CULTURAL RESOURCE MANAGEMENT PLAN FOR ALTON COAL DEVELOPMENT'S PROPOSED DEVELOPMENT OF THE ALTON AMPHITHEATER AND SINK VALLEY, KANE COUNTY, UTAH

DRAFT 2

Patricia Stavish

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INTRODUCTION

The Alton Coal Cultural Resource Management Plan (CRMP) is a new, collaborative approach to state and federal undertakings with potential affects to cultural resources in the Alton Amphitheater and Sink Valley regions. The Alton Coal project is being developed in phases on both public and private lands located in the Alton Amphitheater and Sink Valley, south of the town of Alton, Utah and includes a reasonably foreseeable transportation route that travels north from Alton along US Highway 89, west along State Route 20, and south along Interstate 15. The Alton Coal project area is divided into two separate project areas and phases of development, proceeding by separate permitting and leasing actions. The first action, the Coal Hollow Mine project area, is located in Sink Valley on private lands subject to state mine permit application no. C/025/005, overseen by the Utah Division of Oil, Gas and Mining (UDOGM). This private phase of development includes 433 acres of land located in Sections 19, 20, and 30 of Township 89 South, Range 5 West (Figure 1). The second phase includes leased federal coal within the Alton Coal Tract, which is located on public lands administered by the Bureau of Land Management (BLM), Kanab Field Office, and private lands. SWCA Environmental Consultants, under the direction of the BLM, is currently preparing an Environmental Impact Statement (EIS) for a federal coal lease application under the Lease by Application (LBA) process set forth at 43 CFR 3425. The Alton Coal Tract, includes 3,544 acres of federal coal reserves beneath public and private surface areas, of which 2,284 acres occur on public land administered by the BLM and 1,260 acres occur on private land. The Alton Coal Tract is located in Sections 12, 13, 24, and 25 of Township 89 South, Range 6 West; and Sections 7, 18, 19, 20, 30, and 31 of Township 89 South, Range 5 West (Figure 1).

The private and federal actions associated in the Alton Coal CRMP involve a number of state and federal agencies and must be compliant with a number of state and federal mandates. The Coal Hollow Mine permit on private lands is overseen by UDOGM and must be in compliance with Utah Code 9-8-404. The proposed federal leasing action for the Alton Coal Tract, is under the jurisdiction of the BLM. Although not currently under consideration, prior to mining the federally leased coal, a mine permit must be obtained through UDOGM. The proposed leasing action must be in compliance with the National Environmental Policy Act (NEPA) of 1969, Section 106 of the National Historic Preservation Act of 1966 (as amended), the Archaeological and Historic Conservation Act of 1972, the Archaeological Resources Protection Act of 1979, the American Indian Religious Freedom Act of 1978, and the Utah State Antiquities Act of 1973 (amended 1990). All of the involved agencies (those mentioned above, as well as the Utah State Historic Preservation Office and the State of Utah Public Lands Policy Coordination Office) are aware that while the mine permit on public land and the proposed federal lease are not directly connected, these actions are related and therefore this document is a reference for UDOGM, the Utah State Historic Preservation Office (SHPO), and the Utah Public Lands Policy Coordination Office (PLPCO) for application to Utah Code 9-8-404, as well as for the BLM and UDOGM for application to Section 106 of the NRHP and NEPA.

The management plan will be implemented in a phased process that begins with immediate impacts to the cultural resources on private lands, and the subsequent phases of data recovery that will be conducted should a federal action proceed. Each phase of research, the research or testing design and data recovery will amend this document. This plan includes a systematic approach to the management of sites located in the project area and consists of three proposed phases of research and mitigation. Phase I consists of the mitigation of seven archaeological sites that

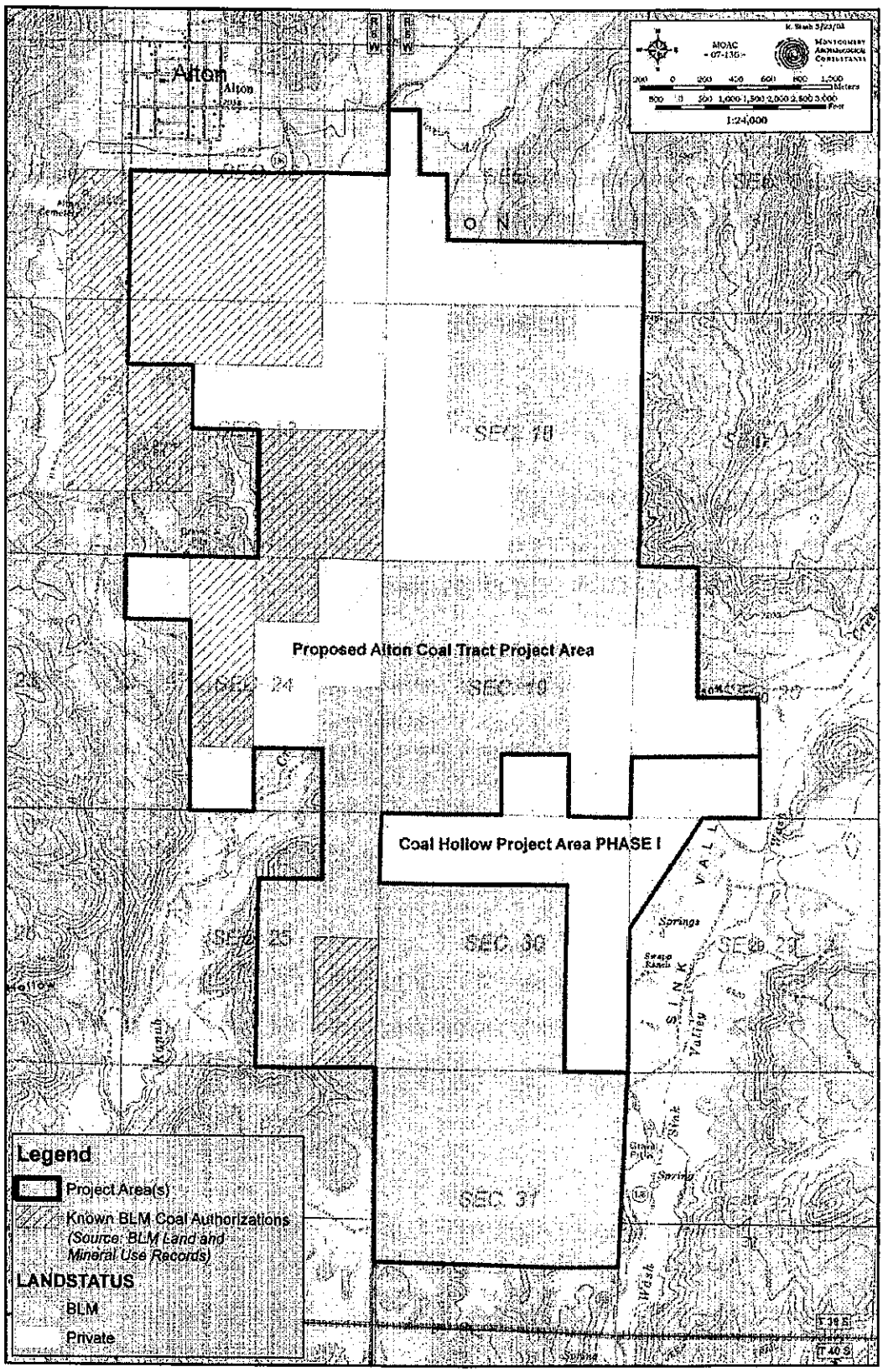

Figure 1. Alton Coal Project Area, Kane County, Utah; Showing the Current Boundaries for the Coal Hollow Project Area and the Alton Coal Tract Lease Project Area.

will be impacted by Alton Coal Development's proposed Coal Hollow surface mining plan. This phase of the project is located entirely on private lands, is in consultation with UDOGM, SHPO, and PLPCO and in compliance with Utah Code 9-8-404. Phase I data recovery and research will serve to inform possible subsequent phases of research through the collection of data regarding geomorphology, site depositional processes, depositional preservation, and erosional processes that have been operative in the project area, as well as chronology, artifact distribution, site function, subsistence, technology, and settlement patterns. Research would proceed to Phase II if all of the following events occur: 1) the BLM completes an EIS for the Alton Coal Tract federal coal lease application; 2) the BLM decides to offer the Alton Coal Tract for lease; 3) the lease is offered for competitive bid; 4) Alton Coal Development, LLC successfully acquires the lease. Phase II consists of an assessment of Phase I data and methods, the determination of comprehensive research questions, the development of a testing design, and the testing of eligible sites. Phase II accompanies a proposed federal action, which triggers compliance with Section 106 of the NRHP Act and NEPA and is in consultation with the BLM, UDOGM, and SHPO. Phase III consists of the refinement of overarching research questions and methods based on the results of Phases I and II, the selection of sites for mitigation, and the mitigation of the selected sites. Phase III also accompanies the proposed federal action consistent with Section 106 of the NRHP Act and NEPA and in consultation with the BLM, UDOGM, and SHPO. During the mining of private and federal coal it may be necessary to identify and mitigate the effects of associated actions (pipelines, power lines, roads, etc.) as such actions are proposed during the course of mine development.

This document will first discuss the affected environment including the physiography, climate, plant and animal resources, current land uses and impacts, and the cultural resources. The next section will discuss the consequences of each project phase, a description of each research phase, and stipulations for the production and review of mitigation plans. The document will then conclude with a brief summary of the project.

AFFECTED ENVIRONMENT

This section discusses the relevant aspects of geography, geology, climate, and biological resources. These topics set the stage for a discussion of cultural history, archaeological inventories and investigations, and the cultural resources documented in the project area. The affected environment includes the Coal Hollow project area, the Alton Coal Tract project area, and the reasonably foreseeable transportation route. The Coal Hollow and Alton Coal Tract project areas are located in the Alton Amphitheater and Sink Valley localities, south of the town of Alton, Kane County, Utah. The legal description of the project area, sans the transportation route, is Sections 12, 13, 24, and 25 of Township 89 South, Range 6 West; and Sections 7, 18, 19, 20, 30, and 31 of Township 89 South, Range 5 West (Figure 2). The reasonably foreseeable transportation route (Figure 3) extends west from Alton on CR-10/Cistern Road, north along US-89 through the NRHP Historic District in Panuitch to SR-20; west along SR-20 to Insterstate 15 and then south along Interstate 15 to Cedar City; and finally along Iron Springs Road to Iron Springs.

Physiography

The project area lies within the Grand Staircase Section physiographic subdivision of the Colorado Plateau (Stokes 1986). This area is characterized by a series of cliffs and terraces that rise from the Grand Canyon in Arizona to the summit of the High Plateaus in Utah. This section is bounded on the east by the East Kaibab Monocline, on the west by the Hurricane Fault, on the north by the edges of the various high plateaus, and on the south by the Grand Canyon of Arizona.

