

### 3.6 MINERALS AND MINING

Mineral development is an important land use within the federal, state and local multiple-use mandate in Garfield County. In communities across the country, mining provides jobs, economic activity and important commodities that are essential to maintain a high quality of life. Mineral and mining resources are located throughout the County; and resources located on state and private lands have been developed to the extent economically and practically feasible. This section of the Resource Management Plan identifies Garfield County's plans, programs and policies for non-energy mineral and mining resources. Energy related resources are discussed in the Energy section of this plan.

Minerals on Federal lands are divided into three categories, each subject to different laws and regulations.

1. Locatable, which are subject to the Mining Law of 1872, as amended, include gold, silver, copper and other hard rock minerals.
2. Leasable minerals, such as coal and a host of other commodities, are subject to various Mineral Leasing Acts.
3. Saleable minerals, such as sand and gravel that are essential to construction and roadbuilding, are subject to the Materials Act of 1947, as amended.

#### Current Setting

Locatable Minerals Locatable minerals include both metallic minerals (gold, silver, lead, copper, zinc, nickel, etc.), nonmetallic minerals (fluorspar, mica, certain limestones and gypsum, tantalum, heavy minerals in placer form, and gemstones) and certain uncommon variety minerals. The eastern part of the County in the Colorado Plateau is rated as high potential for metals, including uranium, vanadium and gold as the primary resource.

Metallic mineral deposits in Garfield County include paleo-placer deposit of titanium, zircon and uranium located along the eastern rim of the Kaiparowits Plateau, uranium Deposits in the Circle Cliffs area and near the Henry Mountains, and in the Orange Cliffs as well as, metal mining occurrences of antimony, mercury and silver associated with igneous rocks in western Garfield County.

The uranium titanium paleo-placers within the Kaiparowitz plateau are significant because of the resources they contain. A resource estimate reported in *Titanium-Zirconium-Bearing Fossil Placers Deposits in the Cretaceous Straight Cliffs Formation, Garfield and Kane Counties, Utah*, Glory and others, 1997 indicates deposits range between 300,000 and 1,000,000 tons. Grades between 3% and 11 % ZrO<sub>2</sub> and 9.6% to 22% TiO<sub>2</sub> are reported. The Calf Canyon deposit in Garfield County is estimated to contain 300,000 to 600,000 tons. The only uranium mineral reported in these deposits is monazite, which contains rare earth elements (REE) as well. There is significant interest in REE's as strategically important elements for defense and the computer industry.

Uranium districts in the Circle Cliffs and Orange Cliffs areas produced uranium from the Shinerump and Mossback Members of the Chinle Formation respectively. All of the mines in these districts are small and operated briefly in the 1950s, and 1960s with minor production in the 1970s. Uranium deposits in the Henry Mountain Districts are within the Morrison Formation. Most of these deposits were small however exploration in the South Henry Mountains during the 1980's, delineated the largest uranium deposit known in the Salt Wash Member of the Morrison Formation (20 million pounds of contained  $U_3O_8$  in all categories). A uranium mill constructed near Ticaboo makes it likely that production will occur in the future.

Base metals deposits near Antimony and Spry are small with limited potential for production. Gold mineralization associated with the igneous rocks of the Henry Mountains have been developed in recent years with limited success.

Leasable Minerals Since 1920, the Federal Government has leased fuels and certain other minerals (43 CFR Parts 3000-3590). Today, minerals that are subject to lease include oil and gas, oil shale, geothermal resources, potash, sodium, potassium, sulfur, native asphalt, solid and semisolid bitumen, bituminous rock, phosphate, and coal. In addition, some hardrock minerals, depending on their location, may be considered leasable. Federal agencies may also lease these minerals on certain private lands, provided the mineral rights are owned by the federal government. Most of the minerals leased under this program are used to make fertilizer or feed stock (mineral supplement for livestock) or have other industrial processes.

