

**Energy and Mineral Resources Assessment
Plan Revision
Nantahala and Pisgah National Forests**

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Introduction

This energy and mineral resource assessment of the Nantahala and Pisgah NFs is based on information from several sources, including U.S. Geological Survey (USGS), Bureau of Land Management (BLM), North Carolina Department of Environment and Natural Resources, North Carolina Geological Survey, and Land Quality Section, Mountain Resources Commission for Western North Carolina.

On June 3, 2013 the Nantahala and Pisgah NFs sent a letter to the State Director, BLM Eastern States Office requesting:

1. Coordination with BLM regarding energy and mineral resources in revising the Nantahala and Pisgah National Forests Land and Resource Management Plan.
2. BLM become a cooperating agency in the National Environmental Policy Act (NEPA) process for revising the Plan.

Energy and mineral resources are part of the Western North Carolina Vitality Index developed and funded by the Mountain Resources Commission in partnership with the Blue Ridge National Heritage Area and the USDA Forest Service. The Mountain Resources Commission was established during the 2009 North Carolina General Assembly legislative session to encourage healthy and equitable development while preserving the natural resources, open spaces, and farmland of the mountain region of Western North Carolina.

The Western North Carolina Vitality Index assesses components of the vitality of 27 counties in western North Carolina through the perspectives of their natural, social, built, and economic environments. The Index is made to allow planners and decision makers the information necessary to inspire quality discussion and craft informed decisions on issues affecting western North Carolina's abundant natural resources and its potential for sustainable growth (<http://www.wncvitalityindex.org/>).

The 18 counties where the Nantahala and Pisgah NFs are located are part of the 27 counties covered by the Western North Carolina Vitality Index. The Index draws on information from various State agencies including the North Carolina Department of Environment and Natural Resources, North Carolina Geological Survey, and Land Quality Section.

What are the current type, extent, and general location of energy and mineral activity and energy facilities on the Nantahala and Pisgah NFs?

Energy and Mineral Supply

Federal leasable minerals

A Bureau of Land Management (BLM) hardrock mineral lease (NC-ES 13667) for olivine is in effect in the Buck Creek area of Clay County on the Tusquitee Ranger

District in the Nantahala NF. The 158 acre BLM lease for olivine is in effect but mining operations under the lease are not active.

Federal mineral materials

A Forest Service mineral materials contract for crushed stone and riprap is in effect in the Massey Branch quarry near Robbinsville area of Graham County on the Cheoah Ranger District in the Nantahala NF. Contract operations occur within 34.4 acres of the Massey Branch quarry, where mining operations have occurred for many years under a series of five year mineral material contracts. The most recent five year contract was issued in May 2012 and will expire May 31, 2017. This five year contract is for 1,250,000 tons, mined at a rate of 250,000 tons per year. Actual production for 2010-2012 is:

Year	Production (short tons)
2010	9,623
2011	9,248
2012	9,975

The Johns Knob quarry on the Cheoah Ranger District was a key source of mineral materials to build the Cherohala Skyway in Graham County. In 2013 the Ranger District is considering a request to use the quarry for a landslide repair on the Skyway.

Other quarries that have been active in the past include: 1) O.J. Wilson quarry (2 acres), a dimension stone quarry near Unicoi in Yancey County on the Appalachian Ranger District, Pisgah NF, 2) A. Taylor quarry (3 acres), a dimension stone quarry near Linville in Avery County on the Grandfather Ranger District, Pisgah NF.

The Nantahala and Pisgah NFs use mineral materials (crushed rock aggregate, rip rap, landscaping rock, etc.) for 1) FS administrative uses such maintaining roads and developing recreation sites, trailheads, and other facilities, 2) FS contracts, such for timber sales, flood or landslide repairs, where mineral materials are needed for the project. The vast majority of mineral materials used by the Forest are purchased from private rock quarries located on private land off the Forest.

The Cotton Patch area located on the Appalachian Ranger District of the Pisgah NF, is under a special use authorization issued to the NC Department of Transportation for a waste area due to recurring slide activity on Interstate 40. The stockpile contains approximately 100 cubic yards of material that could eventually be crushed for future use.

In fiscal year 2012, the Tusquitee and Nantahala ranger districts each issued two mineral material permits for landscaping rock to the general public.