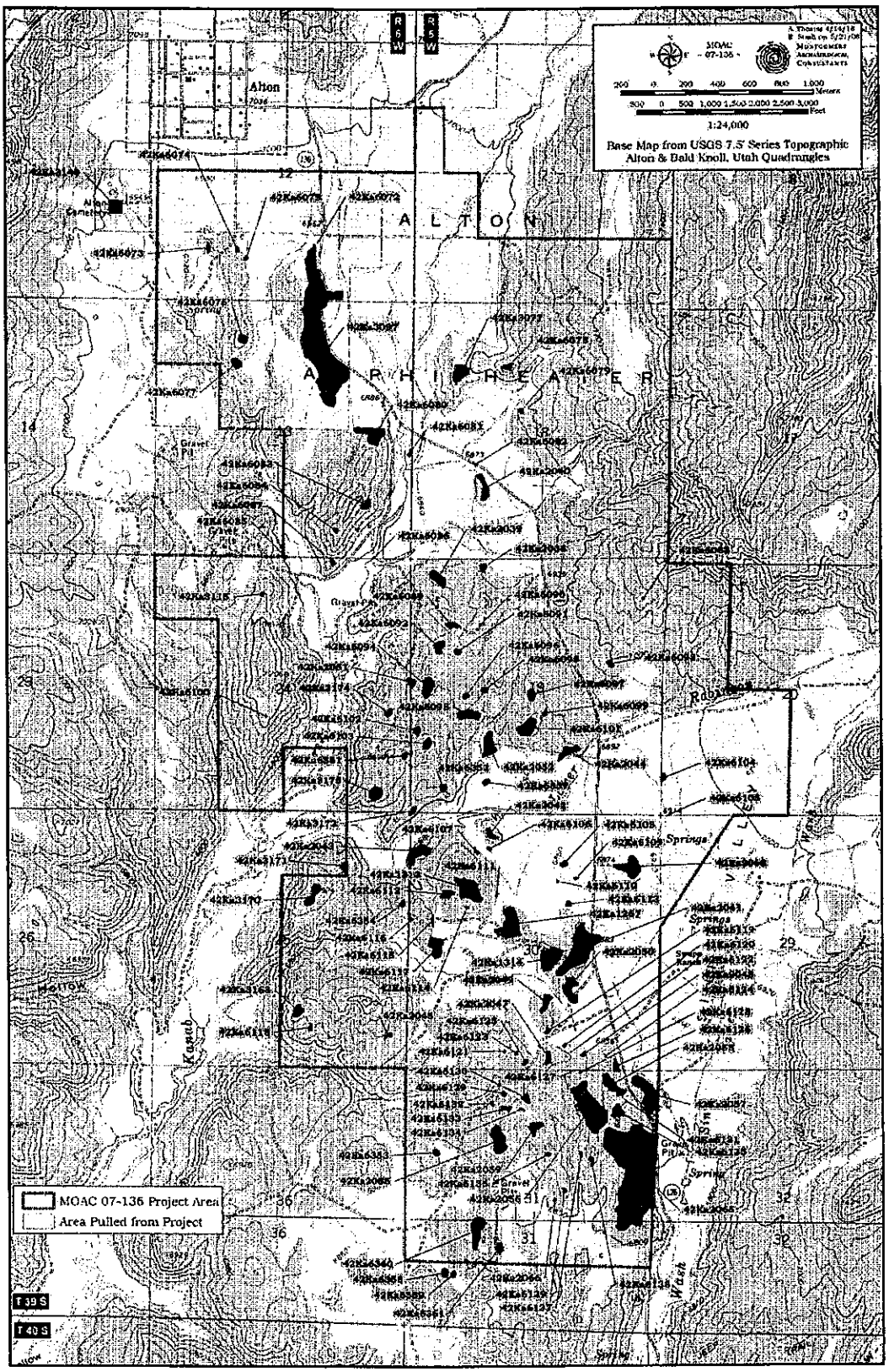

Figure 2. Alton Coal Project Area, Kane County, Utah; Showing Cultural Resources.

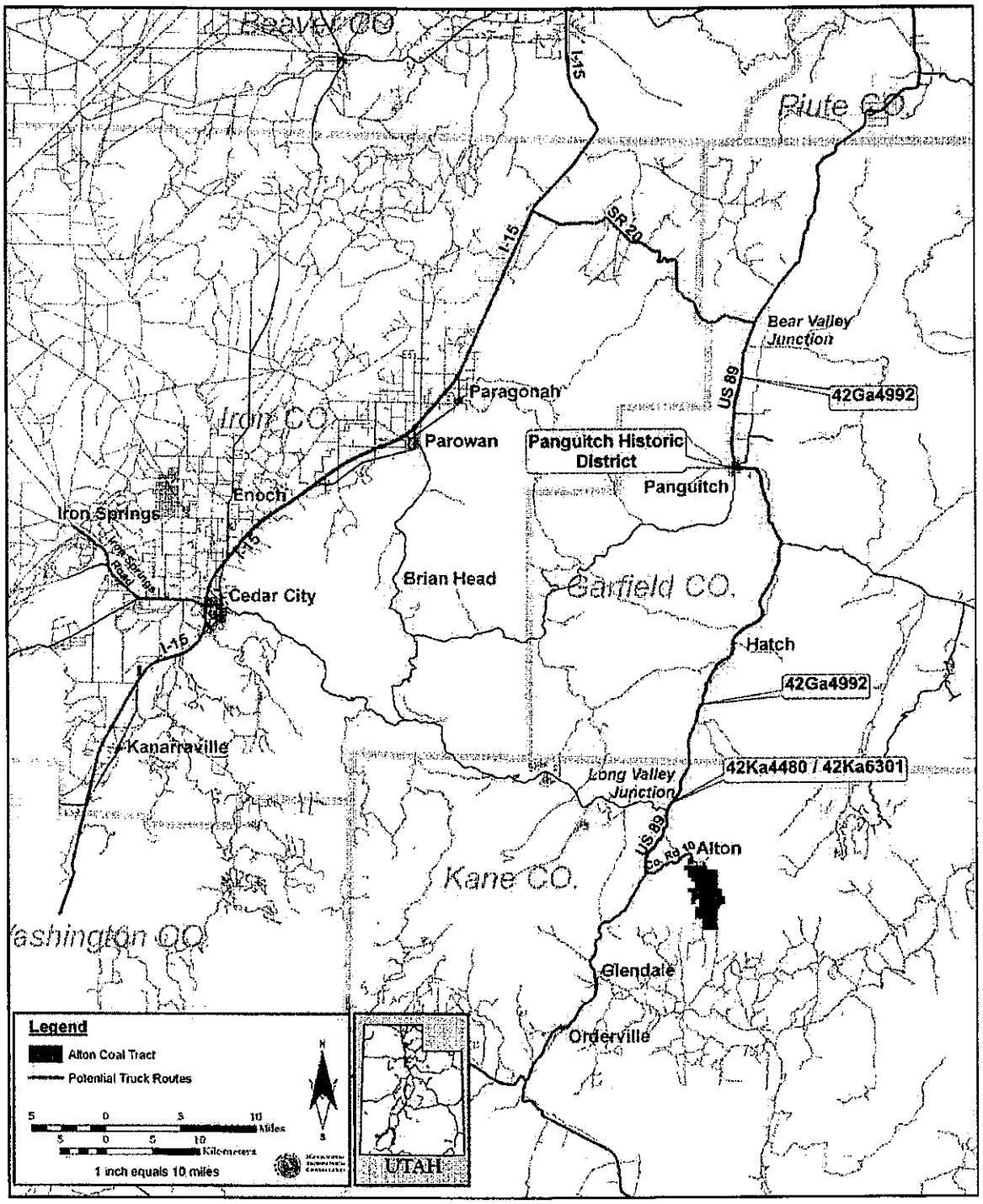

Figure 3. Reasonably Foreseeable Transportation Route, Kane, Garfield, and Iron Counties, Utah.

Harder rock layers create cliffs and accompanying benches and tablelands, whereas the softer rock units have eroded into slopes and badlands. Specifically, the project area is located along the western edge of the Paunsaugunt Plateau. The Alton Coal Field is comprised of relatively horizontal bedrock units of Mesozoic age (see Stavish 2006, Appendix C). Within portions of the project area, bedrock units are exposed as low hills and along the incised drainage of Kanab Creek. The exposed bedrock units include, from the oldest to youngest, the Winsor member of the Carmel formation (Jurassic), the Dakota formation (Cretaceous), and the Tropic shale (Cretaceous). The two most prominent geologic units are alluvium and Tropic Shale. The horizontal deposition of the geologic formations coupled with time and erosion has reduced much of the area to flat ridges and benches which are dissected by long alluvial drainages and their tributaries. Drainages often widen to form meadows, such as Sink Valley and the Alton Amphitheater. Alluvium, derived from weathered bedrock, is extensive throughout the project area along the broad, open areas of cultivation and valley floor. Characteristics of the alluvium include the location of low, relatively level areas of the project area, including cultivated fields, incised arroyos, and drainages. According to Lamm (Stavish 2006, Appendix C), total depth of the alluvium is not known and likely varies across the project area. Soils in the drainages have some agricultural potential as a result of their sand, gravel and silt composition and the presence of limestone and arkosic minerals (Gregory 1951:12).

The possible natural impacts to cultural resources distributed on the alluvium include localized slope failure/collapse of arroyo walls, piping of finer grained sediments, entrenching of drainages, and the potential for buried archaeological sites (see Stavish 2006, Appendix C). Cultural resources distributed across the Tropic shale formation are potentially impacted by localized slope failure, surficial creep on steeper slopes, slope wash on steeper slopes, and erosion of weathered bedrock slopes on steep to gentle slopes. Furthermore, the vertical erosion of sediments formed in situ on exposures of the Tropic shale may also distort the integrity of buried cultural resources (Ibid.).

Climate

Elevation in the project area ranges from 6800 ft (2079 m) to 7200 ft (2202 m). Climatic patterns are based on a 59 year record (1915 to 1974) from the Alton, Utah, weather station (Halbirt and Gualtieri 1981:8). The current weather pattern for the area exhibits a two season maxima of precipitation, winter and mid-late summer. The dominant seasonal precipitation occurs during the winter months, from December through March, when a low pressure system over the Pacific-California coast brings heavy snowfall. Precipitation during the summer occurs as short, heavy rains triggered by conversional mixing of warm moist air from the Gulf of Mexico and cool dry air from the mountainous regions of the Southwest.

The average monthly temperatures are generally mild and follow a modal distribution with a low of 26°F during January and a high of 65°F during July. The number of consecutive frost-free days average between 84 to 104 days (Gregory and Moore 1931). This period is shorter than the necessary 100 to 120 frost-free days required to mature modern hybrid corn, and more time is needed under dry conditions (Crosswhite 1981). Because the arable land is located within drainages, the growing season is further shortened due to the effects of cold air drainage.

Plant and Animal Resources

The project area consists primarily of three vegetation zones: a pinyon-juniper community, a sagebrush community, and an agricultural community. Generally, the pinyon and juniper associated vegetation occurs on the tops and the slopes of the ridges. However, the pinyon and juniper associations have encroached in the sagebrush community. The sagebrush community exists within the alluvial floodplains, draws, and meadows. Also located within the alluvial floodplains and meadows are several fields of agriculture. It is generally held that the pinyon and juniper encroachment into sagebrush communities is a current phenomenon caused by overgrazing of the land (Halbirt and Gualtieri 1981). After the settlement of the west, the great influx of domestic livestock depleted many ranges and the combination of overgrazing, lack of fire, and the dissemination of seeds by animals lead to the encroachment of pinyon and juniper communities in to grassland and sagebrush communities (Ibid.). Halbirt and Gualtieri (1981:10) infer that the vegetation composition prior to European settlement was a more open pinyon-juniper community located on ridge and mesa slopes and tops and that the floodplains, draws, and mesa interiors were populated with a grassland-browse community.

