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**Southwestern
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Minerals and Energy Specialist Report

Forest Plan Revision
FEIS

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Specialist Report

Introduction

This report evaluates and discloses the potential environmental consequences on the minerals and energy resource that may result with the adoption of a revised land management plan. It examines, in detail, four different alternatives for revising the 1987 Apache-Sitgreaves National Forests (Apache-Sitgreaves NFs) land management plan (1987 forest plan).

Relevant Laws, Regulations, and Policy that Apply

Federal Land Policy and Management Act of October 21, 1976, (43 U.S.C. 1761-1771). Title V of the Federal Land Policy and Management Act (FLPMA) authorizes the Secretary of Agriculture to issue permits, leases, or easements to occupy, use, or traverse National Forest System (NFS) lands. FLPMA directs the United States to receive fair market value unless otherwise provided for by statute and provides for reimbursement of administrative costs, in addition to the collection of land use fees.

General Mining Law of 1872 allows exploration, development, and production of minerals from mining claims on public lands.

Geothermal Steam Act of December 24, 1970 authorizes issuance of leases for the development and utilization of geothermal steam and associated geothermal resources.

Organic Administration Act of June 4, 1897, (16 U.S.C. 477-482, 551) authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the national forests. This is the basic authority for authorizing use of NFS lands for other than rights-of-way.

Mineral Material Act of 1947 authorizes disposal of common variety minerals. It also allows free use by government agencies, municipalities, and non-profit organizations.

The Surface Resources Act of 1955 (aka Multiple Use Mining Act) allows the sale of mineral materials, such as sand and gravel, and provides direction for the multiple uses of surface resources of mining claims.

Energy Policy Act of 2005 directed the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate energy transport corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal lands in portions of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

Mineral Leasing Act of 1920, as amended on November 16, 1973, (30 U.S.C. 185(1) authorizes the issuance of permits and easements for oil and gas pipelines. It requires annual payments in advance which represent fair market rental value and provides for reimbursement to the Government for administrative and other costs incurred in monitoring, construction (including costs for preparing required environmental analysis and documentation), operation, maintenance, and termination of oil and gas pipelines.

Title 36 CFR 228 - Minerals provides Forest Service direction for locatable minerals, mineral materials, and oil and gas resources.

Title 36 CFR 251 provides overall direction for land uses, including miscellaneous land uses; special uses (Outfitter/Guides, for example); appeal of decisions relating to occupancy and use of USFS lands; and access to non-Federal lands.

Weeks Act of March 1, 1911 authorizes purchase of lands within the watersheds of navigable streams in order to promote regulation of the flow of navigable streams or for the production of timber, provided the legislature of the state in which the lands are located consents to the acquisition. This law is the primary land acquisition authority for the Forest Service.

Wilderness Act of September 3, 1964 established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas" and administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as Wilderness.

Forest Service Manual (FSM) 1900 Planning

FSM 2800 Minerals and Geology

Forest Service Handbook 2809.15 Minerals and Geology Handbook

Methodology and Analysis Process

This section describes the methodology and analysis processes used to determine the environmental consequences on minerals and energy resources from implementing the alternatives. Environmental consequences are not site-specific at the broad forest planning level and are described with qualitative descriptions supported by past trends, records, special use authorizations, mining claims, and mineral withdrawals. The report compares how each alternative varies in its emphasis of mineral and energy activities and development by comparing the amount of land that is or may be withdrawn from mineral entry.

Methodology and analysis process for this report include use of GIS for management area acreages, review of BLM mining claim records, and review of reports (see references) on potential mineral and energy development.

The INFRA – Special Use Database (SUDS) Mineral Materials application was used to determine the type, amount, and value of mineral materials sales.