Privately-owned minerals (non-federal subsurface; non-federal minerals; reserved and outstanding rights; split estate)

Hewitt Quarry, a mineral reservation located within the Nantahala National Forest in Swain County, occupies approximately 25 acres of the 300 acre private mineral estate. The quarry contains limestone or low grade marble.

Energy and Mineral Demand

Fossil fuel consumption

The Nantahala and Pisgah NFs use energy and non-energy mineral resources for a wide range of resource programs. The overwhelming majority of the tools, equipment and energy used to manage the Forest and sustain ecosystems are made of minerals, not wood. Minerals are used in three forms, 1) the hardware made from minerals: tools, equipment, computers, GPS, cell phones, vehicles, culverts, bridges, water wells, fire trucks, aircraft, electrical grid, and other infrastructure, 2) highly processed mineral supplies needed to fuel, power, operate and maintain the hardware or to conduct operations (applying fertilizer, herbicides, fire retardant, etc.): gasoline, diesel, oil, chemicals, batteries, etc. 3) minerals used as construction materials or in a relatively raw form: aggregate, rip-rap, concrete, landscaping rock, building stone, etc.

Forest Fleet

In fiscal year 2012, the Nantahala and Pisgah NFs consumed a total of 100,228 gallons of fossil fuels (gasoline and diesel), and travelled 1,981,419 miles.

The Forest also consumed fossil fuel through such activities as, 1) contractors performing road grading, road resurfacing, cutting up and hauling fallen trees that block roads and bridges, etc., 2) volunteers travelling back and forth to the Forest, 3) helicopters and fixed wing aircraft used in fire management, insects and disease surveillance, and monitoring, and flood and wind storm damage assessments, 4) airplane, bus and vehicle transportation of fire fighters from across the U.S. to fight forest fires on the Forest.

Forest Recreation

The Forest provides and promotes public recreation requiring substantial travel that consumes fossil fuels (gasoline, diesel, oil). The number of Nantahala and Pisgah Forest visitors and distances travelled in FY2008 are reported in the Forest's Visitor Use Report as part of National Visitor Use Monitoring (USDA-Forest Service). Report data (Tables 2, 9 and 11) was used to estimate total round-trip miles travelled by Forest visitors. The draft estimate indicates that visitors travelled about 500 million miles in order to recreate on the Nantahala and Pisgah Forest in FY2008. Assuming 20 miles per gallon, recreation users of the Forest consumed on the order of 25 million gallons of gasoline/diesel in FY2008. This estimate includes only round trip mileage from the visitors' home to the Forest, and does not include any additional miles the visitor may have travelled on the Forest as part of the visit.

Forest Timber Harvest

For FY 2010-2012, the Nantahala and Pisgah NFs used an estimated 120,647 gallons per year for fossil fuel consumption for timber harvest.

Mineral materials consumption

The Forest uses mineral materials (crushed rock aggregate, rip rap, landscaping rock, etc.) to construct and maintain the roads, develop recreation sites, trailheads, and other facilities. The largest use of mineral materials is road aggregate on the Forest's approximately 1,613 miles of open roads. Every year the Forest resurfaces a few roads with several thousand tons of aggregate. For fiscal year 2010 to 2012, the Forest's average annual aggregate use was 4,000 tons per year. However, there is a backlog of roads in need of resurfacing, so the 4,000 tons per year is substantially less than the annual surface rock replacement needed to maintain 1,613 miles of open road.

Table 1 – Report aggregate use by Ranger District for FY 2010-2012.

	FY10	FY11	FY12
	Aggregate (tons)	Aggregate (tons)	Aggregate (tons)
Appalachian	None Reported	130	None Reported
Cheoah	None Reported	601	None Reported
Grandfather	None Reported	640	300
Pisgah	390	555	427
Tusquitee	94	1,082	None Reported
Nantahala	33	6,253	1,350
Total	517	9261	2077

In addition to regular maintenance, minerals materials in large quantities are needed to repair roads and stream crossings damaged or destroyed by storm events, floods, road slopes failures, etc. These episodic emergencies can increase the need for mineral materials far beyond the annual use for routine maintenance and surface rock replacement. The Forest uses rocks pits on the Forest to supply some mineral materials, however, the vast majority of mineral materials used by the Forest are purchased from quarries on private land off the Forest.

What is the potential for energy and mineral activity on the Nantahala and Pisgah NFs.