A number of edible plant species are available in the Alton Amphitheater and Sink Valley regions. Table 1 lists these edible plants, their ethnographic use, and seasonal occurrence.

Table 1. Edible Plants Available in the Alton Amphitheater and Sink Valley (after Halbirt and Gualtieri 1981:11, Table 2).

Common Name	Latin Name	Parts Used	Ethnographic Use	Seasonality
Barberry	*Berberis sp.*	berries, leaf	medicine, food	early fall
Canyon grape	*Vitis sp.*	berries	food	late summer - early fall
Cattail	*Typha sp.*	seeds, roots	food	fall
Currant	*Ribes sp.*	berries	food	fall
Goosefoot	*Chenopodium sp.*	seeds, plant	food	summer - fall
Juniper	*Juniperus sp.*	seeds, leaves	medicine, food	fall
Oak	*Quercus sp.*	acorns	food	fall
Onion	*Allium sp.*	root	food	spring - summer
Pinyon	*Pinus edulis*	nuts	food	fall
Prickly pear	*Opuntia sp.*	root, fruit, pads, blossom	medicine, food	spring - winter
Sagebrush	*Artemisia sp.*	seeds, leaves	medicine, food	fall
Sedge	*Carex sp.*	stem, roots	food	spring -summer
Serviceberry	*Amelanchier sp.*	berries	food	late summer - early fall
Squawbush	*Rhus sp.*	berries	food	late summer - early fall

Common Name	Latin Name	Parts Used	Ethnographic Use	Seasonality
Stickleaf	*Mentzelia sp.*	seeds	medicine, food	fall
Sunflower	*Helianthus sp.*	seeds, tubers	medicine, food	late summer - early fall
Various Grasses	*Gramineae*	seed	food	spring - fall
Yucca	*Yucca sp.*	fruit, root	food	summer

The region is inhabited by a wide range of animals that include at least 30 species of mammal, 85 species of bird, and 6 species of reptile. Historic settlement of the area and subsequent overgrazing have severely effected local animal populations. Grizzly bear, elk, antelope, beaver, lynx, and wolf have completely disappeared from the area and the deer population has been heavily reduced (Halibirt and Gualtieri 1981:10). Potential mammal resources found in the Alton Amphitheater and Sink Valley areas, prehistorically, include mule deer, elk, antelope, red and gray fox, lynx, badger, grizzly bear, wolf, coyote, mountain lion, porcupine, deer mice, wood rat, marmot, ground squirrel, pine squirrel, prairie dog, gopher, jackrabbit, cottontail rabbit, and beaver. Potential bird and reptile resources include wren, mourning dove, hawk, woodpecker, owl, bald eagle, raven, thrush, sparrow, rattlesnake, gopher snake, garter snake, horned toad, and whiptail and swift lizards. For the Southern Paiute who occupied the Alton area, deer was the chief large-game animal with rabbits and an assortment of rodents taken throughout the year (Kelly 1964:36).

Current Land Uses/Impacts

Current land use in the Alton Amphitheater and Sink Valley areas include farming, ranching, and mining. Agricultural lands cover over 20 percent of the land in the project area. Crops that currently and historically have been planted in the region include wheat, oats, barley, and alfalfa (Bradley 1999). Cattle and other ranching livestock graze on unimproved farmlands and on public lands managed by the BLM, Kanab Field Office. Livestock raised in the area include cattle, horses, mules, sheep, pigs, and poultry. Historic coal mining has been conducted in the area and three archaeological historic sites were documented in 1993 and 1994 by Nielson Consulting Group and Timpanogos Research Associates (Hughes et al. 1994). The Smirl Mine (42Ka4017), and the Jacob A. Sorenson Mine (42Ka4019), and the Alton Mine (42Ka4091) were located south of the town of Alton, along Kanab Creek. The Smirl Mine was opened in January 1944 to produce coal for local consumption. The mine was operated as a truck or wagon mine until 1961 when the mine closed due to a fire. Jacob A. Sorenson's mine, also known as Prospect 2A, was leased for coal production in 1936 and there are no records of the closure of the mine. The Alton Mine dates to the 1960s and no additional information could be ascertained. The remnants of these mining activities were reclaimed shortly after the sites were documented and no surface artifacts or features could be relocated during a 2005 cultural resource inventory (Stavish 2006, 2007).

Cultural Resources

Cultural-Historical Overview

Paleoindian

Human occupation in the region represents the Paleoindian, Archaic, Formative, Protohistoric, and Historic cultural stages. The first Native American occupation of the general study area probably occurred during the Paleoindian stage at the late glacial Pleistocene-Holocene boundary (ca. 11,500 B.P. - 9000 B.P.). Early Paleoindian artifact assemblages are typified by large, lanceolate projectile points, spurred end scrapers, gravers and borers, and crescents (Frison 1978:78), indicating the exploitation of megafaunal and floral resources. On the basis of projectile point typologies and subsistence strategies, the early portion of the Paleoindian stage is commonly divided into two cultural complexes referred to as the Clovis (ca. 11,500 - 11,000 B.P.), and the Folsom (ca. 11,000 - 10,000 B.P.). Aikens and Madsen (1986) postulate that Paleoindian people migrated into the eastern portion of the Great Basin following the recession of Lake Bonneville (10,500 B.P.). Several surface fluted projectile points have been reported from Garfield County (Copeland and Fike 1988) and northeastern Arizona (Geib 1995). Late Paleoindian or Plano projectile points have been found on the Kaiparowits Plateau and classified as large stemmed or concave base points (Geib et al. 2001:191-192).

Archaic Stage

The Archaic stage (7800 - 500 B.C.) is generally viewed as a hunting-gathering lifeway that is represented by subsistence practices more labor-intensive than those of Paleoindians with a greater number of smaller animal and plant species being intensively exploited. Several cultural sequences for the Archaic stage are proposed on the basis of regional differences. Jennings (1978) provides a concept of the western Archaic, or Desert Culture, based on diverse resource exploitation, diagnostic artifacts including cordage and basketry, and artifactual variability in various regions such as the California-Nevada axis and Utah-Oregon axis. Matson (1991) presents a four-period sequence model incorporating data from the Greater Southwest: Early (7800 - 4000 B.C.), Middle (4000 - 2000 B.C.), Late (2000 - 1000 B.C.), and Terminal (1000 B.C. to roughly A.D. 700). Immediately east of the project area, Geib et at (2001) outlines the following four period sequence for the Western Kaiparowits Plateau: Early Archaic (9000 B.P. to 6000 B.P), Middle Archaic (6000 B.P. to 4000 B.P.), Late Archaic (4000 B.P. to c. 2000 B.P. or the adaptation to agriculture), and the Terminal Archaic (2000 B.P. to A.D. 500).

South of the study area, the Early Archaic period is labeled the Desha Complex known for its crudely made, shallow, side-notched lanceolate points. In the Glen Canyon region excavations from Sand Dune and Dust Devil Cave provide a radiocarbon date of 5050 to 6050 B.C. (Lindsay et al. 1968). About a dozen projectile points were recovered from the lower layer in Sand Dune Cave including Pinto Series, Jay, and varieties of side-notched points (later classified as Sand Dune Side-notched) (Matson 1991:147). Faunal remains recovered from the Desha Complex include those of mountain sheep, cottontail, pack rat, and lesser numbers of jackrabbit, gopher, squirrels, skunk, and bison (one bone). At Dust Devil Cave, the earliest Archaic component (Stratum IV) provided a date from a yucca-lined pit of ca. 8793 B.C. along with an abundance of prickly pear cactus (*Opuntia*) extracted from human feces (Ambler 1996:42). Significant materials recovered from this cave included 25 Archaic sandals, classified into three basic types; open-twined, fine warp-faced, and coarse warp-faced (Ibid 44). On the northern Colorado Plateau the

earliest Archaic component is dated at Cowboy Cave (42Wn420) between 7430 and 7100 B.C. although no artifacts were found in this stratum (Schroedl and Coulam 1994:11). The upper Early Archaic component (Stratum III 5250 - 4350 B.C.), however, contained 11 projectile points (Pinto, Northern Side-notched, and Elko Corner-notched), faunal remains (cottontails, jackrabbits, porcupine, and *Canis* sp.), and floral remains (sunflower, sand dropseed, chenopods, cactus, juniper and bugseed) (Jennings 1980). The most significant features from Stratum III were a number of depressions referred to as "scooped out troughs" by Jennings (1975:9), more recently redefined by Schroedl and Coulam (1994:6-7) as pitstructures which were repeatedly cleaned out and reoccupied during the Early Archaic. In the Alton West Coal leasehold previous investigations have documented several Early Archaic projectile points types (Pinto Series, Humboldt, and Northern Side-notched) from sites which include later Formative and Late Prehistoric temporal components (e.g. 42Ka2045 and 42Ka2056) (Halbirt and Gualtieri 1981).

During the Middle Archaic period (4000 - 2000 B.C.) there was a decrease in the occupation of the Colorado Plateau, presumably caused by the Altithermal climate, which may have been a two drought event (Matson 1991:165-166). Many of the previously mentioned sites (Dust Devil Cave and Cowboy Cave) exhibit a reduced intensity of occupation during the Middle Archaic period. Recent radiocarbon data from the Glen Canyon region are filling the Middle Archaic gap (e.g. 1,000 years) as proposed by Berry and Berry (1986) for the Colorado Plateau indicating that the hunter-gatherers of the area may have not completely abandoned the area 6,000 years ago (Geib 1996:32). Middle Archaic settlement patterns most likely reflect the response to a probable protracted drought by populations shifting residential camps to water-rich lowlands and especially higher elevation settings (above 8,000 ft). Common projectile points at Middle Archaic sites are Sudden Side-notched, San Rafael Side-notched, Hawken Side-notched and Elko Series. Previous investigations in the Alton West Coal leasehold have identified such point types as Sudden Side-notched from sites which include other Archaic periods and later temporal components which appear to represent residential camps and processing camps (Halbirt and Gualtieri 1981).

