

VEGETATION SURVEY

Rev. 1

Date: 02/09/09

OF THE
ENVIRONMENTAL REPORT
IN SUPPORT OF THE APPLICATION FOR
LICENSE FOR SOURCE MATERIAL MILLING

PIÑON RIDGE URANIUM MILL
Montrose County, Colorado

Submitted to:

Radiation Management Unit
Colorado Department of Public Health and
Environment

Prepared for:



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Project No. 83088
DCN 83088.5.J-ALB08RP001

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1.0 INTRODUCTION

Energy Fuels Resources Corporation (EFR) proposes to license, construct, and operate a conventional acid leach uranium and vanadium mill at the Piñon Ridge Mill site (the Site) in western Montrose County, Colorado. Site facilities will include an administration building, a 17-acre mill, tailing ponds totaling 90 acres, an 80-acre evaporation pond, a 5-acre ore storage pad, and an access road. The mill will process ore produced from mines within a reasonable truck-hauling distance. The mill will process up to 500 tons of ore per day but is designed to accommodate subsequent expanded production capacity of up to 1,000 tons per day. The expected operating life of the mill is 20 to 40 years.

The Piñon Ridge Mill is subject to regulation by the State of Colorado, and the mill license (Radioactive Source Material License) will be issued and administered by the Colorado Department of Public Health and Environment (CDPHE). The activities described in this document were performed as part of the baseline characterization required for the Environmental Report (ER) in accordance with Section 3.8.8, Part 3, 6 CCR 1007-1. This report presents the results of the vegetation surveys conducted by Kleinfelder for EFR in support of the license application.

1.1 Site Location

The proposed Piñon Ridge Mill is located in the Paradox Valley at 16910 Highway 90, approximately 14 miles west of Naturita, in Montrose County, Colorado. The Site's legal description is the Southwest $\frac{1}{4}$ of the Southeast $\frac{1}{4}$ of Section 5, all of Section 8, the North $\frac{1}{4}$ of Section 17, and the Southeast $\frac{1}{4}$ of the Northwest $\frac{1}{4}$ of Section 17, Township 46 North, Range 17 West, of the New Mexico Principal Base and Meridian. The Site is located on both the Davis Mesa Quadrangle and Bull Canyon Quadrangle 1:24,000 United States Geological Survey (USGS) topographic/geologic maps. The Site location with respect to major topographic features is shown in Figure 1.

1.2 Ecological Setting

The United States Forest Service (USFS) has developed a mapping framework to help understand the hierarchical order of all ecosystems. This framework is called the National Hierarchical Framework of Ecological Units (ECOMAP, 1993; Cleland et al., 1997). All ecosystems are recognized by differences in climatic regime. Therefore, parts of the same geographic areas may be located in different ecosystems due to differences in climatic regime. The underlying premise is that climate, as a source of energy and moisture, acts as the primary control for the ecosystem. The Site lies within the Colorado Plateau Ecoregion as shown in Figure 2.

The Colorado Plateau Ecoregion (Colorado Plateau) is a (Level III) ecoregion. The Colorado Plateau is a physiographic province encompassing 130,000 square miles or 83.2 million acres of the Four Corners states, including Utah's southeastern quarter (Chapman et al., 1997) Figure 2. The Colorado Plateau is a complex of badlands, sheer-walled canyons, buttes, mesas, plains, dunes, and isolated mountain ranges. It is characterized by its high elevation and arid to semi-arid climate. The Colorado Plateau has developed great relief through the erosive action of high-gradient, swift-flowing rivers that have down-cut and incised the plateau. Approximately 90 percent of the plateau is drained by the Colorado River and its tributaries. The Colorado, Little

Colorado, San Juan, and Escalante Rivers carve large canyons as they pass through the Plateau.

The Colorado Plateau contains mostly public and tribal lands. Elevations range from 1,200 feet above Mean Sea Level (MSL) within the Grand Canyon to 12,700 feet above MSL in the La Sal Mountains. This wide range of elevations produces diverse habitats. The Plateau is bounded on the east by the southern Rocky Mountains, on the north by the central Rocky Mountains, and on the south and west by the Basin and Range Province (Chapman, 2006).

The more prevalent habitats are piñon-juniper/juniper savanna, riparian, big sagebrush shrublands, steppe, and grasslands. The region has conspicuous but irregular vegetation zones. The woodland zone is the most extensive, dominated by what is often called a pygmy forest of piñon pine (*Pinus edulis*) and several species of juniper (*Juniperus* spp.). Between the trees, the ground is sparsely covered by gramma (*Bouteloua* spp.), other grasses, herbs, and various shrubs, such as big sagebrush (*Artemisia tridentata*) and mountain mahogany (*Cercocarpus montanus*) (Tuhy et al., 2002).

The mountain zone extends over broad areas on the high plateaus and mountains, but is actually much smaller than the piñon-juniper zone. The vegetation varies considerably, from ponderosa pine (*Pinus ponderosa*) in the south to lodgepole pine (*P. contorta* var. *latifolia*) and aspen (*Populus tremuloides*) farther north. Northern Arizona contains four distinct Douglas-fir (*Pseudotsuga menziesii*) habitat types (Hermann, 1982).

The lowest zone by elevation has arid grasslands but with many bare areas, as well as xeric shrubs and sagebrush. Several kinds of cacti and yucca are common at low elevations in the south.

The climate of the Colorado Plateau is often described as “desert” because annual precipitation averages less than 10 inches. Most of precipitation occurs in the winter as snow and subsequently infiltrates the soil (Tuhy et al., 2002). Contribution to streamflow within the sagebrush semi-desert comes from the rapid melting of snow over frozen surface soil or intense rainfall (West, 1983).

1.2.1 Shale Deserts and Sedimentary Basins

The Site is located in Shale Deserts and Sedimentary Basin (Level IV) ecoregion, a sub-region within the Colorado Plateau that encompasses 1,870,720 acres. Elevations range from 4,900 feet above MSL to 8,000 feet above MSL (Chapman et al., 2006). The Shale Deserts and Sedimentary Basins prevalent physiography is nearly level to rolling plains and basins with benches, low rounded hills, and badlands (Chapman et al., 2006) Figure 3.