Federal leasable minerals

Solid Minerals Other Than Coal and Oil Shale

Mineral resources on the Nantahala and Pisgah National Forests include more than 40 metallic and non-metallic minerals based on mineral resource information in the Mineral Resources Data System (MRDS) of the U.S. Geological Survey. MRDS is a data base of

mineral site records including present and past mines, prospects, and occurrences along with related geologic, commodity, and deposit information. The MRDS has about 200 records showing that the known mineral resources on the Nantahala and Pisgah National Forests include minerals listed in Table 2.

Table 2 - Mineral resources on the Nantahala and Pisgah National Forests based on Mineral Resources Data System (MRDS) of the U.S. Geological Survey.

Asbestos	Garnet	Mica	Silver
Arsenic	Gold	Molybdenum	Sulphur
Beryllium	Iron	Niobium	Thorium
Copper	Kaolin	Olivine	Tin
Chromium	Kyanite	Palladium	Titanium
Cobalt	Lead	Platinum	Uranium
Columbium	Magnesite	Quartz	Vermiculite
Corundum	Manganese	Rhodium	Zinc
Feldspar	Marble, Dimension	Silica	Zirconium
Fluorine-Fluorite			

A comprehensive overview of the North Carolina's mineral resources and economic impact compiled by Jeffrey Reid, Senior Geologist, Energy and Minerals, titled "North Carolina's Mineral Storehouse and Emerging Resources", is available online at: <http://www.imcc.isa.us/North%20Carolina's%20Mineral%20Storehouse%20and%20Emerging%20Resources.pdf>.

North Carolina and the U.S. have an emerging need for a variety of mineral resources (including special, unusual and rare minerals) to build and operate the infrastructures for National defense and renewable energy (wind, solar, biomass), clean car technology, greenhouse gas reduction and carbon capture infrastructure, high tech computer and internet infrastructure, and other climate change mitigation and adaptation infrastructures. Considering these emerging mineral resources of current interest, the geologic setting of the Nantahala and Pisgah NFs indicates potential for many emerging mineral resources including:

- Rare Earth Elements (REE)
- Platinum group minerals
- Kaolinite, halloysite
- Olivine
- Gem stones (including diamonds)
- Heavy minerals (HM) – especially monazite (REE's and thorium) and related heavy minerals (kyanite, garnet, zircon, etc.)
- Garnet
- Kyanite and related aluminosilicate minerals

- Base metals and gold
- Feldspar
- Silica (quartz)
- Talc and related minerals
- Dimension stone – especially marble
- Tailings piles – diverse minerals to be reprocessed using advanced mineral recovery machines and techniques

The US Geological Survey conducted a study of the bedrock geology and mineral resources of the Knoxville 1°x2° Quadrangle, Tennessee, North Carolina, and South Carolina, an area that includes most of the Forest (Robinson and others, 1992). This study also indicates the Forest has a potential for a vast array of metallic and non-metallic minerals important to society's needs now and in the future.

The Nantahala and Pisgah NFs potential for a vast array of leasable solid minerals for National defense and for climate change mitigation and adaptation infrastructures probably is not matched by any other National Forest in the eastern U.S., nor by any other unit of a federal surface management agency in the eastern U.S.

Oil and Gas

During the oil crisis of the early 1980's, large areas of Nantahala and Pisgah NFs were leased for federal oil and gas. When oil prices dropped, interest waned because of the exploration costs and unfavorable risk/reward in an unproven province for oil & gas exploration and development.

The U.S. Geological Survey conducted a study of the bedrock geology and mineral resources of the Knoxville 1°x2° Quadrangle, Tennessee, North Carolina, and South Carolina, an area that includes most of the Forest (Robinson and others, 1992). In regard to oil and gas potential, the study found that the northwestern portion of the Knoxville quadrangle is a high-risk frontier area for natural gas exploration (Wallace deWitt, Jr., written communication, 1989).

In 2008 the Bureau of Land Management issued a report "North Carolina - Reasonable Foreseeable Development Scenario for Fluid Minerals" that assessed oil and gas occurrence potential and oil and gas development activity potential for federal lands in North Carolina, including the Forest. The BLM report concluded: "No oil and gas wells are forecast to be drilled in North Carolina in the next ten years... There are no estimates of the surface disturbances associated with the development of oil and gas on federal minerals within the State of North Carolina because no new wells are predicted to occur over the next ten years."

More information about oil and gas potential in the Blue Ridge may emerge from field research the North Carolina Geological Survey is planning for summer 2013.