The Late Archaic period began around 4,000 years ago and corresponds to a noticeable increase in radiocarbon dates in the region and is temporally correlated with an increase of effective moisture what is termed as the sub-boreal interval (Berry and Berry 1986). This period is marked by a heavy reoccupation of Cowboy Cave starting at about 1750 B.C. and is characterized by the inhabitants engaging in broad-scale hunting and gathering with an increased emphasis on mountain sheep and chenopods/amaranths (Matson 1991:171). Gypsum projectile points comprised approximately 30 percent of the total identifiable collection from Cowboy and adjacent Walters Cave (Jennings 1980:36). These stemmed points are among the most common type of point found in southeastern Utah and appeared on the northern Colorado Plateau sometime after 2550 B.C. (Holmer 1986:105). Split-twig figurines are another important diagnostic of the Late Archaic period, best known from Cowboy Cave, but occur over a broad territory centered on the Colorado River and it tributaries. Farther south in the Glen Canyon region, Late Archaic occupations are less represented, although a few Gypsum points were recovered from Dust Devil Cave (Geib and Ambler 1991). On the Kaiparowits Plateau, Late Archaic sites are represented primarily by residential camps situated in the higher elevations with access to ample water, fuel wood, large and small game, and plant resource diversity whereas the limited activity camps and reduction loci are prevalent in the lower elevations that contained a greater abundance of economic grasses (Geib et al. 2001:367). Investigations at the Arroyo Site (42Ka3976) situated in the Grand Staircase-Escalante National Monument revealed a potential pitstructure exposed in a trench below a Formative horizon, dated to circa 1850 B.C., may attest to a semi-permanent occupation of the floodplain environment (McFadden 2000:15). In the Alton West Coal leasehold several Late Archaic Gypsum projectile were recorded at open sites with other older and more recent prehistoric temporal components (42Ka2047 and 42Ka2059) (Halbirt and Gualtieri 1981).

The Terminal Archaic period (1000 B.C. to roughly A.D. 700) is marked on the northern Colorado Plateau by the presence of arrow points and shafts along with the introduction of corn. The Archaic-Formative transition at Cowboy Cave is found in two separate episodes of occupation beginning about A.D. 100 during a period of high effective moisture (Schroedl and Coulam 1994:23). This relatively intense occupation (Stratum Vb) appeared to have represented a late summer/early fall seed processing locale based on the coprolite evidence (Hogan 1980). A corn cache as well as corn kernels were found in this horizon revealing that the pre-Formative occupants were growing this domesticate, although the extent of agricultural dependency is unknown. It is well established that corn dates to at least 1200 B.C. across much of the southern portion of the Colorado Plateau with later dates derived from sites farther north (Geib 1996:54). Even if the populations in the study area were not actively involved with farming, they were likely in contact with farmers or were a least experiencing changes resulting from the presence of nearby farmers. At Hog Canyon Dune (42Ka2574), located at the junction of Hog and Kanab creeks about two miles north of Kanab, charred corn kernels were recovered from a pitstructure in association with a hearth and a burial yielding two dates: 910 - 390 B.C. and A.D. 60-640 (Janetski 1993:229). The dating of bow and arrow introduction to the eastern Great Basin and Utah has been an issue of continuing debate. Past evidence from the lithic technologies between the terminal Archaic and Basketmaker II populations indicates that by ca. A.D. 100 the bow and arrow was employed by the ancestral Fremont, while the ancestral Anasazi continued to employ the atlatl. In the northern portion of the region, at Cowboy Cave, arrow points come from preceramic Stratum V deposited about A.D. 100-600 (Schroedl and Coulam 1994). To the south, the Sunny Beaches site (42Ka2751) in the Glen Canyon Recreational Area is somewhat of an anomaly. A number of Rose Spring Corner-notched points, which are accepted markers of bow and arrow technology dated earlier (e.g. around A.D. 100) than the established chronology for Basketmaker II aceramic occupations. In the Alton Coal Leasehold previous inventories have documented Rose Spring Corner-notched arrow points from several sites. At site 42Ka2056 both Early Archaic Pinto Series points and Rose Spring Corner-notched points were found, but in two separate lithic assemblage loci (Halbirt and Gualtieri 1981:85).

Formative Stage

The Formative stage began about A.D. 500, when ceramics were generally used on the Colorado Plateau, and continued until A.D. 1300, with the Anasazi abandonment of Four Corners region. Within the region, this stage encompasses two different cultures: the Anasazi (Puebloan) and the Fremont. The project area is within the occupation zone of the Anasazi, which is divided into two recognizable branches the Virgin Anasazi and the Kayenta Anasazi. The Virgin Anasazi primarily occupied the Arizona Strip, southwestern Utah, and southernmost Nevada. Whereas, the Kayenta Anasazi occupied a large portion of northern Arizona and far southeastern Utah. The Fremont are considered a separate entity, found primarily at sites in Utah north of the Anasazi region. Artifactual evidence in the study area indicates primarily a Virgin Anasazi cultural tradition, although both Kayenta Anasazi and Fremont ceramic types have been identified.

The Virgin Anasazi occupied the area from Basketmaker II through early Pueblo III times, and apparently adapted horticultural practices to a variety of environmental conditions (Thompson and Thompson 1978; Walling and Thompson 1988). Investigations in the Grand Staircase area east of Kanab Creek indicates it was occupied continuously from at least Basketmaker II times (ca. A.D. 300) through late Pueblo II (ca. A.D. 1200). Virgin Anasazi residential units are characterized by an architectural sequence from pithouse residences with separate cist storage facilities, through

intermediate stages of room block development, and eventually to substantial surface masonry pueblos incorporating both storage and habitation functions (Talbot 1990). According to McFadden (1996:24) the quantity of storage space per residential unit did not vary significantly over time indicative of a continuity of subsistence practices. In the Grand Staircase region Virgin Anasazi sites located immediately adjacent to cultivable fields were fully residential with large storage capacities (Ibid 7). Furthermore residential mobility may have been part of an adaptive strategy that allowed the Virgin Anasazi to engage in agriculture in an environment in which a variety of short-term environmental fluctuations needed to be accommodated. In contrast the Kolob/Skutumpah Terrace area where the present study area resides (above 6,400 ft) is characterized by a short growing season (less than 120 days at Alton), hence prehistoric agricultural potential was risky. Several studies in this area (Christensen et al. 1983; Halbirt and Gualtieri 1981; Keller 1987:87) indicated that the vast majority of the prehistoric sites are limited activity sites or camps related to hunting and gathering behavior. For the entire Alton Coal leasehold, Keller (Ibid.:87) estimates that 23 percent of the total sites date from Basketmaker III to Pueblo II. However, surveys in the Alton Amphitheater conducted by MOAC (Stavish 2006, 2007) suggest a smaller percentage, only seven percent, of Basketmaker III to Pueblo II temporal components. Data compiled by McFadden (1996:17) from this area, as well as the Grand Staircase and Upper Virgin River, suggests that Virgin Anasazi residential sites are predominantly associated with agricultural potential, while hunting/gathering sites are more common in the elevated zone where agriculture is not feasible. Ceramic types identified in the Alton Coal leasehold are dominated by mainly Virgin Anasazi North Creek Gray, North Creek Corrugated, Shinarump Brown, and St George Black-on-Gray. To a lesser extent Kayenta Anasazi (Tusayan Black-on-Gray) and Fremont Great Salt Lake Gray have been reported in the area adjacent to Kanab Creek (Halbirt and Gualtieri 1981:35).

In the Grand Staircase physiographic section the adaptive strategy of the Virgin Anasazi is summarized by McFadden (1996:30) as an occupation of multiple "homesteads" located in a variety of different agricultural niches, each with different characteristics but all suitable for agriculture. Furthermore, shifts in residence would occur periodically in response to short term climatic fluctuations, but also as a result of local environmental deterioration. A comparison of site types from the lower elevation study areas and the Kolob and Skutumpah Terrace area suggests that given frequent residential moves, the farmsteads themselves could have served as base camp/processing stations with this upland functioning as a hunting-gathering component.

In Washington and Kane Counties, archaeological investigations have revealed habitation sites, storage sites, possible field houses, and nonstructural Virgin Anasazi sites. In the Kanab area, structural sites are situated along Kanab Creek, and its perennial tributary Johnson Creek, to access water for agricultural land. In some places and times, deep soils made possible true dry-farming; in other cases, sites are situated in areas where natural drainage concentrates runoff. East of Kanab, where the population peaks in Late PII times, sites are increasing, situated where they can take advantage of runoff concentrated by washes and streams (Lyneis 1995:225). Other site types found in the Upper Virgin Anasazi area consist of storage features but no dwellings, which may represent part of the flexible nature of Virgin Anasazi settlement patterns (Lyneis 1995:218). In addition, nonstructural sites with Anasazi ceramics are found throughout the area in nonagricultural locations. These may include rockshelters, sometimes associated with large roasting pits, as well as featureless sherd and lithic scatters.

Protohistoric and Southern Paiute

Protohistoric occupation of the project area is attributed to the Southern Paiute, members of the Numic population. Several models address the migration of Numic populations to the Great Basin. Some theorize that Numic expansion from the southwestern Great Basin eastward occurred approximately 1,000 years ago (Lamb 1958). Other models view the expansion taking place several thousand years ago (Taylor 1961, Swanson 1962). On the basis of the co-occurrence of Southern Paiute and Virgin Anasazi ceramics in stratigraphic context it is theorized that entry into the southwestern Utah area by Numic speakers occurred during the late occupational period of the Virgin Anasazi (Westfall et al. 1987). Fowler (1994) compares the material culture of the Southern Paiute to that of the Virgin Anasazi, noting similarities such as clay figurine styles, certain features of coiled basketry, and one type of sandal, and concludes that these similarities suggest interaction between the groups. Besides pottery or perishable materials, the other common diagnostic is the Desert Side-notched projectile point. Although Desert Side-notched points should be considered horizon marker rather than ethnic markers, Southern Paiute use of the study area is well documented (Kelley 1964), and appeared to have constituted the primary post-A.D. 1300 indigenous occupation. Cottonwood Triangular points may not be useful diagnostics of Numic occupations if they are unfinished items broken in production; such tools might have been intended as Desert Side-notched points or Bull Creek points or some other arrow point type (Geib et al. 2001:392). Southern Paiute Brown Ware found in southwest Utah is characterized as conical-bottomed vessels exhibiting undulating surfaces on their thick walls. Decoration is limited to some surface incising, corrugation or fingernail impressions, and/or clapboarding of coils; the former often over the entire surface of the vessel (Baldwin 1950). Temper tends to be visible and coarse and fall into two types for the area: 1) abundant very fine rounded to subangular particles that are generally clear and appear to be frosted suggesting that they originate from eolian and alluvial deposits; 2) large angular to subangular particles most of which are white and very fine grained as if derived from a crushed quartzite or other aphanitic particles (Westfall et al. 1987:70).

The Southern Paiute were hunter-gatherers and part-time horticulturists, with domesticates playing a minor role in their subsistence strategy (Fowler and Fowler 1971, 1981; Steward 1938). This cultural tradition is characterized by the use of rockshelters, and open camp sites containing wickiup dwellings, rock-filled roasting pits, fire hearths, conical-bottomed brownware ceramics, some decorated with fingernail incisions, rabbit fur blankets, basketry hats and containers, digging sticks, milling stones, and stone tools (Euler 1966; Westfall et al. 1987). Social organization revolved around bands of multiple family units, cooperating and joining forces when necessary to ensure the survival of the community (Steward 1938). At least 16 major bands, or 35 smaller groups, have been identified in Utah.