Climate for the Shale Deserts and Sedimentary Basins includes a mean annual precipitation of 8 to 15 inches. The mean temperature in degree Fahrenheit (°F) in January is 6/36 (min/max) and in July the mean temperature °F is 48/92 (min/max). This ecoregion has a mean annual 90 to 120 frost free days (Chapman et al., 2006).

The more prevalent vegetation community in the Shale Deserts and Sedimentary Basins is a sparse cover of mat saltbrush, shrubland, and salt desert scrub: shadscale (*Atriplex confertifolia*), Nuttall's saltbrush (*A. nuttallii*), fourwing saltbrush (*A. canescens*), blackbrush (*Coleogyne ramosissima*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), desert trumpet (*Eriogonum inflatum*), galleta grass (*Pleuraphis rigida*), and other associated

grasses. Floodplain areas support greasewood or creosotebush (*Larrea tridentata*), alkali sacaton (*Sporobolus airoides*), seepweed (*Suaeda suffrutescens*), and shadscale. Badland areas have little to no vegetation cover (Chapman et al., 2006).

Land uses and land cover include shrubland, rangeland, and areas of dryland and irrigated cropland with winter wheat, small grains, forage crops, and pinto beans. Orchards of apples, peaches, pears, and apricots line the Gunnison and Colorado River valleys. Shrublands provide important winter habitat for wildlife (Cleland et al., 2006). According to the CDOW (2008) the Site is located within the critical winter range for the wildlife species. Additionally, the Site habitat is considered potentially suitable habitat for the Gunnison's sage grouse (CDOW, 2008). Refer to the Wildlife Survey Kleinfelder, 2009) for additional wildlife information.

1.2.2 Semiarid Benchlands and Canyonlands

The Semiarid Benchlands and Canyonlands (Level IV) ecoregion as a sub-region within the Colorado Plateau that encompasses 5,810,560 acres within the Colorado Plateau. Elevations range from 5,400 feet above MSL to 9,200 feet above MSL (Cleland et al., 2006). The Semiarid Benchlands and Canyonlands prevalent physiography is benches, mesas, cuernas, alluvial fans, hillsides, cliffs, arches, and canyons with a few isolated peaks. The areas of low relief alternate with the areas of high relief (Chapman et al., 2006) Figure 3. The southern portion of the Site; has representative features that are prevalent to this sub-region of the Colorado Plateau. The features of this sub-region exhibited on the Site, are benches, mesas, alluvial fans cliffs, and areas of low relief that alternate with areas of high relief.

Climate for the ecoregion includes a mean annual precipitation of 10 to 18 inches with 20 to 25 inches at the highest elevations. The mean temperature °F in January is 8/40 (min/max) and in July the mean temperature °F is 48/88 (min/max). This ecoregion has a mean annual 60 to 120 frost free days (Chapman et al., 2006).

The more prevalent vegetation community is the piñon/juniper woodland, Gambel oak woodland, and sagebrush steppe with black sagebrush (*Artemisia nova*), winterfat (*Krascheninnikovia lanata*), Mormon tea (*Ephedra viridis*), four-wing saltbrush, shadscale, galleta grass, and blue gramma (*Bouteloua gracilis*) (Chapman et al., 2006).

Land uses and land cover include woodland and shrubland, rangeland, recreation, coal mining, oil and gas production, and oil shale extraction (Chapman et al., 2006).

1.3 Habitat Ecotones

Three ecotones (areas where two distinctly different habitats converge) are relevant to the ecology of the Site (Figure 4). These ecotones include a piñon-juniper habitat along the bluffs in the southwest portion of the Site; a joining, narrow strip of big sage habitat; a native grassland habitat abuts both big sage habitats throughout the central portion of the site extending from the northwest corner of the site centrally to the southeast portion of the Site; and, another big sage habitat covers the northeast half of the Site.

1.3.1 Piñon-Juniper Habitat

Piñon-juniper habitat extends over large areas in western Colorado (Tueller et al., 1979). In Colorado, there are approximately five million acres of piñon-juniper habitat (Brown, 1994).

Seventy percent of Colorado's piñon-juniper woodland is located within the Colorado Plateau (Colorado Partners in Flight, 2008).

The piñon-juniper habitat type is a cold-adapted evergreen woodland situated above desert or grassland vegetation habitat and below mountain shrub habitat (Pieper, 1977); elevations range from 4,500 feet above MSL to 7,500 feet above MSL (Brown, 1994). Colorado piñon or two-needle piñon occurs in the eastern two-thirds of the piñon pine range. Several species of juniper are dominant or co-dominant, including Rocky Mountain juniper (*Juniperus scopulorum*), Utah juniper (*J. osteosperma*), one-seed juniper (*J. monosperma*), alligator juniper (*J. deppeana*), California juniper (*J. californica*), and redberry juniper (*J. coahuilensis*) (Colorado Partners in Flight, 2008).

Proportions of juniper and piñon within the habitat vary greatly, and pure stands of either tree may occur. Typically, as elevation increases, piñon dominance increases, juniper density decreases, total tree density increases, and trees become larger (Pieper, 1977; LaRue, 1994). Piñon pines drop out completely at the lowest elevations. Depending on site variables, piñon-juniper may range from an openly spaced savanna to a closed forest. Piñon-juniper understories vary from completely open to quite dense, the densest understories occurring in open canopy woodland/sagebrush communities and where Gambel oak (*Quercus gambelii*) is encroaching (Colorado Partners in Flight, 2008).

Soils underlying piñon-juniper often are shallow, rocky, and low in fertility (Pieper, 1977). The relative resistance to fire of these soil types favors piñon-juniper growth. Deep soil sites that are burned tend to revert to open "parks," often sagebrush, and resist returning to piñon-juniper cover (Colorado Partners in Flight, 2008).

