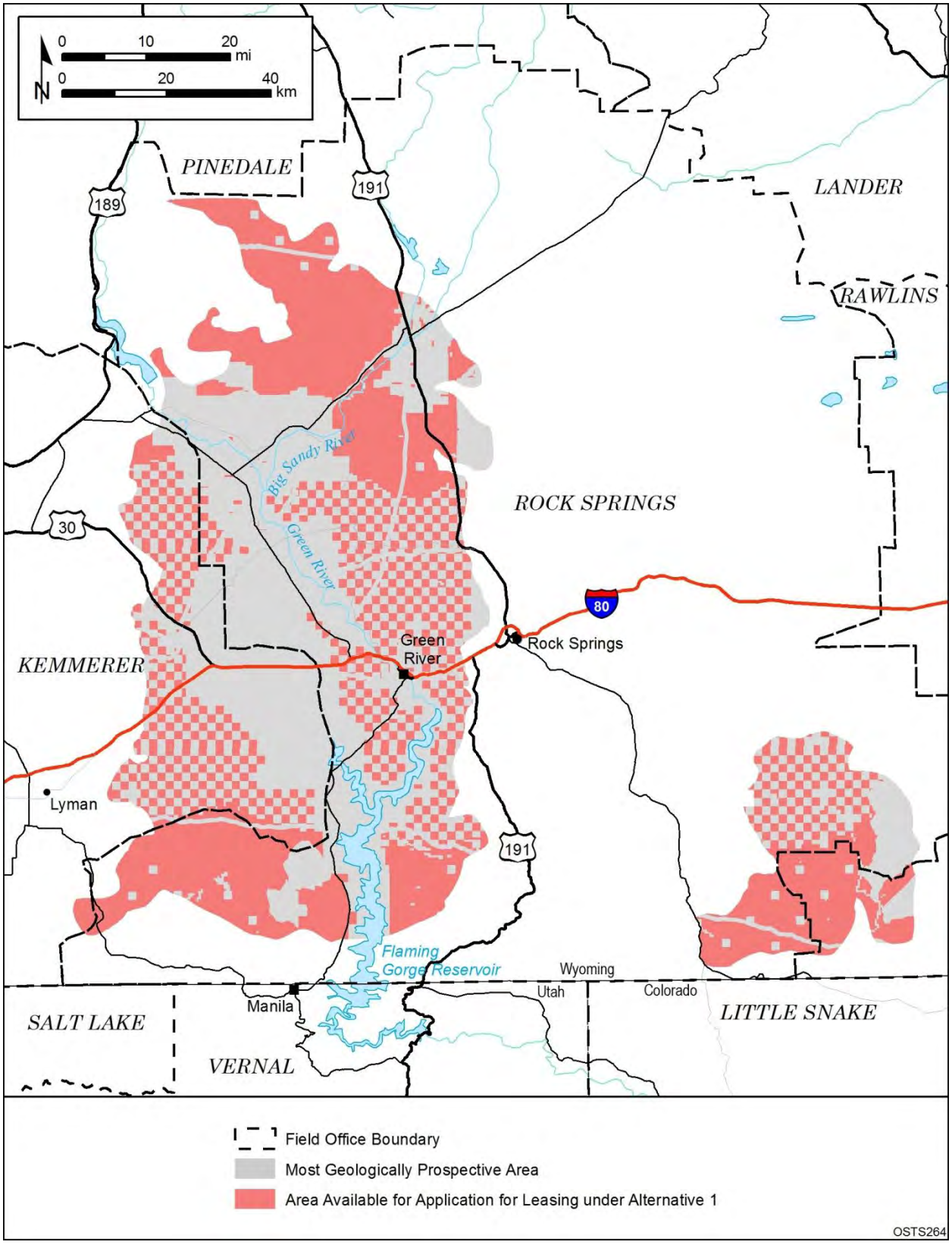

FIGURE 2.3.2-3 Lands Available for Application for Leasing under Alternative 1 in Wyoming

TABLE 2.3.2-1 Estimated Acres Potentially Available in Each State for Application for Leasing for Commercial Oil Shale Development under Alternative 1[a]

State	BLM-Administered Lands	Split Estate Lands	Total
Colorado[b]	307,136	39,473	346,609
Utah[c]	594,958	75,600	670,558
Wyoming	992,824	7,750	1,000,574
Total for Alternative 1	1,894,918	122,823	2,017,741

[a] Totals may not be exact because of rounding. These estimates were derived from GIS data compiled for the PEIS.

[b] Alternative 1 acreage is reduced by 13,308 acres compared to that in the 2008 OSTS PEIS due to removal of lands in NOSR 1 and NOSR 3 in Colorado. See Section 2.3.3 for further explanation.

[c] The split estate lands in Utah include 57,657 acres of split estate lands within the Hill Creek Extension of the Uintah and Ouray Reservation on which the surface rights are owned by the Ute Indian Tribe.

ecological conditions, and on the basis of environmental analysis. As such, it is likely that not all the areas that are currently open under this alternative for potential future leasing would be leased and/or developed. See the discussion under Alternative 4 for examples of what this might look like under different protective scenarios.

As shown in Figure 2.3.2-2, split estate lands within the Hill Creek Extension of the Uintah and Ouray Reservation are included in the lands proposed to be available for leasing under Alternative 1. These lands total 57,657 acres.

Also, as discussed in Section 2.3.1, commercial leases for surface mining projects would be allowed only on those lands in Utah and Wyoming where the overburden is 0 to 500 ft thick. In Utah, under Alternative 1, lands available for application for leasing for surface mining projects total about 85,640 acres in the Vernal RMP planning area. In Wyoming, under Alternative 1, these lands total about 248,000 acres in the Green River RMP planning area.

In Alternative 1, the PRLAs for the five RD&D projects in Colorado coincide entirely with the area proposed to be available for application for commercial leasing. Under the terms of the existing RD&D leases, the federal government has a commitment to grant the RD&D lessees leases for commercial development within the PRLAs, provided that all terms and conditions of the leases are met (see Section 1.4.1). As a result, all lands within the PRLAs would be available for issuance of commercial leases to the current RD&D lessees, subject to lease requirements.

The federal government is not under an obligation to grant leases for commercial development within the existing RD&D lease areas to any other applicants; however, under this alternative, if an existing RD&D leaseholder relinquishes its lease, the area would be available for consideration for future leasing.

The six RD&D leases that have been issued contain terms that allow development of the original leases and could allow development of the associated PRLAs, totaling 30,720 acres. A summary of the key lease terms regarding the PRLAs is provided in Section 1.4.1. For purposes of analysis and comparison, under Alternative 1, it is assumed that each of the leases could reach commercial production utilizing the technologies being tested on the leases and may utilize the whole PRLA leased area. Where the RD&D leases overlay lands classified for open pit (surface), underground, or multimineral development, it is assumed that only the technologies being tested on the individual leases will be utilized in the development. Under this alternative, if an individual RD&D lease holder relinquishes its lease, the area may be leased to another operator consistent with the decisions in the RMP existing at the time of application.

Table 2.3.2-2 provides a summary of the activities and constraints assumed to occur under Alternative 1.

2.3.3 Commercial Oil Shale Program Land Allocation Alternatives

This PEIS analyzes three programmatic land allocation action alternatives in addition to the No Action Alternative. Under each new allocation alternative, 10 land use plans would be amended to (1) identify the most geologically prospective oil shale resources within each planning unit, (2) designate lands within these most geologically prospective areas as available or not available for application for commercial oil shale and tar sands leasing, and (3) identify any technology restrictions. As noted in Chapter 1, the following decisions from the 2008 OSTS PEIS ROD will be carried forward through this planning process and would be applicable regardless of the alternative eventually selected for adoption: the requirement for future NEPA, ESA, and other applicable analyses and consultation activities to occur prior to any decision to lease and/or develop oil shale and tar sands resources; and the specific decision that the BLM will consider and give priority to the use of land exchanges to facilitate commercial oil shale development pursuant to Section 369(n) of the Energy Policy Act of 2005. Table 2.3.2-2 compares the three alternatives. The plans that would be amended under these alternatives include the following:

- Colorado
  - Glenwood Springs RMP (BLM 1988, as amended by the 2006 Roan Plateau Plan Amendment [BLM 2006b, 2007a, 2008c])
  - Grand Junction RMP (BLM 1987)
  - White River RMP (BLM 1997b, as amended by the 2006 Roan Plateau Plan Amendment [BLM 2006b, 2007a, 2008c])

- Utah
  - Monticello RMP (BLM 2008d)
  - Price RMP (BLM 2008e)

TABLE 2.3.2-2 Summary of Activities and Conditions Assumed for Each of the Oil Shale Alternatives

Condition	Alternative 1 (No Action)	Alternative 2 (Conservation Focus)	Alternative 3 (Research Lands Focus)	Alternative 4 (Moderate Development)
Land use plans amended	No land use plans in Colorado, Utah, and Wyoming will be amended.	10 land use plans in Colorado, Utah, and Wyoming will be amended.	Same as Alternative 2	Same as Alternative 2.
Potential area available for application for leasing (RD&D and commercial leases)	2,017,741 acres would be made available for application for commercial lease: Colorado, 346,609 acres Utah, 670,558 acres Wyoming, 1,000,575 acres Under this alternative, the 30,720 acres included in the existing RD&D leases will be available for future leasing if the current leaseholders relinquish their existing leases.	461,965 acres would be made available for application for commercial lease: Colorado, 35,308 acres Utah, 252,181 acres Wyoming, 174,476 acres Under this alternative, of the 30,720 acres included in the existing RD&D leases, if current leaseholders relinquish their leases, only 6,612 acres within the current RD&D lease areas would be available for future leasing.	32,640 acres would be available for application for commercial lease for five current RD&D leases in Colorado and one current RD&D lease in Utah and two potential new leases in Colorado and one in Utah.	1,472,370 to 1,963,414[a] acres would be made available for application for commercial lease: Colorado, 321,071 to 340,147[a] acres Utah, 458,421 to 655,821[a] acres Wyoming, 692,878 to 967,446[a] acres Under this alternative, the 30,720 acres included in the existing RD&D leases will be available for future leasing if the current leaseholders relinquish their existing leases.
Technologies considered	In situ processes. Underground mining with surface retort. Surface mining with surface retort (only in Utah and Wyoming in areas where the overburden is 0 to 500 ft thick).	Same as Alternative 1.	Same as Alternative 1,	Same as Alternative 1.

TABLE 2.3.2-2 (Cont.)

Condition	Alternative 1 (No Action)	Alternative 2 (Conservation Focus)	Alternative 3 (Research Lands Focus)	Alternative 4 (Moderate Development)
Lands excluded from commercial leasing	• Wilderness Areas, WSAs, and other areas that are part of the NLCS. • ACECs existing as of the signing of the 2008 OSTS ROD that are currently closed to mineral development. • The MMTA in Wyoming. • Segments of rivers determined to be eligible for WSR status by virtue of a WSR inventory. • Historic trails. • Monument Valley Management Area in Wyoming. • Management Area 3, Jack Morrow Hills Planning Area in Wyoming. • Incorporated town and city limits. • NOSRs 1 and 3 in Colorado	Same as Alternative 1 plus: • All areas that the BLM has identified or may identify as a result of inventories conducted during this planning process, as lands containing wilderness characteristics • The whole of Adobe Town "Very Rare or Uncommon Area." • Core or priority sage-grouse habitat, as defined by such guidance that the BLM or DOI might issue. • All ACECs analyzed in the 2008 OSTS PEIS plus additional ACEC acreages as a result of Colorado, Utah and Wyoming planning efforts recently completed, as well as areas under consideration for designation as ACECs under current planning processes. • All areas identified as excluded in Alternative C of the 2008 OSTS PEIS (see Section 2.3.3.1).	All lands will be excluded from application for lease except lands within six current and three potential new RD&D leases.	Same as alternative 1 plus: • The whole of Adobe Town "Very Rare or Uncommon Area." • All ACECs analyzed in the 2008 OSTS PEIS plus additional ACEC acreages as a result of Colorado, Utah, and Wyoming planning efforts recently completed, as well as areas under consideration for designation as ACECs under current planning processes.

TABLE 2.3.2-2 (Cont.)

Condition	Alternative 1 (No Action)	Alternative 2 (Conservation Focus)	Alternative 3 (Research Lands Focus)	Alternative 4 (Moderate Development)
Regulatory and operational constraints	All commercial development would be conducted in compliance with existing federal, state, and local regulatory requirements and established BLM policies.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Additional NEPA requirements	Additional NEPA analysis would be required before any leases for commercial development can be issued. Site-specific NEPA analysis also would be conducted during review and approval of project plans of development.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Abbreviations: ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; DOI = U.S. Department of the Interior; MMTA = Mechanically Mineable Trona Area; NLCS = National Landscape Conservation System; NEPA = National Environmental Policy Act; NOSR = Naval Oil Shale Reserves; OSTS = oil shale and tar sands; RD&D = research, development, and demonstration; WSA = Wilderness Study Area.

[a] This range corresponds to 75% protection of LWC and sage-grouse core and priority habitat at the low end to no protection at the high end.

  - Richfield RMP (BLM 2008f)
  - Vernal RMP (BLM 2008g)

- Wyoming
  - Green River RMP (BLM 1997a, as amended by the Jack Morrow Hills Coordinated Activity Plan [BLM 2006a])
  - Kemmerer RMP (BLM 2010)
  - Rawlins RMP (BLM 2008e)

The potential impacts from oil shale development and the possible mitigation measures discussed in the Chapter 4 impact analyses could be considered, as appropriate, during the future lease and project-specific NEPA analyses that would be required prior to leasing and/or development under all of the alternatives.

In all three allocation action alternatives, the BLM recognized that the six existing RD&D leases contain terms and conditions that could allow commercial development of the original leases and the associated PRLAs totaling 30,720 acres. A summary of the key lease terms and conditions regarding the PRLAs is provided in Section 1.4.1. For purposes of analysis and comparison, under all three allocation alternatives, it is assumed that each of the leases could reach commercial production utilizing the technologies being tested on the leases, and utilizing up to the entire leased area. If an initial RD&D lease holder relinquishes its lease, different acreages within the existing RD&D and PRLA lease areas would be available for future leasing under each alternative as noted in Table 2.3.2-2 above and as described in the discussion below.

Also, in all three allocation alternatives, new RD&D leases could be issued in any areas opened to commercial oil shale leasing. New RD&D projects might precede commercial oil shale leasing or might be conducted contemporaneously with commercial leasing and operations. Impacts from new RD&D projects are anticipated to be qualitatively similar but smaller in scale than those of commercial projects, at least until any RD&D lease might be converted to a commercial oil shale lease and expanded to include preference right acreage. Additional NEPA analysis would be required prior to issuance of any RD&D lease and prior to conversion of an RD&D lease to a commercial oil shale lease and expansion into a PRLA.

As discussed in Section 1.2, the BLM has determined that certain lands within the most geologically prospective oil shale resource areas must be excluded from commercial leasing, under all alternatives, to comply with existing laws and regulations, E.O.s, land use plan designations, and other administrative designations or withdrawals. As a result, commercial leasing is excluded from all designated Wilderness Areas, WSAs, and other areas that are part of the NLCS lands administered by the BLM (e.g., National Monuments, NCAs, WSRs, National Historic Landmarks, and National Historic and Scenic Trails), existing ACECs that are currently closed to mineral development, and lands within incorporated town and city limits. This includes the NOSR 1 and 3 lands that were erroneously included as open under the 2008 OSTS PEIS (BLM 2008a).

Oil shale deposits, generally, were originally withdrawn in 1930 (E.O. 5327, "Withdrawal of Public Oil-Shale Deposits, and Lands Containing Same for Investigation,

Examination, and Classification" [U.S. President 1930]) by President Herbert Hoover, subject to valid existing rights. The E.O. temporarily withdrew the deposits of oil shale and lands containing such deposits owned by the United States from lease or other disposal, in order to protect the oil shale resource, pending classification under the applicable public land laws. Oil shale was later determined to be leasable in 1954 (retroactive to 1920). A later withdrawal order issued in 1968 (Public Land Order 4522) added to the protection of oil shale on these same lands, permanently withdrawing them from appropriation under the mining law and from sodium leasing, unless it could be shown that sodium mining would not cause significant damage to oil shale beds.

Section 204 of FLPMA requires the BLM to review existing withdrawals to determine if they are still needed for their original purpose. Since oil shale and associated minerals (nahcolite, sodium, and dawsonite) have been determined to be leasable and current policy and procedures provide for adequate protection of the oil shale resource, the oil shale withdrawals are no longer needed to administer public lands. Therefore, as these oil shale withdrawal orders have, over time, been recognized as being no longer needed, they have been revoked in part, on several occasions, lifting the withdrawals from most public lands. The NOSRs 1 and 3 are an exception to this general trend. Congress transferred jurisdiction over these lands from DOE to the BLM in the 1997 Transfer Act. The NOSRs were originally set aside for national security purposes (this was after the turn of the century when the Navy turned from coal-fired to oil-fired vessels), and the statutes under which they were managed by DOE reflected this purpose. In the 1997 Transfer Act, in recognition that national defense needs no longer warranted such interest in oil shale (see P L. 105-85, codified as amended at 10 USC 7439), Congress expressed the need to dispose of the property in a way that benefitted the taxpayers, and provided for the transfer of NOSRs 1 and 3 to management by the BLM. However, the Transfer Act did not, itself, revoke the original withdrawal, and only specifies that the BLM should lease resources subject to the Act, "for the purpose of exploration for, and development and production of, petroleum (other than in the form of oil shale) located on or in public domain lands in Oil Shale Reserves numbered 1 and 3…" Nor has the Secretary of the Interior subsequently revoked the withdrawal pursuant to Section 204 of FLPMA. Therefore, the withdrawal is still in effect on NOSRs 1 and 3, and these lands are closed and not available for future opportunity to lease for the development of oil shale resources under all alternatives, including the No Action Alternative. The 2008 OSTS PEIS (BLM 2008a) did not include a NEPA analysis to open these lands for future oil shale leasing; rather, it did not specifically state that they were excluded from future oil shale leasing. In addition, the map of the preferred alternative in Colorado incorrectly showed them as open. The NOSRs 1 and 3 total 56,238 acres.

The BLM has also determined that additional areas would be closed and would not be available for future opportunity to lease for commercial development of oil shale resources under all allocation action alternatives. These additional areas include:

- *Mechanically Mineable Trona Area (MMTA)*. This area, which is located in the Green River Basin in Wyoming, falls within a portion of the Known Sodium Leasing Area (KSLA) that encompasses the world's largest known

trona deposits.[8] Trona leases have been issued within this area, and production occurs from a number of underground mines. The BLM has determined that the MMTA would be excluded from oil shale leasing until technology or other factors exist to allow development of the oil shale resource without jeopardizing the safe operation of underground trona mines.

- *Segments of rivers that the BLM has determined to be potentially eligible for WSR status by virtue of a WSR inventory*. These river segments and a corridor extending at least 0.25 mi from the high water mark on either side of these segments would be excluded from commercial leasing (see footnote 2 on p. 2-11 for a discussion of this restriction).

- *Historic trails*. Historic trails identified by the BLM Wyoming State Office and a corridor extending at least 0.25 mi on either side of the trail would be excluded from commercial leasing.[9]

- *Monument Valley Management Area.* Oil shale development within this management area, which is located in the Rock Springs Field Office area, is prohibited in the Green River RMP (BLM 1997a). Specifically, the RMP directs that these lands remain withdrawn from oil shale development until a comprehensive study of the area has been conducted, including an assessment of the potential designation of this area as an ACEC on the basis of the need to protect cultural and paleontological resources.

- *Management Area 3, Jack Morrow Hills Planning Area.* In accordance with the Jack Morrow Hills Coordinated Activity Plan (BLM 2006a), extensive restrictions on surface-disturbing activities have been established for Area 3 within the Jack Morrow Hills Planning Area because of the presence of sensitive natural and cultural resources. The portion of Area 3 that overlaps with the most geologically prospective oil shale resources in the Green River Basin is restricted to No Surface Occupancy (NSO) and has been excluded from future leasing on the basis of input from the field office.

- *Expansion Areas around Rock Springs and Green River, Wyoming.* The BLM has determined that it will not issue leases within the "expansion areas" agreed upon with the cities of Rock Springs and Green River, Wyoming.

- *Incorporated Town and City Limits.* The BLM has determined that it will not issue leases within incorporated town and city limits.

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8 Trona is a hydrous sodium carbonate mineral that is refined into soda ash, sodium bicarbonate, sodium sulfite, sodium tripolyphosphate, and chemical caustic soda.

9 For the purposes of analysis in this PEIS, the centerline of trails mapped in the GIS was used to define the 0.25 mi buffer.

Public lands outside of the most geologically prospective area are not being excluded from consideration for leasing for any environmental or other specific reason and could be considered for application for leasing at a later time but would require consideration in a new NEPA analysis and a land use plan amendment before leasing could be authorized. Areas within the most prospectively valuable area that are excluded from consideration for application for leasing in the current PEIS, or environmentally and economically sound proposals employing different technologies, could also be considered in the future.

Leasing would occur pursuant to regulations governing the leasing and development of oil shale (73 FR 69469) (Nov. 18, 2008); codified at 43 CFR Parts 3900–3930). While the BLM is in the process of considering amendments to this rule, this PEIS does not depend on any particular provision of the rule but anticipates that decisions regarding leasing and approval of plans of development will be informed by appropriate analysis documents as required by NEPA and other applicable authorities.

In general, however, under the oil shale regulations, the process for authorizing oil shale leasing and development would proceed as follows. The BLM would issue a call for applications for commercial leases that may be restricted to certain areas. In response, companies would be required to identify the specific lands that they are interested in as part of their lease application package. It is also possible that the BLM would identify specific tracts to be leased in the call for applications. The proposed process would require that NEPA analyses be conducted prior to lease issuance. Information collected as part of the lease application process would be incorporated into the NEPA analysis. Applicants would be required to identify key information regarding aspects of the proposed development needed to support a complete NEPA review (e.g., technologies to be employed, level of planned development, anticipated off-site impacts, and strategies to comply with regulatory requirements). During that NEPA review, the BLM would identify and establish appropriate lease stipulations to mitigate anticipated impacts. In addition, the subsequent approval of project-specific plans of development would require NEPA review to (1) consider site-specific and project-specific factors and (2) identify and require appropriate mitigation measures as needed to control impacts beyond those established in the lease stipulations. The NEPA review for the plan of development may be incorporated into the NEPA review conducted for the lease application, at BLM's discretion, and if adequate operational data are provided by the applicant(s). Under Alternatives 2b and 4b, where RD&D leasing will be required prior to a lessee obtaining a commercial lease, the BLM is still in the process of working out the exact details of the process, but expects at this point that the RD&D leasing process will be detailed in the *Federal Register* Notice announcing the Request for Nomination.

Under all allocation action alternatives, the BLM would require that the operator conduct commercial development in compliance with existing federal, state, and local regulatory requirements and established BLM policies, as generally described in Section 2.2 and Appendix D. This compliance would include, as appropriate, obtaining and complying with all required permits (e.g., air, water, and waste management) as required by regulatory agencies; and operating within the permit constraints. In addition, the operator would have to conduct any commercial development consistent with any constraints that emerged from the BLM's completion of consultation, as appropriate, with the USFWS under Section 7 of the ESA in

connection with authorization of any leasing/development project(s), and its completion of consultation with State Historic Preservation Officers (SHPOs), Tribal Historic Preservation Officers, and other consulting parties under Section 106 of the NHPA (P.L. 89-665) in connection with authorization of any leasing/development project(s). The operator would have to conduct any commercial development in compliance with any other relevant and applicable requirements, as well. Compliance-related conditions would be developed on a project-by-project basis during site-specific analyses.

Under all allocation action oil shale alternatives, in Colorado, lands within the Multimineral Zone identified in the White River RMP (BLM 1997b) would be made available for application for commercial lease only if the applicant can demonstrate that it would use technologies that allow recovery of oil shale resources without preventing the recovery of or otherwise destroying other minerals (i.e., nahcolite and dawsonite).

2.3.3.1 Alternative 2, Oil Shale Conservation Focus (Alternative 2a), with RD&D First Requirement (2b)

Under this alternative, 10 land use plans in Colorado, Utah, and Wyoming would be amended to designate less than 830,000 acres (acreage opened under Alternative C in the 2008 OSTS PEIS) available for future commercial oil shale leasing.[10] This alternative would exclude from commercial oil shale leasing the following categories or groups of categories of public lands and/or their resource values that may warrant protection from potential oil shale leasing and development:

1. All areas that the BLM has identified or may identify as a result of inventories conducted during this planning process, as LWC;

2. The whole of the Adobe Town "Very Rare or Uncommon" area, as designated by the Wyoming Environment Quality Council on April 10, 2008 (180,910 acres total; 167,517 acres of public land, of which 10,920 acres are already a BLM WSA);

3. Core or priority sage-grouse habitat, as defined by such guidance as the BLM or the DOI may issue;

4. All ACECs located within the areas analyzed in the 2008 OSTS PEIS (76,666 acres in existing ACECs in the 2008 OSTS PEIS plus additional

[10] In a February 15, 2011, settlement of a lawsuit brought by several environmental advocacy groups challenging the 2008 OSTS PEIS and ROD, the DOI and BLM agreed to analyze an alternative that considers excluding from oil shale/tar sands leasing and development all lands containing the resource types listed, as well as an alternative that considers excluding from oil shale/tar sands leasing and development some portion of the lands containing the resource types listed. The latter alternative is represented by Alternative 4, the Moderate Development Alternative, described below.

ACEC acreages as a result of Utah and Wyoming planning efforts recently completed)[11]; and

5. All areas identified as excluded from commercial oil shale and tar sands leasing in Alternative C of the September 2008 OSTS PEIS (Alternative C made 830,296 acres available for potential commercial oil shale leasing and 229,038 acres available for potential commercial tar sands leasing).

RD&D First Requirement (2b). Under this alternative, the lands open for future leasing consideration would be the same as those in Alternative 2(a), but only for RD&D leases. The BLM would issue a commercial lease only when a lessee satisfies the conditions of its RD&D lease and the regulations at 43 CFR. Subpart 3926 for conversion to a commercial lease. The preference right acreage, if any, which would be included in the converted lease, would be specified in the RD&D lease.

The environmental impacts of Alternative 2(b) would be analytically indistinguishable from those of Alternative 2(a). Only the method of obtaining a lease would be different. Accordingly, the analysis in this PEIS of Alternative 2 applies fully and equally to both alternatives. To the extent there may be differences in environmental consequences between Alternative 2(a) and 2(b), these would be related to the timing of the commencement of impacts, as well as, possibly, length of disturbance. However, these issues are best addressed in the lease and/or project-specific analysis.

The benefits of Alternative 2(b) would include facilitating a robust RD&D program. It would also avoid allowing a few companies to tie up large areas with speculative commercial leases. Thus it would promote access by innovative small companies to the federal oil shale resource for RD&D.

In the event that a commercially viable technology is demonstrated and becomes widely available in the near future, it is possible that Alternative 2(b) could result in delaying commercial leasing on federal lands. If that possibility, however speculative at the present, were to occur, the pertinent RMPs could be amended contemporaneously with review of proposed commercial leases. The oil shale leasing and management regulations at 43 CFR Part 3900 would not be affected by the selection of any alternative analyzed in this PEIS, and thus would remain available for future decisions concerning commercial leasing.