The area adjacent to the present town of Alton was the summer home of one of the seven socio-economic groups that comprised the Kaibab Band of the Southern Paiute (Kelley 1964). The organization of these groups was largely economic in character, however, some attention was allotted to social residence. It appears that the group inhabiting the Alton area was a small patrilocal aggregate. While evidence exists that other groups visited the area occasionally to gather seeds and berries, there seems to have been minimal economic cooperation between groups (Ibid.). The Alton group was controlled by a chief who directed the seasonal movements of camps, and who was in most instances in charge of deer hunting (Ibid 27). According to Kelley (Ibid 6), campsite location was determined by the presence of springs which fell under the jurisdiction of the local economic group. Subsistence activities varied according to seasonality, with the occupants of a spring "....tending to share the same seasonal cycle" (Ibid 8). During the winter, the group

resided in Kanab Canyon were semi-permanent camps in the sense that the occupants returned to them following hunting and foraging trips. Resources utilized during this period included seeds and rabbits, the latter hunted in large scale drives consisting of perhaps 25 individuals from different households (Ibid 24). Periodically, deer and pinyon nut forays were also conducted along the top of the Vermillion cliffs. When snows receded in the spring, the group moved north to the Alton area and subsisted until summer on stores of food previously cached in caves (Ibid 16). The group remained in Alton for most of the summer collecting a wide variety of seeds and berries as well as hunting deer, marmot, and rabbit (Halbirt and Gualtieri 1981:15). At some point during this period the group returned briefly to the Kanab area to gather seeds and cached them for the succeeding winter occupation (Kelly 1964:16). Deer hunting and the gathering of "plateau" seeds was emphasized during the late summer to fall months. It is during this period that deer begin to congregate in small migratory groups.

Navajos occupied areas of the Skutumpah Terrace during the post World War II period (about 1945 to 1970) while cutting and installing cedar fences for local ranchers (Halbirt and Gualtieri 1981:56). Physical remains from the Navajo occupation primarily east of the project area fall into one of the four following categories: 1) forked-stick hogans composed of interlocking poles and a corbelled roof entrance; 2) palisade hogan composed of a corbelled roof supported by four corner posts and a series of stringers which lean against the roof; 3) brush hogan roughly square in plan view and partially supported by two living pinyon trees which provided the superstructure firm support; 4) sweat lodge consisting of three interlocking poles with stringers leaning against the frame and packed with mud daub (Bradley 1999:56).

Historic - European

The first documented entry of European Americans into Kane County was the expedition of Fathers Francisco Atanasio Dominguez and Silvestre Velez de Escalante in the autumn of 1776 to establish an overland route between settlements in Santa Fe and Los Angeles. Because of a snowstorm near Milford, the expedition halted the attempt to reach California, and instead followed a route to the southeast to return to Santa Fe. Along this route they named Sulphur Creek (later renamed the Virgin River), Rio de Pilar (later known as Ash Creek), and Hot Sulphur Springs (Alder and Brooks 1996; Bradley 1999). Another early explorer, Jedediah Smith, followed parts of the Dominguez and Escalante Old Spanish Trail, of which various portions were later referred to as the California Trail, through Washington County in 1826 and 1827. His route created a new pathway for pioneers traveling from the East to California, and was widened to an actual wagon road in 1849. Other explorers to follow in these footsteps include John C. Fremont in 1844 and Mormon pioneer leaders from Salt Lake City in 1847 (Alder and Brooks 1996).

Important to the Mormon colonization effort was the organization of an Indian mission in Harmony in early 1854. Jacob Hamblin, a Mormon explorer and settler of Kane County, led the effort to establish harmonious relationships with key Native American leaders. His knowledge of the area also facilitated government exploration and mapping projects, including a Colorado River voyage with John Wesley Powell in 1871 that documented the landscape of Glen Canyon and the present-day city of Kanab. While Kanab is the principal settlement in Kane County, small towns in Long Valley are important centers of agriculture and stock-raising. In 1862, John and William Berry first led a team of ranchers into the Long Valley area in search of rangeland for their cattle. The area was called Long Valley due literally to its length (a long narrow valley situated between high mountain walls), fertile land, and proximity to water. The first settlement in the valley was probably that of Berryville (later renamed Glendale), established by the Berry brothers in 1864.

Berryville was abandoned in June 1866 due to conflicts between the Mormon settlers and Pauite and Navajo tribes in the area. This pattern of settlement was common to many of the small towns in Long Valley throughout the late 1800s. On January 16, 1864, the Utah Territorial Legislature approved an act that officially created Kane County. Its boundaries were defined on the west to include the upper Virgin River area, including Virgin City, the principal town in the new county at the time (Bradley 1999:56-59). Kane County remained isolated because of its challenging landscape, its relatively small population, and its lack of connection to railroad lines.

The town of Alton is a small ranching community located near the head of Long Valley. It originally developed from Upper Kanab, an earlier settlement in the valley of upper Kanab Creek that was abandoned during the Black Hawk War. Upper Kanab was first settled by Lorenzo Wesley Roundy when he brought his family to Upper Kanab Creek in 1865. Historically, this area had tall grass, good fodder for their animals, streams of clear water, abundant wildlife in the nearby mountains, berries and other wild fruit, and timber for homes and fences (Bradley 1999:65). The settlement was first called Roundy's Station and the immigrants built two log cabins that first summer. In 1865, the Mormon Church ordered inhabitants of Upper Kanab and other small settlements to go to Kanab, Dixie, and larger towns in the area to help fortify them against Pauite raids (Ibid 65-66). Settlers did not return to Upper Kanab until 1870, when Lorenzo Roundy's nephew, Byron Donalvin Roundy, and his wife settled there. Byron and his brother, William Roundy, organized a cattle company called the Canaan Cooperative Stock Company, headquartered in St. George. In 1882, Edwin D. Woolley and Daniel Seegmiller also brought their families to settle in Upper Kanab. Two buildings, a schoolhouse and a recreation hall, were erected in 1885 at the head of the Virgin River. During the late 1880s, when the federal government began to crack down on the polygamists of Utah territory, many Mormon men fled to the area to escape marshals (Ibid 143-149). In 1887, the communities of Ranch, Upper Kanab, and Sink Valley joined together to form a LDS ward. In 1908, the town acquired its present-day name of Alton during a May Day celebration drawing. Charles R. Pugh, who had been reading a book about the Alton Fjord in Norway, suggested the name. The population of the town peaked at 350 in the 1930s (Ibid 210). In the post World War II years, coal reserves were discovered near Alton, and the Smirl-Alton coal mines extracted an average of 40 tons daily in 1949. Today, Alton is home to fewer than 100 people, and its main sources of livelihood stem from ranching, the timber industry, and its potential for coal mining.

Today, most traffic through the area is generated by tourists headed to attractions such as Bryce Canyon National Park, Zion National Park, and Grand Staircase-Escalante National Monument. Bryce Canyon, the southern part of which lies in Kane County, was designated a national monument by President Warren G. Harding in 1923, and elevated to National Park status in 1928. Originally, the boundary of Zion National Park ended at the Washington-Kane County State line. In 1930, it was expanded to include part of Kane County, which was made accessible by the Zion-Mt. Carmel tunnel and road (Bradley 1999:218). Grand Staircase-Escalante National Monument was established by President Bill Clinton on September 17, 1996. The monument comprises approximately 1.7 million acres in Kane and Garfield Counties. These major tourist destinations are all accessible via US Highway 89, which bisects Long Valley and proceeds through every town in Kane County except Alton (Ibid 8).

Previous Archaeological Work In or Adjacent to the Project Area

A record search for previous projects and cultural resources was conducted at the Utah State Historic Preservation Office, Salt Lake City on March 25, 2005 by Ms. Marty Thomas. Intensive cultural resource investigations have taken place in the area since the 1980s; however, numerous archaeological sites have been recorded since the 1970s. The majority of the eleven identified inventories were conducted by the Museum of Northern Arizona or Bureau of Land Management and are mostly related to proposed mining activities.

In 1974, the Museum of Northern Arizona (MNA) performed clearance of 48 drilling locations and access routes on the Skutumpah Terrace in Kane County; 19 drilling locations and access routes in the Alton Amphitheater in Kane County; and four meteorological tower sites in Kane County (Davidson et al. 1974). Thirty-six archaeological sites were documented during the investigations. Three of these sites are located in the current project area, 42Ka1267, 42Ka1314, and 42Ka1834. Site 42Ka1267 is a lithic campsite with lithic tools, lithic debitage and ground stone that was determined to be significant. 42Ka1314 is an artifact scatter determined to be significant. These sites were re-documented; however, site 42Ka1834, a small lithic scatter with a single projectile point, could not be relocated in the field.

In 1979-1980, MNA conducted inventories for Utah International, Inc.'s coal mining lease area situated on the Skutumpah Terrace and Alton Amphitheater (Halbirt and Gualtieri 1981). The four surveyed parcels were designated Alton East and Alton West, the coal preparation plant site, and major road routes. A total of 107 archaeological sites, most of which were of prehistoric affiliation, were documented dating from the Archaic to Late Prehistoric. A total of 107 archaeological sites, most of which were of prehistoric affiliation were documented dating from the Archaic to Late Prehistoric. A portion of the Alton West parcel is located within the current project area and includes previously documented sites 42Ka2037, 42Ka2038, 42Ka2039, 42Ka2040, 42Ka2045, 42Ka2047, 42Ka2048, 42Ka2049, 42Ka2050, 42Ka2051, 42Ka2052, 42Ka2055, 42Ka2056, 42Ka2057, 42Ka2058, 42Ka2059, 42Ka2065, and 42Ka2066. These sites are prehistoric temporary camps, artifact scatters and lithic scatters. All of these sites, except 42Ka2037, were re-documented for the current undertaking. Site 42Ka2037 is a lithic scatter with a single projectile point that was not relocated during the 2005 MOAC inventories.

In 1980, the Bureau of Land Management (BLM) Kanab Field Office performed a Class III inventory of Engineers International, Inc. seismic testing areas (McFadden 1980). No cultural resources were located in the project area. The BLM performed a cultural resource inventory in 1981 of a tract allotment for Heaton Brothers (McFadden 1981). No archaeological sites were documented during the project. The Cone allotment chaining area was surveyed by the BLM in 1982, resulting in a finding of no cultural resources (McFadden 1982).

In 1984, the BLM surveyed the Syler Knoll chaining area for cultural resources (McFadden 1984). Previously recorded site 42Ka2045, a large lithic scatter containing diagnostic artifacts, was located within the project area. Because 42Ka2045 was previously evaluated as not significant (for eligibility to the NRHP), clearance was recommended for the chaining activities.

In 1986, MNA performed cultural resource inventories of 43 drill locations and access roads within the Alton Coal Field for Utah International, Inc. (Weaver 1986). Two new archaeological sites, located outside of the current project area, were documented. Also in 1986, MNA performed survey and monitoring of nine test pit locations and access routes for Utah International, Inc. (Weaver and Hurley 1986). No new cultural resources were documented.

In 1986, the Museum of Northern Arizona (MNA) returned to the Alton Coal Leasehold to survey another 12,500 acres, resulting in the documentation of 103 additional sites of which six occur in the present project area (42Ka3077, 42Ka3080, 42Ka3097, 42Ka3115, 42Ka3140, and 42Ka3168) (Keller 1987). Site 42Ka3077 is a lithic and hearth scatter of Archaic affiliation that was recommended as eligible to the NRHP. 42Ka3097 is a multi-component Archaic, Anasazi, Paiute, and historic artifact scatter that was recommended as eligible to the NRHP. Site 42Ka3115 is a lithic scatter of Paiute affiliation that was recommended as eligible to the NRHP and site 42Ka3140 is the Alton Cemetery. Site 42Ka3168 is a lithic and hearth scatter of Virgin Anasazi affiliation that is recommended as eligible to the NRHP. Site 42Ka3080 was described as a historical agricultural trash dump consisting of various agricultural implements and an automobile. This site was not re-located during the current inventory and was likely moved or reclaimed from the in-use agricultural field.