Assumptions

In the analysis for this resource, the following assumptions have been made:

- The agency has the capacity to screen, process, and administer mineral activities.
- The economy will fluctuate and influence mineral exploration.
- There are no known leases on the forests for the following leasable mineral resources: oil and gas, oil shale, coal or geothermal. Should valid leasable mineral proposals be submitted, the Forest Service would respond as a cooperating agency when requested by the BLM, which acts as the lead agency for subsurface mineral extraction. Therefore, the effects to leasable minerals will not be analyzed in this report.
- The potential for locating energy developments and corridors for non-extractive energy are not analyzed in this report, but are found in the Lands Specialist Report.

Revision Topics Addressed in this Analysis

Minerals and energy resources are part of the "Community-Forest Interaction" revision topic.

- The indicator for mineral resources is the amount (acres) of land currently or potentially withdrawn from mineral entry.

Summary of Alternatives

A summary of alternatives, including the key differences among alternatives, is outlined in the Draft Environmental Impact Statement.

Description of Affected Environment (Existing Condition)

Minerals

Individuals operating under United States mining laws have a statutory right (General Mining Law of 1872) to enter NFS lands to locate and develop mineral resources. Mineral resources on federally-owned lands are separated into three categories - locatable, leasable, and mineral materials (salable) - by statutory and regulatory direction. Mineral activity fluctuates with consumer demand and prices. The currently high prices (Gold Price 2011) for many minerals could make exploration and development more economical. Mineral resource activity on the Apache-Sitgreaves NFs has historically been low. Mineral activity is presently concentrated in a few scattered areas. Commodity use and production have shown declines from the past. However, these forest uses contribute to sustaining the lifestyles and traditions of local communities.

The following sections discuss locatable and salable minerals. The potential for locatable minerals on Apache-Sitgreaves NFs lands may be much greater at depth than surface geology would otherwise suggest. The potential for leasable minerals on the Apache-Sitgreaves NFs is low because of the existing geology. There are no known leases on the forests for the following leasable mineral resources: oil and gas, oil shale, coal or geothermal (BLM 2009/2013). Should valid leasable mineral proposals be submitted, the Forest Service would respond as a cooperating agency when requested by the BLM, which acts as the lead agency for subsurface mineral extraction.

Locatable Minerals

Locatable minerals are those valuable deposits subject to exploration and development under the General Mining Law of 1872 (as amended). Examples of locatable minerals include, but are not limited to iron, gold, copper, silver, lead, and zinc. The public has a statutory right to explore for, claim, and mine mineral deposits found on federally-owned lands subject to U.S. mining laws. Through a Memorandum of Understanding with the BLM, the Forest Service administers most aspects of operation under the General Mining Law of 1872 on NFS lands. The Forest Service would respond to future operating plans for valid locatable mineral development as they are submitted. Proposals for development of discoveries would likely be infrequent since there are a limited number of claims on the forests. A large copper deposit and open pit copper mine exist just south of the forest boundary near Morenci, Arizona.

There are three types of locatable mining claims found on the Apache-Sitgreaves NFs: lode, placer, and mill sites. Mining claims may vary in size, but there are maximum size limits by type of claim (UDSI BLM 2008):

- Lode - 1,500’ x 600’or approximately 21 acres
- Placer - 20 acres per person with a maximum of 160 acres for an association of eight or more persons
- Mill site - 5 acres

Table 1. Number of active mining claims on the Apache-Sitgreaves NFs (USDA FS 2009a,amended 2013).

County	Ranger District	Placer Claims	Lode Claims	Mill Site Claims
Apache	Springerville	1	7	0
Coconino	Black Mesa	8	0	0
Greenlee	Clifton	173	199	12
Navajo	Lakeside/Black Mesa	34	0	0

A mining claimant on NFS lands is required by 36 CFR 228, Part A, to file an operating plan or notice of intent for proposed mining activities that includes the name and address of operators, a sketch or map of the location, descriptions of operations, access timing, operating period, and environmental protection measures. The Apache-Sitgreaves NFs would work with the claimant to assure that standards and guidelines in the forest plan are met as well as the necessary level of NEPA analysis and documentation. The operating plan requires an environmental analysis and decision before the plan is approved.