Coal

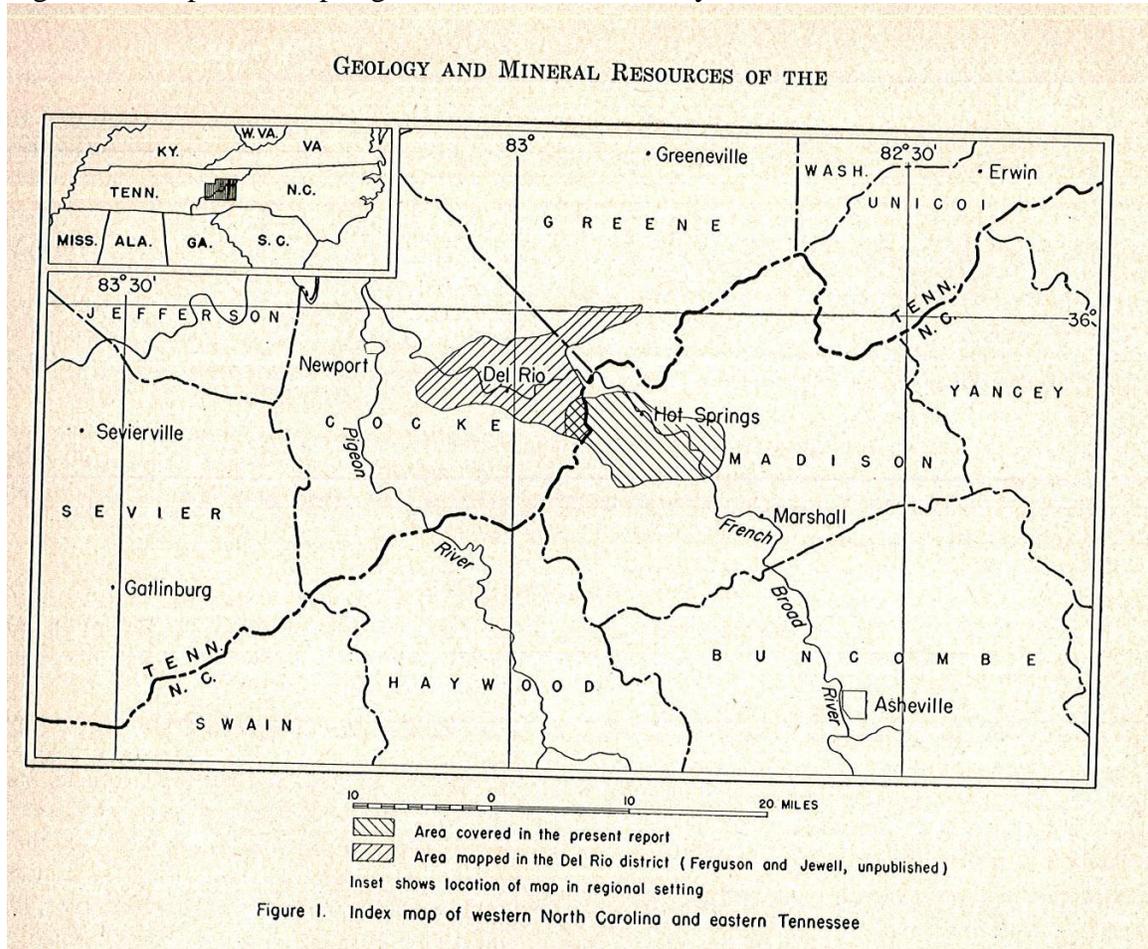
A 1992 US Geological Survey study of the bedrock geology and mineral resources of the Knoxville 1°x2° Quadrangle, Tennessee, North Carolina, and South Carolina, an area that includes most of the Forest (Robinson and others, 1992), concluded that rocks in the Knoxville quadrangle contain no coal.

Geothermal

The North Carolina Geological Survey conducting a study of the geology and mineral resources of the Hot Springs window, Madison County (Oriel, 1950). The study area, depicted in Figure 1, includes parts of the Pisgah NF. The reports states:

“The hot springs constitute the most valuable mineral resource in the area covered by the present report. Since their discovery, the springs have attracted visitors from many states and have been an important source of revenue for the town and county.”

Figure 1 – Map of Hot Springs window area studied by Oriel, 1950



The US Geological Survey conducted a study of the major warm springs in the Appalachians extending from western Georgia to eastern New York (Hobba and others, 1979).