As the Draft PEIS was being developed, the idea for this alternative emerged. It is presented here in brief. This alternative is not noted elsewhere in the document but will be developed further in preparation of the Final PEIS. Analytically, this subalternative is indistinguishable from Alternative 2(a**)** in terms of environmental consequences. Therefore further environmental analysis in preparation of the Final PEIS is not anticipated, although more detailed explanation may be provided, particularly in response to comments received**.**

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[11] This would include analysis of excluding from future oil shale and tar sands leasing not only all ACECs, but also areas that had been under consideration for designation as ACECs in the applicable plans undergoing revision or amendment at the time, but which were eventually not designated.

Lands that fall under items 1 through 4, above, in and around the most geologically prospective oil shale areas in Colorado, Utah, and Wyoming are shown in Figures 2.3.3-1, 2.3.3-2, and 2.3.3-3, respectively. The Adobe Town "Very Rare or Uncommon" area is shown in Figure 2.3.3-3 in the eastern portion of the Washakie Basin in Wyoming. These various areas excluded from lands available for application under Alternative 2 are lands that were considered for exclusion under Alternative C of the 2008 OSTS PEIS, as noted in item 5 above.

Lands available for application for oil shale leasing within the most geologically prospective area under Alternative 2 in Colorado, Utah, and Wyoming are shown in Figures 2.3.3-4, 2.3.3-5, and 2.3.3-6, respectively. Table 2.3.3-1 lists by state the approximate number of acres of BLM-administered land available for application for leasing under Alternative 2. Table 2.3.3-2 identifies the types of stipulations and restrictions in place for oil and gas leasing in each state that were used to identify those lands that would not be available for application for leasing for commercial oil shale development under Alternative C of the 2008 OSTS PEIS. These lands total 57,657 acres.

In Alternative 2, portions of three of the five PRLAs for the Colorado RD&D leases are not identified as available for application for commercial leasing. These include portions of the areas associated with the Chevron, AMSO, and Shell Site 2 RD&D projects. For the other two Colorado RD&D projects, Shell Sites 1 and 3, none of the PRLAs coincide with the area identified as available for application for commercial leasing.

Also, as discussed in Section 2.3.1, commercial leases for surface mining projects would be allowed only on those lands in Utah and Wyoming where the overburden is 0 to 500 ft thick. In Utah, under Alternative 2, lands available for application for leasing for surface mining projects total about 85,640 acres in the Vernal RMP planning area. In Wyoming, under Alternative 2, these lands total about 248,000 acres in the Green River RMP planning area.

2.3.3.2 Alternative 3, Oil Shale Research Lands Focus (RD&D with PRLA only)

Several comments were received during the public scoping process that suggested that the BLM should not move forward to establish commercial leasing programs for oil shale or tar sands development on public lands. The variety of concerns cited as reasons for not establishing commercial programs included (1) the sensitivity of specific resources within the three-state study area, such as LWC, visual resources, ecological resources, and cultural resources; (2) the lack of definitive information about the technologies that will be employed in commercial operations; (3) the need for the nation to focus on alternative sources of energy, such as renewable resources; and (4) in the case of oil shale, the potential recurrence of adverse socioeconomic impacts resulting from a possible boom or bust cycle of development. Under this Research Lands Focus Alternative, developed in consideration of these comments, 10 land use plans would be amended such that public lands for commercial leasing would be available only where there were existing RD&D leases at the time the ROD for the 2012 Final OSTS PEIS is signed. The six current RD&D leases contain terms and conditions that could allow commercial development of the original leases and the associated PRLA totaling 30,720 acres. Another three potential RD&D leases (two in Colorado and one in Utah) are currently undergoing NEPA analysis. Maximum acreage of these three leases, if approved, would be 1,920 acres, bringing the total acreage to 32,640 acres as available for potential oil shale leasing under this alternative.

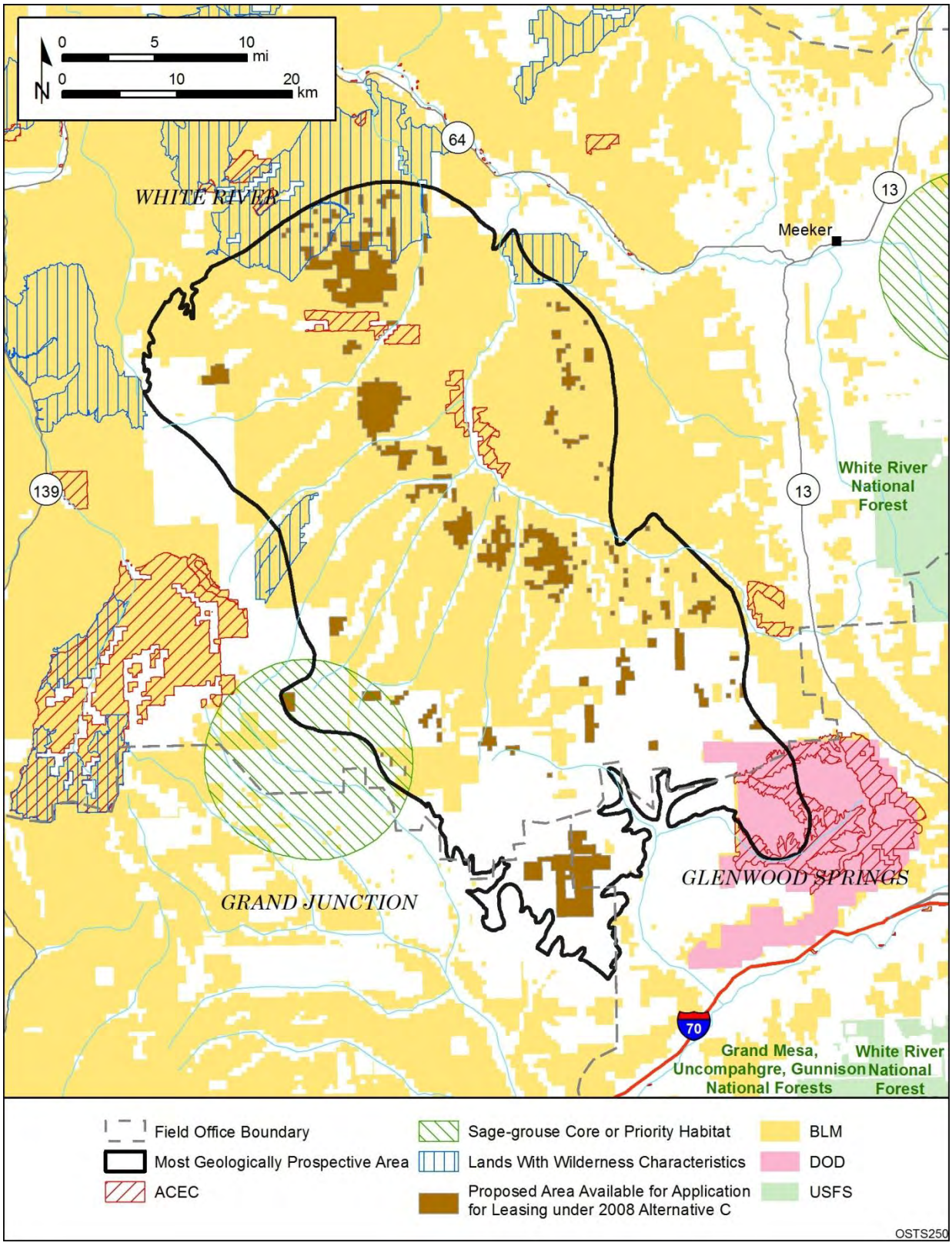

FIGURE 2.3.3-1 Lands Excluded from Application for Oil Shale Leasing under Alternative 2 in Colorado

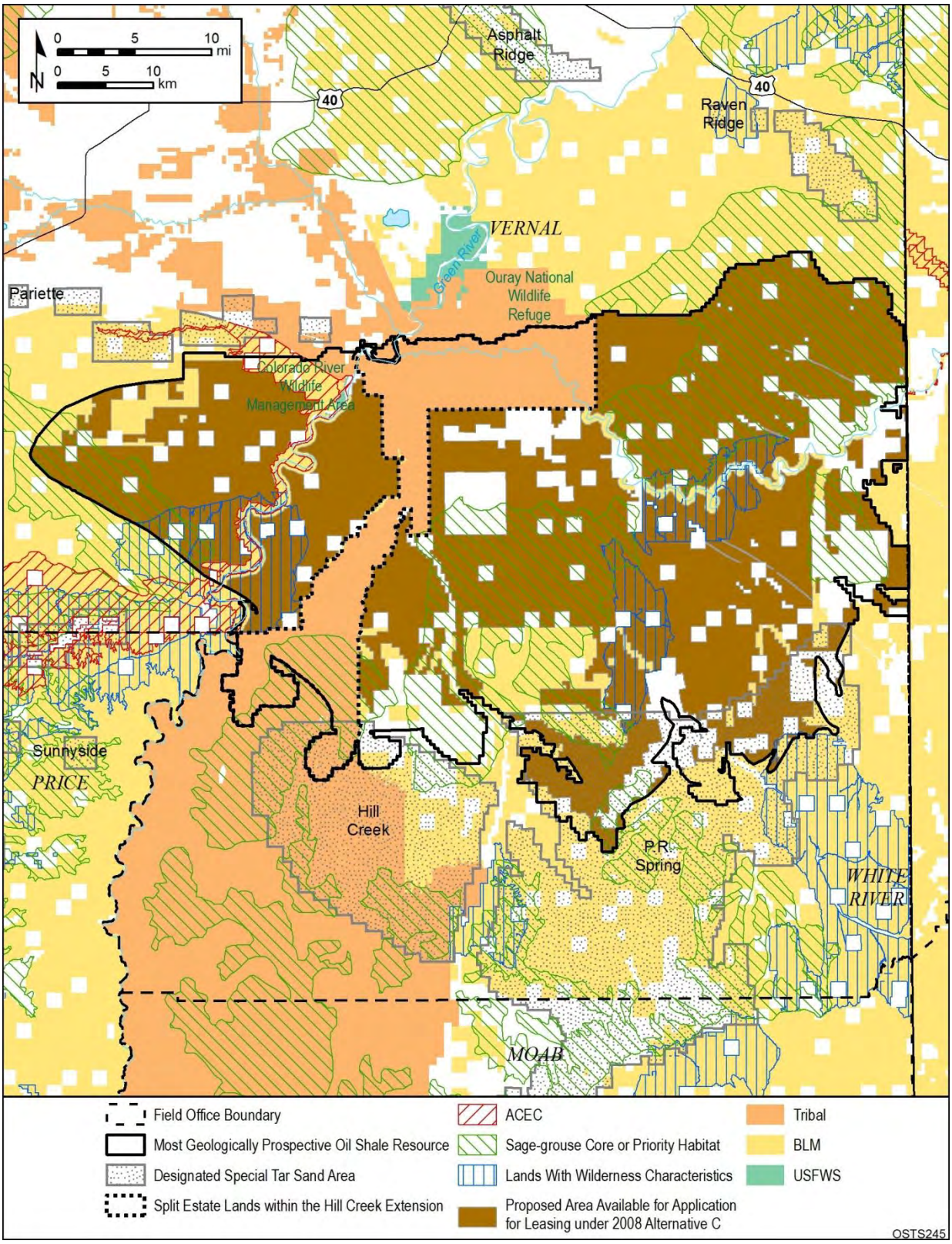

FIGURE 2.3.3-2 Lands Excluded from Application for Oil Shale Leasing under Alternative 2 in Utah

FIGURE 2.3.3-3 Lands Excluded from Application for Oil Shale Leasing under Alternative 2 in Wyoming

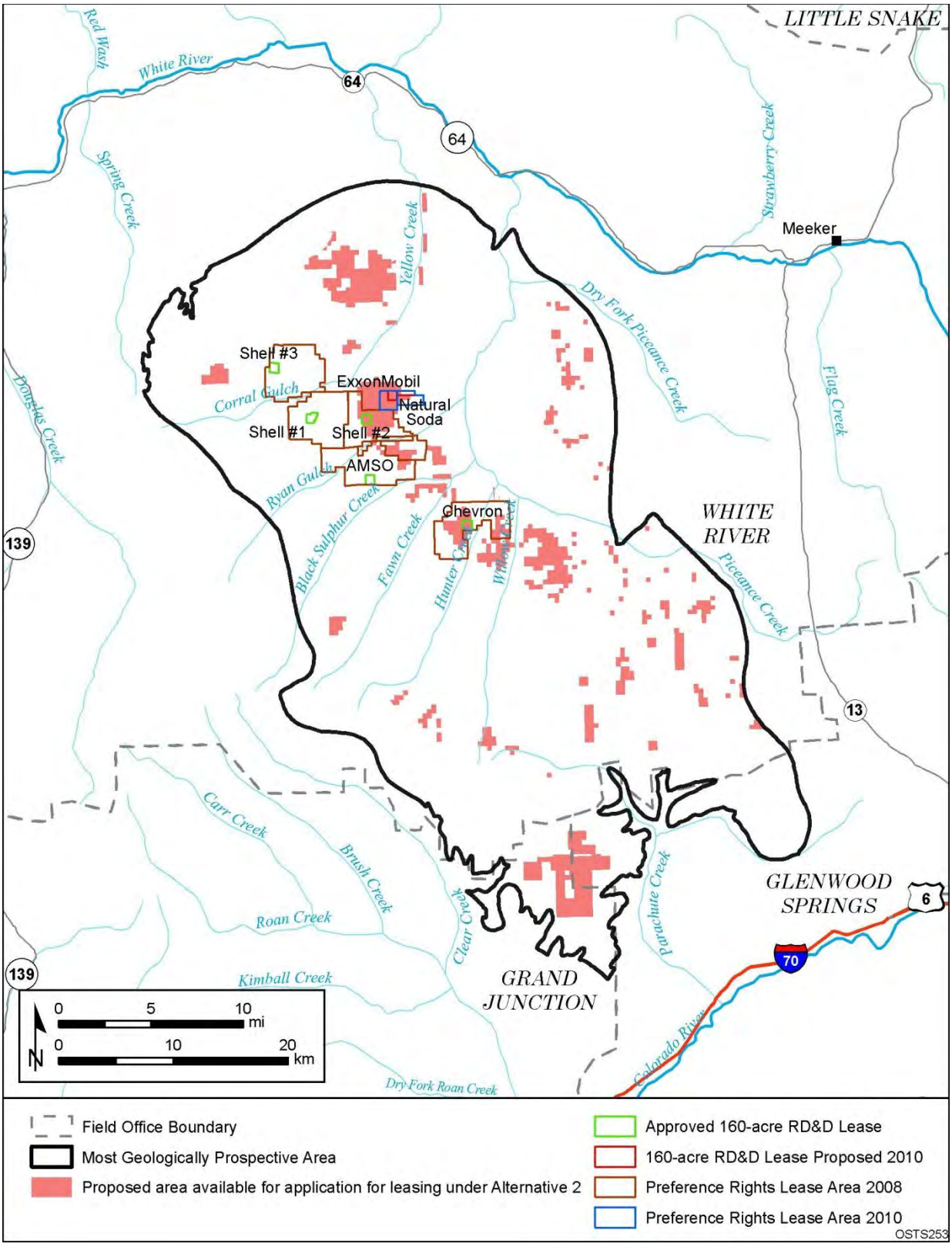

FIGURE 2.3.3-4 Lands Available for Application for Oil Shale Leasing under Alternative 2 in Colorado

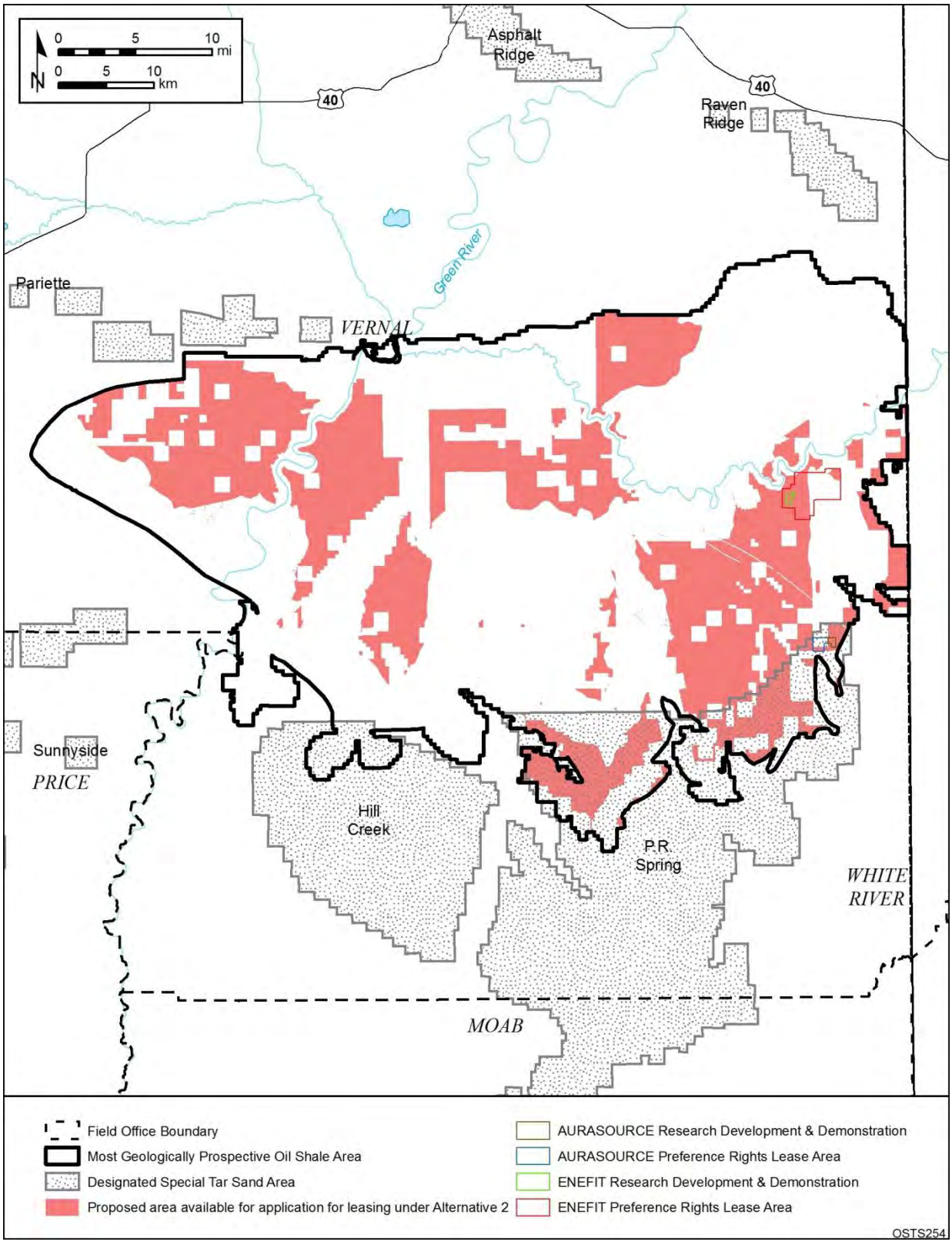

FIGURE 2.3.3-5 Lands Available for Application for Oil Shale Leasing under Alternative 2 in Utah

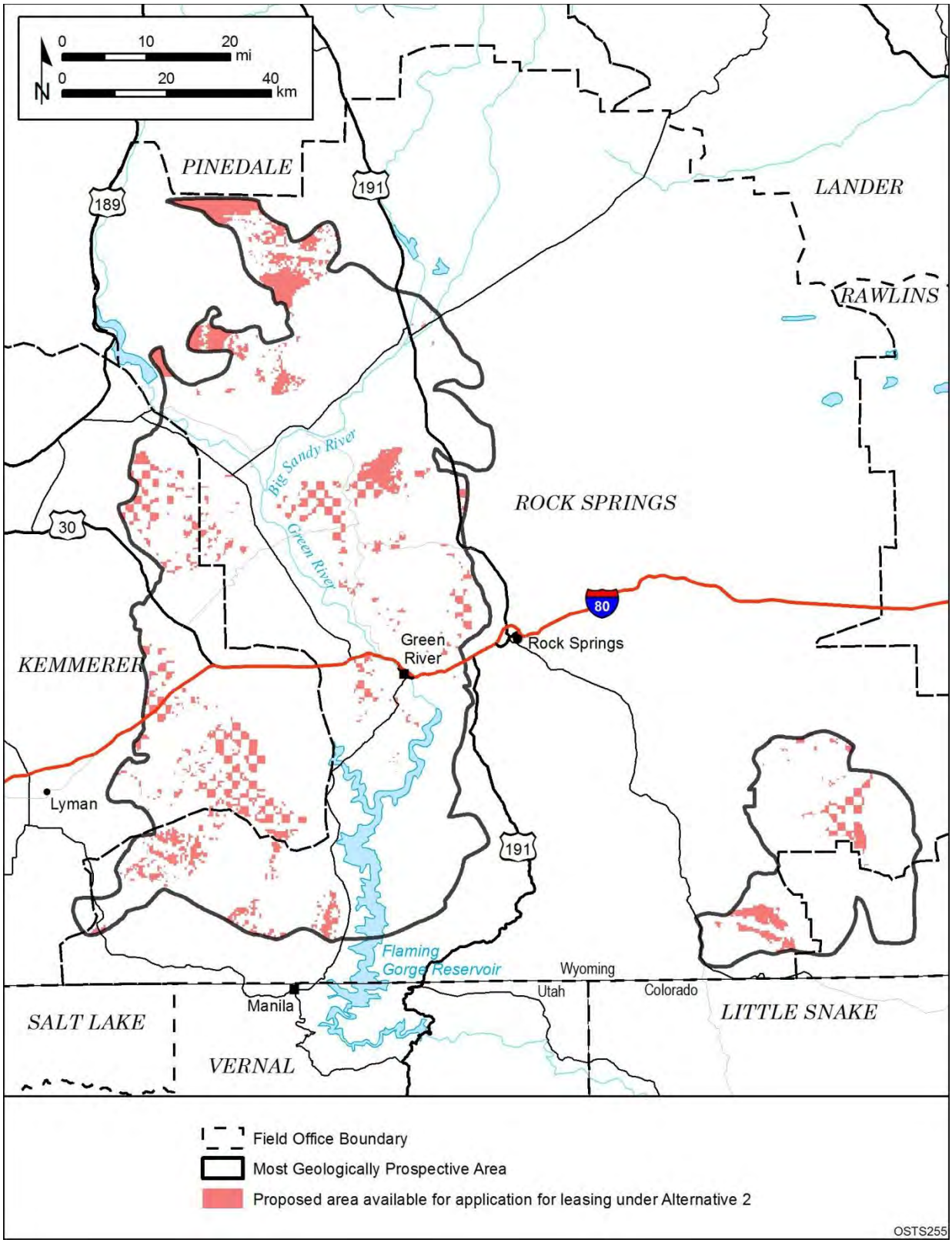

FIGURE 2.3.3-6 Lands Available for Application for Oil Shale Leasing under Alternative 2 in Wyoming

TABLE 2.3.3-1 Estimated Acres Potentially Available in Each State for Application for Leasing for Commercial Oil Shale Development under Alternative 2[a]

State	BLM-Administered Lands	Split Estate Lands	Total
Colorado	23,249	12,059	35,308
Utah	249,041	3,140	252,181
Wyoming	173,388	1,088	174,476
Total for Alternative 2	445,678	16,287	461,965

[a] Totals may not be exact because of rounding. These estimates were derived from GIS data compiled for the PEIS analyses.

Lands included under Alternative 3, the five current RD&D oil shale leases with PRLA lands in Colorado and the current RD&D lease with PRLA land in Utah, are shown in Figures 2.3.2-1 and Figure 2.3.2-2, respectively. Figure 2.3.3-7 shows the locations of the two potential new RD&D oil shale leases in Colorado, along with the five existing RD&D leases in Colorado, and Figure 2.3.3-8 shows the location of the potential new RD&D oil shale lease in Utah.

In Alternative 2, portions of three of the five PRLAs for the Colorado RD&D leases are not identified as available for application for commercial leasing. These include portions of the areas associated with the Chevron, AMSO, and Shell Site 2 RD&D projects. For the other two Colorado RD&D projects, Shell Sites 1 and 3, none of the PRLAs coincide with the area identified as available for application for commercial leasing. For Alternative 3, as is the case for Alternative 1, for the Enefit RD&D project in Utah, the same portion of the area that is not identified as available for lease also is not available for application for commercial leasing under Alternative 3 because of the presence of a potentially eligible WSR, Evacuation Creek (see discussion on this in Section 2.3.3.1).

2.3.3.3 Alternative 4, Oil Shale Moderate Development (2008 OSTS PEIS ROD Minus Adobe Town and ACECs) (Alternative 4a), with RD&D First Requirement (4b)

Under Alternative 4, the BLM would amend 10 land use plans in Colorado, Utah, and Wyoming to designate acreage less than 2,017,714 acres as available for future consideration for leasing for commercial oil shale leasing and less than 430,686 acres as available for application for commercial tar sands leasing.[12] This alternative would exclude from commercial oil shale or tar sands leasing:

[12] This alternative satisfies the settlement agreement to exclude some, but not all, lands from the application of oil shale and tar sands leasing, in comparison to Alternative 2.

TABLE 2.3.3-2 Resources Covered by Stipulations and Restrictions in Place for Oil and Gas Leasing in Each State That Were Used To Identify Lands Not Available for Application for Leasing under Alternative C of the 2008 OSTS PEIS

Colorado
Slopes and erosive/critical soils
Riparian zones and wetlands
Sage-grouse leks and nesting habitat
Raptor nests, roosts, fledgling habitat, and concentration areas
Wildlife habitat[a]
Colorado River cutthroat trout habitat
Listed, proposed, or candidate threatened or endangered and BLM-designated sensitive species
Sensitive plants and remnant vegetation associations
Wild horses and wild horse management areas
Visual Resource Management (VRM) Class II areas
ACECs
Paleontological and cultural resources
Utah
Slopes and erosive critical soils
Floodplains, watersheds, and live water
Sage-grouse leks and nesting habitat
Raptor nests and habitat
Wildlife habitat[a]
Black-footed ferret habitat
Special status plants
ACECs
Paleontological resources
Other[b]
Wyoming
Slopes and fragile/erosive soil
Sage-grouse and greater sage-grouse leks and nesting habitat
Raptor nests and concentration areas
Wildlife habitat[a]
Sensitive species
VRM Class I and II areas
Historic trails
ACECs
Cultural resources
Other[b]

[a] Wildlife habitat includes a combination of winter range, crucial winter range, summer range, and calving areas for antelope, deer, elk, and moose, as well as seclusion areas for other wildlife.

[b] Other resources include Special Management Areas (SMAs), recreation areas, and areas restricted from leasing for reasons not specified in the GIS data.