Human activities have affected the distribution of piñon-juniper habitat. Wide-scale programs designed to convert piñon-juniper woodlands to grasslands for grazing began in earnest after World War II (Colorado Partners in Flight, 2008). In spite of these conversions, human activity has generally increased piñon-juniper coverage. Fire suppression in grasslands adjacent to piñon-juniper woodland has allowed the woodlands to advance by out-competing grasses (Little, 1977). Today, human activities in piñon-juniper woodlands are diverse and increasing. Big game hunting and firewood, fence post, and pine nut harvesting are currently stabilized; however, recreational pursuits are burgeoning (Pieper, 1977; LaRue, 1994). Many of these pursuits include all-terrain vehicles, which can rapidly turn paths and trails into roads. Oil and gas development has also increased the quantity and quality of roads in the piñon-juniper zone (Colorado Partners in Flight, 2008).

1.3.2 Big Sage Habitat

Within the Colorado Plateau, sagebrush is found at elevations of approximately 4,000 feet above MSL to 10,000 feet above MSL. On moist sites the sagebrush may reach 10 feet tall, but more typically it is less than five feet (Colorado Partners in Flight, 2008). It exists in a variety of climatic conditions, including low-elevation, semi-desert habitats and moist, cool, mountainous areas. Sagebrush species common in Colorado include big sagebrush and mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Colorado Partners in Flight, 2008). Plants found in association with sagebrush habitats include rabbitbrush (*Ericameria nauseosa*), bitterbrush (*Purshia* spp.), snowberry (*Symphoricarpos albus*), mountain mahogany, piñon pine, juniper, and aspen (*Populus tremuloides*). Grasses, especially bunchgrasses, are common components of sagebrush habitats, including wheatgrass species (*Pseudoroegneria* spp.), junegrass

(*Koeleria macrantha*), Arizona fescue (*Festuca arizonica*), and Idaho fescue (*F. idahoensis*) (Colorado Partners in Flight, 2008).

Immense stands of sagebrush, interspersed with small openings of native bunchgrasses, formerly covered hundreds of thousands of acres in the West (Vale, 1975). Little is known about the natural disturbance regimes that shaped this ecosystem, although pre-settlement sagebrush habitat probably experienced at least occasional wildfires (Colorado Partners in Flight, 2008). Given the slow recovery rate of sagebrush (it will not re-sprout after fire, but must come back from seed, a process that can take 15 to 30 years), these wildfires probably sculpted a landscape mosaic of sagebrush stands of varying age interspersed with grassy open areas on the scale of tens to thousands of hectares (Colorado Partners in Flight, 2008).

The primary use of sagebrush habitats by humans has been for livestock grazing. Historically, sagebrush was cleared to increase forage and to allow a higher stocking rate of domestic animals or to support more grazing wildlife (Colorado Partners in Flight, 2008). Where little or no sagebrush removal has occurred, heavy grazing sometimes leads to the elimination of native perennial grasses, which are replaced by exotic annual grasses. In some cases, the herbaceous cover is lost entirely and is replaced by shrubs, which prompts land managers to remove the shrub cover through plowing, burning, chaining, or herbicide treatment (Colorado Partners in Flight, 2008).

Sagebrush habitats that are converted to another cover type have limited potential to revert to sagebrush. Instead, they are usually maintained in those other cover types via increased frequency of fire, distance to seed sources, loss of symbiotic mycorrhizal fungi, and competitive exclusion by other plants (Colorado Partners in Flight, 2008). Large acreages of sagebrush have been removed in the interest of improving forage productivity on grazing lands. Perhaps 30 percent of Colorado's sagebrush had received some treatment between 1900 and 1974 (Braun et al., 1976). Other factors compromising the ecological integrity of sagebrush habitat include invasion by exotic (e.g., cheatgrass) or native (e.g., piñon-juniper) plant species, conversion to agricultural, residential, and other developed land types, and changes in natural fire regimes (Colorado Partners in Flight, 2008).

1.3.3 Grassland Habitat

Grasslands in Western Colorado are areas dominated by grasses and forbs, and have few or no trees. Grazing and roaming animals occur in abundance across these grasslands. Originally the grasses were perennial bunchgrasses but grazing has encouraged the increased growth of sod grasses on areas with deep soil and heavy to moderate rainfall (Colorado Partners in Flight, 2008). The bunchgrasses have been replaced by annual grasses in areas with low precipitation. In some areas with deep soils and well protected from erosion, bunchgrasses still cover large areas in association with a few shrubs and cacti. However, there are areas where grass cover has been reduced as a result of woody plant and cacti colonization (Paysen et al., 2000).

Within the grassland habitat, trees and large shrubs are largely absent. Seasonal drought, occasional fires, and grazing by large mammals all prevent woody shrubs and trees from becoming established. A few trees such as cottonwoods (*Populus deltoides*), oaks (*Quercus* spp.), and willows (*Salix* spp.) grow near rivers and streams, and hundreds of species of flowers grow among the grasses (Colorado Partners in Flight, 2008).

Typical species of grasses found within the grassland habitat include bent-grass (*Agrostis palustris*), blue gramma, downy brome (*Bromus tectorum*), galleta-grass, and fox-tailed barley

(*Hordeum jubatum*) (Colorado Division of Wildlife, 2008). Flowers include asters (*Aster* spp.), blazing stars (*Liatriis spicata*), sunflowers (*Helianthus annuus*), clovers (*Trifolium* spp.), and plains wild indigo (*Baptisia bracteata*).

Grasslands have hot summers and cold winters. Summer temperatures can be well over 100 °F, while winter temperatures can be as low as minus 40° F (Colorado Partners in Flight, 2008). Annual precipitation is typically between 10 to 35 inches per year with much of the precipitation occurring in the late spring and early summer. Snow often serves as a reservoir of moisture for the beginning of the growing season. Seasonal drought and occasional fires help maintain these grasslands.

Drought plays a large role in keeping trees from taking over the grasslands. Some years receive less rain than others, just as certain seasons receive significantly less rain than others (Colorado Partners in Flight, 2008). Trees generally cannot withstand the lack of water as easily as grasses, and thus, grasses remain dominant.