In 1987, the Museum of Northern Arizona (MNA) surveyed 22 auger borings and 27 backhoe test pits for Utah International, Inc. (Weaver and Hurley 1987).

In 1993 and 1994, Nielson Consulting Group and Timpanogos Research Associates performed cultural resource inventories and site evaluations of several abandoned mines in central and southern Utah (Hughes et al. 1994). Three of the mines (42Ka4017, the Smirl Mine; 42Ka4019, Prospect 2A; and 42Ka4091, the Alton Mine) are located in the current project area. None of these mines are evaluated as eligible to the NRHP. These sites could not be re-located during the 2005 MOAC inventories, likely as a result of reclamation.

A stratified probability sample inventory of the Kaiparowits Plateau was conducted in 1998 and was designed to provide information on the density, distribution, and diversity of cultural resources in the region (Geib et al. 2001). This survey identified prehistoric remains dating from the early Archaic through the Protohistoric; including Archaic, Fremont, Anasazi, and Late Prehistoric (likely Southern Paiute). While Archaic sites were numerous across the survey area with abundant cultural remains, small Late Prehistoric sites containing few cultural remains were identified to have the greatest density. Sites attributed to the Archaic period are dominated by hunting camps. Importantly, the authors note that many Archaic sites on the Kaiparowits Plateau appear to be mainly surface phenomena and appear to have little potential for buried cultural remains (Ibid.:7-5). Residential and hunting camps were identified with equally high frequency for the Fomative period, and together represent more than half of the identified Formative period sites. Of the identified Late Prehistoric site types on the Kaiparowits Plateau, hunting camps were identified with the greatest frequency (Geib et al. 2001).

In June and July 2005, MOAC conducted a cultural and fossil resource inventory of Alton Coal Development's project area in the Alton Amphitheater, south of the town of Alton, Utah (Stavish 2007). The inventory resulted in the documentation of 31 previously recorded archaeological sites and 60 new archaeological sites. The previously recorded archaeological sites include one historic site (Alton Cemetery); three multi-component prehistoric/historic sites; and 27 prehistoric sites that consist of temporary camps, artifact scatters, and lithic scatters. The new archaeological sites include two historic sites (a corral and a bridge); two multi-component prehistoric/historic sites; and 56 prehistoric sites that consist of temporary camps, artifact scatters, and lithic scatters. The inventory also resulted in the documentation of 30 new paleontological localities and three previously documented paleontological localities (Stavish 2007). In August 2005, MOAC completed a survey of six coal seam drill sites for Alton Coal Development; no cultural resources were found (Thornton and Montgomery 2005).

In 2007, the Bureau of Land Management, Kanab Field Office, conducted a cultural resource inventory of additional lands associated with the Alton Coal Area of Potential Effect (APE) (Zweifel 2007). The inventory resulted in the documentation of 14 archaeological sites (42Ka3170-42Ka3172, 42Ka3174, 42Ka3175, 42Ka6351-42Ka6354, and 42Ka6357-42Ka6361). Two of theses sites (42Ka6358 and 42Ka6259) are located outside of the current APE and are not included in the project area.

Previous Archaeological Investigations - Regional

Regional archaeological investigations conducted in the vicinity of the project area include investigations at the Red Cliffs Site (Dalley and McFadden 1985), the Little Man Archaeological site on the Virgin River (Dalley and McFadden 1988), along SR-9 (Horn 1991), the Washington City-Green Spring Project (Westfall et al. 1987), the Interstate 15 within the Middleton to Snowfield Interchange project (Westfall 1991), and at Quail Creek (Walling et al. 1986). These sites consist mainly of Pueblo I and Pueblo II Virgin Anasazi, Archaic, and Southern Paiute affiliation. Large excavation projects have been completed for the Kern River 2003 Expansion Project (Reed et al. 2005), at Sand Hollow (Talbot and Richens 2002) and Corral Canyon (Roberts and Eskenazi 2006). Numerous small sites have also recently been excavated in the St. George Basin including 42Ws1809 (Eskenazi 2006) and 42Ws2556 (Eskenazi 2005).

Fourteen sites were investigated along Interstate 15 within the Middleton to Snowfield Interchange project area (Westfall 1991). These sites include four prehistoric and 10 historic resources. Test excavations at the prehistoric sites indicated that site 42Ws1220 is a multi-component Archaic, Virgin Anasazi and Southern Paiute camp, site 42Ws2364 is a lithic scatter of unknown cultural affiliation, site 42Ws2394 is a resource processing camp of unknown cultural affiliation, and site 42Ws2395 is a Virgin Anasazi (Pueblo I) habitation.

The Quail Creek project included a wide range of site types that reflect Native American use from the late Archaic/Basketmaker period to the Paiute period (Walling et al. 1986). Quail Creek is the only Virgin Anasazi settlement system covering an entire canyon that has been investigated using radiocarbon dating methods, as well as macrobotanical and pollen analysis of botanical samples. The radiocarbon dates, in association with the temporally diagnostic ceramics from the sites, suggest that the area was used continuously during the Virgin Anasazi period from about A.D. 80 to 1290 and possibly as late as A.D. 1380.

The Red Cliffs site is a Pueblo I-II Virgin Anasazi habitation that was excavated and stabilized by the Bureau of Land Management (Dalley and McFadden 1985). The Red Cliffs site contained 27 storage features and two habitations, with other minor features including firepits, midden areas, and use surfaces. The complexity of building sequences and storage blocks is suggested as evidence of a periodic settlement strategy (ibid.). The BLM also excavated several Virgin Anasazi sites located on the Virgin River between Quail Creek and Hurricane, Utah that are known as the Little Man sites (Dalley and McFadden 1988). The habitations and storage features excavated at the Little Man sites suggest episodes of reuse, rebuilding, and reoccupation. The authors also suggest that a full range of tool production activities were occurring at each site, which included hunting and related processing activities (ibid.:256).

The Green Spring excavations were conducted in 1985 by Abajo Archaeology and consisted of six small rock shelters with seven associated outdoor hearths (Westfall et al. 1987). The analysis of artifacts, macrobotanical and pollen samples, and faunal remains was interpreted to suggest that the sites represented short-term encampments and residential camps whose occupants were

engaged in resource procurement and processing (ibid.). The sites were occupied during the Pueblo I and II periods and later by Paiute groups (after A.D. 1800). The site function is suggested to have shifted from a seasonal base camp during the Pueblo I occupation to a specialized resource procurement locale during the Pueblo II period. Radiocarbon dates from heathers in the front of the shelters yielded historic dates; however the historic Euro-American artifacts associated with the Southern Paiute occupation of the shelters were not found in association with these features. The historic Euro-American artifacts associated with the Southern Paiute occupation include pieces of fabric, a bullet, and eighteen cartridge casings (ibid.).

Excavations at sites 42Ws54 and 42Ws1226 along State Road 9 between St. George and Hurricane, Utah were conducted by Alpine Archaeological Consultants (Horn 1991). Site 42Ws54, an open scatter of artifacts with an nearby Anasazi roomblock, contained 2,795 artifacts and dates to the Pueblo II Virgin Anasazi and Southern Paiute periods (ibid.:52). Site 42Ws1226 was a small rockshelter with deep alluvial and cultural deposits that contained 1,333 artifacts and occupation is attributed entirely to the Southern Paiute period. Deposits in the floodplain below site 42Ws1226 appear to date from the Archaic to the Protohistoric (ibid.:87).

A large-scale data recovery effort was undertaken by Brigham Young University prior to the construction of the Sand Hollow Reservoir near Hurricane, Utah (Talbot and Richens 2002). The Sand Hollow project investigated over 30 components that represented occupations spanning the Early Archaic through the Southern Paiute periods. Talbot and Richens (2002:401) documented substantial evidence of the use of the plant and animal resources during the Middle and Late Archaic periods during both short and longer-term stays. The excavations resulted in the interpretation of 14 structures or possible structures and numerous pit features described as postholes, subfloor pits, and thermal pits (ibid.:399). Temporary habitation features are noted for both the Late Archaic and Southern Paiute periods.

The Kern River 2003 Expansion Project concentrated archaeological date recovery efforts to a limited number of sites with good potential for addressing pertinent research questions (Reed et al. 2005). The 22 sites selected for archaeological excavation range from Paleoindian lithic scatters to Euroamerican town sites. Sites located in southwestern Utah are primarily lithic and ceramic scatters that range from Early Archaic to Protohisotric temporal affiliations, and include both Virgin Anasazi and Fremont cultural groups.

HRA conducted excavations at site 42Ws2556, which is located on a terrace adjacent to the Virgin River, near the town of Bloomington, Utah (Eskenazi 2005). The excavations centered on a charcoal stain that dated to the Southern Paiute period and pollen from a quartzite mano suggests that the occupants of the site processed locally available resources such as Cheno-am seeds. Eskenazi (2005:54) suggests that the site functioned a temporary plant and animal processing camp that was used for as short a period as only a single night to a few days. Artifacts from earlier and later periods suggest that the site may also have been briefly occupied by Archaic and Anasazi groups.

The Coral Canyon excavations conducted by HRA consisted of test excavations and data recovery at 23 sites located north of Washington City, Utah (Roberts and Eskenazi 2005). The documented sites were occupied during the Early Archaic through the Late Archaic period and the Southern Paiute Period (ibid.). The site types, similar to those documented in the Sand Hollow report, included short-term processing camps, seasonal residences, and residential camps. The associated paleo-environmental study suggested that the Coral Canyon sites were occupied during cooler, wetter periods, such as the Late Archaic and Little Ice Age (A.D. 1500-1700) (ibid.:208).

Data recovery at the Plain View site, 42Ws1809, conducted by HRA resulted in the documentation of six storage features, four hearths, and a shallow, ephemeral living structure (Eskenazi 2006). Two and possibly three occupations are proposed to have occurred between A.D. 800 and 900. Floatation and pollen samples that fuel woods were obtained locally, and that two features may have been involved in plant processing activities (ibid.:76). The presence of slab-lined storage cists indicated that the occupants invested time and energy into creating for reliable food storage and the site was likely used for short-term stays while the food was being processed or for longer periods of time during milder seasons (ibid.:90).

To summarize, cultural resource projects conducted in the vicinity of the current project area have yielded evidence of prehistoric and historic sites. Prehistoric site types include lithic scatters, lithic quarry/workshops, residential camps, specialized resource procurement and processing camps, transitory camps, and habitations. Cultural affiliation of these sites is attributed to Archaic, Virgin Anasazi, and Southern Paiute peoples.