Based on these studies by the NCGS and USGS, the portion of the Pisgah NF in the vicinity of Hot Springs has potential for geothermal resources, including Enhanced Geothermal Systems (EGS) as defined by the U.S. Department of Energy.

Mineral Potential for Wilderness, Wilderness Study, and Roadless Areas

The US Geological Survey conducted a study of the bedrock geology and mineral resources of the Knoxville 1°x2° Quadrangle, Tennessee, North Carolina, and South Carolina, an area that includes most of the Forest (Robinson and others, 1992). This study provides an overview of USGS studies for mineral potential information for Wilderness, Wilderness Study, and Roadless Areas at that time as follows:

“The Knoxville quadrangle contains all of two and parts of three wildernesses, three wilderness study areas, and 11 roadless areas in the National Forests plus the large proposed wilderness in the Great Smoky Mountains National Park (fig. 4). Wilderness resource assessments have been completed on some of these areas. The Shining Rock Wilderness, an area of 13,400 acres in the Pisgah National Forest near the center of the quadrangle in Hay-wood County, N.C. (Lesure and Dunn, 1982) was established as a wilderness in 1964. In 1984 the Shining Rock Additions of 5,100 acres were added to the north and southwest of the original wilderness, and the Middle Prong Wilderness of 7,900 acres was established a few miles to the west. These additional areas have not been studied by USGS. About 4,000 acres of the Ellicott Rock Wilderness lie in the Nantahala and Sumter National Forests along the southern border of the quadrangle where Georgia, North Carolina, and South Carolina meet (Luce and others, 1983). The northern part of the Southern Nantahala Wilderness, consisting of about 10,000 acres in the Nantahala National Forest, lies along the southern border of the quadrangle in Clay and Macon Counties, N.C., 20 mi west of Ellicott Rock (Peper and others, 1991). The eastern three-fourths of the Joyce Kilmer-Slickrock Wilderness in the Nantahala and Cherokee National Forests straddles the North Carolina-Tennessee border in the southwestern part of the quadrangle (Lesure and others, 1977).

“The three wilderness study areas—Craggy Mountain, Overflow, and Snowbird—are in North Carolina and were so designated by the North Carolina Wilderness Act of 1984. These areas were recommended as further planning areas in 1979 by the Second Roadless Area Review and Evaluation (RARE II) and have been studied by USGS. The Craggy Mountain Wilderness Study Area of about 2,300 acres is 10 mi northeast of Asheville in the Pisgah National Forest (Lesure and others, 1982). The Snowbird Wilderness Study Area of 8,490 acres is in the Nantahala National Forest along the western edge of the quadrangle about 5 mi south of the Joyce Kilmer-Slickrock Wilderness (Lesure and Chatman, 1983), and the north half of the Overflow Wilderness Study Area of 3,200 acres is in the Nantahala National Forest 5 mi west of Ellicott Rock Wilderness (Koeppen and others, 1983).

“The remaining roadless areas defined in RARE II were recommended for multiple use and have not been studied by USGS (fig. 4). These include the following in the Pisgah National Forest: Balsam Cone, 13,529 acres; Middle Prong, 2,265 acres; Wildcat, 7,120 acres; and Shining Rock Extension, 4,876 acres. In the Nantahala National Forest there are Fishhawk Mountain, 5,430 acres; Southern Nantahala, 11,412 acres; Chunky Gal, 12,445 acres; Tusquitee Mountains, 16,860 acres; Cheoah Bald, 21,434 acres; and Joyce Kilmer-Slickrock Addition, 1,179 acres. In the Cherokee National Forest there is Devil’s Backbone, 4,100 acres.”

Based on limited research so far, there do not appear to be any USGS studies specific to areas designated since 1992 such as in the Inventoried Roadless Areas in the 2001 Roadless Area Conservation Rule.

Federal mineral materials

The Forest has a high potential for the occurrence of mineral materials (aggregate, rip rap, building stone, landscaping rock, etc.) that can be used to meet the Forest’s needs as well as local or regional needs for mineral materials. The potential for development of mineral materials will be based on Forest Plan direction.

What portion of the Nantahala and Pisgah NF is the subsurface ownership not FS, and where is that located?

Most of the minerals underlying the federal lands that make up the Nantahala & Pisgah NFs are federally owned. However, some tracts acquired by the USDA Forest Service either had the mineral rights reserved (reserved rights) or already had the mineral rights severed (outstanding rights). The land status in which owner of the mineral rights on a tract is different than the surface owner of the tract is referred to by various names: split estate; private subsurface ownership; reserved or outstanding mineral rights (ROR abbreviation); nonfederal mineral ownership; nonfederal minerals rights; private mineral rights.