Overgrazing by livestock and plowing are the two greatest threats to grasslands (Colorado Partners in Flight, 2008). Since the development of the steel plow, much of these grasslands have been converted to agricultural lands because of their rich soil. Large amounts of grasslands have been converted to agriculture or urban development (Colorado Division of Wildlife, 2003). Lack of fire and fragmentation are also threats. Fire plays a big role in this biome, preserving biodiversity and keeping trees from overtaking the grasses. Lightning from large storms rolling over the grasslands ignites large grass fires (Colorado Partners in Flight, 2008). These fires help certain plants by germinating seeds, clearing ground cover to allow rare plants a chance, and by nourishing the soil with freshly burnt vegetation.

1.4 Threatened and Endangered Species

The United States Fish and Wildlife Service (FWS) currently lists 13 species of plants as federally threatened or endangered in the State of Colorado (Bureau of Land Management, 2008). Of these 13 federally listed plant species, only the clay-loving buckwheat (*Eriogonum pelinophilum*) is listed in the United States Department of Agriculture (USDA) database to occur in Montrose County, Colorado (USDA, 2008).

The clay-loving buckwheat is a federally listed endangered species with designated critical habitat. It is known to occur in the Mancos Shale hills within Delta and Montrose counties, Colorado. Much of the former habitat in the Montrose, Colorado area has been destroyed since the species was listed in 1984 (Flora of North America, 2008). The habitat associated with the clay-loving buckwheat in Delta County was largely destroyed in 2001 by off-road vehicle activities in the designated critical habitat. A small population of clay-loving buckwheat is preserved at the Fairview Natural Area east of Montrose (Flora of North America, 2008).

The clay-loving buckwheat is similar to the Comb Wash buckwheat (*Eriogonum clavellatum*), although the two are well-separated geographically. It is a smaller plant than Comb Wash buckwheat in habit. The flowers of Comb Wash buckwheat lack the pronounced, rounded, greenish-red to brownish-red base of the perianth seen in clay-loving buckwheat, and the tepals are distinctly dimorphic in Comb Wash buckwheat whereas they are essentially monomorphic in clay-loving buckwheat. Ants actively pollinate the flower. Some 50 additional species of insects are found to visit the flowers, but none were confirmed as a pollinator (Bowlin et al., 1993).

1.5 Sensitive Species

Of the approximately 3,200 flowering plant species in Colorado, there are 172 plants species found within Colorado that are recognized as "sensitive species". Of the 172 plant species that are recognized as "sensitive species", there are 26 plant species (see Table 1) in Colorado that are of special concern to the Colorado Natural Heritage Program (CNHP) in the Uncompahgre area of Montrose County. The following table is a list of those "sensitive species" known to occur in the Uncompahgre area (UPP, 2009). Due to historic human and agricultural practices that have occurred within, on, or near the site, no Federal or State plants, Species of Concern, or Sensitive Species were observed or are expected to occur at the Site.

Table 1 Sensitive Federal, State, and CNHP Plant Species in the Uncompahgre Area*

Common Name	Scientific Name	Occurrence**
Southern maiden-hair fern	<i>Adiantum capillus-veneris</i>	Not observed
Grand Junction milkvetch	<i>Astragalus linifolius</i>	Not observed
Naturita milkvetch	<i>Astragalus naturitensis</i>	Not observed
San Rafael milkvetch	<i>Astragalus rafaensis</i>	Not observed
Sandstone milkvetch	<i>Astragalus sesquiflorus</i>	Not observed
Wetherill milkvetch	<i>Astragalus wetherillii</i>	Not observed
Rocky Mountain thistle	<i>Cirsium perplexan</i>	Not observed
Mountain whitlow-grass	<i>Draba rectifruca</i>	Not observed
Showy draba	<i>Draba spectabilis var oxyloba</i>	Not observed
Giant helleborine	<i>Epipactis gigantea</i>	Not observed
Wild hollyhock	<i>Iliamna grandiflora</i>	Not observed
Minute rush	<i>Juncus bryoides</i>	Not observed
Colorado desert parsley	<i>Lomatium coninum</i>	Not observed
Good-neighbor bladderpod	<i>Lesquerella vicina</i>	Not observed
Paradox Valley lupine	<i>Lupinus crassus</i>	Not observed
Dolores skeleton plant	<i>Lygodesmia doloresensis</i>	Not observed
Eastwood monkey-flower	<i>Mimulus eastwoodiae</i>	Not observed
Western mouse-tail	<i>Myosurus cupulatus sensu lato</i>	Not observed
Long-flower cat's-eye	<i>Oreocarya [Cryptantha] longiflora</i>	Not observed
Paradox breadroot	<i>Pediomelum aromaticum</i>	Not observed
Little penstemon	<i>Penstemon breviculus</i>	Not observed
Abajo penstemon	<i>Penstemon lentus</i>	Not observed
Grand Mesa penstemon	<i>Penstemon mensarum</i>	Not observed
Canyon bog-orchid	<i>Platanthera sparsiflora var. ensifolia</i>	Not observed
Uinta basin hookless cactus	<i>Sclerocactus glaucus</i>	Not observed
King clover	<i>Trifolium kingii subsp. kingii</i>	Not observed

*Data from Colorado Natural Heritage Program, November 2000 (BLM) and September 2001 (FS)

**Not observed at the Site during the vegetation survey

A summary of each of these species follows.

Southern Maidenhair Fern: The southern maidenhair fern (*Adiantum capillus-veneris*) is a delicate fern that is widespread in the world and found in the United States across the southern tier of states from California to the Carolinas. Fan-shaped leaves descend from purple to black stems in a patchwork of green. The habitat for the southern maidenhair fern is moist ledges, crevices, and boulders along streams, rivers, and springs. There is no suitable habitat on the Site for southern maidenhair fern.

Grand Junction Milkvetch: The Grand Junction milkvetch (*Astragalus linifolius*) is identified by its extremely reduced foliage, few flowered racemes, and sessile, upright pods. This species is endemic to the gullied hills of sandstone areas along the lower Gunnison and Grand Rivers in west central Colorado and possibly in extreme eastern Utah. There is suitable habitat on the Site, but no Grand Junction milkvetch was observed on the Site.