Mining, which includes all minerals activities, represents 0.6 percent of total employment attributable to activities on the Apache-Sitgreaves NFs (UDSA FS 2009b). The majority of the mining employment occurs on non-NFS lands adjacent to the forests near Clifton, Arizona.

Mineral Activity

The potential for locatable minerals on the Apache-Sitgreaves NFs is low because of the existing geology. The following minerals (table 2) may be found in the counties where the Apache-Sitgreaves NFs are located. The Apache-Sitgreaves NFs encompass parts of five counties: Apache, Greenlee, Navajo, and Coconino in Arizona and Catron in New Mexico. The Apache NF portion located within New Mexico is administered by the Gila NF. The forests border three other counties: Graham and Gila in Arizona and Grant in New Mexico.

Table 2. Minerals that may be found on the Apache-Sitgreaves NFs. (Galbraith and Brennan 1970)

County	Ranger District	Mineral
Apache	Alpine/Springerville	Cobaltite, Erythrite (Cobalt Bloom)
Coconino	Black Mesa	Manganese oxide, Dolomite
Greenlee	Clifton	Gold (lode, placer), Copper, Chalcocite, Sphalerite, Chalcopyrite, Covellite, Pyrite, Molybdenite, Cuprite, Tenorite, Pyrolusite, Magnetite, Fluorite, Magnesite, Smithsonite, Coronadite, Cerussite, Dolomite, Malachite, Azurite, Gerhardtite (Chase Creek Canyon), Gypsum, Chalcanthite, Melanterite, Epsomite, Goslarite, Brochantite, Antlerite, Alunite, Spangolite, Cyanotrichite, Crocoite, Libethenite, Vanadinite, Pyroxene, Tremolite, Garnet, Willemite, Zircon, Dioptase, Epidote, Hemimorphite, Glauconite, Serpentine, Kaolinite, Nontronite, Chrysocolla
Navajo	Lakeside/Black Mesa	Gypsum

Additional exploration for locatable minerals would most likely be limited. Active mining claims for locatable sandstone are located on the Lakeside Ranger District (six to eight separate claimants) and two separate claims on the Black Mesa Ranger District (see table 1). Each claimant operates under an approved plan of operations. Mining claims on the Clifton Ranger District (Greenlee County) are generally associated with the adjacent private copper mining operations. There are no known abandoned mines on Apache-Sitgreaves NFs lands that would require closure. A number of small abandoned surface operations and test pits are scattered across the forests and are not regarded as hazardous.

Mineral Withdrawals

Mineral withdrawals are under the authority of the 1872 Mining Law for the purpose of limiting activities in order to maintain other public values in the area or reserve the area for a particular public purpose or program. A withdrawal is the withholding of an area from application of the general land laws such as prohibiting the filing of new mining claims in an area. Designated wilderness is withdrawn from mineral entry in the enabling legislation. The Forest Service may request withdrawal of areas from mineral activity if the activity might conflict with other management objectives. Mineral entry withdrawals are generally initiated for administrative sites, developed public recreation areas, and areas highly valued by the public, such as scenic corridors. The 1987 forest plan identified several management areas that may be withdrawn from mineral entry, but no action has been taken to withdraw those areas.

Currently, 46,604 acres or 2.3 percent of the Apache-Sitgreaves NFs are withdrawn from locatable mineral entry (Aragon 2011). These withdrawals include wilderness, the RNA and botanical area, highway corridors, reservoirs, recreation areas, administrative sites, and developed campgrounds.

Salable Minerals

Salable mineral (also known as common variety mineral) materials are generally low-value deposits of sand, clay, and stone used for building materials and road surfacing. Extracting these materials from NFS lands is at Forest Service discretion. The major statutes pertaining to salable minerals are the Minerals Materials Act of 1947, and the Surfaces Resources Act of 1955.

The Apache-Sitgreaves NFs have lands that are potential sources of sand, gravel, landscape rock, cinders, and crushed rock. There are also off-forest sources to meet private needs. The demand for common variety mineral materials from the Apache-Sitgreaves NFs is currently low. Permitted uses are predominantly small private sales from common use pits, a multi-operator commercial pit, and various pits for State and county road uses, primarily for road cinders and/or gravel.