GIS data for the Nantahala and Pisgah NFs lists 205 tracts with outstanding or reserved mineral rights in which there is less than 100% federal mineral ownership. Total acreage of outstanding mineral rights on these tracts is anywhere from 102,523 acres to 125,714 acres depending on which tracts or portions of tracts, had mineral claims extinguished per the N.C. Ancient Minerals Act (N.C. Gen. Stat. § 1- 42.1 through § 1- 42.9).

In summary, the existing information is insufficient to provide a reasonable estimate on the extent of current subsurface ownership. This lack of reliable information affects not only consideration of private mineral rights (subsurface ownership; reserved and outstanding mineral rights) but also consideration of federal mineral ownership on the tracts with unclear or unresolved mineral rights status. It likely would be time-consuming and costly, particularly if attorney’s opinion is sought, to remedy the insufficient information.

Are there any abandoned mines or mining related hazards in need of reclamation or restoration?

Recent Abandoned Mine Lands (AML) closures to abate mine hazards for public safety have been accomplished at Ray Mine on the Appalachian District, Pisgah NF. More closures are planned.

The Tusquitee Ranger District has identified several mine shafts and is considering shaft closure in the Buck Creek area of Clay County on the in the Nantahala NF.

The Mineral Resources Data System (MRDS) of the U.S. Geological Survey can be as to develop an Abandoned Mine Lands inventory. MRDS is a data base of mineral site records including present and past mines, prospects, and occurrences along with related geologic, commodity, and deposit information. The MRDS has about 200 records for Nantahala and Pisgah National Forests, but only some of these records would lead to an AML site needing a safety closure.

What are the current policies for rockhounding and gold panning on the forests?

The Forest-wide Direction for recreational collection of minerals (rockhounding, gold panning, etc.) in the current Forest Plan is to:

- Allow recreational collection of minerals where minerals are loose and free on the surface, in federal ownership, and not restricted by permit.
- Restrict mineral collection to nonmechanical equipment with no significant ground and stream disturbance.

Consistent with the Plan, the Forest's current policy on the Forest's public website is at <http://www.fs.usda.gov/detail/nfsnc/recreation/?cid=stelprdb5420144>

The public collecting of mineral specimens for non-commercial purposes on the Forest is based on authorities from two federal agencies: the Bureau of Land Management (BLM) and the Forest Service. BLM provides the mineral authority for disposal of mineral specimens (gold, etc.) to the public, while the Forest Service provides the surface management authority determining what areas and under what conditions the public may collect minerals specimens. For more information regarding recreational rockhounding, see the recreation section of this assessment report.

Need for change for Forest Plan components for mineral resources

A compilation of the current Plan direction on mineral resources is in Appendix A. The need for change is indicated by a need to recognize the distinct opportunity the Forest has to contribute minerals resources needed and critical for National defense and for required for renewable energy (wind, solar, biomass), clean car technology, greenhouse gas reduction and carbon capture infrastructure, high tech computer and

Internet infrastructure, and other climate change mitigation and adaptation infrastructures.

The pressing National need for action is highlighted by a National Research Council report *Minerals, Critical Minerals, and the U.S. Economy*. The National Academy of Sciences (2007) describes the report in brief, and the following excerpts are relevant to the need for change:

“This report investigates and highlights the importance of minerals in modern U.S. society, which minerals might be termed “critical” and why, the extent to which the availability of these minerals is subject to restriction, and the data, information, and research needed to aid decision makers in taking steps to avoid restrictions in mineral supply. The audience for the study includes not only federal agencies, industry, and research organizations, but also the general public and decision makers.”

“For example, platinum group metals and rare earth elements are fundamental to the construction and function of automobile catalytic converters. At present, no viable substitutes exist for these minerals in this application, resulting essentially in a ‘no-build’ situation for catalytic converters should the supply of those minerals be restricted. These minerals’ importance is high in this application.”

“The portfolio of minerals needed for manufacturing is dynamic. The Information Age is creating demand for an ever-wider range of metallic and nonmetallic minerals to perform essential functions in cellular telephones (e.g., tantalum), liquid crystal displays (e.g., indium), computer chips (a broad mineral suite), and photovoltaic cells (e.g., silicon, gallium, cadmium, selenium, tellurium, and indium).”