Naturita Milkvetch: The Naturita milkvetch (*Astragalus naturitensis*) flowers during late April and May. Its habitat is generally sand filled pockets of sandstone slickrock and rimrock pavement along canyons in the piñon-juniper habitat. Known populations occur from 5,000 to 7,000 feet above MSL. The current distribution of this plant includes McKinley and San Juan Counties, NM, southwestern Colorado and adjacent Utah. There is suitable habitat on the Site, but no Naturita milkvetch was observed on the Site.

San Rafael Milkvetch: The San Rafael milkvetch (*Astragalus rafaensis*) forms local colonies on gullied hills and washes in seleniferous soils derived from shale or sandstone formations of the San Rafael Swell in Emery County, Utah and Montrose County in west central Colorado. There is suitable habitat on the Site, but no San Rafael milkvetch was observed on the Site.

Sandstone milkvetch: The Sandstone milkvetch (*Astragalus sesquiflorus*) is found on sandstone ledges, talus and sandy washes at elevations from 5,000 to 5,500 feet above MSL. There is suitable habitat on the Site, but no Sandstone milkvetch was observed.

Wetherwill Milkvetch: The Wetherwill milkvetch (*Astragalus wetherwillii*) flowers during early May to late June. The habitat for the plant is steep slopes, canyon benches, and talus under cliffs, in sandy clay soils derived from shale or sandstone. The Wetherwill milkvetch grows with sagebrush and juniper at an elevation from 5,250 to 7,400 feet above MSL. There is suitable habitat on the Site, but no Wetherwill milkvetch was observed on the Site.

Rocky Mountain Thistle: Rocky Mountain thistle (*Cirsium perplexans*) is a member of the sunflower family (Asteraceae, or Compositae). The global distribution of Rocky Mountain thistle is limited to western Colorado, within the Colorado and Gunnison river valleys (Weber and Wittman, 2001). Rocky Mountain thistle tends to grow in dry, sparsely vegetated or disturbed areas. This thistle has been described as occurring adjacent to drainages and dry arroyos along roadsides. There is suitable habitat on the Site, but no Rocky Mountain thistle was observed on the Site.

Mountain Whitlow-Grass: Mountain whitlow-grass (*Draba rectifruca*) is found in the mountains, often on gravelly soil. Harrington (1954) indicates that the distribution of this species is scattered over the western half of Colorado, except at the extreme northern part of the state, at an elevation of 7,500 to 10,000 feet above MSL. There no suitable habitat on the Site for mountain whitlow-grass.

Showy Draba: Showy draba (*Draba spectabilis* var. *oxyloba*) habitat is found in moist montane meadows, spruce-fir forests, and in willow thickets at an elevation of 8,300 feet (Rollins, 1993; Hitchcock, 1941; Dorn, 1992). There is no suitable habitat on the Site for showy draba.

Giant Helleborine: Giant helleborine (*Epipactis gigantea*) is, like most orchids, a herbaceous perennial. Giant helleborine grows all over the west from Texas to British Columbia to South Dakota, always in distinct locations, not in uniform distribution. The orchid flowers are pale yellow-brown to yellow with purple veins. This particular species is a terrestrial orchid, rather than an epiphytic one having air roots. It grows near streams, creeks, seeps on sandstone cliffs and hillsides, springs, and sometimes hot springs. The giant helleborine can be found at an elevation between 4,800 to 8,000 feet above MSL. There is no suitable habitat for the giant helleborine on the Site.

Wild Hollyhock: Wild hollyhock (*Lilium grandiflora*) flowers in July and August. Wild hollyhock can be found in damp montane meadows and stream courses at elevations between 7,000 to 11,000 feet above MSL. Wild hollyhock can be found in Garfield, Mesa, Montezuma, Ouray, Pitkin, and Routt counties in Colorado. There is no suitable habitat on the Site for wild hollyhock.

Minute Rush: Minute rush (*Juncus bryoides*) is a small rush measuring approximately 10-45 mm in height. It is red in color. Weber and Wittman (1996) refer to it as “rare or overlooked”, flowering in early spring on seepy sandstone ledges in the Ponderosa pine habitat. Minute rush is easily mistaken for a moss. It has been identified within the Grand Mesa, Uncompahgre, and Gunnison National Forests. There is no suitable habitat on the Site for minute rush.

Colorado Desert Parsley: The Colorado desert parsley (*Lomatium coninum*) is found in rocky soils derived from Mancos shale. The plant occurs in shrub communities from 5,500 to 7,000 feet above MSL. There is no suitable habitat on the Site.

Good-neighbor Bladderpod: The good-neighbor bladderpod (*Lesquerella vicina*) is a perennial plant found on sandy-gravel soils consisting of sandstone fragments over Mancos Shale within piñon-juniper habitat. It is also associated with the ecotone between piñon-juniper habitat and salt desert scrub lands in Montrose and Ouray counties, Colorado. The typical elevation where this species occurs is between 5,800 to 7,500 feet above MSL. This plant flowers from late March to mid June and remains in fruit into July. There is suitable habitat on the Site, but no good-neighbor bladderpod was observed on the Site.

Paradox Valley Lupine: The Paradox Valley lupine (*Lupinus crassus*) habitat is characterized by piñon-juniper habitat, or clay barrens derived from Chinle or Mancos Formation shales. It grows in draws and washes with sparse vegetation. The Paradox Valley lupine is found at elevations between 5,000 and 5,800 feet above MSL. There is suitable habitat on the Site, but no Paradox Valley lupine was observed on the Site.

Dolores Skeleton Plant: The foot-tall Dolores skeleton plant (*Lygodesmia doloresensis*) is found in mixed juniper-desert shrub and juniper-grassland communities on alluvial soils at elevations of 4,400 to 4,800 feet above MSL (Atwood 1991). Soils are derived from sandstone outcrops associated with the undivided lower portion of the Cutler Group. This species is known to occur along the Dolores River Canyon in Mesa County, Colorado and along the Colorado River Canyon in Grand County, Utah. There was no suitable habitat on the Site for the Dolores skeleton plant.