Potash, used in fertilizers, is produced from Mississippian aged evaporate beds in San Juan and Grand Counties to the east. Potential for similar deposits lie in the extreme northeast corner of Garfield County. However, this area is managed by the National Park Service as portions of Canyonlands National Park or Glen Canyon National Recreation Area, so exploration and development is highly unlikely. Salt is also found in the same beds as potash in Grand and San Juan Counties to the East. Potential for similar deposits lie in same areas that may contain potash and have similar restrictions on development.

Phosphate is a principal component of fertilizer. One occurrence of phosphate, probably from the mineral apatite, is known in Garfield County.

Uses for silica include abrasive, glass and chemical, metallurgical, refractory, and electronic. Abrasive uses include stone cutting, glass grinding and blasting. Glass and chemical uses require extreme high purity and narrow size limits. Metallurgical silica is usually pebble in size but some modern smelters require a small size. Applications of metallurgical silica include the making of silica alloys and as a flux. Refractory uses include mold or cord sand in foundry operations, bottom sand in open hearth and electric steel furnaces and for patching or lining of furnaces and associated vessels. Other uses include as a filter media, hydraulic fracturing in the oil and gas industry and as a component of computer chips. Silica of high purity is found in the Navajo Formations in Garfield County.

Salable Minerals Salable minerals or mineral materials are the largest group of mineral resources and are often termed industrial minerals. Salable minerals include sand and gravel, stone, clay, and humate. The rights to industrial minerals on federal lands can be acquired by claim, lease or

purchase from the federal agency. Manufacturing processes that consume these minerals, produce items that are sold to consumers, usually located within a reasonable transportation distance of the mine site.

There are several mineral material pits authorized within the County. Many of the pits are available to the public, while others are only available for Federal Highway Administration or governmental use.

Sand and gravel have been some of the most significant mineral commodities mined from the area. The single greatest use has been for construction activities including highways, and most mining has been near existing roads. With the creation of additional layers of federal regulation, future sand and gravel production from the County will be focused even more on limited areas where material deposits do not conflict with other uses.

The development potential for sand and gravel deposits in the planning area is rated as high in areas of past or present sand and gravel extraction, as well as where the proper host formations are found within three miles of a paved road. Sand and gravel development potential is moderate where the host formations are more than three miles from a paved road, and low where the host formations are administratively restricted from future development. Continued exploration and development activities for sand and gravel are expected for the next 15 years at a level that increases slightly from past rates. Most of the activity would be in the areas of high development potential, but some would also occur farther from paved roads to allow maintenance of unpaved county roads.

Building stone is used for the support and ornamentation of buildings. This includes stone used for facades, counter tops and other decorative uses. With the advent of concrete foundations, the use of stone for foundations has stopped. The market for various stones depends on architectural style and interior decor fashions. Early settlers used field stone and quarry stone mostly for home and building construction. A small number of building/dimension stone quarries remain active, and there are several that are inactive or abandoned. In addition, there are a small number of decorative stone quarries, as well as quarries for rip-rap. The development potential for stone is rated as high at past and present quarry sites and moderate outside these areas where the proper host formations occur. Stone exploration or development activity is expected to continue during the next 15 years at rates slightly higher than historic activity levels.

The term clay is both a particle size term and a group of crystalline minerals. As a rock type it is a very fine grained sedimentary rock where most of the grains are composed of the crystalline minerals also called clays and other detrital grains less than 4 microns in size. Clay behaves plastically when wet and has an amazing variety of uses. The most common types are two-layer clay minerals called the kaolin group and three-layer type called the montmorillonite group. The montmorillonite group are the types that occur in Garfield County. These clays have swelling characteristics when wet, and are used to line water impoundments, and in oil well drilling muds. The two formations outlined above are the Mancos Shale and the Petrified Forest Member of the Chinle Formation. Although clay is one of the more prominent materials, only a few small mines are known to have produced clay in Garfield County. The development potential for clay is rated as high at past and present extraction sites and moderate outside these areas where the

host formations are present. No additional significant clay exploration or development activity is expected during the next 15 years.