“The report applies the criticality matrix to 11 minerals/mineral groups: copper, gallium, indium, lithium, manganese, niobium, platinum group metals, rare earth elements, tantalum, titanium, and vanadium (Figure 3)...Of the 11 minerals that the report examines, platinum group metals, rare earths, indium, manganese, and niobium, were determined to be most “critical”. Their uses and applications, the difficulty in finding appropriate mineral substitutes for these applications, and the risk to their supply for any one of a number of reasons were high enough to place these minerals in or near the critical “zone” of the criticality matrix.”

http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/critical_minerals_final.pdf

In the western U.S., the FS and BLM are two federal surface management agencies with multiple use missions where mineral exploration and development can play a meaningful role. In onshore eastern U.S., BLM has scattered subsurface federal mineral rights under non-federal surface, but BLM does not have significant surface management lands. In eastern U.S., the Forest Service is the only surface management federal agency with multiple use mission where minerals can play a meaningful role. And among NFs in eastern U.S., the Nantahala and Pisgah National Forests has distinctive opportunity.

The Nantahala and Pisgah National Forests potential for a vast array of leasable solid minerals for National defense and for climate change mitigation and adaptation infrastructures probably is not matched by any other National Forest in the eastern U.S., nor by any other unit of a federal surface management agency in the eastern U.S.

Because developable minerals resources are rare and concentrated in small pockets within the landscape, very little percentage of Forest acres are needed to accommodate mineral development, perhaps on the order of ¼ of 1% of Forest acreage. But in order to accommodate mineral development the Forest Plan direction needs to provide flexibility (adaptive management) because future mineral development sites cannot be predicted or scheduled as they can for surface resource development. Mineral potential is not an inventory in the sense of surface resources inventories of trees, streams, wildlife, etc.

The federal government is mobilizing to lead implementation of climate change mitigation and adaptation. The Nantahala and Pisgah National Forests has the multiple use mission and the distinct opportunity to provide leadership in provisioning the mineral raw materials required to implement climate change mitigation and adaptation.

Desired Condition

Because mineral resources are managed under a variety of laws, regulations and USDA and USDI jurisdictions, the Desired Condition needs to have sections addressing each part of mineral resource management in order to provide clarity for Line Officers and the public in implementing the revised Plan. The following is a possible format and content for the Desired Condition for Mineral Resources:

Desired Condition – Mineral resources activity (occupying less than ¼ of 1% of Forest land) is sustaining renewable resource operations on the Forest and is supplying the region and U.S. with minerals required for climate change mitigation and adaptation.

Federal leasable minerals (FS & BLM administered) - At dispersed locations, drilling and exploration under BLM leases is providing the subsurface inventory information needed to responsibly manage the federal mineral estate. Several underground mines and a few surface mines under BLM hardrock leases are supplying a variety of minerals required for National defense and for renewable energy (wind, solar, biomass), clean car technology, greenhouse gas reduction and carbon capture infrastructure, high tech computer and Internet infrastructure, and other climate change mitigation and adaptation infrastructures.

Federal mineral materials (FS administered) –

Forest force account or contract – Most of the thousands of tons of aggregate used every year to replace road surface rock worn out and depleted by recreation and other users of the hundreds of miles of Forest roads is mined on private off Forest and hauled to Forest roads. Rock trucks can be seen delivering aggregate, riprap, landscaping rock, etc. to sustain renewable resource and ecosystem management

operations, such as, 1) construct or maintain developed recreation sites, trails, 2) restoration and watershed condition improvement projects, 3) Forest Service timber sale contracts, 4) flood repairs, 5) landslide repairs, 6) road construction, reconstruction, and maintenance. Some mineral materials for these projects are from Forest borrow pits and quarries as needed to reduce fossil fuel consumption, reduce costs, or in emergencies such as flood or landslide repairs. The waste of funds and the loss of the Forest's valuable pits and quarries due to premature reclamation is not seen on any Ranger District.

Public use (non-commercial sale) – The public is gathering landscaping rock, building stone, and other minerals materials in the areas allowed for such use and after paying for a Forest Service mineral material permit.

Public use (commercial sale) – A commercial pit or quarry is a rare sight on the Forest, but might be present for long-term support to rural infrastructure, or short-term or intermittent use for contractors for state or federal highway projects.