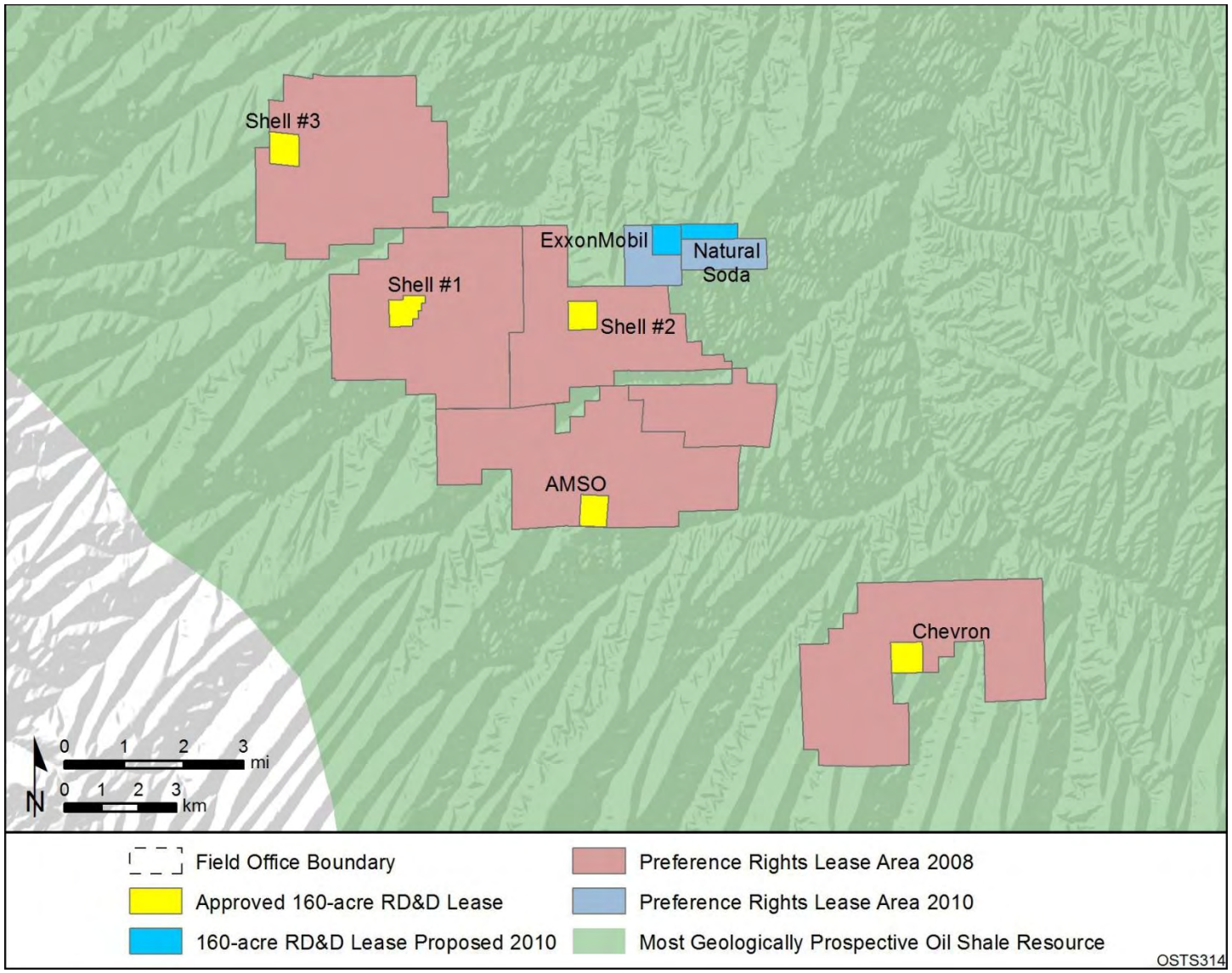

FIGURE 2.3.3-7 Two Potential New RD&D Oil Shale Leases in Colorado (Natural Soda and ExxonMobil) and the Five Existing RD&D Leases in Colorado

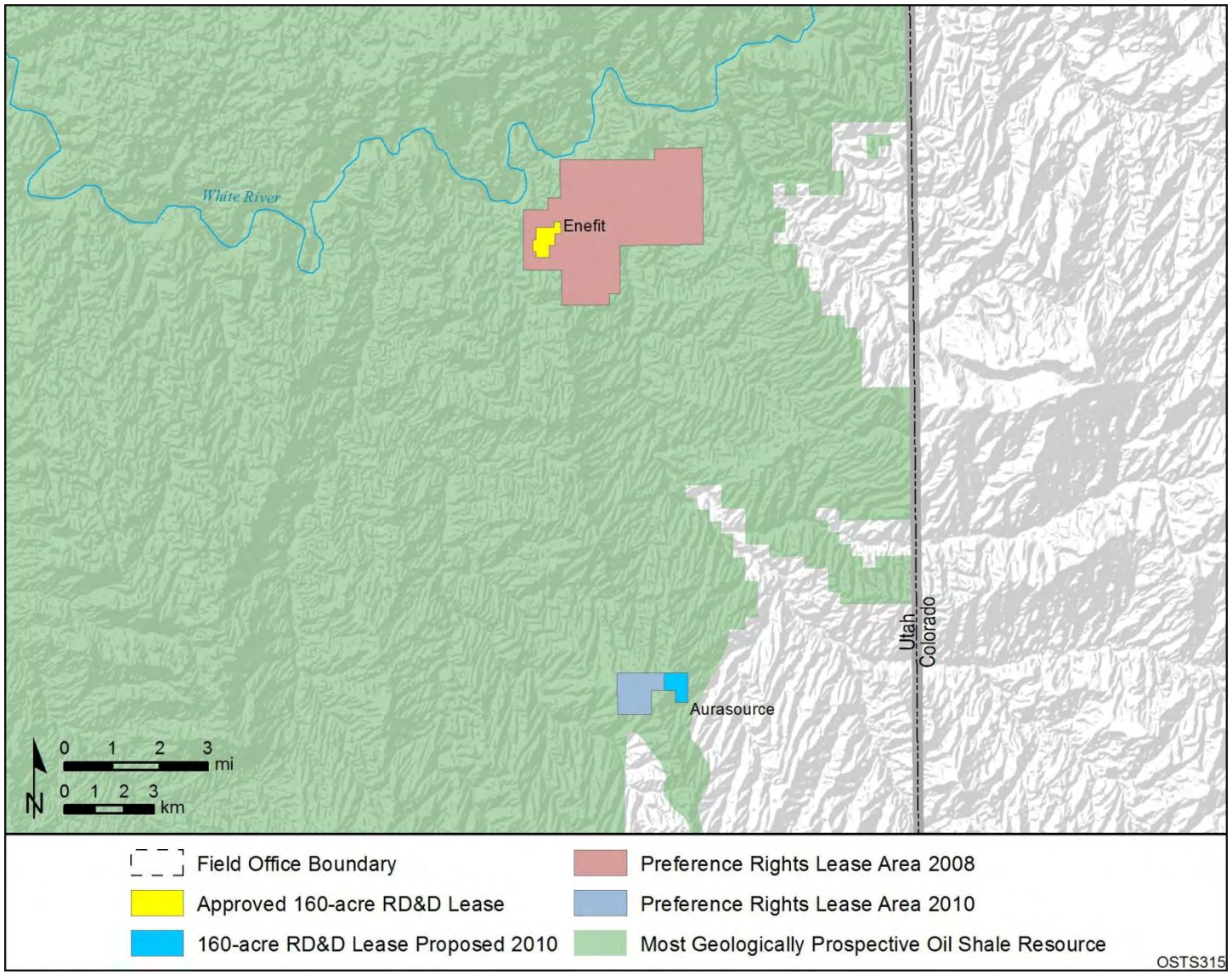

FIGURE 2.3.3-8 Potential New RD&D Oil Shale Lease (Aurasource) in Utah

1. The whole of the Adobe Town "Very Rare or Uncommon" area, as designated by the Wyoming Environment Quality Council on April 10, 2008 (180,910 acres total; 167,517 acres of public land, of which 10,920 acres are already a BLM WSA).

2. All ACECs located within the areas analyzed in the 2008 OSTS PEIS (76,666 acres in existing ACECs in 2008 OSTS PEIS plus additional ACEC acreages as a result of Colorado, Utah, and Wyoming planning efforts recently completed).[13]

RD&D First Requirement (4b). Under this alternative, the lands open for future leasing consideration would be the same as those in Alternative 4(a) but only for RD&D leases. The BLM would issue a commercial lease only when a lessee satisfies the conditions of its RD&D lease and the regulations at 43 CFR Subpart 3926 for conversion to a commercial lease. The preference right acreage, if any, which would be included in the converted lease, would be specified in the RD&D lease.

The environmental impacts of Alternative 4(b) would be analytically indistinguishable from those of Alternative 4(a). Only the method of obtaining a lease would be different. Accordingly, the analysis in this PEIS of Alternative 4 applies fully and equally to both alternatives. To the extent there may be differences in environmental consequences between Alternatives 4(a) and 4(b), these would be related to the timing of commencement of impacts, as well as, possibly, length of disturbance. However, these issues are best addressed in the lease and/or project-specific analysis.

The benefits of Alternative 4(b) would include facilitating a robust RD&D program. It would also avoid allowing a few companies to tie up large areas with speculative commercial leases. Thus it would promote access by innovative small companies to the federal oil shale resource for RD&D.

In the event that a commercially viable technology is demonstrated and becomes widely available in the near future, it is possible that Alternative 4(b) could result in delaying commercial leasing on federal lands. If that possibility, however speculative at the present, were to occur, the pertinent RMPs could be amended contemporaneously with review of proposed commercial leases. The oil shale leasing and management regulations at 43 CFR Part 3900 would not be affected by the selection of any alternative analyzed in this PEIS and thus would remain available for future decisions concerning commercial leasing.

As the Draft PEIS was being developed, the idea for this alternative emerged. It is presented here in brief. This alternative is not noted elsewhere in the document but will be developed further in preparation of the Final PEIS. Analytically, this alternative is indistinguishable from Alternative 4(a**)** in terms of environmental consequences. Therefore,

[13] This would only include those ACECs that formally designated in those plans. ACECs that were proposed but not formally designated in the applicable plans undergoing revision/amendment at that time would be excluded.

further environmental analysis in preparation of the Final PEIS is not anticipated, although more detailed explanation may be provided, particularly in response to comments received**.**

Under Alternative 4, lands that would be available for future consideration for leasing would include those BLM-administered lands within the most geologically prospective oil shale areas, including split estate lands where the federal government owns the mineral rights. The whole of Adobe Town in Wyoming would be excluded, as would all ACECs, as described above.. Lands available for application for leasing under Alternative 4 are shown in Figures 2.3.3-9, 2.3.3-10, and 2.3.3-11.

Lands within the most geologically prospective oil shale and tar sands areas identified by the BLM as LWC would be managed as in Alternative 1; that is, they would be available for future consideration of leasing and development. Decisions regarding management of these areas would be left to the discretion of the individual field offices to make the leasing decisions, which would determine the management of such areas through additional NEPA and planning processes (as appropriate) with respect to LWC. Thus consideration of management actions for LWC related to oil shale and or tar sands resources would be consistent with what the governing RMP provides with respect to management of such lands for other resources.

Similarly, with respect to the management of sage-grouse habitat, under Alternative 4, lands would be managed as in Alternative 1. No specific decisions regarding core and priority habitat will be made; rather, those decisions will be left up to the individual field offices to make, which would determine the management of such areas through additional NEPA and planning processes (as appropriate) with respect to core and priority sage-grouse habitat, consistent with applicable BLM policies. These policies were described in the 2008 OSTS PEIS (pp. 4-78–4-80) and include BLM's policies and general practices, including specific frequently used mitigation measures, that might be applied to any development, as warranted by analysis at the lease and/or development stage. More recently, the BLM has issued nationwide and state-specific guidance recommending the consideration of certain management practices to address the appropriate management of sage-grouse habitat in the context of land use actions, and this information is presented in a text box in Section 4.8.1 of this PEIS. Field offices would need to take this guidance into account, and incorporate protective measures in any authorizations, as warranted by ecological conditions and on the basis of environmental analysis. As such, it is likely that not all the areas that are currently open under this alternative for potential future leasing would be leased. The maximum acreage developed could be much less than that presented in Table 2.3.3-3, as a result of the application of current BLM policy.

Depending on what the applicable RMP provides with respect to LWC and core and priority sage-grouse habitat, it may be necessary to initiate a plan amendment at the leasing and/or development stage to make allocation decisions on an individual RMP basis regarding management of these lands with respect to oil shale and tar sands resources. The reason for qualifying the amount of acreage available for lease under this alternative is that while areas of core and priority sage-grouse and areas of LWC are left open for potential future leasing and development of oil shale and tar sands resources, the likelihood of all this acreage as being available for further oil shale and tar sands resources leasing and development is low. National and state-specific guidance related to sage-grouse management and protection of core and

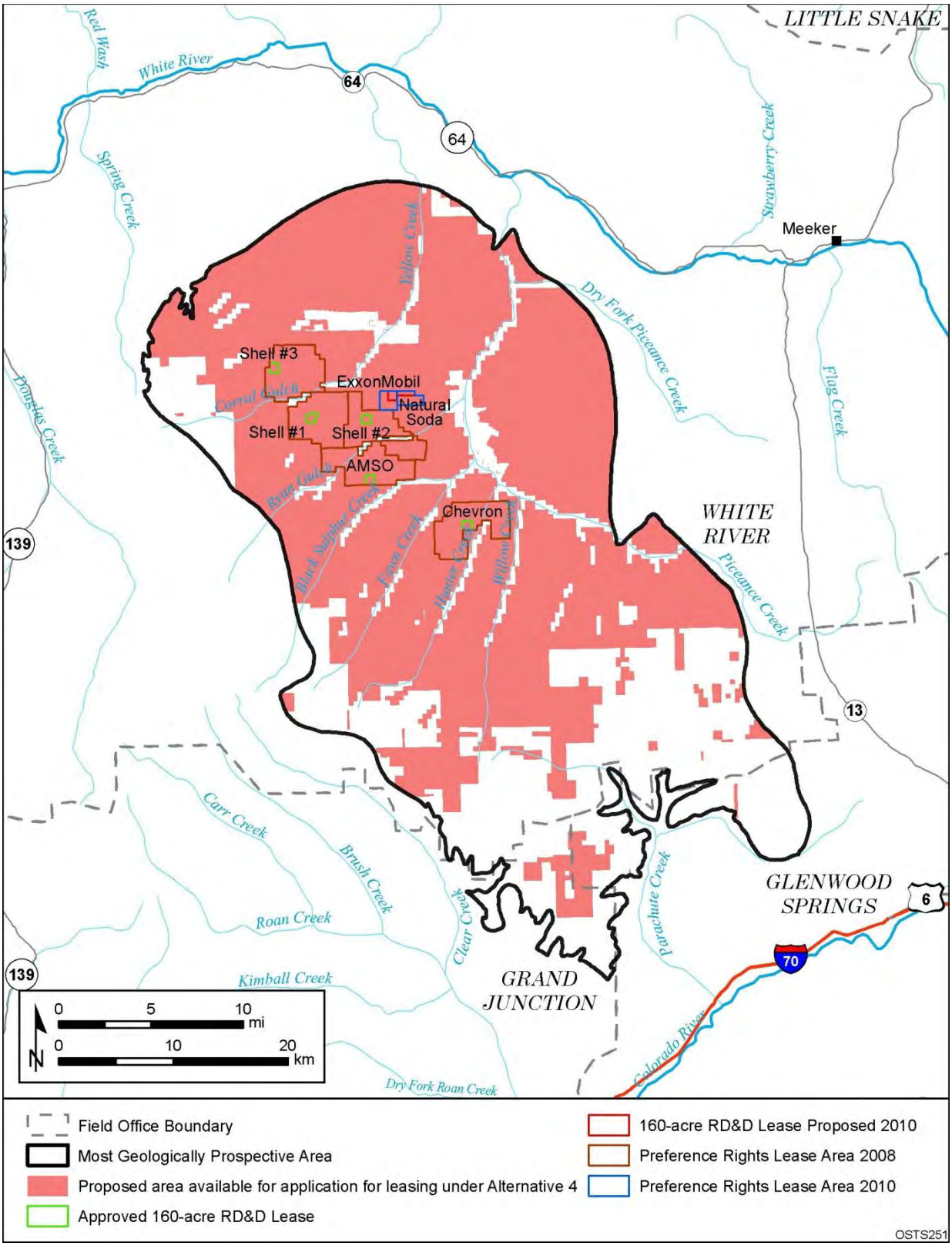

FIGURE 2.3.3-9 Lands Available for Application for Oil Shale Leasing under Alternative 4 in Colorado

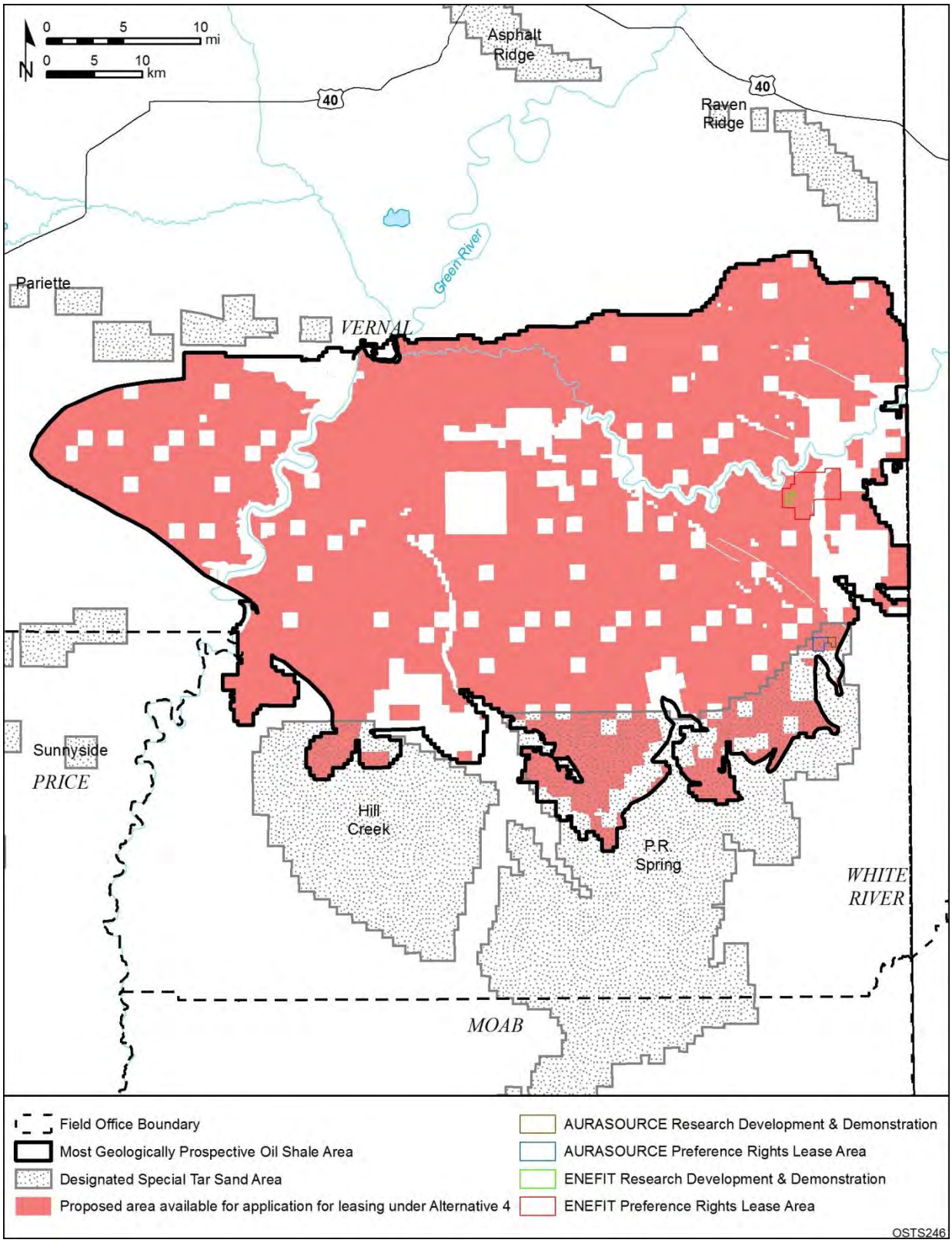

FIGURE 2.3.3-10 Lands Available for Application for Oil Shale Leasing under Alternative 4 in Utah

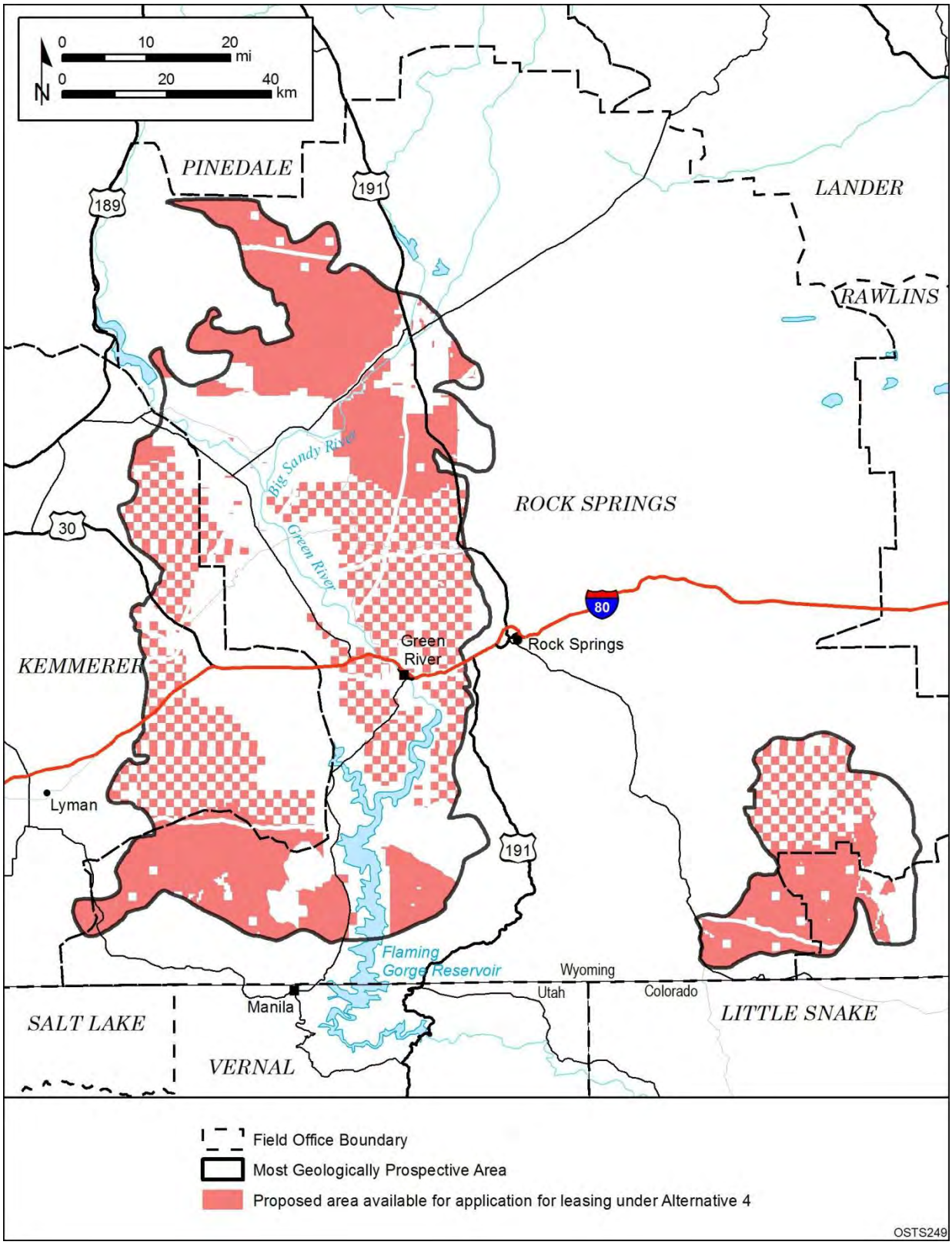

FIGURE 2.3.3-11 Lands Available for Application for Oil Shale Leasing under Alternative 4 in Wyoming

TABLE 2.3.3-3 Estimated Acres Potentially Available in Each State for Application for Leasing for Commercial Oil Shale Development under Alternative 4,[a] Assuming None of the LWC and Sage-Grouse Core and Priority Habitat Are Protected through NSO or No Lease Stipulations

State	BLM-Administered Lands	Split Estate Lands	Total
Colorado	300,718	39,429	340,147
Utah	580,221	75,600	655,821
Wyoming	959,862	7,584	967,446
Total for Alternative 4	1,840,801	122,613	1,963,414

[a] Totals may not be exact because of rounding. These estimates were derived from GIS data compiled for the PEIS analyses. This table assumes NSO/no lease measures are not applied as mitigation to protect LWC or sage-grouse core and priority habitat areas.

priority habitat will likely result in substantially less acreage being available, as will field office management decisions related to the protection of LWC. It is difficult to establish disturbance amounts at the programmatic level, before more is known regarding the specifics of leasehold location and technology to be used. Tables 2.3.3-4 and 2.3.4-5 show what this might look like under different protective scenarios. The scenarios are only provided to illustrate this idea, but the decisions to protect these amounts are not being made at this time as part of this land use plan amendment initiative. These decisions would be made at the field office level as part of the NEPA and/or planning analyses completed for leasing and site-specific development.

As shown in Figures 2.3.3-9, 2.3.3-10, and 2.3.3-11 and reflected in Table 2.3.3-2, a large amount of land (i.e., more than 1,500,000 acres) available for application for leasing under Alternative 4 is excluded under Alternatives 2 and 3. In addition, particularly in Colorado and Wyoming, a large portion of the lands proposed to be available for application for leasing is composed of relatively small, isolated tracts of land. These factors could result in limiting the amount of commercial oil shale development to some level below that which might be realized under Alternative 4.

Also, as discussed in Section 2.3.1, commercial leases for surface mining projects would be allowed only in Utah and Wyoming on those lands where the overburden is 0 to 500 ft thick. In Utah, under Alternative 4, lands available for application for leasing for surface mining projects total about 46,900 acres in the Vernal RMP planning area. In Wyoming, under Alternative 4, these lands total about 68,200 acres in the Green River RMP planning area.

TABLE 2.3.3-4 Estimated Acres Potentially Available in Each State for Application for Leasing for Commercial Oil Shale Development under Alternative 4, Assuming 75% of the LWC and Sage-Grouse Core and Priority Habitat Are Protected through NSO or No Lease Stipulations

State	Acres LWC and Sage-Grouse[a]	BLM-Administered Lands	Split Estate Lands	Total
Colorado	24,436	282,547	38,524	321,071
Utah	263,200	393,843	64,578	458,421
Wyoming	366,091	686,696	6,182	692,878
Total for Alternative 4	653,727	1,363,086	109,284	1,472,270

[a] Acreage that is identified as either LWC or sage-grouse core or priority habitat or both within Alternative 4.