Eastwood Monkey-Flower: The Eastwood monkey-flower (*Mimulus eastwoodiae*) is endemic to the Canyon Lands of southeastern Utah and adjacent lands of Colorado, Arizona, and New Mexico. The Eastwood monkey-flower occurs in moist seeps and hanging garden communities in sandstone cliffs in the Canyonlands. Approximately 25 occurrences have been mapped, with additional occurrences documented on the Navajo Nation. Threats, such as disturbance by livestock and humans, are considered relatively minor because many sites have low accessibility. There is no suitable habitat for the Eastwood monkey-flower on the Site.

Western Mouse-Tail: Western mouse-tail (*Myosurus nitidus*) was first discovered in Montezuma County under sagebrush by Alice Eastwood, and is the only known collection in Colorado at this time. According to Harrington (1954) this species is reported in northern Arizona, northern New Mexico, and southwestern Colorado. There is suitable habitat on the Site, but no western mouse-tail was observed on the Site.

Long-Flower Cat's-Eye: Long-flower cat's-eye (*Oreocarya [Cryptantha] longiflora*) is typically called "longflower cryptantha" which is part of the Boraginaceae plant family. This plant is found on plains and on mesas in Colorado and Utah. Long-flowers cat's-eye can be found at elevations between 4,500 to 8,000 feet above MSL. The duration of the long-flowers cat's-eye plant is biennial and perennial. There is no suitable long-flower cat's-eye habitat located on the Site.

Paradox Breadroot: The Paradox breadroot (*Pediomelum aromaticum*) is a member of the pea family (Fabacea). The plant is a perennial herb. The plant prefers open piñon-juniper habitat, in sandy soils or adobe hills. The Paradox breadroot grows at an elevation of 4,800 to 5,700 feet above MSL. There is suitable habitat at the Site, but no Paradox breadroot was observed on the Site.

Little Penstemon: The little penstemon (*Penstemon breviculus*) is a perennial flower that flowers from May and June. The habitat for the little penstemon is sandy or clay soils of the Ojo Alamo Sandstone or Nacimiento Formation. The plant also has sagebrush and piñon-juniper associations at elevations of 4,800 to 6,000 feet above MSL. There is suitable habitat at the Site due to the sagebrush and piñon-juniper association, but no little penstemon was observed on the Site.

Abajo Penstemon: The Abajo penstemon (*Penstemon lentus*) is a perennial herb which flowers in May and June. The Abajo penstemon is a Four Corners endemic plant that is much more abundant in Utah than in Colorado, New Mexico or Arizona. New Mexico has four specimen records, Arizona has seven specimen records, Colorado has 39 specimen records and Utah has 56 specimen records collected. Its total range is about 160 miles. Abajo penstemon can be found in sagebrush, piñon-juniper, Gambel oak, and ponderosa pine communities at elevations of 4,500 to 7,500 feet above MSL. There is suitable habitat at the Site, but no Abajo penstemon was observed on the Site.

Grand Mesa Penstemon: The Grand Mesa penstemon (*Penstemon mensarum*) grows easily in well-drained soil in hot, sunny locations, and it is cold hardy in USDA zones 4-8. It is endemic to Colorado, and is known from approximately 30 occurrences in Garfield, Mesa, Delta, and Gunnison Counties. A vast majority of occurrences are documented on or near Forest Service land. This plant occurs among oaks and in meadows and colonizes roadcuts (Harrington, 1954). This species also occurs in deep clayey loam soils. The Grand Mesa penstemon can be found

at elevations of 7,100 to 9,350 feet above MSL. Habitat for the Grand Mesa penstemon was not observed on the Site.

Canyon Bog-Orchid: The canyon bog-orchid (*Platanthera sparsiflora* var. *ensifolia*) inhabits open, wet areas, seeps and bogs. Elevations range from 800 to 5,200 feet above MSL. The canyon bog-orchid is identified as a facultative wetland species (FWS, 1988). The small number of occurrences and the low population numbers contribute to the species' status in Colorado. There was no suitable habitat observed on the Site.

Uinta Basin Hookless Cactus: The Uinta basin hookless cactus (*Sclerocactus glaucus*) occurs in the Uinta Basin in Duchesne and Uintah counties, Utah, and in Delta, Garfield, Mesa, and Montrose counties, Colorado. Uinta Basin hookless cactus is found on river benches, valley slopes, and rolling hills of the Duchesne River, Green River, and Mancos formations. It is found in xeric, fine textured soils overlain with cobbles and pebbles, growing in salt desert shrub and piñon-juniper communities at elevations ranging from 4,100 to 6,200 feet above MSL. There is suitable habitat on the Site, but no Uinta hookless cactus was observed at the Site.

King Clover: No data are available on the king clover (*Trifolium kingii* subsp. *kingii*).

2.0 PURPOSE AND SCOPE

The vegetation study addressed by this report is intended to provide data and preliminary analysis for the baseline characterization of the environmental conditions present on the Site. This characterization will be used to establish potential environmental impacts caused by the construction, operation, and decommissioning of the uranium mill facility at the Site, and to provide a baseline for the current, pre-operational conditions of the Site.

Data were collected by Kleinfelder biologists during a four-season ecological survey to characterize the baseline conditions of the Site for inclusion in the Environmental Report (ER) in accordance with CDPHE guidance. The ER is required to be submitted in support of the license application to the CDPHE. Field investigations were conducted in general accordance with applicable Kleinfelder standard operating procedures (SOP) and Quality Procedures (QP) outlined in the work plan (Kleinfelder, 2007).

3.0 METHODS

Kleinfelder biologists used the line-transect method to collect site-specific vegetation data. Johnson and Routledge (1985) state that the line-transect method is the preferred method for assessing medium to large sites. Kleinfelder biologists conducted field studies on a seasonal frequency equating to a four-season survey. All transects were observed during each of the four seasons. Those seasons include Summer 2007, Fall 2007, Winter 2007/08, and Spring 2008. During the Summer 2007 and Winter 2007/08 season, odd-numbered sample points were observed and field data were collected concurrently for vegetation, wildlife, wildlife habitat, and bird point count surveys. Wildlife survey results are reported separately in the Wildlife Survey report dated January 2009. During the Fall 2007 season, even-numbered sample points were observed and data were collected for vegetation, wildlife, wildlife habitat, and bird point count surveys. During the Spring 2008 season, all even- and odd-numbered sample points (totaling 60) were evaluated to identify seasonal variations.