Free use (other government agencies or non-profit organization) - A non-commercial pit or quarry is a rare sight on the Forest, but might be present for use on public projects or non-commercial purposes.

Rockhounding - Visitors continue to enjoy the long-standing tradition of rockhounding, recreational mineral collecting, in the areas allowed for such use. The Forest is part of North Carolina famous rockhounding experience that draws visitors and tourism to western North Carolina.

Abandoned Mine Lands - Safety hazards at abandoned mine land are mitigated using appropriate closure techniques.

Subsurface ownership - FS resource management on tracts subject to private mineral rights is not resulting in “takings” lawsuits costing the government millions of dollars.

The Desired Condition would lead to development of Plan components (Objectives, Standards, and Guidelines) during the Planning Period.

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Appendix A
Nantahala and Pisgah National Forests
(LRMP Amendment 5)
Minerals Management - Forest-wide and Management Area Direction

Forest Direction		
Desired Future Condition	Utilization of mineral resources is provided in an environmentally sound manner.	
Forest-wide Direction		
Activities	General Direction	Standards
Minerals Management	Utilize mineral resources only when Forest-wide and Management Area direction and cultural resources can be protected. Do not consent to leases for mineral activities that can not meet Management Area objectives including those concerning visual quality, soil, water, wildlife, and fisheries habitat and plant communities.	If consent is given to mineral leasing, in addition to standard contract stipulations which provide for basic resource protection (soil, water, cultural resources, vegetation, wildlife, and fish, etc.), include additional appropriate stipulations to meet Management Area special objectives. These stipulations include but are not limited to no surface occupancy, seasonal operating limitations, size limitations and special rehabilitation measures. Require mineral royalty rates to meet fair market value.
	Determine the need for special stipulations on all applications for permits, leases, and licenses, based on site-specific analysis.	
	Require an operating plan before a site is developed.	Authorize only operating and rehabilitation plans that include at least the following: <ul style="list-style-type: none"> - A schedule of activities - An estimate of the amount of material to be removed. - Measures for stabilizing soil, protecting water quality, restoring vegetation, and protecting visual quality.
Heritage Resource Management	Ensure that all land use permits, contracts, and other Forest use authorizations contain adequate stipulations and provisions for protection of significant heritage resources.	Restrict mineral activity at Native American Religious Sites. Allow no surface occupancy. Require mitigation of significant archeological sites prior to any impact.
Dispersed Recreation Management	Allow recreational collection of minerals where minerals are loose and free on the surface, in federal ownership, and not restricted by permit.	Restrict mineral collection to nonmechanical equipment with no significant ground and stream disturbance.

Minerals Management

Management Area Direction			
MA	Acres	General Direction	Standards
1B	38,498		
2A	40,642		
2C	37,680		
3B	232,873		
4A	55,604		
4C	179,992		
4D	160,080		
5	119,685		
6	8,419	Manage mineral activities to protect wilderness capability.	Stipulate no surface occupancy in any new lease.
7	66,550	Allow no mining. All minerals under Federal ownership have been withdrawn from mining.	
8	12,520	Require approval by the Chief of the Forest Service for any new mineral permits or leases in experimental forests.	
9	7,900	Manage mineral activities to protect the distinctive scenic qualities.	Stipulate no surface occupancy in all new leases.
10	1,460	Restrict mineral activities to retain the characteristics of the area.	Stipulate no surface occupancy for any new lease.
11	6,540	Permit mineral leasing with special stipulations to protect the historic, educational, and interpretive values of the area.	Stipulate in all new leases no surface occupancy within interpretive areas unless compatible with exhibit objectives.
12	3,030	Manage mineral activities to be compatible with a pleasing recreational experience.	Stipulate no surface occupancy in all new leases.
13	10,370	Manage mineral activities to protect the unique characteristics of the area.	Stipulate no surface occupancy in new leases.
14	12,450	Manage mineral activities to protect the character of the trail corridor.	Stipulate in all new leases no surface occupancy.
15	2,050	Allow no mineral activities.	
16	1,260	Issue permits for minerals only when stipulations in leases will be compatible with administrative needs and public use of administrative sites.	
17	3,880	Restrict mineral activities where necessary to protect area resources.	Stipulate no surface occupancy in any new lease. Issue no permits for common variety minerals.
18	101,530 embedded	Restrict mineral activities where necessary to maintain riparian values.	Stipulate no surface occupancy in any new lease except for need roads.