TABLE 2.3.3-5 Estimated Acres Potentially Available in Each State for Application for Leasing for Commercial Oil Shale Development under Alternative 4, Assuming 25% of the LWC and Sage-Grouse Core and Priority Habitat Are Protected through NSO or No Lease Stipulations

State	BLM-Administered Lands	Split Estate Lands	Total
Colorado	294,662	39,127	333,789
Utah	518,095	71,926	590,021
Wyoming	868,807	7,116	875,923
Total for Alternative 4	1,681,564	118,169	1,799,733

In Alternative 2, portions of three of the five PRLAs for the Colorado RD&D leases are not identified as available for application for commercial leasing. These include portions of the areas associated with the Chevron, AMSO, and Shell Site 2 RD&D projects. For the other two Colorado RD&D projects, Shell Sites 1 and 3, none of the PRLAs coincide with the area identified as available for application for commercial leasing. For Alternative 4, as is the case for Alternative 1, for the Enefit RD&D project in Utah, the same portion of the area that is not identified as available for lease also is not available for application for commercial leasing under Alternative 4 because of the presence of a potentially eligible WSR, Evacuation Creek (see discussion on this in Section 2.3.3.1).

Under the terms of the RD&D program, the federal government has a commitment to grant the RD&D companies leases for commercial development within the PRLAs, provided that all terms and conditions of the leases are met (see Section 1.4.1). As a result, all lands within the PRLAs would be available for issuance of commercial leases to the current RD&D lessees, subject to their lease requirements.

2.4 TAR SANDS

Tar sands are sedimentary rocks containing bitumen, a heavy hydrocarbon complex. Lighter, more volatile hydrocarbons once present in these rocks have escaped to the environment, leaving the heavier, less volatile bitumen in place. Because of the very viscous nature of the bitumen, tar sands cannot be processed by normal petroleum production techniques.[14]

More than 50 tar sands deposits occur in Utah. Limited data are available on many of these deposits, and most of the known bitumen occurs in just a few of the deposits. The deposits that are being evaluated in this PEIS are those classified in the 11 sets of geologic reports (minutes) prepared by the USGS in 1980 (USGS 1980a–k) and formalized by Congress in the Combined Hydrocarbon Leasing Act of 1981 (P.L. 97-78).[15] The 11 STSAs, which define the tar sands study area, are shown in Figure 2.4-1 and listed in Table 2.4-1, along with their total size in acres and the number of acres of BLM-administered and split estate lands within each STSA. These STSAs are considered to be the most geologically prospective areas for tar sands development.

Although no tar sands development is currently taking place on public lands in Utah, the BLM does have a pending application for a tar sands lease. In the mid-1980s, a number of CHLs were issued in the Pariette and P.R. Spring STSAs under the authority of the Combined Hydrocarbon Leasing Act (P.L. 97-78). These include four leases in the Pariette STSA and two leases in the P.R. Spring STSA; these leases remain in existence. Also in the mid-1980s, a number of operators holding oil and gas leases or tar sands claims within designated STSAs applied to convert their leases to CHLs. In most instances, the conversion of these leases has not been completed; thus, a number of pending conversion applications remain within the study area, specifically within the Circle Cliffs, Tar Sand Triangle, and P.R. Spring STSAs.[16] The BLM is currently engaged in adjudication of these leases.[17] Tar sands deposits outside the areas

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[14] "Tar sands" should be distinguished from the "oil sands" found in Canada. The differences between these two resources and the resulting differences in how they might be developed are discussed in Appendix B.

[15] See 30 USC 181, which defines "special tar sands area" as an area designated by the Secretary of the Interior's orders of November 20, 1980 (45 FR 76800–76801) and January 21, 1981 (46 FR 6077–6078).

[16] While the Circle Cliffs STSA is a designated STSA, the BLM-administered portion of it falls entirely within the GSENM and has been excluded from consideration for being designated as open to application for leasing in this PEIS.

[17] Decisions in this PEIS and its accompanying ROD regarding the availability of lands within the STSAs for future commercial leasing and the constraints under which such future leases would be issued would not affect the existing CHLs or any of the pending applications that are converted to CHLs.

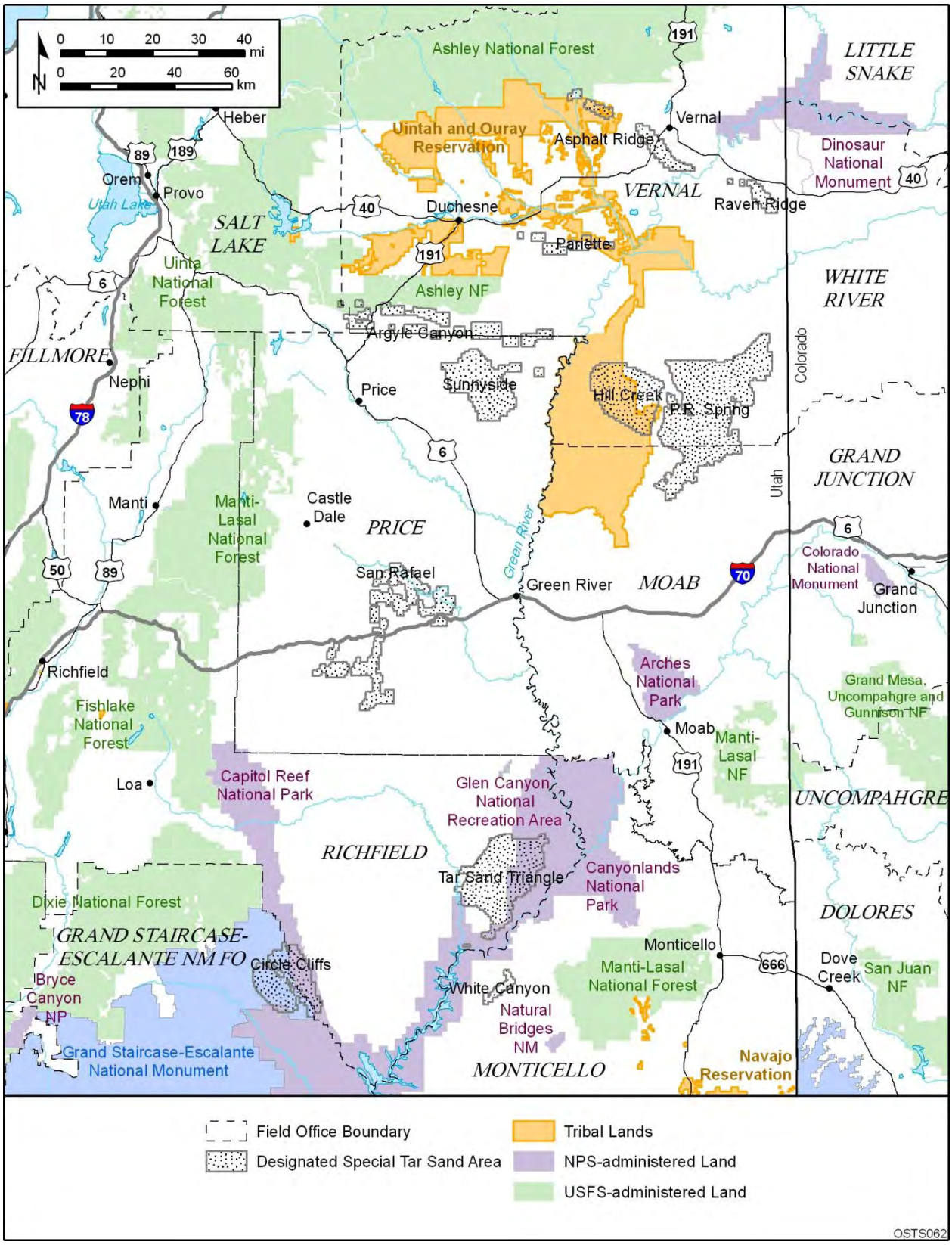

FIGURE 2.4-1 Special Tar Sand Areas in Utah

TABLE 2.4-1 Total Size in Acres of the 11 STSAs and Acres of BLM-Administered and Split Estate Lands within Each STSA[a,b]

STSA	Total Size	Total BLM-Administered Lands within STSA	Total Split Estate Lands within STSA
Argyle Canyon	22,259	1,224	11,869
Asphalt Ridge	39,151	5,324	128
Circle Cliffs[c]	91,303	50,852	6,707
Hill Creek[d]	106,795	19,826	36,583
Pariette	22,622	12,336	78
P.R. Spring	273,922	184,100	7,639
Raven Ridge	16,533	14,352	16
San Rafael Swell	130,737	115,665	0
Sunnyside	157,406	78,676	18,175
Tar Sand Triangle	155,049	82,208	0
White Canyon	10,490	8,050	0
Total	1,026,266	572,613	81,196

[a] Totals may not be exact because of rounding. These estimates were derived from GIS data compiled for the PEIS analyses.

[b] Split estate lands include areas where the federal government owns, and the BLM administers, the subsurface mineral rights, but the surface estate is owned by Tribes, states, or private parties.

[c] The Circle Cliffs STSA is included for information purposes only; it has been excluded from consideration for being designated as open to application for leasing in this PEIS. The BLM-administered lands fall entirely within the GSENM.

[d] The split estate lands in the Hill Creek STSA include 35,472 acres of split estate lands within the Hill Creek Extension of the Uintah and Ouray Reservation on which the surface rights are owned by the Ute Indian Tribe.

designated by the Secretary of the Interior in the 11 sets of minutes are not available for leasing under the CHL Program, but are available for development under a conventional oil and gas lease.

Potential tar sands development could occur on the existing CHLs or on pending conversion leases should they be converted to CHLs.

2.4.1 Potential Commercial Tar Sands Development Technologies

This section briefly describes the tar sands development technologies that have been considered in the scope of the PEIS analyses. Appendix B provides a more detailed discussion of potential technologies that may be used over the next 20 years and includes a discussion of oil sands development in Canada. Information presented in this section and Appendix B on

technologies that might be used is taken from the best available published data. Because commercial tar sands development is still evolving, many details regarding the specific technologies that will be used in the future to produce oil from tar sands are unknown. In the absence of complete and definitive information about the technologies that may be deployed, a number of assumptions have been made. These assumptions are discussed in Section 5.1.

Commercial development of a tar sands resource occurs in three major steps: (1) recovery of the bitumen in its natural setting, (2) processing of the bitumen to extract it from the inorganic matrix (largely sand and silt) in which it occurs, and (3) upgrading of the bitumen to produce a synthetic crude oil suitable as a feedstock for a conventional refinery. The physical and chemical features of the tar sands deposits and other circumstantial factors associated with their deposition dictate the most appropriate development schemes. Typical development schemes always involve each of the above major steps, although many permutations of these steps are possible and many interim steps may also be necessary.

Recovery methods can be categorized as either mining activities or in situ processes, although some techniques involve a combination of recovery methods. Mining consists of using surface or subsurface mining techniques to excavate the tar sands with subsequent recovery of the bitumen by washing, flotation, or retorting.[18] True in situ methods generally involve either heating the tar sands (referred to as in situ combustion) or injecting materials (e.g., steam, hot water, gas, or solvents) into them to mobilize the bitumen for recovery. Depending on production costs and the price of the synthetic crude produced, surface mining operations are generally cost-effective only where the overburden is no more than about 45 m (150 ft) (Meyer 1995). In situ processes requiring high pressures are generally considered to require a thick overburden of about 150 m (500 ft) to contain the pressure. Between these depths, bitumen must be recovered by other means.

The choice of recovery method affects which extraction and processing operations are used. In mining operations, the mined bitumen must be processed to recover or separate it from the inorganic matrix (largely sand, silt, and clay) in which it occurs. Nonmining recovery methods produce bitumen mixed with water, steam, other gases, or solvent from which it must be separated. If combustion recovery is used, the viscosity of the recovered bitumen may need to be reduced prior to further processing. In all cases, the viscosity of the bitumen might need to be changed prior to further processing and upgrading (BLM 1984). Depending on the recovery method, mining operations may also need to perform similar separations. The recovery processes evaluated in this PEIS include those discussed in Appendix B: the hot water process, cold water process, solvent extraction process, and thermal recovery processes, including retorting.

Irrespective of the recovery and processing technologies employed, it is assumed that in most commercial projects the recovered bitumen would need to be upgraded in order for it to be accepted by oil refineries as feedstock for conventional fuels. Although there are variations among different production operations, four main processes are used to upgrade bitumen: coking (thermal conversion), catalytic conversion, distillation (fractionation), and hydrotreating.

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[18] The PEIS does not evaluate the application of underground mining technologies for the commercial development of tar sands because, at this time, underground mining to develop tar sands does not appear to be commercially viable.

Four technology combinations are evaluated in this PEIS for commercial tar sands development:

- Surface mining projects with surface retorting,
- Surface mining projects with solvent extraction,
- In situ steam injection projects, and
- In situ combustion projects.

While many hypothetical development scenarios could be constructed for various technology combinations, it is not possible to project or analyze all of them in this PEIS.

For the same reasons the BLM has elected not to attempt to issue leases on the basis of the NEPA analysis in this PEIS (see Section 2.5.1). This PEIS does not include analysis of a particular development scenario. Because the tar sands industry in the United States still lacks a commercially implemented technology, the BLM concluded that trying to anticipate a certain level of development would be too speculative.

Therefore, this PEIS includes description and analysis not of a particular level of development, but of the possible impacts of each type of technology that has been considered and researched, so far as this information is available to the BLM at this time.

In all allocation alternatives, including the No Action Alternative, RD&D leases could be issued in any areas opened to commercial tar sands leasing. While there has never yet been any formal RD&D program for tar sands leasing, and there is no present intention to establish such a program, nevertheless, RD&D projects might precede commercial tar sands leasing or might be conducted contemporaneously with commercial leasing and operations. Impacts from RD&D projects are anticipated to be qualitatively similar but smaller in scale than those of commercial projects, at least until any RD&D lease might be converted to a commercial tar sands lease and expanded to include preference right acreage. Additional NEPA analysis would be required prior to issuance of any RD&D lease and prior to conversion of an RD&D lease to a commercial tar sands lease and expansion into a PRLA.

If and when applications to lease are received and additional information becomes available, the BLM will conduct NEPA analyses, including consideration of direct, indirect, and cumulative effects, reasonable alternatives, and possible mitigation measures, as well as what level of development may be anticipated. On the basis of that NEPA analysis to be conducted at the lease stage, the BLM will consider the establishment of general lease stipulations and BMPs, either by further plan amendment, if necessary, or by other means.

This PEIS considers the components of current technologies that could be implemented in order to analyze the range of potential impacts that could occur. The scope of the PEIS analyses is intended to be broad enough to include the potential array of technologies that might be used to commercially develop tar sands resources on public lands. It is possible, however, that

additional technologies may be identified as viable in the next 20 years. The application of such technologies on public lands may be allowed by the BLM; however, these technologies would need to be evaluated on a case-by-case basis.

2.4.2 Alternative 1, Tar Sands No Action Alternative, No Change to 2008 Decision

Under this alternative, no existing land use plans would be amended. In 2008, the BLM designated a total of 430,686 acres available for applications for commercial tar sands leasing. The lands available for lease under the 2008 land use plan amendment decisions would remain available for future leasing consideration under Alternative 1, no action. See Section 2.3.2 for a full description of the No Action Alternative. Figure 2.4.2-1 shows the lands available for application for leasing under Alternative 1. Table 2.4.2-1 shows the acreages by STSA. Table 2.4.2-2 provides a summary of the activities and conditions assumed to occur under Alternative 1 relevant to tar sands leasing.

2.4.3 Commercial Tar Sands Land Allocation Alternatives

The three new allocation action alternatives that the BLM has developed for establishing a commercial tar sands program are also summarized in Table 2.4.2-2. These new allocation alternatives, labeled Alternatives 2, 3, and 4, consist of different management approaches to future commercial tar sands leasing. Under all allocation alternatives, including the No Action Alternative, the BLM proposes to make certain lands within the STSAs available for application for commercial leases and certain lands unavailable. Under all alternatives, additional NEPA and other appropriate analyses would be conducted prior to the issuance of commercial leases. In addition, site-specific NEPA and other appropriate analyses would be conducted during evaluation and approval of plans of development during the project development phase. These site-specific analyses, which potentially could be combined into a single NEPA evaluation, would identify potential project-specific impacts and define appropriate lease stipulations and required mitigation measures. The potentially applicable mitigation measures discussed in the Chapter 5 impact analyses would be applied during the site-specific analyses, as appropriate.

As discussed in Section 1.2, the BLM has determined that certain lands within the STSAs are excluded from commercial leasing under all alternatives, on the basis of existing laws and regulations, E.O.s, land use plan designations, and other administrative designations or withdrawals. As a result, commercial leasing is excluded from all designated Wilderness Areas, WSAs, and other areas that are part of the NLCS administered by the BLM (e.g., National Monuments, NCAs, WSRs, and National Historic and Scenic Trails). Leasing also would be excluded from all existing ACECs and lands within incorporated town and city limits. The BLM has also determined that additional areas would be closed and would not be available for future opportunity to lease for commercial development of tar sands resources under all allocation action alternatives. These additional areas include:

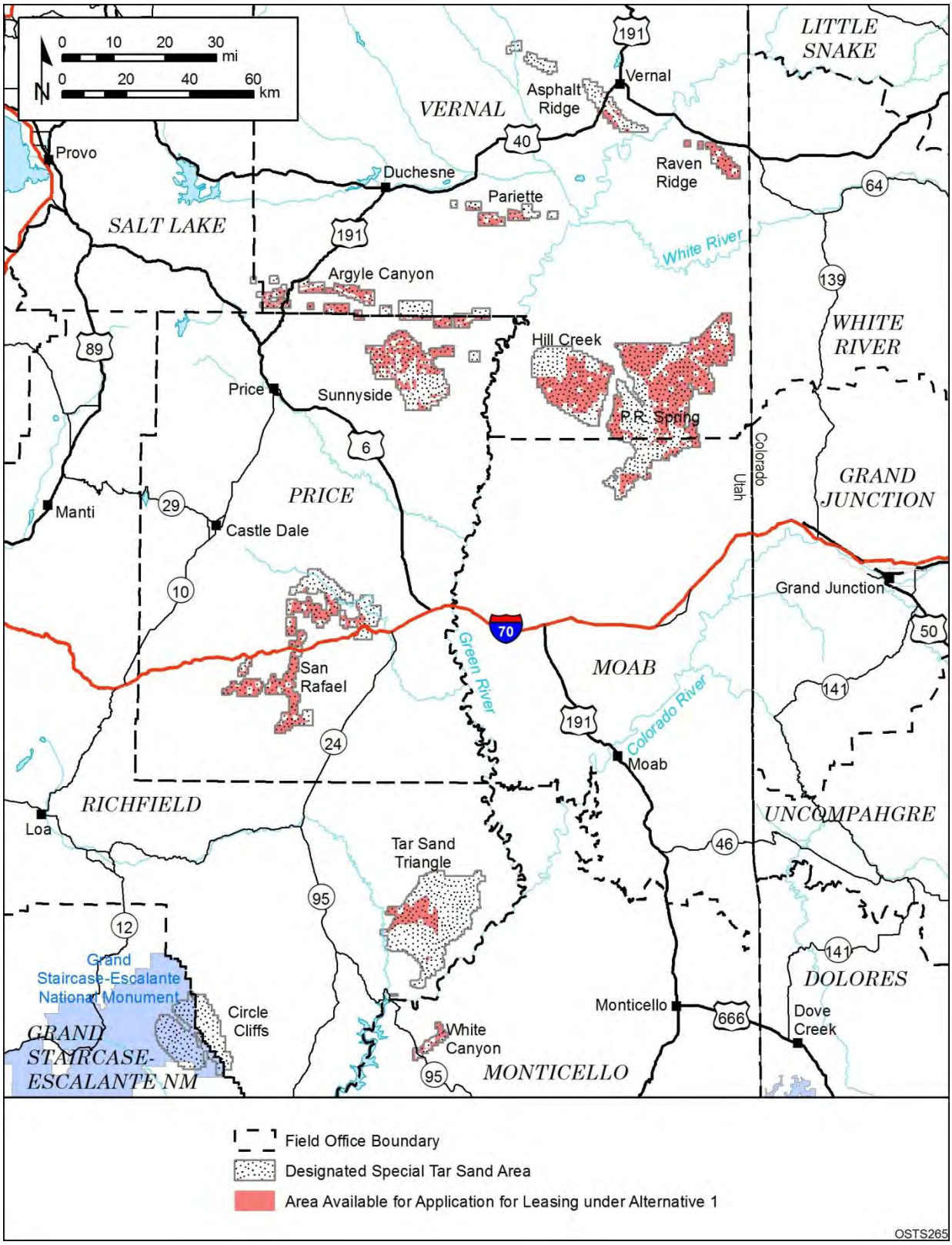

FIGURE 2.4.2-1 Lands Available for Application for Tar Sands Leasing under Alternative 1 for Commercial Tar Sands Development within the STSAs in Utah

TABLE 2.4.2-1 Estimated Acres Potentially Available under Alternative 1 for Application for Leasing in Each STSA for Commercial Tar Sands Development[a]

STSA	BLM-Administered Lands	Split Estate Lands	Total
Argyle Canyon	1,022	10,204	11,226
Asphalt Ridge	5,310	125	5,435
Circle Cliffs[b]	0	0	0
Hill Creek	19,924	36,583	56,507
Pariette	10,083	78	10,161
P.R. Spring	145,922	6,694	152,617
Raven Ridge	14,348	16	14,364
San Rafael	70,475	0	70,475
Sunnyside	61,338	16,624	77,962
Tar Sand Triangle	24,938	0	24,938
White Canyon	7,001	0	7,001
Total for Alternative 1	360,362	70,324	430,686

[a] Totals may not be exact because of rounding. These estimates were derived from GIS data compiled for the PEIS analyses.

[b] Leasing for commercial tar sands development in the Circle Cliffs STSA is excluded under all alternatives because it falls entirely within the GSENM and units managed by the NPS on which mineral leasing and development are prohibited.

- *Circle Cliffs STSA.* Most of the Circle Cliffs STSA falls entirely within the GSENM and Capitol Reef National Park. The issuance of new leases for mineral development within each of these units is prohibited. Also, a small portion of the Circle Cliffs STSA underlies the Glen Canyon NRA; this area is part of the "Natural Zone" within which mineral leasing and development are prohibited.

- *Segments of rivers that have been determined to be potentially eligible for WSR status by virtue of a WSR inventory*. These river segments and a corridor extending at least 0.25 mi on either side of these segments would be excluded from commercial leasing.

Leasing would occur as set forth in 43 CFR Part 3140. For information purposes, the process could be summarized as follows. The BLM would hold a competitive lease sale as provided for in 43 CFR 3141.1. A potential lessee could submit a request or expression of interest in one or more tracts for competitive lease offering as provided for in 43 CFR 3141.6-1. The BLM anticipates that it will need additional information about potential technologies for, and impacts from, commercial production of tar sands in order to complete an analysis under NEPA, NHPA, ESA, and other appropriate laws, policies, and regulations for issuing leases or

TABLE 2.4.2-2 Summary of Activities and Conditions Assumed for Each of the Tar Sands Alternatives

Condition	Alternative 1 (No Action)	Alternative 2 (Conservation Focus)	Alternative 3 (Pending Commercial Lease)	Alternative 4 (Moderate Development)
Land use plans amended	No plans would be amended.	Four plans would be amended.	Same as Alternative 2.	Same as Alternative 2.
Potential area made available for application for leasing (RD&D and commercial leases)	430,686 acres would be available for application for commercial lease. Argyle Canyon: 11,226 acres Asphalt Ridge: 5,435 acres Circle Cliffs: 0 acres Hill Creek: 56,507 acres Pariette: 10,161 acres P.R. Spring: 152,617 acres Raven Ridge: 14,364 acres San Rafael: 70,475 acres Sunnyside: 77,962 acres Tar Sand Triangle: 24,938 acres White Canyon: 7,001 acres	91,045 acres would be available for application for commercial lease. Argyle Canyon: 0 acres Asphalt Ridge: 0 acres Circle Cliffs: 0 acres Hill Creek: 9,835 acres Pariette: 830 acres P.R. Spring: 42,304 acres Raven Ridge: 9,119 acres San Rafael: 8,927 acres Sunnyside: 19,888 acres Tar Sand Triangle: 97 acres White Canyon: 45 acres	The pending Asphalt Ridge lease application south of Vernal, Utah covering approximately 2,100 acres.	276,708 t0 425,790[a] acres would be available for application for commercial lease. Argyle Canyon: 11,215 to 11,226 acres Asphalt Ridge: 1,387 to 5,435 acres Circle Cliffs: 0 acres Hill Creek: 53,372 to 62,152 acres Pariette: 10,161 acres P.R. Spring: 108,922 to 152,617 acres Raven Ridge: 12,643 to 14,364 acres San Rafael: 26,147 to 69,696 acres Sunnyside: 42,946 to 68,200 acres Tar Sand Triangle: 6,570 to 24,938 acres White Canyon: 3,345 to 7,001 acres
Technologies considered	Surface mining with surface retort Surface mining with solvent extraction In situ steam injection In situ combustion	Surface mining with surface retort Surface mining with solvent extraction In situ steam injection In situ combustion	Same as Alternative 1.	Same as Alternative 1.

TABLE 2.4.2-2 (Cont.)

Condition	Alternative 1 (No Action)	Alternative 2 (Conservation Focus)	Alternative 3 (Pending Commercial Lease)	Alternative 4 (Moderate Development)
Lands excluded from commercial leasing	Wilderness Areas, WSAs, other areas that are part of the NLCS. • All ACECs existing as of the signing of the 2008 ROD. • The Circle Cliffs STSA. • Historic trails. • Segments of rivers determined to be eligible for WSR status by virtue of a WSR inventory. • Incorporated town and city limits.	Same as Alternative 1, plus: • Lands with wilderness characteristics • Adobe Town "Very Rare or Uncommon" area. • Core or priority sage-grouse habitat. • ACEC acreage both added since the 2008 OSTS PEIS ROD and under consideration for designation. • Areas excluded under Alternative C of the 2008 OSTS PEIS not included in Alternative 1.	All areas except the pending Asphalt Ridge lease application.	Same as Alternative 1 plus Adobe Town "Very Rare and Uncommon" area in Wyoming and ACEC acreage added in planning efforts in Utah and Wyoming since the 2008 OSTS PEIS ROD, as well as areas under consideration for designation as ACECs in current planning processes.
Regulatory and operational constraints	All commercial development would be conducted in compliance with existing federal, state, and local regulatory requirements and established BLM policies.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Additional NEPA requirements	Additional NEPA analyses would be required before any leases for commercial development could be issued. Site-specific NEPA analyses also would be conducted during the review and approval of project plans of development.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

TABLE 2.4.2-2 (Cont.)

Condition	Alternative 1 (No Action)	Alternative 2 (Conservation Focus)	Alternative 3 (Pending Commercial Lease)	Alternative 4 (Moderate Development)
Applicable leasing regulations	Leasing (including CHLs) would be conducted pursuant to the regulations pertaining to tar sands leasing at 43 CFR Part 3140.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Abbreviations: ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; CFR = *Code of Federal Regulations*; CHL = combined hydrocarbon lease; DOI = U.S. Department of the Interior; NLCS = National Landscape Conservation System; NEPA = National Environmental Policy Act; NOSR = Naval Oil Shale Reserves; OSTS = oil shale and tar sands; RD&D = research, development, and demonstration; ROD = Record of Decision; STSA = Special Tar Sand Area; WSA = Wilderness Study Area.