The 1987 forest plan does not allow permitting of mineral material activities in MA 14-Black River (Mainstem), MA 15-East and West Fork Black River, MA 16-Chevelon Canyon, and MA17-East and West Forks Little Colorado River. Also, no streambed alteration or removal of mineral materials is allowed if it significantly affects riparian-dependent resources, channel morphology, or streambank stability.

Mineral Activity

Sales of mineral materials have varied considerably. In FY2006, 18,400 tons were sold for $9,660 (USGS 2006), while 38,600 tons were sold for almost $21,000 in FY2009 (USDA FS 2010). Free use permits were issued for 25,300 tons in FY2006. The Forest Service uses materials for routine maintenance of National Forest System roads; some rock crushing occurs for project-specific needs. In FY2006 the Forest Service used almost 500,000 tons of mineral materials. These uses are expected to continue. There may be additional pressure for mineral materials as non-NFS lands adjacent to the forests are developed.

An increase in demand of common variety minerals could be expected as road construction and maintenance occurs on and around the forests. The demand for gravel may increase as campgrounds, forest roads, and county roads are improved. Increased work associated with federal and state highway construction, reconstruction, and maintenance may increase the demand for construction materials and the forests may be obligated to provide material under the Title 23, Section 317 of the Federal Highways Act.

Leasable Minerals and Energy

There are minimal extractable (leasable) resources on the Apache-Sitgreaves NFs. Geothermal development would be limited as only small areas are underlain by thermal waters. A small coal bed is located along the forests boundary north of Pinedale, but has not been developed. There are no known oil and gas resources.

There are no current leases for oil and gas, geothermal, or coal on the Apache-Sitgreaves NFs. The 1987 forest plan requires no surface occupancy for leasable minerals in MA 14-Black River (Mainstem), MA 15-East and West Fork Black River, MA 16-Chevelon Canyon, and MA17-East and West Forks Little Colorado River. Surface occupancy is limited or prohibited in areas that are highly visible, have erosive or unstable soils, are critical wildlife habitat, and are managed community watersheds, etc. No surface occupancy is also recommended for all developed recreations sites and electronic sites.

Solar energy potential is high and future development would be related to demand. Wind potential is low because of sporadic winds and the terrain (USDA FS 2009a). There may be a need for additional energy corridors or developments (e.g., electric transmission lines, pipelines, wind turbines) because of the expected demand for electricity to serve the growing populations of Arizona and the Southwest and to provide reliable and consistent services. As communities expand and as non-NFS lands surrounded by NFS lands are developed, distribution lines may be proposed to provide electric services. Energy corridors and energy development (infrastructure) are discussed in the Lands Specialist Report.

Cave Resources

Several caves are found on the Apache-Sitgreaves NFs. Most are lava tubes on the eastern portion of the Sitgreaves NF, but sinkholes and a small number of limestone caves are found in the western portion of the forests.

Environmental Consequences

The land management plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carryout any project or activity. Because the land management plan does not authorize or mandate any site-specific projects or activities (including ground-disturbing actions) there can be no direct effects. However, there may be implications, or longer term environmental consequences, of managing the forests under this programmatic framework.

Minerals

Leasable Minerals

There are no known leases on the forests for the following leasable mineral resources: oil and gas, oil shale, coal or geothermal (BLM 2009/2013). Therefore, there would be no effect to on leasable minerals in all alternatives.

Locatable Minerals

Effects to locatable minerals would be limited to the different amounts of land that could be withdrawn from mineral entry in the alternatives. There would be no effects to existing mineral claims. The effects to future locatable mineral activities are within the section below.

Mineral Withdrawals

The current areas that are withdrawn from mineral entry would be carried forward in **all alternatives**. This would equate to 46,604 acres not being available for mineral location and development. Because of the low mineral potential of the forests and the very small percentage (2.3 percent) of the forest withdrawn from mineral entry, there would no effects to mining claim location and development.