Overview of Cultural Resources in the Project Area

In 2005, MOAC completed two cultural resource inventories located in the Alton Amphitheater and Sink Valley, south of the town of Alton, Utah (Stavish 2006, 2007). In 2007, the BLM Kanab Field Office completed a cultural resource inventory of 510 acres of BLM lands (Zweifel 2007). The inventories examined a total of 3,977 acres; these incldue 2,284 acres of public lands administered by the Bureau of Land Management, Cedar City District, Kanab Field Office, and 1,693 acres of private lands. Additionally, the foreseeable transportation route utilizes US-89, which has been designated as 42Ka4480 (old US-89) and 42Ka6301 (current alignment) in Kane County and 42Ga4992 in Garfield County, and have been recommended as not eligible to the NRHP. The NRHP Historic District in Panguitch is also located along the foreseeable transportation route and is recommended as eligible to the NRHP under Criteria A and C. The Environmental Impact Statement (EIS) that the BLM and SWCA Environmental Consultants are preparing for the federal coal lease application describes the foreseeable transportation route through the Historic District of Panguitch as a cumulative effect. Combined, these inventories resulted in the documentation of 113 cultural resources (Table 2). These sites consist of five historic sites, six multi-component prehistoric/historic sites, and 102 prehistoric sites (see Table 2). The historic sites include trash scatters/dumps (42Ka1267, 42Ka2058, 42Ka6113, and 42Ka6135), the US-89 heritage road (42Ka4480, 42Ka6301, and 42Ga4992), the Panguitch Historic District, a corral (42Ka6082), and a collapsed bridge (42Ka6086). The multi-component prehistoric/historic sites include prehistoric artifact scatters with historic trash dumps (42Ka1267, 42Ka2058, and 42Ka6113), a prehistoric artifact scatter with a historic herding camp (42Ka2050), a prehistoric temporary camp with a historic trash scatter (42Ka6135), and a prehistoric lithic scatter with a historic homestead (42Ka2068). The prehistoric sites include 22 temporary camps, 16 artifact scatters, and 64 lithic scatters. The temporal and/or cultural periods represented by the sites include the Archaic (Early Archaic and Late Archaic), Anasazi, Fremont, Numic, and Southern Paiute. Three sites (42Ka3140, 42Ka6358, and 42Ka6359) were documented during cultural resource inventories associated with both of the proposed projects, but are located outside the project area, though this is dependent on the final lease area.

Table 2. Site Type and NRHP Eligibility of Sites.

State Site Number	Site Type	Temporal or Cultural Affiliation	Land Status	NRHP Eligibility
42Ka1267	Prehistoric Artifact Scatter Historic Trash Dump	Numic, Historic	Private	Eligible; D
42Ka1313	Prehistoric Temporary Camp	Archaic, Anasazi PII, Numic	BLM, Private	Eligible; D
42Ka1314	Prehistoric Temporary Camp	Southern Paiute	Private	Eligible; D
42Ka2038	Prehistoric Artifact Scatter	Southern Paiute	BLM	Eligible; D
42Ka2039	Prehistoric Temporary Camp	Archaic, Numic	BLM	Eligible; D
42Ka2040	Prehistoric Artifact Scatter	Southern Paiute	Private	Eligible; D
42Ka2041	Prehistoric Lithic Scatter	Anasazi, Southern Paiute	BLM, Private	Eligible; D
42Ka2042	Prehistoric Temporary Camp	Unknown	Private	Eligible; D
42Ka2043	Prehistoric Lithic Scatter	Numic	Private	Eligible; D
42Ka2044	Prehistoric Lithic Scatter	Archaic	BLM, Private	Eligible; D
42Ka2045	Prehistoric Artifact Scatter	Archaic	BLM	Eligible; D
42Ka2047	Prehistoric Temporary Camp	Unknown	BLM	Eligible; D
42Ka2048	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka2049	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka2050	Prehistoric Artifact Scatter Historic Herding Camp	Archaic, Historic	Private	Eligible; D
42Ka2051	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka2052	Prehistoric Artifact Scatter	Archaic	BLM	Eligible; D
42Ka2055	Prehistoric Temporary Camp	Archaic, Fremont, Southern Paiute	BLM	Eligible; D
42Ka2056	Prehistoric Artifact Scatter	Fremont, Numic	BLM	Eligible; D
42Ka2057	Prehistoric Temporary Camp	Anasazi, Southern Paiute	BLM	Eligible; D
42Ka2058	Prehistoric Artifact Scatter Historic Trash Dump	Late Archaic, Historic	BLM	Eligible; D
42Ka2059	Prehistoric Artifact Scatter	Unknown	BLM	Eligible; D
42Ka2065	Prehistoric Temporary Camp	Archaic, Anasazi, Fremont, Southern Paiute	BLM	Eligible; D

State Site Number	Site Type	Temporal or Cultural Affiliation	Land Status	NRHP Eligibility
42Ka2066	Prehistoric Artifact Scatter	Unknown	BLM	Eligible; D
42Ka2068	Historic Homestead and Prehistoric Lithic Scatter	Unknown, Historic	Private	Eligible; D
42Ka3077	Prehistoric Artifact Scatter	Unknown	Private	Eligible; D
42Ka3097	Prehistoric Artifact Scatter	Archaic, Anasazi, Southern Paiute	Private	Eligible; D
42Ka3115	Prehistoric Temporary Camp	Unknown	Private	Eligible; D
42Ka3140	Historic Cemetery	Historic	Private	Eligible; A, B
42Ka3168	Prehistoric Artifact Scatter	Anasazi	BLM	Eligible; D
42Ka3170	Prehistoric Artifact Scatter	Archaic, Late Prehistoric	BLM	Eligible; D
42Ka3171	Prehistoric Open Camp	Late Prehistoric	BLM	Eligible; D
42Ka3172	Prehistoric Artifact Scatter	Pueblo II, Ute/Paiute	BLM	Eligible; D
42Ka3174	Prehistoric Open Camp	Archaic	BLM	Eligible; D
42Ka3175	Prehistoric Open Camp	Archaic, Late Prehistoric	BLM	Eligible; D
42Ka6072	Prehistoric Lithic Scatter	Unknown	Private	Not Eligible
42Ka6073	Prehistoric Lithic Scatter	Unknown	Private	Eligible; D
42Ka6074	Prehistoric Lithic Scatter	Unknown	Private	Eligible; D
42Ka6075	Prehistoric Lithic Scatter	Unknown	Private	Eligible; D
42Ka6076	Prehistoric Lithic Scatter	Unknown	Private	Eligible; D
42Ka6077	Prehistoric Lithic Scatter	Unknown	Private	Not Eligible
42Ka6078	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6079	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6080	Prehistoric Temporary Camp	Archaic, Numic	BLM	Eligible; D
42Ka6081	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6082	Historic Corral	Historic	Private	Not Eligible
42Ka6083	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6084	Prehistoric Artifact Scatter	Southern Paiute	BLM	Eligible; D

State Site Number	Site Type	Temporal or Cultural Affiliation	Land Status	NRHP Eligibility
42Ka6085	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6086	Historic Bridge	Historic	Private	Not Eligible
42Ka6087	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6088	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6089	Prehistoric Temporary Camp	Unknown	BLM	Eligible; D
42Ka6090	Prehistoric Temporary Camp	Unknown	BLM	Eligible; D
42Ka6091	Prehistoric Temporary Camp	Early Archaic	BLM	Eligible; D
42Ka6092	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6093	Prehistoric Lithic Scatter	Unknown	Private	Eligible; D
42Ka6094	Prehistoric Lithic Scatter	Early Archaic	BLM	Eligible; D
42Ka6095	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6096	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6097	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6098	Prehistoric Temporary Camp	Unknown	BLM	Eligible; D
42Ka6099	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6100	Prehistoric Lithic Scatter	Archaic	BLM	Not Eligible
42Ka6101	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6102	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6103	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6104	Prehistoric Lithic Scatter	Archaic	Private	Eligible; D
42Ka6105	Prehistoric Lithic Scatter	Numic	Private	Eligible; D
42Ka6106	Prehistoric Lithic Scatter	Unknown	Private	Eligible; D
42Ka6107	Prehistoric Lithic Scatter	Unknown	Private	Eligible; D
42Ka6108	Prehistoric Lithic Scatter	Early Archaic	Private	Elgible; D
42Ka6109	Prehistoric Lithic Scatter	Unknown	BLM, Private	Eligible; D
42Ka6110	Prehistoric Temporary Camp	Unknown	BLM	Eligible; D
42Ka6111	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6112	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D

State Site Number	Site Type	Temporal or Cultural Affiliation	Land Status	NRHP Eligibility
42Ka6113	Prehistoric Artifact Scatter Historic Trash Scatter	Unknown, Historic	BLM	Eligible; D
42Ka6114	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka6115	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka6116	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6117	Prehistoric Lithic Scatter	Fremont	BLM	Eligible; D
42Ka6118	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6119	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6120	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6121	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6122	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6123	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6124	Prehistoric Lithic Scatter	Unknown	Private	Not Eligible
42Ka6125	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6126	Prehistoric Temporary Camp	Anasazi, Southern Pauite	Private, BLM	Eligible; D
42Ka6127	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka6128	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6129	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka6130	Prehistoric Temporary Camp	Unknown	BLM	Eligible; D
42Ka6131	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6132	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6133	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6134	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka6135	Prehistoric Temporary Camp Historic Trash Scatter	Southern Paiute, Historic	BLM	Eligible; D
42Ka6136	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6137	Prehistoric Lithic Scatter	Unknown	BLM	Eligible; D
42Ka6138	Prehistoric Artifact Scatter	Late Archaic, Southern Paiute	BLM	Eligible; D

State Site Number	Site Type	Temporal or Cultural Affiliation	Land Status	NRHP Eligibility
42Ka6139	Prehistoric Temporary Camp	Unknown	BLM	Eligible; D
42Ka6307	Prehistoric Artifact Scatter	Unknown	Private	Eligible; D
42Ka6351	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka6352	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6353	Prehistoric Seasonal Camp	Unknown	BLM	Eligible; D
42Ka6354	Prehistoric Lithic Scatter	Unknown	BLM	Not Eligible
42Ka6357	Prehistoric Artifact Scatter	Archaic, Late Prehistoric	BLM	Eligible; D
42Ka6358	Prehistoric Lithic Scatter	Archaic	BLM	Not Eligible
42Ka6359	Historic Artifact Scatter	Historic	BLM	Not Eligible
42Ka6360	Prehistoric Lithic Scatter	Middle Archaic, Late Prehistoric	BLM	Eligible; D
42Ka6361	Prehistoric Lithic Scatter	Archaic	BLM	Eligible; D
42Ka4480 42Ka6301 42Ga4992	Historic US-89 Road Alignments in Kane and Garfield Counties	Historic	UDOT	Not Eligible
N/A	Panguitch Historic District	Historic	N/A	Eligible; A, C

Three sites (42Ka3140, 42Ka6358, and 42Ka6359), which are include in Table 2, are not discussed in the description of sites below. These sites are not located within the current boundary of the project area, but were documented during cultural resource inventories of the Alton Amphitheater and Sink Valley localities (Stavish 2006, Zweifel 2007). Site 42Ka3140 is the Alton Cemetery and is defined by 154 graves that date from 1889 to 1997. The cemetery is recommended as eligible to the NRHP under Criteria A and B. Site 42Ka6358 is a disperse, diffuse lithic scatter consisting almost entirely of white tertiary flakes and a probable dart point fragment suggest an Archaic temporal affiliation. Site 42Ka6359 is a historic artifact scatter that consists of four small metal toy wagon beds and associated parts with a small amount of associated historic debris.