Although relatively unknown, humate is a pure form of natural organic material and is one of the most complex substances on earth. Humate is highly concentrated into a solid material and is developed in processes similar to coal. As plant matter decomposes materials progress from plant and animal matter to peat, to humate, and in some cases, then continues to lignite or coal. Humate resources in Utah were developed from vast fresh water seas and are of high quality due to arid conditions that prevented nutrient leaching. No known exploration or development activities for humate have occurred in the area. The development potential for humate is rated as low. No humate exploration or development activity is expected during the next 15 years.

### **Need for Management Change**

- 1) Mineral and mining resources need to be recognized as valuable components of multiple use management and as an appropriate use of federal lands.
- 2) Mineral and mining resources need to be responsibly developed for the benefit man.
- 3) Managers need to support community development by facilitating use of mineral and mining resources.
- 4) Mineral and mining resources located outside Park Service lands and designated wilderness need to be available for development.
- 5) Additional sand, gravel and construction material pits need to be developed near communities.
- 6) Additional sand, gravel and construction material need to be made available in remote locations for watershed, facility and road maintenance.
- 7)

### **Desired Future Conditions**

Garfield County Desires:

- a) Mineral and mining development is recognized and advanced as a valuable component of multiple use management and community development.
- b) Mineral and mining resources are developed at an expanded rate.
- c) Mineral and mining resources are optimized to support community sustainability and stability.
- d) Mineral and mining resources located outside Park Service lands and designated wilderness are available for development to the maximum extent allowed by law.
- e) Additional material pits are developed near communities.

f) Additional material pits are developed for road maintenance, erosion control, stream stabilization and other activities that promote productive and enjoyable harmony between man and his environment.

g) WSA lands that are not suitable for Wilderness designation as identified in the County land use plan are released from further consideration and made available for mineral and mining extraction.

### **Findings, Policies, Goals & Objectives**

**Goal & Objective:** Manage mineral and mining resources to a) prevent undue and unnecessary degradation; and b) optimize use of the resources without compromising the long-term health and diversity of lands in the County.

**Goal & Objective:** Manage mineral and mining resources provide minerals and industries needed for community stability and economic purposes while minimizing impacts to other resources.

**Policy:** Garfield County adopts the principles expressed in Section 63J-8-104 of the Utah Code regarding mineral and mining on federal land. Federal land managers shall achieve and maintain at the highest reasonably sustainable levels, a continuing yield of mineral and mining resources in those subject lands with economically recoverable amounts of such resources.

**Finding & Policy:** A vibrant mineral and mining industry is an important component of a healthy, sustainable and stable economy and the communities and families it supports.

**Goal & Objective:** Manage mineral and mining resources to provide for the responsible use and prosperity of man and local communities.

**Finding:** Increasing restrictions on the development of mineral and mining resources over the last few decades has had a negative impact on Garfield County's economic welfare, community stability and sustainability.

**Policy, Goal & Objective:** Managers shall encourage and facilitate development of mineral and mining resources by private and governmental industries in a manner that satisfies national, state and local needs and provides for economically and environmentally sound exploration, extraction and reclamation.

**Policy:** Garfield County supports implementation of reasonable Best Management Practices for exploration, extraction and reclamation of mineral and mining projects.

**Policy:** Where surface occupancy would be undesirable (cemeteries, culinary water sources, landfills, NRHP sites, developed recreation sites, etc.), manage for optimal leasing with no surface occupancy stipulations.

**Policy:** Garfield County will Coordinate and work cooperatively with federal state and local agencies to maximize responsible, environmentally sound development of mineral and mining resources.

**Policy:** Land managers shall reconsider mineral and mining operations for lands that are designated as No Surface Occupancy or closed when a) the circumstances or relative resource values have changed; b) less restrictive requirements could be developed to protect resources of concern; c) operations could be conducted without causing unacceptable impacts to resources of concern; d) projects are proposed that provide at least 5 full time jobs for a period of not less than 3 years; e) during the next regular planning cycle; or f) prior to the end fiscal year 2025, whichever occurs first.

**Policy:** Consistent with Garfield County's Visual Resource Management Plan, managers shall not consider surface disturbing mineral and mining operations in VRM Class I areas. VRM Class II, III, and IV areas shall be available for surface disturbing mineral and mining operations with appropriate BMPs. Where questions arise regarding allowable activities in VRM Class II, III, and IV areas, managers shall coordinate with Garfield County to assure consistency to the maximum extent allowed by law.