Recommended wilderness (table 3) would be withdrawn from mineral entry if it is congressionally designated as wilderness. Recommended RNAs (table 5) may be withdrawn if they are administratively designated. **Alternative A** would primarily address the fact that mineral production would continue. **Alternative A, B, and C** would generally have little to no effect on mining claim location and development because of the low mineral potential of the forests and the very small percentages (3 percent or less) of the forests that would be withdrawn. Alternative D could have the most effect on future locatable mineral activities because almost one quarter of the forests could be withdrawn and would not allow for this activity but would less effect/impact to the environment due to less ground disturbance.

Table 3. Areas that may potentially be withdrawn from mineral entry in the future

Management Area	Alternative A Acres (percent of forests)	Alternative B Acres (percent of forests)	Alternative C Acres (percent of forests)	Alternative D Acres (percent of forests)
Recommended RNA	1,329 * (0%)	7,858 (<1%)	7,858 (<1%)	5,970 (<1%)
Recommended Wilderness	0 (0%)	7,326 (<1%)	6,982 (<1%)	486,051 (24%)
TOTAL	1,329 (0%)	15,184 (<1%)	14,840 (<1%)	492,021 (24%)

* Acreage from the 1987 forest plan. Does not include recommended Escudilla RNA, because the area is within Escudilla Wilderness

Salable Minerals

Alternative A allows the development new common variety mineral sources where economic considerations are considered and where scenic resource objectives can be met, except in the four identified management areas. Alternative A would have the most lands available for mineral material permitting. **Alternatives B, C, and D** further limit common variety mineral activities in designated and recommended special areas (RNAs, wilderness, eligible and suitable wild and scenic rivers, national recreation trails, scenic byways) and Chevelon Canyon. **Alternatives B and C** would have less land available. The least land would be available in **Alternative D** because of the large amount of land in the Recommended Wilderness MA. The effects/impacts on the environment would be less in Alternative D compared to the A, B & C due to less ground disturbance. Alternative A, B& C would provide more availability on mineral material to the public.

Energy

There would be little to no effects to extractive energy resources from **all alternative** because of the very limited amount of these resources on the Apache-Sitgreaves NFs.

Cave Resources

Alternative A is silent on cave management. The **Action Alternatives** identify desired conditions for cave management. Cave management plans would be developed as needed. Alternatives B, C, and D would provide greater recognition and protection for cave resources and their associated biota.

Cumulative Environmental Consequences

Mineral activities may have adverse environmental consequences on some resources in the short-term and long term. Short-term environmental consequences include increased human activity, such as motorized traffic, noise from construction equipment, temporary roads, and ground disturbance during exploration activities and construction of the authorized facilities.

Long-term environmental consequences include operation and maintenance of the authorized facilities over the life of the facility. Operation and maintenance activities may include increased human activity and noise, motorized vehicle traffic, or additional ground disturbance. Determination and implementation of mitigation measures and design may lessen environmental consequences.

Over the long term, the greater public and communities should benefit from services provided mineral activities. Authorizations that are for a long term commitment (more than 5 years) and permit some type of construction or extractive activity or alter the landscape would encumber NFS lands for the terms of the authorization and most likely for the foresee future. Few authorized constructed features are fully removed or rehabilitated.

If locatable mineral extraction occurs during plan implementation it would result in an irreversible commitment of the resource because it consumes nonrenewable mineralsWind power is emerging in Arizona as a viable, stably-priced, and local renewable electricity source. Interest in Arizona's wind development potential is growing, as evidenced by a dramatic increase in inquiries to the Arizona Wind Working Group (AWWG), increased attendance at AWWG events (from 16 in July 2002 to 62 in March 2009), and increased use of the Arizona Wind Resource Map and other web resources that the AWWG maintains.

The Dry Lake wind plant, located near Snowflake, Arizona, is the first utility-scale project to be built in Arizona. The 63 megawatt (MW) project went on-line in August 2009, sending power to the electric grid. Several other projects are under way and are in various stages of the development process (table 6), from wind resource monitoring to capital investment exploration to permitting and environmental monitoring. Additional transmission lines across the Apache-Sitgreaves NFs related to wind energy develop would add cumulative environmental consequences as described above.