Refer to Appendix B for the habitat assessment forms completed during the field surveys for each season and Appendix C for photographs of the Site.

3.1 Vegetation

A line-transect method modified from Buckland et al. (2007) with selective observation points was utilized. Seven transects were systematically established north to south approximately 300 yards apart from east to west (Figure 5). Sample points were positioned every 300 yards on each transect using dead reckoning techniques with a compass and rangefinder. A total of 60 sample points make up the sampling grid. Sample points were marked with yellow flagging and their locations established using a global positioning system (GPS) device.

The vegetation data collected included: date, time, location, general site description, the presence of wildlife and/or sign, and vegetation information (Appendix A). Vegetation information collected consisted of canopy height, diameter at breast height (DBH) of the closest three trees, DBH maximum, DBH mean, percent ground cover, percent debris cover, and the five most dominant plant species in descending order. Vegetation types were recorded and compared against Colorado State and FWS Federal Threatened and Endangered (T&E) Species Lists.

One plant that is listed as a federally endangered species that is known to occur in Montrose County is the clay-loving wild buckwheat (*Eriogonum pelinophilum*). Sensitive plants known to occur in Montrose County by Federal, State, or CNHP can be found in Table 1 and Section 1.5 of this report.

Representative samples for plants that were not identified in the field, due to time constraints and identification keys, were placed in an 8 ½ inch by 11 inch plant press. Samples were dried in the press for at least five days. Identification was completed using a regional dichotomous key in conjunction with a dissecting stereo microscope.

3.2 Summer Site Observations

From August 20, 2007 through August 24, 2007, Kleinfelder biologists were on the Site to conduct a general walk-through and establish the survey transect methodology. Kleinfelder representatives walked the southwestern bluff observing available habitats for the Site (Meyer, 2008, Page 5). Upon establishment of the sampling grid (Figure 5), the Kleinfelder biologists began the vegetation, wildlife, wildlife habitat, and point count bird surveys. Vegetation, wildlife, wildlife habitat, and point count bird surveys were completed concurrently on odd-numbered sample points for each of the seven transects (Figure 5) (Meyer, 2008, Page 8).

3.3 Fall Site Observations

On September 18 and 19, 2007, Kleinfelder biologists completed vegetation, wildlife, wildlife habitat, and point count bird surveys. Vegetation, wildlife, wildlife habitat, and point count bird surveys were completed concurrently on even-numbered sample points (Figure 5) (Meyer, 2008, Page 13).

3.4 Winter Site Observations

On January 16 and 17, 2008, Kleinfelder biologists completed a second duplicate vegetation, wildlife, wildlife habitat, and point count bird surveys on odd-numbered sample points (Figure 5) (Meyer, 2008, Page 15).

3.5 Spring Site Observations

On May 19 and 20, 2008, Kleinfelder biologists completed duplicate vegetation, wildlife, wildlife habitat, and point count bird surveys on all even- and odd-numbered sample points (Figure 5) (Meyer, 2008, Pages 20-23) to evaluate seasonal changes and determine if additional surveys were required.

3.6 Arroyo Observations

A vegetation assessment of the arroyos was completed in the Fall of 2007 and again in the Spring of 2008 to identify seasonal vegetation variations. The arroyo assessment consisted of a visual vegetation assessment. Refer to Kleinfelder (2008) for a detailed description of the arroyo's located on site.

4.0 RESULTS

Three distinct ecotones were identified within the Site (Figure 4) These ecotones include a piñon-juniper habitat along the bluffs in the southwest portion of the Site; a joining, narrow strip of big sage habitat; a native grassland habitat abuts both the big sage habitats throughout the central portion of the Site extending from the northwest corner of the Site to the southeast portion of the Site; and, another big sage habitat that covers the northeast half of the Site. The plants identified at the Site during the four season vegetation surveys are listed in Table 2.

Table 2
Identified Plants at the 60 Sample Points

Flora	
Common Name	Scientific Name
Trees	
Colorado ash	<i>Fraxinus anomala</i>
one-seeded juniper	<i>Juniperus monosperma</i>
piñon pine	<i>Pinus edulis</i>
Shrubs	
Utah serviceberry	<i>Amelanchier utahensis</i> var. <i>utahensis</i>
big sage	<i>Artemisia tridentata</i>
four-winged saltbrush	<i>Atriplex canescens</i>
mountain mahogany	<i>Cercocarpus montanus</i>
Mormon tea	<i>Ephedra viridis</i> var. <i>viridis</i>
rabbitbrush	<i>Ericameria nauseosa</i>
cliff fendler-bush	<i>Fendlera rupicola</i>
Forbs	
curvseed butterwort	<i>Ceratocephala testiculata</i>
herb sophia**	<i>Descurainia sophia</i>
redstem stork's bill	<i>Erodium cicutarium</i>
broom snakeweed**	<i>Gutierrezia sarothrae</i>
prickly pear	<i>Opuntia</i> spp.
Russian thistle**	<i>Salsola iberica</i>
mustard	Family Brassicaceae
Grasses	
bent-grass	<i>Agrostis palustris</i>
blue grama	<i>Bouteloua gracilis</i>
downy brome	<i>Bromus tectorum</i>
galleta-grass	<i>Hilaria jamesii</i>
fox-tailed barley	<i>Hordeum jubatum</i>
witchgrass	<i>Panicum capillare</i>
sixweeks fescue	<i>Vulpia octoflora</i>

** Noxious Weeds

Table 3 provides the canopy heights, canopy cover, diameter breast heights (DBH), percent ground cover, and percent debris cover for each of the three ecotones. Table 4 provides the five dominant plants for each of three ecotones. Some of the above listed categories are not applicable to certain ecotones as they have no trees, and are identified as Not Applicable (N/A).