[a] This range corresponds to 75% protection of LWC and sage-grouse core and priority habitat at the low end to no protection at the high end.

approving plans of developments. That information does not presently exist and would likely need to come from the industry before the BLM would proceed with leasing or approval of operations.

Under all allocation action alternatives, the BLM would ensure that the operator conducts commercial development in compliance with existing federal, state, and local regulatory requirements and established BLM policies, as generally described in Section 2.2 and Appendix D. That compliance would include, as appropriate, obtaining all permits (e.g., air, water, and waste management) as required by regulatory agencies; operating within the permit constraints; completing consultation with the USFWS under Section 7 of the ESA; completing consultation with SHPOs, Tribal Historic Preservation Officers, and other consulting parties under Section 106 of the NHPA; and compliance with any other relevant and applicable requirements. Compliance-related conditions would be developed on a project-by-project basis during site-specific analyses.

Under each of the three new allocation action alternatives, four land use plans in Utah would be amended to redesignate lands within the STSAs as available or not available for application to lease. The plans that would be amended to address commercial tar sands leasing and development include the following:

- Monticello RMP (BLM 2008d);
- Price RMP (BLM 2008e);
- Richfield RMP (BLM 2008f); and
- Vernal RMP (BLM 2008g).

Public lands outside of the STSAs are not being excluded from consideration for leasing for any environmental or other specific reason and could be considered for application for leasing at a later time but would require consideration in a new NEPA analysis and a land use plan amendment before leasing could be authorized. Areas within the STSAs that are excluded from consideration for application for leasing in the current PEIS, or environmentally and economically sound proposals employing different technologies, could also be considered in the future.

The following sections describe the new allocation action alternatives evaluated in this PEIS. The sections identify the additional leasing exclusions that the BLM has identified for each alternative and the proposed land use plan amendments. The specific land use plan amendments are discussed in greater detail in Appendix C.

2.4.3.1 Alternative 2, Tar Sands Conservation Focus

Under the terms of the 2011 settlement of the litigation over the 2008 oil shale and tar sands plan amendment (USDC, Colorado, February 15, 2011 [USDC Colorado 2011]), the DOI

and BLM agreed to analyze an alternative that excludes from oil shale and tar sands leasing and development all of the resource types listed below. Under this alternative, six land use plans in Utah would be amended to designate less than 229,000 acres (acreage opened under Alternative C of the 2008 plan amendment) as available for future commercial tar sands leasing.[19] This alternative would exclude from commercial tar sands leasing the following categories or groups of categories of public lands and/or their resource values that may warrant protection from potential oil shale leasing and development:

1. All areas that the BLM has identified or may identify as a result of inventories conducted during this planning process, as LWC;

2. The whole of the Adobe Town "Very Rare or Uncommon" area, as designated by the Wyoming Environment Quality Council on April 10, 2008 (180,910 acres total; 167,517 acres of public land, of which 10,920 acres are already a BLM WSA);

3. Core or priority sage-grouse habitat, as defined by such guidance as the BLM or the DOI may issue;

4. All ACECs located within the areas analyzed in the 2008 OSTS PEIS (76,666 acres in existing ACECs in the 2008 OSTS PEIS plus additional ACEC acreages as a result of Utah and Wyoming planning efforts recently completed), as well as all areas under consideration for designation as ACECS in planning processes currently underway; and

5. All areas identified as excluded from commercial oil shale and tar sands leasing in Alternative C of the September 2008 OSTS PEIS (Alternative C made 830,296 acres available for potential commercial oil shale leasing and 229,038 acres available for potential commercial tar sands leasing).[20]

Specifically, under Alternative 2, the BLM proposes to designate a total of 91,045 acres available for commercial tar sands leasing by amending two land use plans to adopt the conditions and constraints discussed above and in accordance with applicable federal, state, and local regulations and BLM policies. The lands that would be available for application include all BLM-administered public lands within the STSAs, including split estate lands where the federal government owns the mineral rights, except those lands described above and in Section 2.4.3.

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[19] In a February 15, 2011, settlement of a lawsuit brought by several environmental advocacy groups challenging the 2008 OSTS PEIS and ROD, the DOI and BLM agreed to analyze an alternative that considers excluding from oil shale/tar sands leasing and development all lands containing the resource types listed, as well as an alternative that considers excluding from oil shale/tar sands leasing and development some portion of the lands containing the resource types listed. The latter alternative is represented by Alternative 4, the Moderate Development Alternative, described below.

[20] This would include analysis of excluding from future oil shale and tar sands leasing not only all ACECs, but also areas that had been under consideration for designation as ACECs in the applicable plans undergoing revision or amendment at the time, but which were eventually not designated.

Lands that are excluded from application for tar sands lease under Alternative 2 described in items 1-4, above, are shown in Figure 2.4.3-1. All prospective tar sands areas are in Utah; the Adobe Town exclusion in Wyoming thus does not affect tar sands areas. The lands that would be available for application for lease under Alternative 2 are shown in Figure 2.4.3-2. Table 2.4.3-1 lists the approximate number of acres of BLM-administered lands, including areas where the federal government owns only the mineral estate, available for application for commercial leasing under Alternative 2 by STSA.[21]

In the formulation of Alternative C in the 2008 OSTS PEIS, the BLM excluded from commercial tar sands development all lands where such surface-disturbance and seasonal limitations were in place to protect known sensitive resources. Lands within each field office where stipulations for no surface disturbance, controlled surface use, or seasonal limitations were in place for oil and gas leasing were also excluded. Table 2.4.3-2 identifies the types of stipulations and restrictions in place for oil and gas leasing in each state that were used to identify lands excluded under Alternative C.

As shown in Figure 2.4.3-1 and reflected in Table 2.4.3-1, 340,181 acres available for application for leasing under Alternative 1 are excluded under Alternative 2; several STSAs become entirely unavailable for application for lease. In addition, in some of the STSAs, a large portion of the lands proposed to be available for leasing is composed of relatively small, isolated tracts of land. These factors could result in limiting the potential amount of commercial tar sands development to a level well below that which might be realized under Alternative 1.

2.4.3.2 Alternative 3, Tar Sands Pending Commercial Lease

This alternative is designed as an analogue to the Research Lands Focus Oil Shale Alternative 3, described in Section 2.3.3.2, in order to respond to scoping comments that called for consideration of closing public lands to all development other than research projects. Unlike with respect to oil shale, there is no specific "RD&D" program for tar sands. Therefore, this alternative would also analyze foregoing the leasing of tar sands for the commercial development of fluid mineral resources, entirely, except for one tar sands lease currently under consideration. The Asphalt Ridge tar sands lease application, shown in Figure 2.4.3-3, is located approximately 11 mi south of Vernal, and the expression of commercial leasing interest that forms its basis was submitted on November 16, 2009. This prospective lease is for a commercial tar sands project; however, as with oil shale, the technology to develop tar sands commercially for fluid minerals development is in its nascent stages. While Alternative 3 analyzes the potential effects of this pending lease application, which covers approximately 2,100 acres, for the purposes of informing land use allocation decision-making, the information and analysis in this PEIS is not considered to be the NEPA analysis sufficient to provide the basis for determining whether or

[21] The maps and acreage estimates were constructed by applying the leasing restrictions discussed in the text to the best available GIS datasets available to the BLM. These maps and acreage estimates may contain errors and should be considered to be only representative of the proposed leasing area for this alternative. As specific areas are considered for commercial leasing, a detailed evaluation of land status would be required.

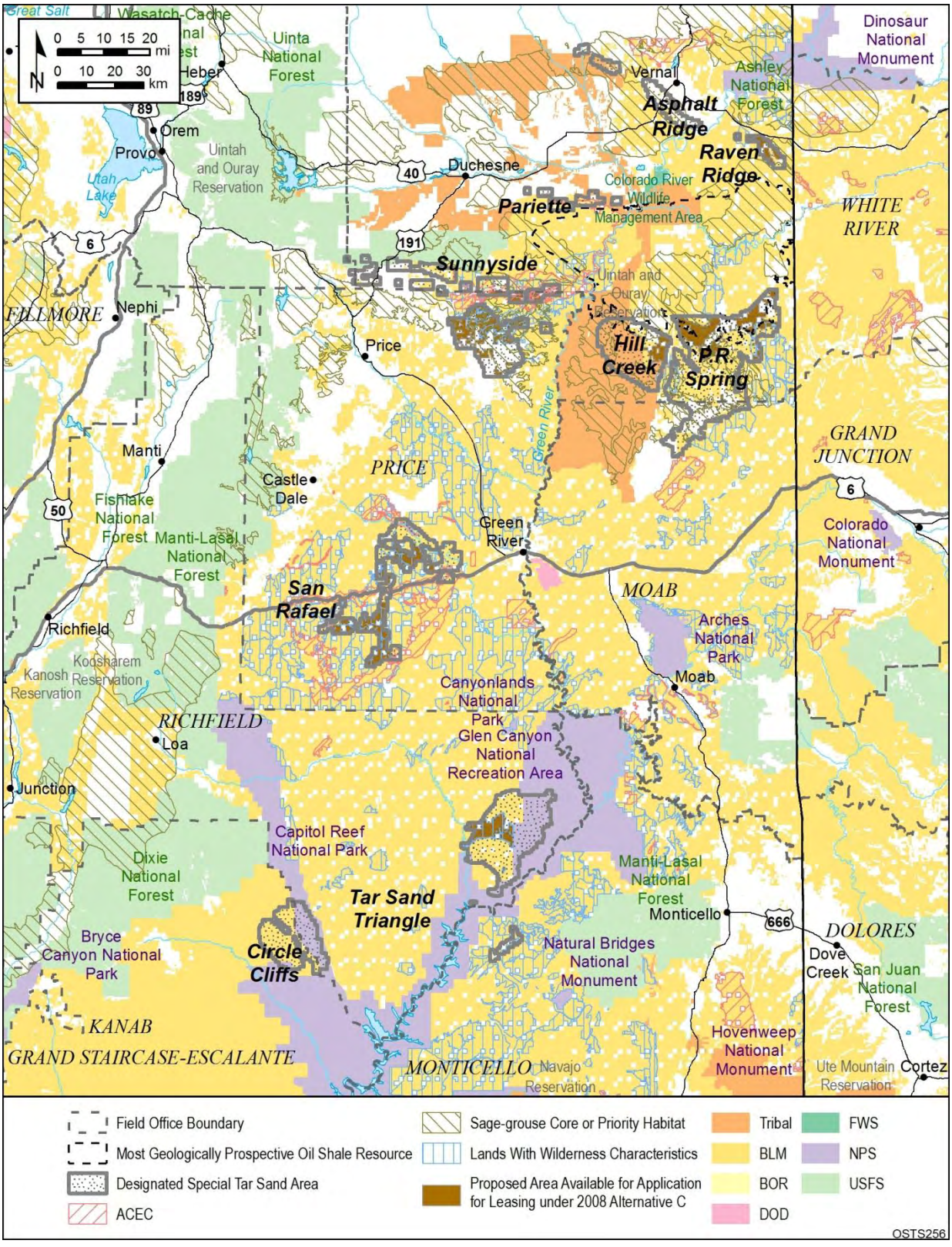

FIGURE 2.4.3-1 Lands Excluded from Application for Leasing under Alternative 2 for Commercial Tar Sands Development within the STSAs in Utah

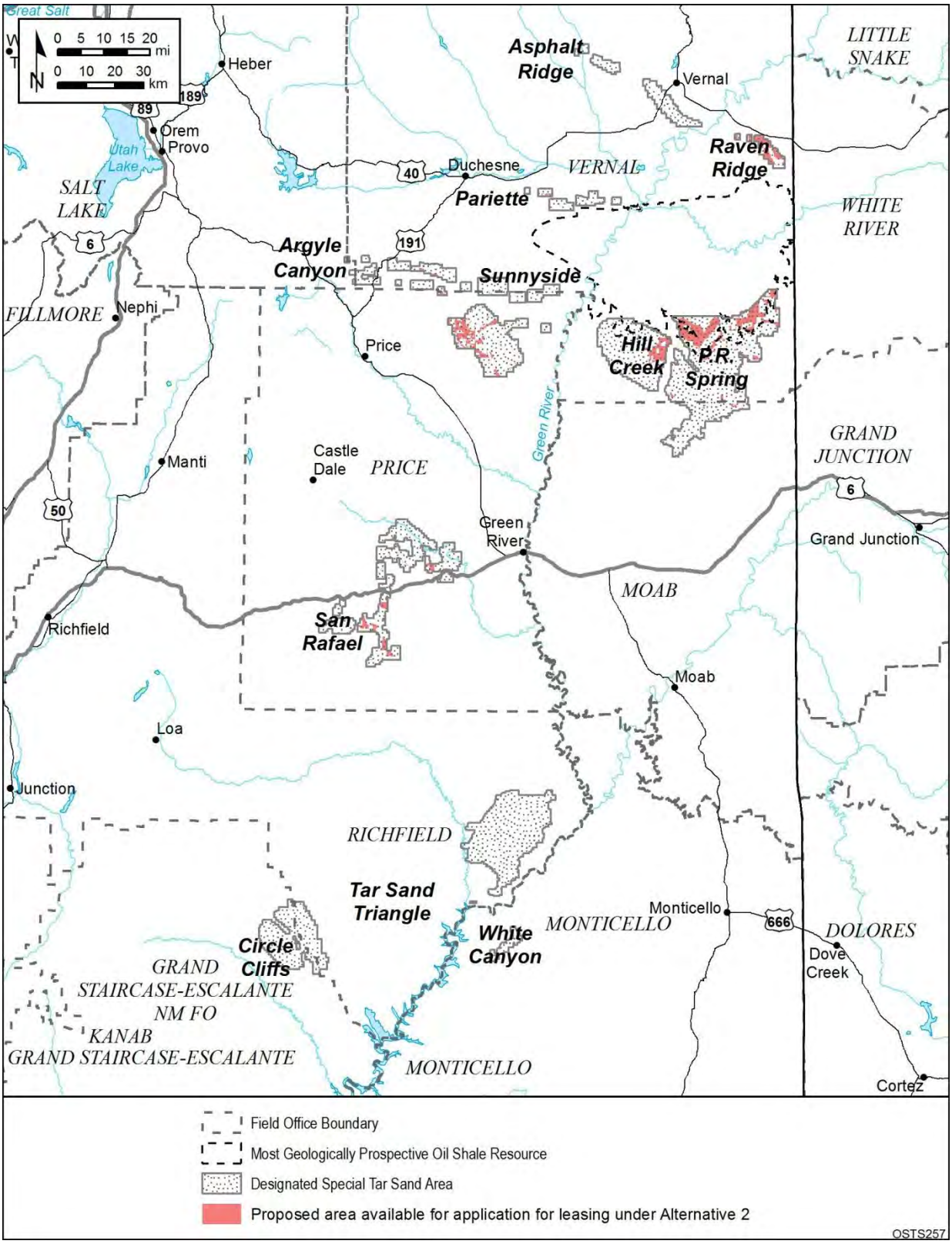

FIGURE 2.4.3-2 Lands Available for Application for Tar Sands Leasing under Alternative 2 for Commercial Tar Sands Development within the STSAs in Utah

TABLE 2.4.3-1 Estimated Acres Potentially Available under Alternative 2 for Application for Leasing in Each STSA for Commercial Tar Sands Development[a]

STSA	BLM-Administered Lands	Split Estate Lands	Total
Argyle Canyon	0	0	0
Asphalt Ridge	0	0	0
Circle Cliffs[b]	0	0	0
Hill Creek	9,355	480	9,835
Pariette	752	78	830
P.R. Spring	38,861	3,443	42,304
Raven Ridge	9,103	16	9,119
San Rafael	8,927	0	8,927
Sunnyside	10,834	9,054	19,888
Tar Sand Triangle	97	0	97
White Canyon	45	0	45
Total for Alternative 2	77,974	13,071	91,045

[a] Totals may not be exact because of rounding. These estimates were derived from GIS data compiled for the PEIS analyses. The GIS data may contain errors; therefore, these estimates should be considered to be only representative of the proposed leasing area.

[b] Leasing for commercial tar sands development in the Circle Cliffs STSA is excluded under all alternatives because it falls entirely within the GSENM and units managed by the NPS on which mineral leasing and development are prohibited.

not to issue that lease. The NEPA analysis associated with the decision whether or not to issue the Asphalt Ridge lease is under preparation in a separate process.

Under this alternative, there is the possibility of limited development, in the event the pending commercial lease is issued; therefore, the opportunity remains for future decisions regarding availability of public lands for this resource to be made on the basis of demonstrable economic viability and in light of specific environmental information. Should tar sands development technologies be demonstrated to be feasible, the opportunity will still exist to consider making public lands available for future development.

2.4.3.3 Alternative 4, Tar Sands Moderate Development (2008 OSTS PEIS ROD Minus Adobe Town and ACECs)

Under Alternative 4, the BLM would amend four land use plans in Utah to designate acreage less than 430,686 acres as available for application for commercial tar sands leasing.

TABLE 2.4.3-2 Resources Covered by Stipulations and Restrictions in Place for Oil and Gas Leasing in the STSAs That Were Used to Identify Lands Not Available for Application for Tar Sands Leasing under Alternative C of the 2008 OSTS PEIS

Slopes and erosive/critical soils
Floodplains, watersheds, and live water
Sage-grouse leks and nesting habitat
Raptor nests and habitat
Wildlife habitat[a]
Special status plants and relict vegetation
VRM Class II areas and other high-quality visual resources
ACECs
Paleontological resources
Other[b]

[a] Wildlife habitat includes a combination of winter range, crucial winter range, summer range, and calving areas for antelope, bighorn sheep, deer, and elk, as well as seclusion areas for other wildlife.

[b] Other resources include SMAs, recreation areas, and areas restricted from leasing for reasons not specified in the GIS data.

This alternative satisfies the settlement agreement to exclude some, but not all, lands from the application of oil shale and tar sands leasing,[22] in comparison to Alternative 2. This alternative would exclude from commercial oil shale or tar sands leasing:

1. The whole of the Adobe Town "Very Rare or Uncommon" area, as designated by the Wyoming Environment Quality Council on April 10, 2008 (180,910 acres total; 167,517 acres of public land, of which 10,920 acres are already a BLM WSA).

2. All ACECs located within the areas analyzed in the 2008 OSTS PEIS (76,666 acres in existing ACECs in the 2008 OSTS PEIS plus additional ACEC acreages as a result of Utah and Wyoming planning efforts recently completed).[23]

Under Alternative 4, lands that would be available for future consideration for leasing would include those BLM-administered lands within the most geologically prospective tar sands areas, including split estate lands where the federal government owns the mineral rights. The

[22] This alternative satisfies the settlement agreement to exclude some, but not all, lands from the application of oil shale and tar sands leasing, in comparison to Alternative 2.

[23] This would only include those ACECs that formally designated in those plans. ACECs that were proposed but not formally designated in the applicable plans undergoing revision/amendment at that time would be excluded.

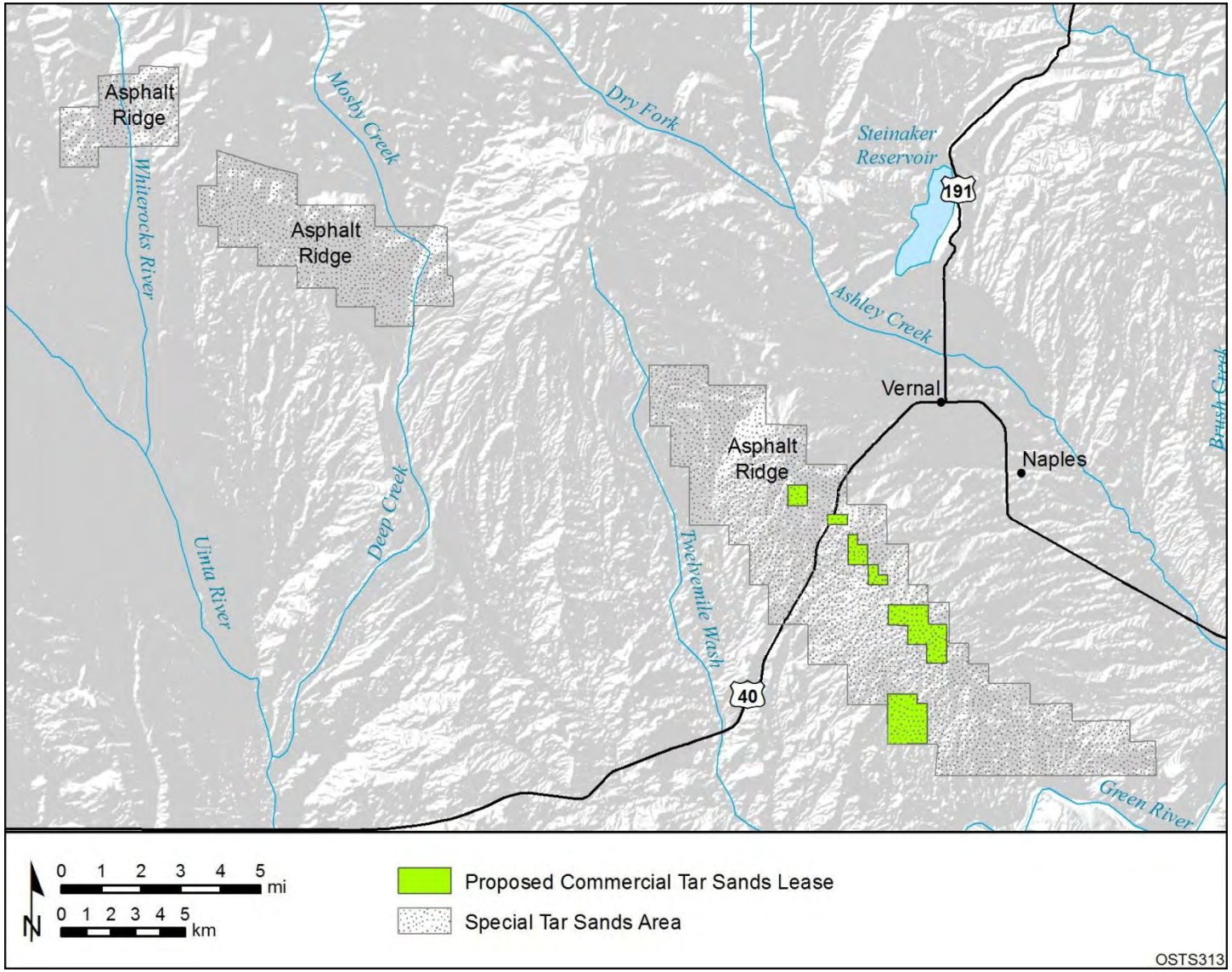

FIGURE 2.4.3-3 Location of Potential Tar Sands Lease under Alternative 3

whole of Adobe Town in Wyoming would be excluded, as would all ACECs, as described above. Lands available for application for tar sands leasing under Alternative 4 are shown in Figure 2.4.3-4.

Lands within the most geologically prospective tar sands areas identified by the BLM as LWC would be managed as in Alternative 1; that is, they would be available for future consideration of leasing and development. Decisions regarding management of these areas would be left to the discretion of the individual field offices to make the leasing decisions, which would determine the management of such areas through additional NEPA and planning processes (as appropriate) with respect to LWC. Thus consideration of management actions for LWC related to oil shale and or tar sands resources would be consistent with what the governing RMP provides with respect to management of such lands for other resources.

Similarly, with respect to the management of sage-grouse habitat, under Alternative 4, lands would be managed as in Alternative 1. No specific decisions regarding core and priority habitat will be made; rather, those decisions will be left up to the individual field offices to make, which would determine the management of such areas through additional NEPA and planning processes (as appropriate) with respect to core and priority sage-grouse habitat consistent with applicable BLM policy. These policies were described in the 2008 OSTS PEIS (pp. 4-78 to 4-80) and include BLM's policies and general practices, including specific frequently used mitigation measures that might be applied to any development, as warranted by analysis at the lease and/or development stage. More recently, the BLM has issued nationwide and state-specific guidance recommending the consideration of certain management practices to address the appropriate management of sage-grouse habitat in the context of land use actions, and this information is presented in a text box in Section 4.8.1 of this PEIS. Field offices would need to take this guidance into account and incorporate protective measures in any authorizations, as warranted by ecological conditions, and on the basis of environmental analysis. As such, it is likely that not all the areas that are currently open under this alternative for potential future leasing would be leased. The maximum acreage developed could be much less than expressed in Table 2.4.3-3, as a result of the application of current BLM policy.