**Policy, Goal & Objective:** Opportunities shall be maintained to access mineral and energy resources to sustain viable rural economies and to contribute to the health, welfare and economic growth of the region, state and nation.

**Policy:** Lands disturbed by mineral and energy activities shall be reclaimed using the best techniques and principles and returned to other productive uses.

**Finding & Policy:** Mineral and mining activities occur on a very small percentage of the land, generally less than 1%. Mineral and mining exploration, development, extraction and reclamation are compatible with other uses and can occur concurrently or sequentially with such uses.

**Policy:** Mineral and mining activities will be prioritized outside special status species habitat. When mineral and mining activities are proposed in special status species habitat, priority will be given to development in non/low value habitat first and then in the least suitable habitat and will implement avoid, minimize, mitigate protocols.

**Policy:** Surface disturbing mineral and mining activities in special status species habitat shall comply with the Garfield County conservation plan for the species of concern. If no County plan has been adopted for the particular species of concern, land managers shall coordinate species conservation plans and habitat evaluation guides with Garfield County as part of environmental analysis for the proposed mineral/mining activity.

**Finding & Policy:** Garfield County has sufficient areas managed for primitive recreation in existing parks, monuments, recreation areas, and designated wilderness. Managers shall prioritize exploration, development, extraction and reclamation of mineral and mining resources

over wilderness values and primitive recreation unless specifically mandated otherwise by federal law.

**Policy:** Mineral and mining exploration, development and extraction shall be allowed in Class II and Class III pinyon/juniper woodlands with an median age less than 200 years to the maximum extent allowed by law. Consistent with ecologic site descriptions, reclamation activities in such areas may restore lands to desired future conditions consistent with management objectives.

**Finding and Policy:** No Surface Occupancy restrictions are not suitable for special status species habitat where the Wildlife Habitat Evaluation Guide score is less than 70% of the maximum, unless approved by the County Commission. Mineral and mining projects that include reclamation anticipated to improve a Wildlife Habitat Evaluation Guide score at least 10% are found to be a net benefit to the species of concern.

**Policy:** Management of the County's mineral and mining resources in areas designated for sage grouse management shall be consistent with the County's Resource Management Plan to the maximum extent allowed by law.

**Policy:** Land shall not be managed for wilderness characteristics if they contain mining and mineral resources that have the potential of being developed prior to the subsequent resource management planning event or 25 years, whichever is longer.

**Policy:** Areas shall not be closed to locatable mineral entry, new mineral material sales, solid mineral leasing, and similar activities without consultation, cooperation and Coordination with the County Commission.

**Policy:** The least restrictive terms and conditions allowed by law shall apply to exploration, development, extraction, and reclamation of mineral and mining resources in Garfield County.

**Policy:** All federal land management plans with mineral/mining development provisions applicable to lands in the County, shall include an environmental analysis that clearly discloses: a) the planning agency has considered and evaluated the mineral and mining potential in all areas of the planning area as if the areas were open to mineral development under standard lease agreements; b) the planning agency has evaluated any management plan prescription for its impact on the areas baseline mineral and mining potential; c) development provisions do not unduly restrict access to public lands for mineral exploration and development; d) the planning agency has analyzed all proposed mineral/mining stipulations and considered adopting the least restrictive necessary to prevent or reduce damage to other significant resource values; and e) the planning agency evaluated mineral/mining restrictions to determine whether to waive, modify or make exceptions to the restrictions on the basis that they are no longer necessary or effective.

## **References**

*Mineral Potential Report for the Kanab Planning Area*, BLM Kanab Field Office Resource Management Plan, 2008

BLM Kanab Field Office Resource Management Plan, 2008

BLM Richfield Field Office Resource Management Plan, 2007

*Geology and Mineral Resources of Garfield County, Utah*, Utah Geological and Mineral Survey, Bulletin 107, Hellmut H. Doelling, October 1975