Table 4. Wind power projects by County surrounding the Apache-Sitgreaves NFs.

Apache County	Two companies have permits to install resource assessment equipment: • NZ Legacy/Renegy is monitoring wind resources on several ranches. This company is now in the application process for permits to erect up to 75 wind turbines on southeast of Petrified Forest National Park. • Vernon Switch Wind LLC (managed by Foresight Wind) obtained a permit in February 2009 for seven meteorological towers northwest of Springerville.

Coconino County	The county has issued permits to Foresight Wind for several projects: • Sunshine Wind Park, near Highway 40 east of Flagstaff, has all of the permits in place for construction. • The Grapevine Canyon Project, southeast of Flagstaff, has started the NEPA process required for construction of transmission access across the Coconino NF.
Navajo County	Several companies have received permits from the county: • Iberdrola Renewables has building permits and has completed construction of Phase I of the Dry Lake wind plant. An additional 63 MW is planned. Iberdrola will need to submit applications for county permits for additional phases. • NZ Legacy has applied for five special-use permits on 25 sections, which would accommodate up to 50 met towers and 475 wind turbines.

Adaptive Management

Authorizations for mineral activities are monitored by periodic inspections, annual approval of operating plans, and annual billing. Adjustments or permit amendments can be made to adapt the authorized uses to current conditions and technologies, provided any changes are not ground disturbing and are within the context of the original intent as approved by the line officer.

Other Planning Efforts

Other land owners and land policies have the potential to affect Apache-Sitgreaves NFs and vice-versa. In the development of the revised land management plan, these considerations have been taken into account.

Arizona Department of Transportation (ADOT) has a comprehensive plan for improvement of transportation across the State of Arizona (ADOT 2004). Increased highway construction may affect the need of mineral materials.

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Appendix A

Mineral and Energy Desired Conditions

All **Action Alternatives** have these mineral-related desired conditions:

- Mineral material resource sites should be located where economical and the scenic integrity objectives can be met. Adverse visual impacts should be minimized.
- Mineral developments, including pits, mines, equipment, and associated structures, do not dominate the scenic landscape.
- Common variety mineral activities should not be permitted in designated or recommended special areas.
- Common variety mineral activities should not be permitted in Chevelon Canyon.
- Mineral materials (e.g., cinders, decorative stone) are available to support resource management needs, personal use, and commercial pursuits.
- Mineral materials (e.g., gravel, cinders) are available for road maintenance activities for the Forest Service transportation system, public road system, and ADOT use.
- Existing designated mineral material collection areas and community pits should be utilized to the maximum before new areas are developed. Additional mineral material development should balance private and community needs while providing for sustainable administrative use.
- Lands where past mineral development or exploration has occurred are returned to stable conditions and appropriately vegetated with native species.
- Abandoned mine lands do not endanger people or the environment.
- Abandoned mine lands or unneeded mineral material pits should be restored, closed, or rehabilitated to provide for resource protection and public health and safety.
- Naturally occurring geological features (e.g., caves, sinkholes) retain their integrity.
- Caves and abandoned mines are available for roosting bats, reducing the potential for displacement, abandonment of young and possible mortality.
- Caves and abandoned mines that are used by bats should be managed to prevent disturbance to species and spread of disease (e.g., white-nose syndrome).
- Key heritage sites, research natural areas, and administrative and recreation sites with an investment in facilities should be withdrawn from mineral entry.
- Oil and gas leases should contain the "no surface occupancy" restriction in designated or recommended special areas (wilderness[2], primitive area, eligible or suitable wild and scenic rivers, research natural areas, botanical area, and wild horse territory).
- Administrative sites, high use developed recreation areas, and other areas with substantial investment should not be available for geothermal or oil and gas leasing.

[2] Designated wilderness is withdrawn from leasing and mineral entry.