Depending on what the applicable RMP provides with respect to LWC and core and priority sage-grouse habitat, it may be necessary to initiate a plan amendment at the leasing and/or development stage to make allocation decisions on an individual RMP basis regarding management of these lands with respect to oil shale and tar sands resources. The reason for qualifying the amount of acreage available for lease under this alternative is that while areas of core and priority sage-grouse and areas of LWC are left open for potential future leasing and development of oil shale and tar sands resources, the likelihood of all this acreage being available for further oil shale and tar sands resources leasing and development is low. National and state-specific guidance related to sage-grouse management and protection of core and priority habitat will likely result in substantially less acreage being available, as will field office management decisions related to the protection of LWC. It is difficult to establish disturbance amounts at the programmatic level, before more is known regarding the specifics of leasehold location and technology to be used. Tables 2.4.3-4 and 2.4.3-5 show what this might look like under different protective scenarios follow. The scenarios are only provided to illustrate this idea, but the decisions to protect these amounts are not being made at this time as part of this

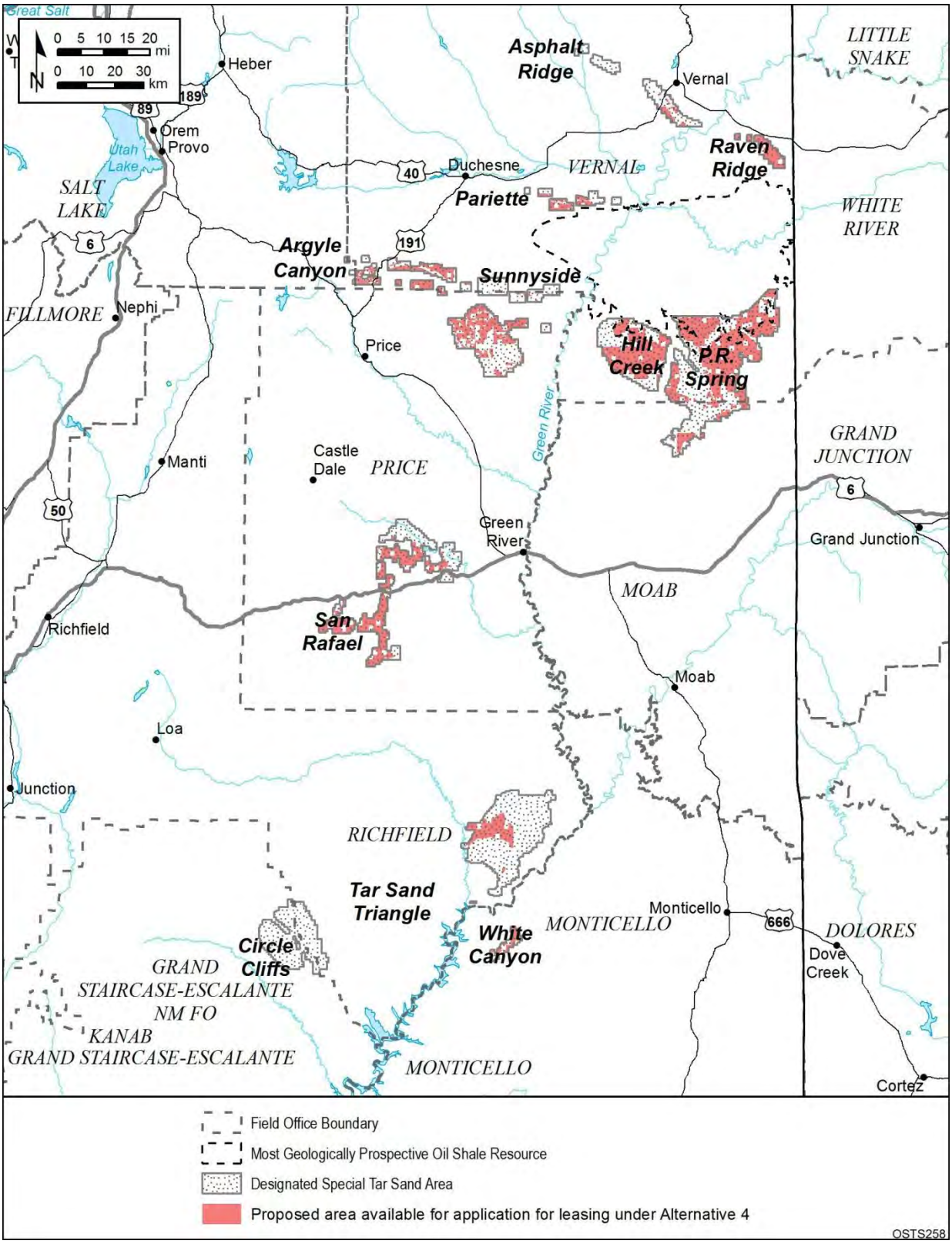

FIGURE 2.4.3-4 Lands Available for Application for Tar Sands Leasing under Alternative 4 for Commercial Tar Sands Development within the STSAs in Utah

TABLE 2.4.3-3 Estimated Acres Potentially Available for Application for Leasing in Each STSA for Commercial Tar Sands Development under Alternative 4[a]

STSA	BLM-Administered Lands	Split Estate Lands	Total
Argyle Canyon	1,022	10,204	11,226
Asphalt Ridge	5,310	125	5,435
Circle Cliffs[b]	0	0	0
Hill Creek	25,568	36,583	62,152
Pariette	10,083	78	10,161
P.R. Spring	145,923	6,694	152,617
Raven Ridge	14,348	16	14,364
San Rafael	69,696	0	69,696
Sunnyside	51,577	16,624	68,200
Tar Sand Triangle	24,938	0	24,938
White Canyon	7,001	0	7,001
Total for Alternative 4	355,466	70,324	425,790

[a] Totals may not be exact because of rounding. These estimates were derived from GIS data compiled for the PEIS analyses. The GIS data may contain errors; therefore, these estimates should be considered to be only representative of the proposed leasing area.

[b] Leasing for commercial tar sands development in the Circle Cliffs STSA is excluded under all alternatives because it falls entirely within the GSENM and units managed by the NPS on which mineral leasing and development are prohibited.

TABLE 2.4.3-4 Estimated Acres Potentially Available in Each State for Application for Leasing for Commercial Tar Sands Development under Alternative 4, Assuming 75% of the LWC and Sage-Grouse Core and Priority Habitat Are Protected through NSO or No Lease Stipulations

State	Acres LWC and Sage-Grouse[a]	BLM-Administered Lands	Split Estate Lands	Total
Utah	198,776	219,053	57,656	276,708

[a] Acreage that is identified as either LWC or sage-grouse core or priority habitat or both within Alternative 4.

TABLE 2.4.3-5 Estimated Acres Potentially Available in Each State for Application for Leasing for Commercial Tar Sands Development under Alternative 4, Assuming 25% of the LWC and Sage-Grouse Core and Priority Habitat Are Protected through NSO or No Lease Stipulations

State	Acres LWC and Sage-Grouse[a]	BLM-Administered Lands	Split Estate Lands	Total
Utah	198,776	309,995	66,101	376,096

[a] Acreage that is identified as either LWC or sage-grouse core or priority habitat or both within Alternative 4.

land use plan amendment initiative. These decisions will be made at the field office level as part of the NEPA and/or planning analyses completed for leasing and site specific development.

2.4.4 Preferred Alternative

At this stage in the planning and NEPA process, the BLM has chosen Alternative 2(b) as the preferred alternative for oil shale, and Alternative 2 as the preferred alternative for tar sands. With respect to oil shale, the BLM would like to maintain focus on RD&D projects, so as to obtain more information about the technological requirements for development of this resource, as well as the environmental implications, before committing to broad-scale commercial development. For instance, the BLM looks forward to gaining a clearer understanding of the implications of development of oil shale for water quality and quantity. Similarly, with respect to tar sands, while there is no formal RD&D program for tar sands, this resource is not, at present, a proven commercially viable energy source, and the BLM would like to obtain more information about the environmental consequences associated with its development, prior to committing to broad-scale commercial development.

The BLM planning regulations at 43 CFR 1610.4-7 require identification of the preferred alternative in a Draft EIS for a land use plan. The identification of a preferred alternative does not constitute a commitment or decision in principle, and there is no requirement to select the preferred alternative in the ROD. The identification of the preferred alternative may change between a draft EIS and a final EIS. Various components of separate alternatives that are analyzed in the draft can also be "mixed and matched" to develop a complete alternative in the final. For example, it has been suggested by one of the cooperating agencies, and seconded by others, that the BLM develop an alternative that would allow for larger scale leasing and development in Utah and Wyoming where the majority of the cooperators support a program that makes more federal oil shale and tar sands resources available for application for future leasing, while limiting development in Colorado where the majority of the cooperators favor a more cautious approach to leasing and development. The BLM seeks comments on this approach as well as other approaches that combine elements of the various alternatives.

2.5 ALTERNATIVES AND ISSUES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

During the initial public comment period regarding the scope of the PEIS, a number of comments were submitted regarding the analysis of specific alternatives or issues. Several suggestions for specific alternatives were incorporated into alternatives assessed in the PEIS.

As discussed below, some of the suggested alternatives and key issues were determined to be either outside the scope of the PEIS or inappropriate to incorporate as recommended in the comment. As a result, these alternatives and issues were eliminated from detailed analysis in the PEIS. The following sections discuss these alternatives and issues, why they were eliminated, and, where applicable, how parts of the PEIS process address the general points raised by commentors.

2.5.1 Alternatives That Use the New USGS In-Place Oil Assessment Maps as the Basis for the Planning Area To Be Analyzed

Several comments were received during the public scoping process that suggested that the BLM should develop an alternative that examines the oil shale resource in the area defined by the recent USGS assessment of in-place oil in oil shales of the Green River Formation in the Piceance and Uinta Basins of western Colorado and eastern Utah (USGS 2010a,b; 2011). Estimated total in-place oil in the Piceance Basin is about 1.5 trillion barrels, or about 50% larger than the previous in-place assessment of about 1 trillion barrels. Almost all of this increase is due to (1) new areas being assessed that had too little data to assess in the previous assessment and (2) new intervals assessed that were not assessed previously. The assessment itself says, “Much of this previously unassessed resource is of low grade and is unlikely to be developed.” The BLM considered this new information and has determined that while the new data should inform and update the 2012 PEIS effort, particularly with respect to information pertaining to the 2008 PEIS study area, the boundaries defining the in-place assessment do not represent the most geologically prospective areas of the Green River Formation located in the Piceance, Uinta, Green River, and Washakie Basins. Therefore, the PEIS will not employ the USGS boundary to define the study area.

2.5.2 Alternatives That Would Apply the Wyoming “Most Geologically Prospective Area” Criteria to Colorado and Utah

Comments were received during the public scoping process that suggested the BLM should develop an alternative that examines the oil shale resource area within an area where the grade and thickness of the oil shale deposits yield 15 gal of oil shale per ton of rock (gal/ton) or more and are 15 ft thick or greater. The PEIS evaluates the potential impacts of designating lands as available or not available for commercial leasing of oil shale and tar sands resources that are located on public lands in Colorado, Utah, and Wyoming. Specifically, the study area for the oil shale resources includes the most geologically prospective resources of the Green River Formation located in the Piceance, Uinta, Green River, and Washakie Basins. The BLM is

continuing to employ for this planning initiative the standard it developed pursuant to the Energy Policy Act of 2005, which is to focus on the most geologically prospective resources as defined by grade and thickness of the deposits.

For the purposes of this PEIS, the most geologically prospective oil shale resources in Colorado and Utah are those deposits that yield 25 gal/ton or more of oil shale and are 25 ft thick or greater. In Wyoming, where the oil shale resource is not of as high a quality as it is in Colorado and Utah, the most geologically prospective oil shale resources are those deposits that yield 15 gal/ton or more of oil shale and are 15 ft thick or greater. The BLM has determined that it would not make economic sense to open larger areas in Colorado and Utah to potential oil shale leasing where the resource is of low grade and unlikely to be developed at this time, because interest in future leasing would be directed at higher grade deposits. Future oil shale production will depend on technological progress and on the levels and volatility of future oil prices. Technology progress will determine how quickly the costs of oil shale extraction can be brought down and how economically natural gas and petroleum liquids can be produced from the process. In the future, once technology has progressed and the higher quality oil shale has been leased and developed, it may be economic to produce these lower-grade deposits. At that time, additional planning and NEPA analysis could be conducted to open these areas to leasing and development, where warranted. If, however, technological progress and economic conditions rapidly come to support development of deposits less than 25 ft thick and yielding less than 25 gal/ton, the areas that would be open in Wyoming under Alternative 1, 2, or 4 would be available for future leasing without further land use planning amendments.

2.5.3 Alternatives Considering Alternate Energy Sources and Carbon Sequestration

Several comments were received during public scoping that suggested that the BLM should evaluate the development of alternate energy sources, including renewable energy (e.g., wind and solar power systems), nuclear energy, and conventional oil and gas resources instead of or in comparison with the development of oil shale or tar sands. In addition, several comments suggested that the BLM should evaluate ways to displace the nation's dependence on oil through conservation and market- and innovation-based strategies. The BLM has determined that such evaluations, although worthwhile with respect to national energy policy development, do not fulfill the purpose of the proposed action to be analyzed in the PEIS, which is to establish an appropriate mix of public lands as open or closed to commercial oil shale and tar sands development.

In addition, several comments suggested that the BLM should evaluate oil shale and tar sands technologies that incorporate carbon sequestration. While the PEIS may acknowledge that such technologies may become available for use, the BLM believes this is an issue that would be best examined in detail at the time of site-specific NEPA analyses of a specific plan of development.

2.5.4 Alternatives That Prohibit Leasing in Specific Areas

A number of scoping comments requested that the BLM develop alternatives prohibiting commercial leasing in specific areas, including all NPS units, the GSENM, existing WSAs, and wilderness-quality lands in Utah. Since the scoping meetings were conducted, the BLM has determined that the scope of this PEIS will be limited to BLM-administered lands only and will not evaluate commercial leasing on USFS- and NPS-administered lands.

Wilderness Areas, WSAs, other lands within the NLCS (including National Monuments), and existing ACECs currently closed to mineral development are excluded from consideration for leasing under all alternatives in the PEIS.

2.5.5 Off-Site Processing of Oil Shale

At least one comment suggested that the BLM develop an alternative that examines off-site processing of oil shale in locations where environmental impacts may be mitigated by site-specific factors. Constructing adequate scenarios that could evaluate all the possible locations and site-specific factors contributing to the magnitude (or mitigation) of impacts would be speculative and potentially misleading. Such considerations might be appropriate at the site-specific level when more information is known about the project location, specific technologies, and other factors. Potential mitigation could be incorporated into the project plan of development at that time.

2.5.6 Establishment of Federal Subsidies

Several comments suggested that the BLM evaluate the potential for federal subsidies and the level of subsidy required to facilitate leasing and development. This suggestion was considered to be outside the scope of the PEIS, which provides analysis related to a purpose and need focused on land use planning decision-making.

2.5.7 Closing of All RD&D Lease Lands, Except for Three Pending Oil Shale RD&D Applications and One Pending Tar Sands RD&D Lease in the Vernal Field Office

One comment suggested closing all RD&D lease lands, except for three pending oil shale RD&D applications and one pending tar sands RD&D lease in the Vernal Field Office. This would mean that the existing RD&D leases, if relinquished, could not be leased again, without another planning process. This alternative was not carried forward because it is largely similar to Alternative 3 and is not consistent with the Secretary's and the Director's emphasis on developing and maintaining a robust RD&D process.

2.5.8 Opening of All ACECs to Oil Shale Leasing

The BLM also considered whether it would be appropriate to include an alternative that opened all ACECs to oil shale and tar sands leasing. This suggestion was not carried forward because a blanket opening of all ACECs to oil shale and tar sands development is not reasonable where some ACECs are closed to fluid mineral development, because of the very specific resource concerns that support their designation as ACECs. It is anticipated that development of oil shale and tar sands resources is likely to have at least as many, if not more impacts on resources as conventional fluid minerals development.

2.5.9 Opening of All Lands with Wilderness Characteristics to Oil Shale and Tar Sands Leasing

At least one comment suggested that the BLM develop an alternative that directs that the LWC remain open to oil shale and tar sands leasing, without restrictions, and without allowing, as is allowed in the no action alternative, individual field offices to exercise their discretion as to how to manage these lands. Under the no action alternative and Oil Shale and Tar Sands Alternatives 4 (Moderate Development), the BLM has not explicitly excluded leasing within lands it believes may have wilderness characteristics, as it has under e Alternatives 2 and 3 for each resource. Recently completed and ongoing plan revisions and plan amendments in many of the field offices where such lands have been identified will determine appropriate management requirements for these areas, under the No Action Alternative and the Moderate Development Alternative for each resource. These management prescriptions may provide for limitations on uses that may take place in areas determined to have wilderness characteristics. Oil shale or tar sands development in such areas may prove inconsistent with such management prescriptions adopted for those areas. Such development may also be inconsistent with the Secretary's and Director's emphasis on developing and maintaining a robust RD&D process in order to discern more about developing technologies before committing certain kinds of resource areas to such uses.

2.5.10 Mid-Range Alternative That Excludes a Fixed Percentage of Lands with Wilderness Characteristics

In an effort to include as part of the analysis, an alternative that considered a moderate approach to management of both LWC and development of oil shale and tar sands resources, the BLM considered including as an element of Alternative 4, above, a provision that would exclude from surface disturbance that may result from oil shale or tar sands development, a fixed percentage of lands identified as having wilderness characteristics, calculated either on a per leasehold basis, or on the basis of the total LWC identified, regardless of leasehold boundary.

The BLM considered several possibilities as to how to structure such a provision, in order to display for purposes of analysis, what such a moderate approach would look like. For instance, the BLM considered whether the percentage disturbance should be calculated on a per leasehold basis or on the basis of the total acreage of the lands identified as having wilderness characteristics, regardless of leasehold boundary. Either option would provide the BLM with a

flexible approach to managing LWC and mitigating potential impacts, depending on project location and technology proposed for use. The primary difference between these two structural possibilities was that, while the latter would seem to offer the BLM more flexibility in preserving the wilderness characteristics, its drawback would be that it would allow the first lessee to "monopolize" the available disturbance percentage of LWC, depending on the relative configuration of lease boundaries and LWC.

Similarly, the BLM considered what the appropriate disturbance percentage might be in order to structure a moderate approach, at this land use allocation stage, but determined that it was not possible to identify a specific percentage, unless specific information was known regarding the relative configuration of the particular proposed leasehold and the potentially impacted LWC, as well as information about the technology to be used and the specifics regarding potential reclamation.

In examining these options, it became clear that such an alternative would be difficult to represent at all, as well as analyze in detail, given the lack of availability of this specific information. Further, the BLM determined that the impacts of such a moderate approach were already considered in the range of alternatives undergoing detailed analysis. That is, under the Conservation Focus and the Research Lands Focus Alternatives, LWC would be identified as not available for future consideration of commercial oil shale and tar sands leasing and development. However, under the No Action and Moderate Development Alternatives, the LWC are to remain available for future consideration of oil shale and tar sands leasing, where such future consideration would be carried out consistent with the manner in which the applicable individual RMP provides for management of wilderness characteristics, when further specifics about proposed commercial leasing and development projects would be known. In the No Action and Moderate Development Alternatives, in particular, the impact analysis displays in a qualitative manner the potential environmental consequences of such commercial leasing and development on LWC. Under the No Action and the Moderate Development Alternatives, specific impacts on LWC would be analyzed in future NEPA analysis supporting individual lease decisions and particular project designs.

At the leasing stage, the field offices may consider maximum disturbance limits and other mitigation measures for the management of oil shale within LWC.

2.5.11 Carrying-Capacity Thresholds

A number of commentors suggested that the BLM consider the potential impacts of oil shale development within the context of carrying capacity of the regional and local environment and communities. The carrying capacity of a system is the maximum level of activity that can be sustained within a specific area without significant, detrimental impact. The White River RMP (BLM 1997b) established carrying-capacity thresholds specific to oil shale development and potential impacts on air quality, socioeconomic impacts, big game habitat, and water quality. Carrying-capacity thresholds have not been established elsewhere within the three-state study area. Although the programmatic alternatives do not explicitly consider carrying-capacity thresholds nor propose that commercial levels be constrained in the future by these thresholds, they do require that additional site-specific NEPA analyses be conducted prior to the issuance of

commercial leases. At that time, when complete information is available defining the location of the commercial development, technologies to be employed, scale of operations, and time line for development, analyses can more reliably define appropriate carrying-capacity thresholds and evaluate potential impacts.

2.5.12 Establishment of Trust Funds

Several commentors requested the PEIS consider the establishment of a trust fund to provide financial support to local communities early in the development process. While the PEIS socioeconomic impact analyses consider the potential benefits of a trust fund in terms of impact mitigation, requiring lessees to establish such a fund is beyond the jurisdiction of the BLM and, therefore, is not included in any of the alternatives. If an applicant proposes such a fund as part of its plan of development, perhaps as potential mitigation for socioeconomic impacts, the BLM would analyze it in site-specific NEPA analyses of the plan of development.

2.5.13 Research Lands Focus That Considers Only the Current RD&D Leases

Under all of the allocation alternatives, the six RD&D leases that have been issued contain terms that allow development of the original leases and could allow development of the associated PRLAs, totaling 30,720 acres. Three pending RD&D oil shale leases are under review, with smaller PRLA acreage totaling 1,920 acres. For purposes of analysis, it is assumed in all alternatives that each of these pending RD&D leases could reach commercial production utilizing the technologies being tested on the leases and may utilize the whole PRLA area. One pending tar sands application, with acreage totaling 2,100 acres is also currently under review. Recognizing that there is a chance that one or more of these pending RD&D oil shale leases and/or the pending tar sands lease would not be approved, the BLM considered developing a separate subalternative under each alternative to analyze these differences. However, since this PEIS is necessarily a qualitative PEIS, it was determined that because of the minimal acreage under consideration, these subalternatives would not be substantially different from the three action alternatives. Impacts from excluding the three new RD&D oil shale projects and/or the pending tar sands lease would be qualitatively similar but smaller in scale than those discussed in the three action alternatives.

2.6 COMPARISON OF ALTERNATIVES

The alternatives presented in this PEIS were evaluated for potential environmental impacts associated with the amendment of land use plans to identify BLM-administered lands in Colorado, Utah, and Wyoming that would be made available or not available for application for leasing for commercial oil shale or tar sands development. The PEIS also identifies the types of environmental impacts that could accompany commercial oil shale and tar sands development. More quantitative and detailed impact analyses, including the identification of the magnitude and extent of potential impacts on specific social, cultural, economic, and natural resources, will be conducted at the leasing and project levels. Table 2.6-1 summarizes the impacts of oil shale alternatives, and Table 2.6-2 summarizes the impacts of the tar sands alternatives that are more fully described in Chapter 6 of the PEIS.

TABLE 2.6-1 Summary Comparison of Potential Environmental Impacts of Amending Land Use Plans To Identify Lands Available or Not Available for Application for Leasing for the Commercial Development of Oil Shale, Including RD&D, in Colorado, Utah, and Wyoming, and Environmental Impacts of Future Construction and Operation of Commercial Projects under the Four Alternatives

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Impacts Common To All Alternatives	The six existing 160-acre RD&D projects are valid existing rights, and the impacts are the same for each of the alternatives. Each of the existing RD&D projects may be expanded to include a total of 5,120 acres if the terms and conditions of their existing leases are met. Commercial development could occur on a total acreage of 30,720 acres based on these existing leases. Impacts identified under Alternative 3 for the RD&D leases would be the same as those under Alternatives 1, 2, and 4. On the basis of the analysis in this PEIS, the BLM has determined that, with the exception noted in the socioeconomic analysis regarding potential impacts on property values, land use plan amendments under Alternatives 2, 3, and 4 would not result in any impacts on the environment or socioeconomic setting. However, the future development of commercial oil shale projects that could be approved after subsequent NEPA analysis identified in these three alternatives would have impacts on these resources. The types of impacts that could be associated with future commercial oil shale development are described in Chapter 4 of the PEIS. The magnitude of these potential impacts cannot be quantified at this time because key information about the location of commercial projects, the technologies that may be employed, the project size or production level, development time lines, and mitigation measures that would be applied, are unknown.			

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Land Use	Current land uses such as grazing, irrigated agriculture, recreation, oil and gas production, and mineral extraction would be affected at locations where commercial oil shale projects (and supporting infrastructure) would be located within the current 2,017,714-acre lease area. These lands include 12 ACECs totaling 46,000 acres where oil and gas leasing is allowed. Additional land use changes would occur on nonfederal lands where project support infrastructure (e.g., power plants and employer-provided housing) would be constructed.	Potential impacts of commercial development would be similar in nature to the impacts identified for commercial development under Alternative 1, but Alternative 2 would make available for application for leasing only 461,965 acres and thus would have less impact on such land uses overall, especially in the Piceance Basin. Alternative 2 would exclude all lands containing core and priority sage-grouse habitat and LWC. Additional land use changes would occur on nonfederal lands where project support infrastructure (e.g., power plants and employer-provided housing) would be constructed.	RD&D project development and operations on up to 32,640 acres would have effects on land use similar in nature to those for Alternative 1 but on a far smaller land area. The RD&D projects are not expected to affect land use on adjacent parcels except where vehicular traffic, noise, and construction and operations activities could alter the quality of recreational activities. Additional land use changes would occur on nonfederal lands where project support infrastructure (e.g., power plants and employer-provided housing) would be constructed.	The effects of Alternative 4 on current land uses such as grazing, irrigated agriculture, recreation, oil and gas production, and mineral extraction within the 1,963,414-acre proposed lease area would be similar in nature and magnitude to those for Alterative 1. However, Alternative 4 would exclude leasing on 12 ACECs totaling 46,000 acres and within about 10,000 acres of the Adobe Town area in Wyoming. Additional land use changes would occur on nonfederal lands where project support infrastructure (e.g., power plants and employer-provided housing) would be constructed.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Soil and Geologic Resources	Future commercial oil shale development could affect soil and geologic resources in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. Potential impacts would be associated with the construction and operation of project facilities and related infrastructure and would include soil disturbance, soil removal and compaction, subsurface disturbance of geologic resources during drilling and mining, and increased erosion potential of exposed soils and geologic materials.	Potential project impacts from future project development would be similar to those identified for Alternative 1 but could occur at fewer locations and in less geologically sensitive locations.	Geologic resources could be affected by construction and operation activities at the six existing and three proposed 160-acre RD&D locations and at areas where support infrastructure (e.g., utility ROWs and access roads) would be located. Potential impacts on soil and geologic resources from development of the RD&D sites would be similar to those identified for Alternatives 1 and 2, but under Alternative 3 impacts would be limited geographically and in overall magnitude.	Similar to Alternative 1.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Paleontological Resources	Impacts could include the destruction of paleontological resources and loss of valuable scientific information within development footprints, degradation and/or destruction of resources and their stratigraphic context within or near the development area, and increased potential for loss of exposed resources from looting or vandalism as a result of increased human access and related disturbance in sensitive areas. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. About 90% of designated acreage (1,784,773 acres) overlies geologic formations having a high potential to contain important paleontological resources	The types of potential impacts would be similar to those identified under Alternative 1. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. About 95% (441,120 acres) of designated acreage overlies geologic formations having a high potential to contain important paleontological resources (i.e., PFYC 4/5). Most of the available acreage overlying high potential geologic formations occurs in Utah (232,239 acres).	The types of potential impacts would be similar to those identified under Alternative 1. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. All the existing RD&D lease areas overly geologic formations having a high potential to contain important paleontological resources (i.e., PFYC 4/5). Of the new acreage designated (1,920 acres), about 76% (1,456 acres) overlies geologic formations having a high potential to contain important paleontological resources. Most of these are located in the Piceance Basin, Colorado (1,121 acres).	The types of potential impacts would be similar to those identified under Alternative 1. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. About 92% (1,769,266 acres) of designated acreage overlies geologic formations having a high potential to contain important paleontological resources (i.e., PFYC 4/5). Most of the available acreage overlying high potential geologic formations occurs in Wyoming (857,040 acres).

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Paleontological Resources (Cont.)	(i.e., PFYC 4/5). Most of the available acreage overlying high potential geologic formations occurs in Wyoming (857,040 acres).			
Water Resources	Commercial oil shale development could impact water resources in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. In the geologically prospective oil shale areas (including a 2-mi buffer zone) are about 184 mi of perennial streams in the Piceance Basin (or about 92% of the total perennial streams in the basin), about 262 mi of perennial streams in the Uinta Basin (or 100% of the total perennial streams in the basin), 190 mi of perennial streams in	Potential impacts from future construction and operation of commercial oil shale projects would be similar to those identified for Alternative 1 but could occur at fewer locations and in less geologically sensitive locations. Alternative 2 includes a total of 386 mi of perennial streams that could be affected by commercial project development, or 51% of the total perennial streams in the four basins. In addition, Alternative 2 excludes lands that are currently identified in BLM land use plans as having steep slopes and/or fragile or highly erosive soils included in Alternative 1. Thus, there is a	Water resources could incur localized impacts as a result of construction and operation activities of the six existing and three proposed RD&D projects. Surface disturbance at the sites could lead to increased erosion and subsequent runoff and sedimentation to local streams. A total of 28 mi of perennial streams could be affected by RD&D, amounting to 12% of the total perennial streams in Colorado and 2% of those in Utah. Groundwater could be affected by dewatering or contamination due to accidental releases of hazardous materials and by-products of retorting	Similar to Alternative 1.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Water Resources (Cont.)	the Green River Basin (or 75% of the total streams in the Basin), and 39 mi of perennial streams in the Washakie Basin (or 75% of the total streams in the Basin). Altogether, the quantity of stream miles is 674 mi, or about 90% of the miles of perennial streams in the four basins. Potential project-related impacts may include reduced surface water quality due to erosion and sedimentation, dewatering of local aquifers, modification of surface and groundwater flow, and contamination of surface water or groundwater due to accidental releases of hazardous materials and by-products of retorting.	reduced potential for erosion-related impacts with commercial oil shale development under this alternative.		