**Table 3
Ecotone Characteristics**

Ecotone	Mean Canopy Height (Feet)	Mean Canopy Cover	DBH (Max inches)	DBH (Mean inches)	Mean Ground Cover	Mean Debris Cover
Piñon/Juniper	15	10.0%	8.0	5.1	28.7%	15.0%
Big Sage	N/A	N/A	N/A	N/A	46.4%	10.6%
Grassland	N/A	N/A	N/A	N/A	51.0%	10.9%

**Table 4
Ecotone Dominant Plants**

Ecotone	**Species 1	Species 2	Species 3	Species 4	Species 5
Piñon/Juniper	piñon pine	one-seeded juniper	bent-grass	Colorado ash	mountain mahogany
Big Sage	big sage	broom snakeweed	downy brome	sixweeks fescue	fox-tailed barley
Grassland	downy brome	four-winged saltbrush	redstem stork's bill	prickly pear	big sage

**Species 1 most dominant. Dominance decreases numerically with Species Number.

Arroyos were initially assessed throughout the site by visual inspection during the fall field survey (Figure 6). Vegetation within arroyos consisted of upland species such as four-winged saltbrush, big sage, and Russian thistle. The arroyos located on the Site were evaluated and classified as discontinuous ephemeral streams according to guidance from the *Review of Ordinary High Water Mark Indicators for Delineating Arid Streams in the Southwestern United States* (Lichvar and Wakeley, 2004).

Vegetation of the arroyos was consistent with the specific ecotone in which it lies. The observed difference in vegetation with arroyos versus outside of arroyos was the increase in growth habit due to increased available moisture within the arroyo channels. Vegetation in the arroyos was upwards of three times the size of surrounding vegetation. In addition, this increase in vegetation results in an increase in the wildlife habitat, as it supplies increased cover and forage.

5.0 CONCLUSIONS

5.1 Threatened and Endangered Species

The FWS currently has 13 species of plants federally listed as threatened or endangered in the State of Colorado (Bureau of Land Management, 2008). Of these 13 species, only the clay-loving buckwheat is federally listed by the USDA to occur in Montrose County, Colorado (USDA, 2008).

The soils on the Site are atypical of the critical habitat soils known for the clay-loving buckwheat. Due to this critical habitat being absent, Kleinfelder believes that the clay-loving buckwheat does not occur on Site. No clay-loving buckwheat was observed during the point count surveys.

In addition, 26 sensitive plants are listed to occur in the Uncompahgre Plateau area (refer to Table 1 and Section 1.5) A database and literature search was completed to identify potentially occurring sensitive plants prior to the field surveys to determine if any Federal, State, or Non-governmental Organization (NGO) listed plants could be present or observed on the Site. No Federal, State, or NGO listed species were observed on the Site.

The CDOW (2008) indicated that the Site is located in critical winter range for wildlife species. The CDOW goes on to provide that the Site provides potentially suitable habitat for the Gunnison's sage grouse. Refer to Kleinfelder (2009) Wildlife Survey Report for further information.

5.2 Piñon-Juniper Habitat

The bluffs along the southwest portion of the Site were investigated for vegetation species of concern and for vegetation health. The bluffs contain the piñon-juniper habitat. Vegetation included piñon pine, one-seeded juniper, single leaf ash, mountain mahogany, cliff fendler-bush, Mormon tea, Utah serviceberry, and various forbs and grasses. No species of concern were observed.

5.3 Big Sage Habitat

The big sage habitat on the Site consists of big sage, four-winged saltbrush, rabbitbrush, and various grasses including, but not limited to, bent-grass, blue grama, downy brome, galleta-grass, and fox-tailed barley.

No plant species of concern were observed, although disturbance of the big sage habitat has the potential to impact the Gunnison sage grouse habitat and critical winter range for wildlife species. The Gunnison sage grouse is not federally listed as threatened or endangered, but it is a Colorado state species of concern. There was no evidence that the big sage habitat on the Site was being utilized by the Gunnison sage grouse. However, the Site is located within the historic range of the Gunnison sage grouse (Bureau of Land Management, 2008). Additionally, according to the CDOW (2008) the Site has potentially suitable big sage habitat that could be utilized by the Gunnison sage grouse. Refer to Kleinfelder (2009) Wildlife Survey Report for further information.

5.4 Grassland Habitat

Interspersed throughout the grassland habitat on the Site was fox-tailed barley, bent-grass, downy brome, galleta-grass, prickly pear, blue gramma, and herb sophia. No species of concern were observed.

5.5 Noxious Weeds

Noxious weeds were present throughout the Site due to disturbed habitat from present and historic agricultural activities including cattle grazing. The observed noxious weeds (Table 2) are successional plants associated with current land management practices. Observed noxious weeds at the Site include Russian thistle, broom snakeweed, and herb sophia.

5.6 Summary

Overall, it is concluded that the Site has been impacted by past human activities. The vegetation found within the specific habitats on the Site is consistent with published literature. The Site is located within identified potential Gunnison sage grouse habitat according to the Colorado Division of Wildlife. The vegetation habitat utilized by the Gunnison sage grouse although limited, does exist within the Site boundaries. In general, the habitat on the Site is of low to average quality due to the past and present human and agricultural practices that have occurred.

Lastly, no Federal or State plant or animal species of concern were observed on the Site.

6.0 LIMITATIONS

Kleinfelder prepared this report in accordance with generally accepted standards of care that exist in Montrose County, Colorado at this time. This report may be used only by Energy Fuels Resources Corporation and only for the purposes stated. All information gathered by Kleinfelder is considered confidential and will be released only upon written authorization by Energy Fuels Resources Corporation or as required by law. Non-compliance with these requirements by Energy Fuels Resources Corporation or anyone else, unless specifically agreed to in advance by Kleinfelder in writing, will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party and Energy Fuels Resources Corporation agrees to defend, indemnify, and hold harmless Kleinfelder from any claim or liability associated with such unauthorized use or non-compliance.

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FIGURES