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Air Quality	Commercial oil shale development could impact air quality in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants or transmission lines) would be located. The construction and operation of future commercial oil shale projects could result in local and regional impacts on air quality and AQRVs, such as visibility and acid deposition. These impacts could result from heavy equipment and vehicle emissions, fugitive dust generation from construction and mining areas and along some access roads, and oil shale processing emissions. In addition, O_3 precursors of NO_x and VOCs from oil shale development could exacerbate wintertime high-O_3 occurrences already prevalent in the study area.	Commercial oil shale development could impact air quality in the Alternative 2 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants or transmission lines) would be located. Potential local and regional impacts on air quality and AQRVs would be similar in nature to those identified for Alternative 1. However, Alternative 2 has more than 1.5 million fewer (about 77%) acres of land than Alternative 1 where future commercial oil shale development could occur and affect local or regional air quality and AQRVs. And, thus, the magnitude of potential impacts is anticipated to be far less than that for Alternative 1.	Air quality is not expected to be adversely affected by the construction and operation of the six current and three proposed RD&D projects. Minor, localized impacts could result from heavy equipment and vehicle emissions, fugitive dust generation from construction and mining areas and along some access roads, and oil shale processing emissions. Commercial oil shale development could impact air quality in the Alternative 3 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants or transmission lines) would be located. Potential local and regional impacts on air quality and AQRVs would be similar in nature to those identified for Alternative 1. However, because of its far smaller lease	Commercial oil shale development could impact air quality in the Alternative 4 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants or transmission lines) would be located. Potential local and regional impacts on air quality and AQRVs would be similar in nature and magnitude to those identified for Alternative 1. Alternative 4 has only approximately 62,500 fewer (about 3%) acres of land than Alternative 1 where future commercial oil shale development could occur and affect local or regional air quality and AQRVs.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Air Quality (Cont.)	Because of the need for project- and site-specific information, it is not possible to identify the nature and magnitude of regional air quality impacts from commercial development within the Alternative 1 potential lease areas.		areas (about 1.7% of land for Alternative 1), the magnitude of potential impacts is anticipated to be minimal compared to that for Alternative 1.	
Noise	Commercial oil shale development could affect noise levels in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants or transmission lines) would be located. In most cases, noise is considered a local problem, not a regional problem. Localized noise levels (i.e., increased noise levels) could be affected by construction activities,	Commercial oil shale development could impact noise levels in the Alternative 2 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants or transmission lines) would be located. Localized noise impacts would be similar in nature and magnitude than those identified for Alternative 1. Changes in ambient noise levels due to project development could	Localized noise impacts (i.e., increased noise levels) could occur at each of the RD&D project locations as a result of construction activities, mining, operating machinery (e.g., crushers and conveyors) and other equipment (generators and compressors), and vehicular traffic. Commercial oil shale development could affect noise levels in the Alternative 3 potential lease areas and at locations on nonfederal lands	Commercial oil shale development could affect noise levels in the Alternative 4 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants or transmission lines) would be located. Localized noise impacts would be similar in nature and magnitude than those identified for Alternative 1. Changes in ambient noise levels due to project development could

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Noise (Cont.)	mining, processing equipment (e.g., crushers and conveyors), pipeline compressor stations, and vehicle traffic. Noise levels from oil shale development could exceed EPA guidelines and/or Colorado regulations for receptors in close proximity but would not exceed them at farther receptor locations (e.g., beyond 0.5 mi).	occur wherever a project is located within the 461,965 acres identified as available for application for leasing under Alternative 2, which is about 1.5 million fewer (about 77%) acres of land than under Alternative 1.	where project-related infrastructure (e.g., power plants and transmission lines) would be located. Localized noise impacts would be similar in nature and magnitude than those identified for Alternative 1. Changes in ambient noise levels due to project development could occur wherever a project is located within the 32,640 acres identified as available for application for leasing under Alternative 3, which is only about 1.7% of the land under Alternative 1.	occur wherever a project is located within more than 1.9 million acres identified as available for application for leasing under Alternative 2, which is about 62,500 fewer (about 3%) acres of land than under Alternative 1.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Ecological Resources (resource subgroups summarized below)	Ecological resources could be affected at each of the proposed areas available for application for leasing of oil shale resources. Impacts related to oil shale development may include wildlife disturbance, habitat loss, exposure to accidental releases of hazardous materials, the spread or establishment of invasive species, and the loss or injury of biota within physically disturbed areas related to the projects (e.g., utility ROWs and access roads).	Commercial oil shale development could impact ecological resources in Alternative 2 potential lease areas in the same manner as Alternative 1 but on 1.5 million fewer acres, some of which has been excluded because of the presence of sensitive ecological resources.	Commercial oil shale development within the Alternative 3 potential lease areas could adversely affect ecological resources in these areas in the same manner as in Alternative 1 but would occur on 1.9 million fewer acres of land.	Commercial oil shale development within the Alternative 4 potential lease areas could adversely affect ecological resources in these areas in the same manner as in Alternative 1 but would occur on 62,450 fewer acres of land.
	Indirect impacts such as those related to surface and groundwater withdrawals could occur in more distant but hydrologically connected areas.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Aquatic Resources	For Alternative 1, within the lease areas (including a 2-mi buffer), there are 49 perennial streams totaling 674 mi. The construction and operation of commercial oil shale projects within the lease areas could adversely affect aquatic resources in these streams. Aquatic resources could be affected by changes in water quality due to erosion, runoff, recharge by contaminated groundwater, and accidental releases of hazardous materials from the project areas. Surface water depletion resulting from groundwater and surface water use could negatively affect aquatic resources. Some aquatic biota could be impacted as a result of the physical disturbance of aquatic habitats during construction and by utility and ROW crossings. Project-related ROWs could also increase public access to aquatic habitats.	For Alternative 2, within the lease areas (including a 2-mi buffer), there are 37 perennial streams totaling 386 mi. The construction and operation of commercial oil shale projects within the lease areas could adversely affect aquatic resources in these streams. Potential types of impacts would be similar to those identified for Alternative 1 and could result in habitat loss or degradation, which could affect the abundance and distribution of aquatic biota in the affected habitats.	For Alternative 3, within the lease areas (including a 2-mi buffer), there are 7 perennial streams totaling 28 mi. Potential impacts would be similar in nature to those identified for Alternative 1 but could occur in fewer locations.	For Alternative 4, within the lease areas (including a 2-mi buffer), there are 49 perennial streams totaling 662 mi. Potential types of impacts would be similar to those identified for Alternative 1 and could result in habitat loss or degradation, which could affect the abundance and distribution of aquatic biota in the affected habitats.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Plant Communities and Habitats	The construction and operation of commercial oil shale projects could impact plant communities and habitats that are present in the Alternative 1 potential lease areas, including oil shale endemics on or near project sites and in areas where associated infrastructure would be located. Impacts could include the direct loss of vegetation from site clearing and grading; reduced habitat quality due to soil compaction, dewatering, water quality reduction, erosion, sedimentation, or accidental releases of hazardous materials; and the introduction or spread of invasive species. Utility and access road ROWs could also result in the fragmentation of some habitats. These potential lease areas include about 167,800 acres that have been identified for the protection of wetlands, riparian habitats, floodplains, special status and	The construction and operation of commercial oil shale projects could impact plant communities and habitats that occur in the Alternative 2 potential lease areas. These potential lease areas do not include land currently identified for the protection of wetlands, riparian habitats, floodplains, special status or sensitive plant species, or remnant vegetation associations. Potential impacts would be similar in nature to those identified for Alternative 1 but could occur in fewer locations. Alternative 2 areas do not include ACECs but are adjacent to or near 20 ACECs designated for sensitive plants or plant communities.	The construction and operation of commercial oil shale projects in areas available for application for leasing under Alternative 3 could affect plant communities and habitats. The areas available for application for leasing include about 39 acres that have been identified for the protection of sensitive plants and remnant vegetation associations and floodplains. Alternative 3 areas do not include ACECs but are near 3 ACECs designated for sensitive plants or plant communities.	The construction and operation of commercial oil shale projects could impact plant communities and habitats that occur in the Alternative 4 potential lease areas. These potential lease areas include about 146,677 acres of land that have been identified for the protection of wetlands, riparian habitats, floodplains, special status and sensitive plant species, and remnant vegetation associations. Potential impacts would be similar in nature to those identified for Alternative 1 but could occur in fewer locations. Alternative 4 areas do not include ACECs but are adjacent to or near 21 ACECs designated for sensitive plants or plant communities.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Plant Communities and Habitats (Cont.)	sensitive plant species, and remnant vegetation associations. Alternative 1 areas also include all or portions of 8 ACECs and are adjacent to or near 14 ACECs designated for sensitive plants or plant communities.			
Wildlife	The construction and operation of commercial oil shale projects could impact wildlife and their habitats where individual projects are located within the 2,017,714 acres currently classified as available for application for oil shale leasing. Wildlife habitats identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include, but are not limited to, 106,092 acres of raptor nests, 89,310 acres of big game severe winter range, 136,991 acres of elk crucial winter range, 13,493 acres of elk calving, 163,100 acres of elk	The construction and operation of commercial oil shale projects could impact wildlife and their habitats where individual projects are located within the 461,965 acres identified for oil shale leasing. There were no habitats for wildlife identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas. A total of 112,851 acres of wild horse HMAs, 172,339 acres of mule deer winter habitat, 11,470 acres of mule deer summer habitat, 159,205 acres of elk winter habitat, and	The construction and operation of commercial oil shale projects could impact wildlife and their habitats where individual projects are located within the 32,640 acres identified for oil shale leasing. Wildlife habitats identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include 78 acres of big game severe winter range and 483 acres of elk and mule deer summer range (these acreages are not additive as they do not account for overlap among habitat categories).	The construction and operation of commercial oil shale projects could impact wildlife and their habitats where individual projects are located within the 1,963,414 acres identified for oil shale leasing. Wildlife habitats identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include, but are not limited to, 103,719 acres of raptor nests, 83,134 acres of big game severe winter range, 126,828 acres of elk crucial winter range, 12,092 acres of elk calving, 162,099 acres of elk and mule deer summer range,

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Wildlife (Cont.)	and mule deer summer range, 110,671 acres of mule deer crucial winter range, 83,237 acres of mule deer winter range, 29,334 acres of mule deer fawning area, 5,021 acres of mule deer migration corridor, 11 acres of moose winter range, 10,600 acres of pronghorn crucial winter range, and 241,673 acres of pronghorn winter range (these acreages are not additive as they do not account for habitat overlap among species or habitat types for a species). A total of 657,256 acres of wild horse and burro HMAs, 861,159 acres of mule deer winter habitat, 172,773 acres of mule deer summer habitat, 850,442 acres of elk winter habitat, and 172,542 acres of elk summer habitat overlap lands that would be available for oil shale leasing.	11,465 acres of elk summer habitat overlap lands that would be available for oil shale leasing. Overall, potential impacts on wildlife and their habitats would be similar in nature to those identified for Alternative 1, but oil shale leasing could occur in less than 24% of lands identified for Alternative 1.	Only 328 acres of wild HMAs, 1,456 acres of mule deer winter habitat, 483 acres of mule deer summer habitat, 1,456 acres of elk winter habitat, and 483 acres of elk summer habitat overlap lands that would be available for oil shale leasing. Overall, potential impacts on wildlife and their habitats would be similar in nature to those identified for Alternative 1, but oil shale leasing could occur in less than 1.7% of lands identified for Alternative 1.	110,513 acres of mule deer crucial winter range, 60,871 acres of mule deer winter range, 20,984 acres of mule deer fawning area, 5,021 acres of mule deer migration corridor, 11 acres of moose winter range, 10,486 acres of pronghorn crucial winter range, and 237,866 acres of pronghorn winter range (these acreages are not additive as they do not account for habitat overlap among species or habitat types for a species). A total of 644,774 acres of wild horse HMAs, 821,540 acres of mule deer winter habitat, 171,852 acres of mule deer summer habitat, 813,842 acres of elk winter habitat, and 171,633 acres of elk summer habitat overlap lands that would be available for oil shale leasing.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Wildlife (Cont.)	Potential impacts on wildlife and their habitats would be associated with site clearing and grading, operational noise and activities, accidental releases of hazardous materials, and increased human access to some habitats, and could result in reduced abundance and distribution of affected species. Construction and operation activities could also disturb wildlife in nearby locations and also fragment habitats along project-related ROWs.			Overall, potential impacts on wildlife and their habitats would be similar in nature to those identified for Alternative 1. Oil shale leasing could occur in nearly 97% of lands identified for Alternative 1.

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Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Threatened and Endangered Species	166 federal candidate, BLM-designated sensitive, and state-listed species, and 20 federally listed threatened or endangered species could occur in areas that are available for application for leasing under Alternative 1. Approximately 382,000 acres of land identified in RMPs with existing lease stipulations for the protection of listed or sensitive species would be available for leasing under Alternative 1.	151 federal candidate, BLM-designated sensitive, and state-listed species, and 14 federally listed threatened or endangered species could occur in areas that are available for application for leasing under Alternative 2. Approximately 382,000 acres of land identified in RMPs with existing lease stipulations for the protection of listed or sensitive species would be excluded under Alternative 2.	39 federal candidate, BLM-designated sensitive, and state-listed species, and 9 federally listed threatened or endangered species could occur in areas that are available for application for leasing under Alternative 3.	153 federal candidate, BLM-designated sensitive, and state-listed species, and 20 federally listed threatened or endangered species could occur in areas that are available for application for leasing under Alternative 4.
	Approximately 99 mi of designated critical habitat for Colorado River endangered fishes and 607,087 acres of core habitat areas for the greater sage-grouse occur within lands identified for application for leasing under Alternative 1.	There are no designated critical habitats for ESA-listed species or core habitat areas for the greater sage-grouse within lands identified for application for leasing under Alternative 2.	There are no designated critical habitats for ESA-listed species within lands identified for application for leasing under Alternative 3. However, approximately 2,338 acres of core habitat for the greater sage-grouse occurs within these lands.	Approximately 99 mi of designated critical habitat for Colorado River endangered fishes and 499,688 acres of core habitat areas for the greater sage-grouse occur within lands identified for application for leasing under Alternative 4.

TABLE 2.6-1 (Cont.)

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Threatened and Endangered Species (Cont.)	Impacts on threatened and endangered species would be similar to or the same as those described for impacts on aquatic resources, plant communities and habitats, and wildlife. Specific impacts associated with development would depend on the locations of projects relative to species populations and the details of project development.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
	The construction and operation of commercial oil shale projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 2,017,714 acres currently classified as available for application for leasing. Habitats for threatened, endangered, or sensitive species identified for spatial or temporal protection in BLM RMPs across all three states that would be present in the lease application areas include 46,971 acres for	The construction and operation of commercial oil shale projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 461,965 acres identified for oil shale leasing. There were no habitats for threatened, endangered, or sensitive species identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas.	The construction and operation of commercial oil shale projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 32,640 acres identified for oil shale leasing. There were no habitats for threatened, endangered, or sensitive species identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas.	The construction and operation of commercial oil shale projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 1,963,414 acres identified for oil shale leasing. Habitats for threatened, endangered, or sensitive species identified for spatial or temporal protection in BLM RMPs across all three states that would be present in the lease application areas include 42,088 acres for special status plants,

TABLE 2.6-1 (Cont.)

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Threatened and Endangered Species (Cont.)	special status plants, 26,487 acres for the bald eagle, 2,100 acres for special status raptors other than the bald eagle, 372,347 acres for the sage-grouse, and 38,041 acres for the black-footed ferret.			15,929 acres for the bald eagle, 2,100 acres for special status raptors other than the bald eagle, 368,843 acres for the sage-grouse, and 38,041 acres for the black-footed ferret.
Visual Resources	Commercial oil shale development could impact visual resources on the Alternative 1 lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. Visually sensitive areas within the potential lease areas include 10 ACECs, 5 SRMAs, 1 WSR, and 2 river segments eligible for WSR designation. Sensitive areas occurring within 5 mi of the potential lease areas include 8 WSAs, 29 ACECs, 2 SRMAs, 12 WSR segments, 8 National Historic Trails, 2 NWRs, 1 National Historic Landmark,	Commercial oil shale development could impact visual resources on the Alternative 2 lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. Potential impacts from project construction and operation would be similar to those identified for Alternative 1. Visually sensitive areas within the potential lease areas include 1 SRMA and 1 WSR. Sensitive areas occurring within 5 mi of the proposed lease areas include 7 WSAs, 24 ACECs, 2 SRMAs, 8 WSRs, 8 National Historic	Commercial oil shale development could impact visual resources on the Alternative 3 lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. Potential impacts from project construction and operation would be similar to those identified for Alternative 1. There are no visually sensitive areas within the potential lease areas, while sensitive areas within 5 mi of the lease areas include 7 WSAs, 3 ACECs, and 2 WSRs. These visually sensitive areas could be affected	Commercial oil shale development could impact visual resources on the Alternative 2 lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. Potential impacts from project construction and operation would be similar to those identified for Alternative 1. Visually sensitive areas within the potential lease areas include 2 SRMAs and 2 WSRs. Sensitive areas occurring within 5 mi of the proposed lease areas include 8 WSAs, 30 ACECs, 1 SRMA, 12 WSRs, 8 National

TABLE 2.6-1 (Cont.)

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Visual Resources (Cont.)	and 1 national scenic highway. These visually sensitive areas could be affected by future commercial oil shale development within the Alternative 1 lease areas.	Trails, 2 NWRs, 1 National Historic Landmark, and 1 National Scenic Highway. These visually sensitive areas could be affected by future commercial oil shale development within the Alternative 2 lease areas.	by future commercial oil shale development within the Alternative 3 lease areas.	Historic Trails, 2 NWRs, 1 National Historic Landmark, and 1 National Scenic Highway. These visually sensitive areas could be affected by future commercial oil shale development within the Alternative 4 lease areas.
Cultural Resources	Commercial oil shale development could impact cultural resources in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. Only some of the cultural resources on the approximately 1.9 million acres that would be available for application for leasing have been identified. Additional resources are likely to exist in the potential leasing area. Some of these resources could be affected by construction and operation of commercial	Commercial oil shale development could impact cultural resources in the Alternative 2 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. The majority of the lands that would be available for application for leasing have the potential to contain important cultural resources. Some of these resources could be affected by construction and operation of commercial projects within the potential lease areas. Potential impacts may include damage or	Portions of the six existing and three proposed RD&D sites have been surveyed for cultural resources, and two of the sites are known to contain cultural resources. Because mitigation is required for RD&D activities, the construction and operation of the nine projects are not expected to significantly impact cultural resources. Some of these resources could be affected by construction and operation of commercial projects within the potential lease areas. Potential impacts may include damage or destruction and increased potential for vandalism or theft due to increased human access.	Commercial oil shale development could impact cultural resources in the Alternative 4 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., power plants and employer-provided housing) would be located. Only some of the cultural resources on the approximately 1.9 million acres that would be available for application for leasing have been identified. Additional resources are likely to exist in the potential leasing area. Some of these resources could be affected by construction and operation of commercial

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Cultural Resources (Cont.)	projects within the potential lease areas. Potential impacts may include damage or destruction and increased potential for vandalism or theft due to increased human access.	destruction and increased potential for vandalism or theft due to increased human access.		projects within the potential lease areas. Potential impacts may include damage or destruction and increased potential for vandalism or theft due to increased human access.
Indian Tribal Concerns	Making land available for application for leasing would not affect resources important to Indian tribes. However, leasing and future development could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the development and operation of commercial projects. Increased access would increase the possibility of destruction, vandalism, and intrusion into sacred sites. Surface mining, with the greatest potential for partial or complete destruction of places	Making land available for application for leasing would not affect resources important to Indian tribes. However, leasing and future development could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the development and operation of commercial projects. Increased access would increase the possibility of destruction, vandalism, and intrusion into sacred sites. The largest land area is protected by surface use restrictions under this alternative. Split estate	Making land available for application for leasing would not affect resources important to Indian tribes. However, leasing and future development could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the development and operation of commercial projects. Increased access would increase the possibility of destruction, vandalism, and intrusion into sacred sites. The fewest resources are likely to be impacted. Split estate parcels on the Uintah and Ouray Ute	Making land available for application for leasing would not affect resources important to Indian tribes. However, leasing and future development could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the development and operation of commercial projects. Increased access would increase the possibility of destruction, vandalism, and intrusion into sacred sites. Split estate parcels on the Uintah and Ouray Ute Reservation could be

TABLE 2.6-1 (Cont.)

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Indian Tribal Concerns (Cont.)	and resources important to tribes, would be allowed in parts of Utah and Wyoming. Split estate parcels on the Uintah and Ouray Ute reservation could be leased, which would affect surface use. Surface use restrictions on excluded areas would afford resources some protection. Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.	parcels on the Uintah and Ouray Ute Reservation could be leased, which would affect surface use. Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.	Reservation would not be leased. Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.	leased, which would affect surface use. Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.

TABLE 2.6-1 (Cont.)

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Socioeconomics	Construction and operation associated with individual oil shale technologies, including the RD&D facilities would have small to moderate impacts on employment, income, population, housing, public finances, and public service employment in the ROI in each state. Small to moderate impacts on property values and recreation would also occur, and water diversions would also affect agriculture. Rapid increases in population in-migration could impact quality of life, requiring a transition from traditional rural, to more urban lifestyles, and potentially cause large social disruption impacts in some communities.	Same as Alternative 1. Socioeconomic impacts could occur within the study area from amending land use plans; specifically, changes in property values could occur.	Same as Alternative 1. Socioeconomic impacts could occur within the study area from amending land use plans; specifically, changes in property values could occur.	Same as Alternative 1. Socioeconomic impacts could occur within the study area from amending land use plans; specifically, changes in property values could occur.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Environmental Justice	Alternative 1 does not involve land use plan amendments.	Minority or low-income populations within the study area would not incur any impacts from amending land use plans.	Minority or low-income populations within the study area would not incur any impacts from amending land use plans.	Minority or low-income populations within the study area would not incur any impacts from amending land use plans.
	Environmental and human health impacts on the general population are expected to be low. Construction and operation of the six RD&D projects could have minor disproportionate impacts on minority and low-income populations, depending on their location, primarily associated with changes in quality of life and social disruption. Property value and visual impacts would depend on the location of land parcels impacted by oil shale projects. Impacts on minority and low-income populations would also depend on the importance of land parcels for subsistence, their cultural and religious	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Environmental Justice (Cont.)	significance, and their possible alternate economic uses for these populations.			
	Larger scale oil shale project construction and operation could disproportionately impact minority and low-income populations depending on their location. Changes in quality of life and social disruption caused by rapid in-migration of population into rural communities would likely occur, thereby undermining local community social structures and requiring a transition to more urban life styles. The impacts of facility operations on air and water quality and on the demand for water for agriculture in the region could also cause environmental justice impacts. Land use and visual impacts would depend on the location of land parcels impacted by oil	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Environmental Justice (Cont.)	shale projects. Impacts on minority and low-income populations would also depend on the importance of land parcels for subsistence, their cultural and religious significance, and their possible alternate economic uses for these populations.			
Hazardous Materials and Waste Management	Future commercial oil shale development within the potential lease areas in Alternative 1would use and generate hazardous materials and wastes. Hazardous materials would include fuels for equipment and heating, lubricating oils, solvents, and other industrial chemicals, as well as materials produced	The use and generation of hazardous materials and wastes would be of the same nature as those identified for Alternative 1.	The six current and three proposed RD&D projects would use and generate similar types of hazardous materials and wastes. Hazardous materials would include fuels for equipment and heating, lubricating oils, solvents, and other industrial chemicals, as well as materials produced during oil shale processing.	The use and generation of hazardous materials and wastes would be of the same nature as those identified for Alternative 1.

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Hazardous Materials and Waste Management (Cont.)	during oil shale processing. Herbicides may also be used to clear and/or control vegetation at project locations and along utility ROWs. Commercial oil shale development may generate spent shale in large quantities if development by mining occurs; the shale would require management as a waste. The specific types and amounts and their handling and treatment would depend on the specific design of each commercial project. Waste materials would be similar among the six current RD&D projects; these would include solids such as construction debris. Liquid wastes would include both sanitary and industrial wastewater.		Herbicides may also be used to clear and/or control vegetation at project locations and along utility ROWs. Waste materials would also be similar among the RD&D projects; these would include solids such as construction debris. Liquid wastes would include both sanitary and industrial wastewater. Future commercial development within an RD&D PRLA involving mining would generate spent shale, which would require management as a waste.	

TABLE 2.6-1 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Oil Shale Development[a]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 3: Research Lands Focus. Amend Land Use Plans To Identify 32,640 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Colorado, Utah, and Wyoming as Available for Application for Leasing for Commercial Oil Shale Development[b]
Health and Safety	The six current RD&D projects and potential future commercial development of oil shale projects in the Alternative 1 lease area could result in health and safety impacts on workers. These impacts would be associated with accidents causing injuries and fatalities, possible hearing loss from high noise levels, and inhalation of particulates and/or volatiles emitted from the facilities.	Potential health and safety impacts from the six current RD&D projects and potential future commercial developments would be the same as those identified for Alternative 1.	The construction and operation of the six current and three potential RD&D projects could result in health and safety impacts on workers as described for Alternative 1. Injuries from all six current RD&D projects are estimated at about 75 per year during construction and 40 per year during operations; less than 1 fatality per year is estimated for both construction and operations. The future commercial development of oil shale projects in the RD&D PRLAs would have the same types of health and safety impacts as would occur in association with the RD&D projects, but the potential incidence of those impacts would be greater	Potential health and safety impacts from the six current RD&D projects and potential future commercial developments would be the same as those identified for Alternative 1.

Footnotes on next page.

TABLE 2.6-1 (Cont.)

Abbreviations: ACEC = Area of Critical Environmental Concern; AQRV = air quality related value; BLM = Bureau of Land Management; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act of 1973; HMA = Herd Management Area; LWC = lands having wilderness characteristics; NEPA = National Environmental Policy Act of 1969; NO_x = nitrogen oxides; NWR = National Wildlife Refuge; O_3 = ozone; PEIS = programmatic environmental impact statement; PFYC = Potential Fossil Yield Classification; PRLA = preference right lease area; RD&D = research, development, and demonstration; RMP = Resource Management Plan; ROI = region of influence; ROW = right-of-way; SRMA = Special Recreation Management Area; VOC = volatile organic compound; WSA = Wilderness Study Area; WSR = Wild and Scenic River.

[a] The adverse impacts of the RD&D projects will be addressed through mitigation measures described in the environmental assessments (EAs) for those projects. All the EAs resulted in Findings of No Significant Impact (BLM 2006c-j; 2007b,c).

[b] Under all alternatives, the nature, magnitude, and extent of project-related impacts of commercial development of oil shale on all resource areas would depend on the type, location, and design of the individual projects.

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TABLE 2.6-2 Summary Comparison of Potential Environmental Impacts of Amending Land Use Plans To Identify Lands Available or Not Available for Application for Leasing for the Commercial Development of Tar Sands in Utah, and Environmental Impacts of Future Construction and Operation of Commercial Projects under the Four Alternatives

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Impacts Common To Alternatives 2, 3, and 4	NA[b]	On the basis of the analysis in the PEIS, the BLM has determined that, with the exception noted in the socioeconomic analysis regarding potential impacts on property values, land use plan amendments would not result in any impacts on the environment or socioeconomic setting. However, the future development of commercial tar sands projects that could be approved after subsequent NEPA analysis would have impacts on these resources. The types of impacts that could be associated with future tar sands development are described in Chapter 5 of the PEIS. The magnitude of these potential impacts cannot be quantified at this time because key information about the location of commercial projects, the technologies that may be employed, the project size or production level, development time lines, and mitigation measures that would be applied, are unknown.		

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Land Use	Future commercial tar sands development could affect current land use in the 430,686-acre Alternative 1 lease area. Current land uses such as grazing, irrigated agriculture, recreation, oil and gas production, and mineral extraction would be affected at locations where commercial tar sands projects (and supporting infrastructure) would be located. Additional land use changes would occur on nonfederal lands where project support infrastructure (e.g., employer-provided housing) would be constructed.	Potential impacts on land use from potential commercial development under Alternative 2 would be similar to those identified for Alternative 1 but would potentially affect only about 91,000 acres of federal land.	Potential impacts on land use from the proposed commercial tar sands lease would be similar to those identified for Alternative 1 but would be restricted to only about 2,100 acres of federal land.	Potential impacts on land use from potential commercial development under Alternative 4 would be similar to those identified for Alternative 1 but would potentially affect about 12,000 fewer acres of federal land.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Soil and Geologic Resources	Future commercial tar sands development could affect soil and geologic resources in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Potential impacts would be associated with the construction and operation of project facilities and related infrastructure and would include soil disturbance, soil removal and compaction, subsurface disturbance of geologic resources during drilling and mining, and increased erosion potential of exposed soils and geologic materials.	Potential impacts on soil and geologic resources from commercial tar sands development would be similar to those identified for Alternative 1, but under Alternative 2, impacts could occur at fewer locations and in less geologically sensitive locations.	Potential impacts on soil and geologic resources from development of the Asphalt Ridge STSA would be similar to those identified for Alternatives 1 and 2, but under Alternative 3, impacts would be limited geographically and in overall magnitude.	Similar to Alternative 1.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Paleontological Resources	Impacts could include the destruction of paleontological resources and loss of valuable scientific information within development footprints, degradation and/or destruction of resources and their stratigraphic context within or near the development area, and increased potential for loss of exposed resources from looting or vandalism as a result of increased human access and related disturbance in sensitive areas. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. About 78% (335,396 acres) of designated acreage overlies geologic formations having a high potential to contain important paleontological resources (i.e., PFYC 4/5).	The types of potential impacts would be similar to those identified under Alternative 1. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. About 88% (80,429 acres) of designated acreage overlies geologic formations having a high potential to contain important paleontological resources (i.e., PFYC 4/5).	The types of potential impacts would be similar to those identified under Alternative 1. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. About 69% (1,458 acres) of designated acreage overlies geologic formations having a high potential to contain important paleontological resources (i.e., PFYC 4/5).	The types of potential impacts would be similar to those identified under Alternative 1. Such impacts could be reduced or eliminated by applying mitigation measures; therefore, adverse impacts are not expected. About 80% (335,396 acres) of designated acreage overlies geologic formations having a high potential to contain important paleontological resources (i.e., PFYC 4/5).

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Water Resources	Commercial tar sands development could impact water resources in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Potential project-related impacts may include reduced water quality due to erosion and sedimentation, dewatering of local aquifers, and contamination of surface water or groundwater by accidental releases of hazardous materials. The Alternative 1 potential lease areas (including a 2-mi buffer zone) include about 185 mi of perennial streams that could be affected by commercial project development, or 68% of the perennial streams in the STSAs.	Potential impacts on water resources from future construction and operation of commercial tar sands projects in the Alternative 2 potential lease areas would be similar to those identified for Alternative 1. Alternative 2 excludes from lease application about 200,000 acres of land that is currently identified in BLM land use plans as having steep slopes and/or fragile or highly erosive soils and included under Alternative 1. Thus, there is a reduced potential for erosion-related impacts with commercial tar sands development under Alternative 2. The Alternative 2 potential lease areas (including a 2-mi buffer zone) include about 125 mi of perennial streams that could be affected by commercial project development, or 46% of the perennial streams in the STSAs.	Potential impacts on water resources from development of the Asphalt Ridge STSA would be similar to those identified for Alternatives 1 and 2, but under Alternative 3, impacts would be limited geographically and in overall magnitude. No perennial streams flow through the STSA, thus reducing the likelihood of impacts on surface water quality.	Similar to Alternative 1.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Air Quality	Commercial tar sands development could impact air quality in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. The construction and operation of future commercial tar sands projects could result in local and regional impacts on air quality and AQRVs, such as visibility and acid deposition. These impacts could result from heavy equipment and vehicle emissions, fugitive dust generation from construction and mining areas and along some access roads, and tar sands processing emissions. In addition, O_3 precursors of NO_x and VOCs from tar sands development could exacerbate wintertime high-O_3 occurrences already prevalent in the study area, especially in Uintah County, Utah.	Commercial tar sands development could impact air quality in the Alternative 2 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Potential local and regional impacts on air quality and AQRVs would be similar in nature to those identified for Alternative 1. However, Alternative 2 has approximately 340,000 fewer (about 79%) acres of land than Alternative 1 where future commercial tar sands development could occur and affect local or regional air quality and AQRVs. And, thus, the magnitude of potential impacts is anticipated to be far less than that for Alternative 1.	The proposed commercial tar sands lease could impact air quality in the project area and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Potential local and regional impacts on air quality and AQRVs would be similar in nature to those identified for Alternative 1. However, because of its far smaller lease areas (about 0.5% of land for Alternative 1), the magnitude of potential impacts is anticipated to be minimal compared to that for Alternative 1.	Commercial tar sands development could impact air quality in the Alternative 4 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Potential local and regional impacts on air quality and AQRVs would be similar in nature and magnitude to those identified for Alternative 1. Alternative 4 has only approximately 12,250 fewer (about 3%) acres of land than Alternative 1 where future commercial tar sands development could occur and affect local or regional air quality and AQRVs.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Air Quality (Cont.)	Because of the need for project- and site-specific information, it is not possible to identify the nature and magnitude of regional air quality impacts from commercial development within the Alternative 1 potential lease areas.			
Noise	Commercial tar sands development could affect noise levels in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. In most cases, noise is considered a local problem, not a regional problem. Localized noise levels (i.e., increased noise levels) could be affected by construction activities, mining, processing equipment, pipeline compressor stations, and vehicle traffic.	Commercial tar sands development could impact noise levels in the Alternative 2 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Localized noise impacts would be similar in nature and magnitude to those identified for Alternative 1. Changes in ambient noise levels due to project development could occur wherever a project is located within the 91,045 acres identified for application for	The proposed commercial tar sands lease could affect noise levels in the Alternative 3 potential lease area and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located.	Commercial tar sands development could affect noise levels in the Alternative 4 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Localized noise impacts would be similar in nature and magnitude than those identified for Alternative 1. Changes in ambient noise levels due to project development could occur wherever a project is located within more than 1.9 million acres identified for application

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Noise (Cont.)	Noise levels from tar sands development could exceed EPA guidelines for receptors in close proximity but would not be exceeded at farther receptor locations (e.g., beyond 0.5 mi).	leasing under Alternative 2, which is about 340,000 fewer (about 79%) acres of land than for Alternative 1.	Localized noise impacts would be similar in nature and magnitude than those identified for Alternative 1. Changes in ambient noise levels due to project development could occur wherever a project is located within the 2,100 acres identified for application for leasing under Alternative 3, which is only about 0.5% of land for Alternative 1.	for leasing under Alternative 2, which is about 12,250 fewer (about 3%) acres of land than for Alternative 1.
Ecological Resources (resource subgroups summarized below)	Ecological resources could be affected in areas available for application for leasing of tar sands resources. Impacts related to tar sands development may include wildlife disturbance, habitat loss, exposure to accidental releases of hazardous materials, the spread or establishment of invasive species, and the loss or injury of biota within physically disturbed areas related to the projects (including utility ROWs and access roads).	Commercial tar sands development could impact ecological resources in Alternative 2 potential lease areas in the same manner as Alternative 1 but on approximately 340,000 fewer acres, some of which are excluded because of the presence of sensitive ecological resources. Indirect impacts would be the same as Alternative 1.	The proposed commercial tar sands lease could impact ecological resources in Alternative 3 potential lease areas in the same manner as Alternative 1 but on approximately 429,000 fewer acres of land. Indirect impacts would be the same as Alternative 1.	Commercial tar sands development could impact ecological resources in Alternative 4 potential lease areas in the same manner as Alternative 1 but on about 12,250 fewer acres of land. Indirect impacts would be the same as Alternative 1.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Ecological Resources (resource subgroups summarized below) (Cont.)	Indirect impacts such as those related to surface and groundwater withdrawals could occur in more distant but hydrologically connected areas.			
Aquatic Resources	For Alternative 1, there are 20 perennial streams totaling about 185 mi of perennial stream habitat within the lease areas (including a 2-mi buffer). The construction and operation of commercial tar sands projects within the potential leases areas could adversely affect aquatic resources by directly disturbing aquatic habitat or by contaminant inputs and surface water depletions resulting from groundwater and surface water use. The development of infrastructure, such as roads and ROWs, could increase public access to fishery resources. Potential impacts could result in habitat loss or degradation, affecting the abundance and distribution of aquatic biota in the affected habitats.	For Alternative 2, there are 12 perennial streams totaling about 125 mi of perennial stream habitat within the lease areas (including a 2-mi buffer). Potential types of impacts would be similar to those identified for Alternative 1 and could result in habitat loss or degradation, which could affect the abundance and distribution of aquatic biota in the affected habitats.	For Alternative 3, there are no perennial streams within the proposed lease area (including a 2-mi buffer). Therefore, there are no direct impacts on aquatic habitats associated with this land use designation. However, impacts on aquatic biota could potentially occur from water depletions.	For Alternative 4, there are 20 perennial streams totaling about 188 mi of perennial stream habitat within the lease areas (including a 2-mi buffer). Potential types of impacts would be similar to those identified for Alternative 1 and could result in habitat loss or degradation, which could affect the abundance and distribution of aquatic biota in the affected habitats.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Plant Communities and Habitats	The construction and operation of commercial tar sands projects could impact plant communities and habitats that are present in the Alternative 1 potential lease areas. The potential lease areas include about 6,874 acres that have been identified for the protection of floodplains, riparian habitats, and special status plant species. Impacts could include the direct loss of vegetation from site clearing and grading; reduced habitat quality due to soil compaction, dewatering, water quality reduction, erosion, sedimentation, or accidental releases of hazardous materials; and the introduction or spread of invasive species. Utility and access road ROWs could also result in the fragmentation of some habitats. Alternative 1 areas also include a portion of 1 ACEC and are adjacent to or near 6 ACECs designated for sensitive plants or plant communities.	The construction and operation of commercial tar sands projects could impact plant communities and habitats that occur in Alternative 2 potential lease areas. The areas where commercial development could occur do not include land currently identified for protection of floodplains, riparian habitats, and special status plant species. Potential impacts would be similar in nature to those identified for Alternative 1 but could occur in fewer locations. Alternative 2 areas do not include ACECs but are adjacent to or near 5 ACECs designated for sensitive plants or plant communities.	The construction and operation of commercial tar sands projects in prospective lease areas in the Asphalt Ridge STSA under Alternative 3 could affect plant communities and habitats. The areas available for application for leasing do not include land currently identified for the protection of riparian habitat, floodplains, or special status plant species. Alternative 3 areas are not in or near ACECs designated for sensitive plants or plant communities.	The construction and operation of commercial tar sands projects could impact plant communities and habitats that occur in Alternative 4 potential lease areas. The areas where commercial development could occur include about 6,859 acres that have been identified for the protection of floodplains, riparian habitats and special status plant species. Potential impacts would be similar in nature to those identified for Alternative 1 but could occur in fewer locations. Alternative 4 areas do not include ACECs but are adjacent to or near 7 ACECs designated for sensitive plants or plant communities.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Wildlife	The construction and operation of commercial tar sands projects could impact wildlife and their habitats where individual projects are located within the 430,686 acres currently classified as available for tar sands leasing. Wildlife habitats identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include 7 acres of raptor nests, 112,809 acres of elk crucial winter range, 26,804 acres of elk calving habitat, 96,564 acres of mule deer crucial winter range, 23,584 acres of mule deer fawning habitat, and 41,588 acres of mule deer migration corridor (these acreages are not additive as they do not account for habitat overlap among species or habitat types for a species). A total of 77,409 acres of wild horse and burro HMAs,	The construction and operation of commercial tar sands projects could impact wildlife and their habitats where individual projects are located within the 91,045 acres identified for tar sands leasing. There were no habitats for wildlife identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas. A total of 17,572 acres of wild horse HMAs, 57,708 acres of mule deer winter habitat, 17,110 acres of mule deer summer habitat, 52,361 acres of elk winter habitat, and 17,170 acres of elk summer habitat overlap lands that would be available for tar sands leasing. Overall, potential impacts on wildlife and their habitats would be similar in nature to those identified for Alternative 1, but tar sands leasing could occur in	The construction and operation of the proposed commercial tar sands project could impact wildlife and their habitats where facilities are located within the 2,100 acres identified for tar sands leasing. Wildlife habitats identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include 41 acres of mule deer fawning habitat. No wild horse HMAs, mule deer summer habitat, or elk winter and summer habitats overlap tar sands areas included in Alternative 3. A total of 1,729 acres of mule deer winter habitat overlap lands that would be available for tar sands leasing. Overall, potential impacts on wildlife and their habitats would be similar in nature to those identified for Alternative 1, but tar sands leasing could occur in	The construction and operation of commercial tar sands projects could impact wildlife and their habitats where individual projects are located within the 425,790 acres identified for tar sands leasing. Wildlife habitats identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include 5 acres of raptor nests, 112,809 acres of elk crucial winter range, 26,804 acres of elk calving habitat, 96,564 acres of mule deer crucial winter range, 23,584 acres of mule deer fawning habitat, and 41,588 acres of mule deer migration corridor (these acreages are not additive as they do not account for habitat overlap among species or habitat types for a species). A total of 77,287 acres of wild horse HMAs, 225,508 acres of mule deer winter habitat,

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Wildlife (Cont.)	228,122 acres of mule deer winter habitat, 77,172 acres of mule deer summer habitat, 194,354 acres of elk winter habitat, and 65,366 acres of elk summer habitat overlap lands that would be available for tar sands leasing. Potential impacts on wildlife and their habitats would be associated with site clearing and grading, operational noise and activities, accidental releases of hazardous materials, and increased human access to some habitats, and could result in reduced abundance and distribution of affected species. Construction and operation activities could also disturb wildlife in nearby locations and also fragment habitats along project-related ROWs.	only about 21% of lands identified for Alternative 1.	less than 0.5% of lands identified for Alternative 1.	77,172 acres of mule deer summer habitat, 198,324 acres of elk winter habitat, and 65,366 acres of elk summer habitat overlap lands that would be available for tar sands leasing. Overall, potential impacts on wildlife and their habitats would be similar in nature to those identified for Alternative 1. Tar sands leasing could occur in about 99% of lands identified for Alternative 1.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Threatened and Endangered Species	58 federal candidate, BLM-designated sensitive, and state-listed species, and 20 federally listed threatened or endangered species could occur in areas that are available for leasing under Alternative 1. Approximately 2,200 acres of designated critical habitat for the Mexican spotted owl and 117,716 acres of core habitat areas for the greater sage-grouse occur within lands identified for application for leasing under Alternative 1. The construction and operation of commercial tar sands projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 430,686 acres currently classified as available for application for leasing. Habitats for threatened,	50 federal candidate, BLM-designated sensitive, and state-listed species, and 20 federally listed threatened or endangered species could occur in areas that are available for leasing under Alternative 2. Approximately 471 acres of designated critical habitat for the Mexican spotted owl occur within lands identified for application for leasing under Alternative 2. However, there are no core habitat areas for the greater sage-grouse in lands identified under Alternative 2. The construction and operation of commercial tar sands projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 91,045 acres identified for oil shale leasing. There were no habitats for	23 federal candidate, BLM-designated sensitive, and state-listed species, and 7 federally listed threatened or endangered species could occur in areas that are available for leasing under Alternative 3. There are no designated critical habitats for ESA-listed species within lands identified for application for leasing under Alternative 3. However, approximately 2,100 acres of core habitat areas for the greater sage-grouse occur in lands identified under Alternative 3. The construction and operation of commercial tar sands projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 2,100 acres identified for oil shale leasing. Habitats for threatened, endangered, or	53 federal candidate, BLM-designated sensitive, and state-listed species, and 22 federally listed threatened or endangered species could occur in areas that are available for leasing under Alternative 4. Approximately 27,200 acres of designated critical habitat for the Mexican spotted owl and 87,780 acres of core habitat areas for the greater sage-grouse occur within lands identified for application for leasing under Alternative 4. The construction and operation of commercial tar sands projects could impact threatened, endangered, and sensitive species and their habitats where individual projects are located within the 418,976 acres identified for oil shale leasing. Habitats for threatened, endangered, or sensitive species

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Threatened and Endangered Species (Cont.)	endangered, or sensitive species identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include 1,625 acres for Graham's penstemon, 36 acres for the bald eagle, and 42,017 acres for the sage-grouse.	threatened, endangered, or sensitive species identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas.	sensitive species identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include 1,638 acres for the sage-grouse.	identified for spatial or temporal protection in BLM RMPs that would be present in the lease application areas include 1,625 acres for Graham's penstemon, 36 acres for the bald eagle, and 42,017 acres for the sage-grouse.
Visual Resources	Commercial tar sands development could impact visual resources in the Alternative 1 lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Short- and long-term visual impacts may result with the construction and operation of the projects and would be associated with construction activities at each site and along associated ROWs. Additional visual impacts may be associated with the presence of site facilities	Potential impacts from project construction and operation would be similar in nature to those identified for Alternative 1. Visually sensitive areas within the proposed lease areas include 1WSA. Sensitive areas within 5 mi of the lease areas include 17 ACECs, 16 WSAs, 4 SRMAs, 1 NRA, 1 National Scenic Highway, and 3 state- or agency-designated scenic highways. These visually sensitive areas could be subject to large visual impacts from future commercial tar sands development within the Alternative 1 lease areas.	Potential impacts from project construction and operation would be similar in nature to those identified for Alternative 1. Visually sensitive areas within the proposed tar sands lease area include 1 National Scenic Highway. Sensitive areas within 5 mi of the lease area include 1 National Scenic Highway.	Potential impacts from project construction and operation would be similar in nature to those identified for Alternative 1. Visually sensitive areas within the proposed lease areas include 1 SRMA, 1 National Scenic Highway, and one state-designated scenic highway. Sensitive areas within 5 mi of the lease areas include 19 ACECs, 18 WSAs, 5 SRMAs, 2 National Scenic Highways, and 3 state- or agency-designated scenic highways.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Visual Resources (Cont.)	within viewsheds and lighting pollution.	Smaller impacts could occur at greater distances from the lease areas.		
Cultural Resources	Commercial tar sands development could impact cultural resources in the Alternative 1 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Some of the land that would be available for application for leasing has been examined for cultural resources. Significant cultural resources were identified in these areas. Additional undiscovered resources are likely to exist in the unsurveyed portions of the potential lease areas. Important cultural resources could be affected by construction and operation of commercial projects within the potential lease areas. Potential impacts may include damage or	Commercial tar sands development could impact cultural resources in the Alternative 2 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Some of the land that would be available for application for leasing has been examined for the presence of cultural resources. Some of the resources identified could be affected by construction and operation of commercial projects within the potential lease areas. Potential impacts may include damage or destruction and increased potential for vandalism or theft due to increased human access.	Some of the 2,100 acres in the proposed tar sands lease have the potential to contain important cultural resources. Potential impacts on these resources from commercial tar sands development within the Alternative 3 potential lease areas would be similar to those identified for Alternative 1 but could occur in fewer locations.	Commercial tar sands development could impact cultural resources in the Alternative 4 potential lease areas and at locations on nonfederal lands where project-related infrastructure (e.g., employer-provided housing) would be located. Some of the land that would be available for application for leasing has been examined for cultural resources. Significant cultural resources were identified in these areas. Additional undiscovered resources are likely to exist in the unsurveyed portions of the potential lease areas. Important cultural resources could be affected by construction and operation of commercial projects within the potential lease areas. Potential impacts may include damage or

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Cultural Resources (Cont.)	destruction and increased potential for vandalism or theft due to increased human access.			destruction and increased potential for vandalism or theft due to increased human access.
Indian Tribal Concerns	Making land available for application for leasing would not affect resources important to Indian tribes. However, leasing and future development could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the development and operation of commercial projects, which all involve widespread surface disturbance. Increased access would increase the possibility of damage, destruction, vandalism, and intrusion into sacred sites. This alternative makes the most land available for potential future development and includes only current land exclusions with	Making land available for application for leasing would not affect resources important to Indian tribes. However, leasing and future development could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the development and operation of commercial projects, which all involve widespread surface disturbance. Increased access would increase the possibility of damage, destruction, vandalism, and intrusion into sacred sites. This alternative makes significantly less land available than Alternatives 1 or 4 but much more than Alternative 3, thus	The proposed commercial tar sands lease could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the proposed commercial project, which could involve widespread surface disturbance. Increased access could increase the possibility of damage, destruction, vandalism, and intrusion into sacred sites. This alternative makes the least land available. Surface mining may be allowed.	Making land available for application for leasing would not affect resources important to Indian tribes. However, leasing and future development could result in adverse impacts depending on the size and location of the facilities and the technology chosen to develop the lease. Some resources could be affected by the development and operation of commercial projects, which all involve widespread surface disturbance. Increased access would increase the possibility of destruction, vandalism, and intrusion into sacred sites. More land is excluded from development than under Alternative 1 but less than under Alternative 2. Surface mining would be allowed.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Indian Tribal Concerns (Cont.)	surface use restrictions. Surface mining would be allowed. Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.	reducing the likelihood of adverse impacts. Surface mining would be allowed. Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.	Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.	Required project-specific surveys, analyses, and consultation with affected Indian tribes could reduce impacts on resources within individual parcels.
Socioeconomics	Construction and operation associated with individual tar sands technologies would have small to moderate impacts on employment, income, population, housing, public finances, and public service employment in the ROI. Small to moderate impacts on property values and recreation would also occur, and water diversions would also affect agriculture. Rapid increases in population in-migration could impact quality of life, requiring a transition from traditional rural,	Socioeconomic impacts could occur within the study area from amending land use plans; specifically, changes in property values could occur. Potential project impacts would be similar to those identified for Alternative 1.	Socioeconomic impacts could occur within the study area from amending land use plans; specifically, changes in property values could occur. Potential project impacts for the commercial tar sands lease would be similar to those identified for Alternative 1.	Socioeconomic impacts could occur within the study area from amending land use plans; specifically, changes in property values could occur. Potential project impacts would be similar to those identified for Alternative 1.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Socioeconomics (Cont.)	to more urban lifestyles, and potentially cause large social disruption impacts.			
Environmental Justice	Tar sands project construction and operation would disproportionately impact minority and low-income populations depending on their location. Changes in quality of life caused by rapid in-migration of population into rural communities would likely occur, thereby undermining local community social structures and requiring a transition to more urban life styles. Social disruption would also occur. The impacts of facility operations on air and water quality and on the demand for water for agriculture in the region could also cause environmental justice impacts. Land use and visual impacts would depend on the location of land parcels impacted by tar sands projects. Impacts on minority and low-income	Potential project impacts would be similar to those identified for Alternative 1.	Impacts from the proposed commercial tar sands lease would be similar to those identified for Alternative 1.	Potential project impacts would be similar to those identified for Alternative 1.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Environmental Justice (Cont.)	populations would also depend on the importance of land parcels for subsistence, their cultural and religious significance, and their possible alternate economic uses to these populations.			
Hazardous Materials and Waste Management	Future commercial tar sands development within the Alternative 1 potential lease areas would use and generate similar types of hazardous materials and wastes. Spent tar sands may also be generated in large quantities if development by mining occurs; the spent tar sands would require management as a waste. The specific types and amounts and their handling and treatment would depend on the specific design of each commercial project.	For individual projects, the types and amounts of hazardous materials and wastes that could be used and generated during commercial tar sands development would be the same as those identified for Alternative 1.	For the proposed tar sands project, the types and amounts of hazardous materials and wastes that could be used and generated during commercial tar sands development would be the same as those identified for Alternative 1.	For individual projects, the types and amounts of hazardous materials and wastes that could be used and generated during commercial tar sands development would be the same as those identified for Alternative 1.

TABLE 2.6-2 (Cont.)

Resource	Alternative 1: No Action. 2,017,714 Acres Currently Classified as Available for Leasing in the Existing White River and Book Cliffs RMPs. No Land Use Plans Would Be Amended To Allow for Additional Tar Sands Development[b]	Alternative 2: Conservation Focus. Amend Land Use Plans To Identify 461,965 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 3: Pending Commercial Lease. Identify 2,100 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]	Alternative 4: Moderate Development: Amend Land Use Plans To Identify 1,963,414 Acres of Federal Land in Utah as Available for Application for Leasing for Commercial Tar Sands Development[a]
Health and Safety	Commercial tar sands project development may result in worker injuries or fatalities from accidents, possible hearing loss from high noise levels, and inhalation of particulates and/or VOCs.	Potential health and safety impacts from project construction and operation would be similar to those identified for Alternative 1 and identical for projects with identical plans of development and located in common lease areas.	Potential health and safety impacts from construction and operation of the proposed tar sands project would be similar to those identified for Alternative 1.	Potential health and safety impacts from project construction and operation would be similar to those identified for Alternative 1 and identical for projects with identical plans of development and located in common lease areas.

Abbreviations: ACEC = Area of Critical Environmental Concern; AQRV = air quality related value; BLM = Bureau of Land Management; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act of 1973; HMA = Herd Management Area; NEPA = National Environmental Policy Act of 1969; NO_x = nitrogen oxides; NRA = National Recreation Area; O_3 = ozone; PEIS = programmatic environmental impact statement; PFYC = Potential Fossil Yield Classification; RD&D = research, development, and demonstration; RMP = Resource Management Plan; ROI = region of influence; ROW = right-of-way; SRMA = Special Recreation Management Area; STSA = Special Tar Sands Areas; VOC = volatile organic compound; WSR = Wild and Scenic River.

[a] Under all alternatives, the nature, magnitude, and extent of project-related impacts of commercial development of tar sands on all resource areas would depend on the type, location, and design of the individual projects.

[b] NA = not applicable.

2.7 REFERENCES

Note to Reader: This list of references identifies Web pages and associated URLs where reference data were obtained. It is likely that at the time of publication of this PEIS, some of these Web pages may no longer be available or their URL addresses may have changed.

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