Eighteen prehistoric sites have multiple prehistoric temporal/cultural components, while the majority of prehistoric sites are single component. However, as many of the single component sites are described as unknown cultural or temporal affiliation, it is possible that some of these sites are multi-component sites of multiple unknown cultural periods. Because of the numerous multi-component sites, 129 individual site components are identified among the 111 sites. This total includes 121 prehistoric components and ten historic components. The prehistoric components can be further sorted temporally, such that there are 30 Archaic components, eight Anasazi components, four Fremont components, 25 Southern Paiute and Numic components, and 62

components of unknown prehistoric affiliation. Diagnostic artifacts indicative of two or more distinct prehistoric cultural periods are identified at 16 multi-component sites. These temporally diverse components represent either the reoccupation of the same locale by subsequent culture groups or the practice of later Native Americans curating and reusing the tools of their predecessors. Collection, curation, and reuse of manos from "archaeological sites" has been noted ethnographically for the Kaibab band of the Southern Paiute (Kelly 1964:37).

Most of the prehistoric sites (n=87) in the project area are comprised of artifact scatters with no associated features. Twenty-one prehistoric sites are comprised of one or more features with or without associated artifacts. The prehistoric sites with features are primarily single component sites of Archaic or unknown temporal affiliation. The features present at both single component and multi-component prehistoric sites are all fire-cracked rock concentrations that most often exhibit little morphology and little to no soil staining.

The historic components (n=10) identified in the project area reflect historic activities since 1889 and represent a variety of homesteading, ranching, and community based activities. Six different historic component types are identified and are primarily defined by the presence of features. Historic component types include trash scatter, herding camp, homestead, historic heritage route, the historic district of Panguitch, corral and bridge. Historic trash scatters are the most common historic component type (n=4) and they appear to represent short term or single episode trash dumps or scatters with no associated historic features. A single historic herding camp component (42Ka2050) is comprised of three discreet trash dump features, two temporary or expedient corral features, a possible wire clothesline, a poorly constructed lumber privy, and an unknown collapsed small lumber structure. A historic homestead component (42Ka2068) is comprised of a standing log structure described as a granary, a stone cellar, a log corral, three log fence sections, and agricultural field, and an associated stand of oak trees with rose bushes. The historic corral and bridge components (42Ka6082 and 42Ka6086) are each solely defined by their features and structural elements. The Panguitch Historic District and the state heritage route US-89 (42Ka4480, 42Ka6301, and 42Ga4992) are historic components associated with the reasonablely foreseeable transportation route of the coal trucks. The Panguitch Historic District was listed on the NRHP in 2006 and consists of a number of architecturally significant institutional, commercial, and residential buildings. An old alignment of state heritage route US-89 has been documented in Kane County, north of Kanab, and is designated as site 42Ka4480. The current alignment and associated features of state heritage route US-89 has been designated as site 42Ka6301 in Kane County and as site 42Ga4992 in Garfield County.

Site size is highly variable depending on site type, location, and duration of use. Site areas range from 43 m^2 (42Ka6122) to 140,123 m^2 (42Ka2065). The smallest sites consist of artifact scatters with no features, where as the larger sites (greater than 10,000 m^2) are typically multi-component and consist of dispersed but continuous artifact scatters and fire-cracked rock features. Examples of the most expansive sites include: site 42Ka2065, a prehistoric multi-component temporary camp with two fire-cracked rock features; site 42Ka3097 a prehistoric artifact scatter with diagnostic artifacts representing the Archaic, Anasazi, and Southern Paiute; and site 42Ka2057 a prehistoric multi-component temporary camp that is affiliated with the Anasazi and Southern Paiute and includes a single fire-cracked rock feature. Most of the sites (n=77) cover less than the average site size (6,531 m^2) and just over a third (n=36) of the total sites cover less than 1000 m^2.

Eligible sites (n=92) are primarily nominated to the National Register of Historic Places (NRHP) under Criterion D, although one site (42Ka3140) is nominated under Criteria A and B. Site 42Ka3140 is the Alton Cemetery, at which many of the buried individuals are early settlers of the Upper Kanab area and early founders of the town of Alton. Additionally, the cemetery dates to an early period of settlement in southwestern Utah and dates to the formation of the community of Alton (Upper Kanab). The remaining eligible sites were recommended to the NRHP under Criterion D and the sites consist of a multi-component historic/prehistoric site, prehistoric temporary camps, and prehistoric artifact scatters. Site 42Ka2068 is a multi-component site that consists of a prehistoric artifact scatter of unknown aboriginal affiliation and a historic homestead. Both components of the site are recommended as eligible to the NRHP, as they are likely to provide further information in various aspects of prehistoric and historic research. All of the prehistoric temporary camp sites or site components were recommended as eligible to the NRHP as they exhibit a diversity of cultural materials, spatial patterning, fire-cracked rock features, and in several cases temporally diagnostic tools or ceramics. Sixty-one prehistoric artifact scatters were recommended as eligible to the NRHP as they exhibit a variety of artifacts, spatial patterning, site integrity and the potential for subsurface material culture. Sites that were recommended as not eligible to the NRHP consist of the remnants of a collapsed historic bridge, a historic period corral, and 15 prehistoric lithic scatters. The prehistoric artifact scatters were recommended as not eligible to the NRHP as they consist of small artifact assemblages that are unlikely to retain intact subsurface deposits. Additionally, the majority of the non-eligible sites are located on the Tropic shale formation, as identified in by Lamm (in Stavish 2006: Appendix C). Cultural resources distributed across the Tropic shale formation are potentially impacted by localized slope failure, surficial creep on steeper slopes, slope wash on steeper slopes, and erosion of weathered bedrock slopes on steep to gentle slopes. Furthermore, the vertical erosion of sediments formed in situ on exposures of the Tropic shale may also distort the integrity of buried cultural resources (Ibid.).

CONSEQUENCES OF PROJECT PHASES

The cultural resource management plan is broken down into phases due to separate state and federal actions undertaken on private and federal lands. Phase I covers the proposed actions on private land and consists of the mitigation of adverse impacts in compliance with Utah Code 9-8-404 in consultation with UDOGM, SHPO, and PLPCO. Phase I consists of data recovery and mitigation of eligible sites, through randomly selected sample units, the targeting of surface features, and archaeological monitoring. As a result, Phase I will need to impart an adaptive field strategy and unanticipated discoveries that occur during this phase will need to be dealt with immediately. At the completion of Phase I data recovery, archaeological monitoring will occur to further collect any unanticipated data or discoveries. An internal review and consultation with participating agencies will be conducted at the end of this phase. Phase II and III cover the possible federal undertaking resulting from the lease of the Alton Coal Tract in compliance with Section 106 of the NRHP Act and NEPA, and is in consultation with the BLM, UDOGM, and SHPO. Phase II will consist of site testing and data recovery based on the development of overarching research questions and a site testing and data recovery plan utilizing statistical sampling methods. These comprehensive research questions will be influenced by the type and nature of the data collect during Phase I data recovery and the sampling design will be influenced by previous methods and techniques. Phase III is a continuance under the proposed federal undertaking, and consists of the refinement of research methods and questions based on Phase I and Phase II data recovery and testing. Phase III also consists of the selection of sites for mitigation and the mitigation of those sites.

Phase I: Data Recovery for Coal Hollow

The first phase of the project consists of the mitigation of seven archaeological sites that will be impacted by Alton Coal Development, LLC's proposed Coal Hollow surface mining plan in the Sink Valley locality, south of Alton, Utah. This phase of the project is located entirely on private lands involves a mine permit overseen by UDOGM and must be in compliance with Utah Code 9-8-404. A permit for archaeological excavation will be requested from PLPCO. Phase I data recovery and research will serve to inform possible subsequent phases of research through the collection of data regarding geomorphology, site depositional processes, depositional preservation, and erosional processes that have been operative in the research area, as well as the research domains. Though Phase I data recovery will occur at only a small subsection of sites located in the area, these Phase I sites are relatively representative of topography, geomorphology, and depositional processes that occur throughout the Alton Amphitheater and Sink Valley localities. The selection of sites for Phase I data recovery is based solely on land status, site eligibility, and potential impacts associated with the Coal Hollow undertaking. Furthermore, Phase I sites will not physically be available for subsequent phases of research, due to the nature of the proposed undertaking. Therefore, Phase I data recovery and field methods will need to be adaptive. If features, activity areas, or multiple levels of occupation are observed during the course of excavating the initial randomly sampled units, then additional units adjacent to such discoveries will be excavated in tandem so as to fully address the nature and extent of such discoveries. Though the Phase I sites can not be preserved for subsequent phases of research, the overarching research design for subsequent phases can and likely will inform the analysis of data recovered from Phase I sites.

The cultural resource inventory of Alton Coal Development's Coal Hollow (Sink Valley-Alton Amphitheater) project area resulted in the documentation of one previously recorded historic/prehistoric site (42Ka2068), five previously recorded prehistoric sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, and 42Ka2044), and nine new prehistoric sites (42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, 42Ka6124, and 42Ka6126) (Stavish 2006). Of the 15 documented sites, one site is not eligible to the NRHP (42Ka2124) and seven of the sites will be avoided by the proposed undertaking (42Ka1313, 42Ka2041, 42Ka2043, 42Ka2044, 42Ka6109, 42Ka6110, and 42Ka6126). The remaining seven sites (42Ka2042, 42Ka2068, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108) cannot be avoided by the undertaking and are all eligible to the NRHP under Criterion D. Briefly, the sites included in the Phase I data recovery plan (Appendix A) include a prehistoric temporary camp of unknown cultural affiliation (42Ka2042), a historic homestead and prehistoric lithic scatter (42Ka2068), a lithic scatter of Archaic temporal affiliation (42Ka6104), a lithic scatter of protohistoric/contact period temporal affiliation (42Ka6105), two lithic scatters of unknown cultural or temporal affiliation (42Ka6106 and 42Ka6107), and a lithic scatter of Early Archaic temporal affiliation (42Ka6108). These sites are situated in the western portion of Sink Valley within the Alton Amphitheater and many of the sites exhibit integrity, spatial patterning, and good potential for intact subsurface cultural remains.

The data recovery plan and research design entitled "Data Recovery Plan and Research Design for Sites 42Ka2042, 42Ka2068, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108, Kane County, Utah," is included in Appendix A. The purpose of the data recovery plan is threefold. First, the data recovery plan serves as a research design to direct the archaeological investigations. This includes the identification and development of relevant research questions and the methods and techniques necessary to address these questions. Second, the plan outlines the methods and techniques that will be used during mitigation, in the laboratory, and during analysis

of the data collected. Third, the data recovery plan addresses reporting results, curation, and dissemination parameters for all portions of the Phase I data recovery. Public involvement in the Phase I data recovery will consist of an invitation to the local chapters of the Utah Statewide Archaeological Society to visit the excavations in an open house setting. Additionally, the local press will be contacted. Data recovery of the Phase I sites will allow for the refinement of archaeological research questions and methods for the potential subsequent phases of archaeological management of the Alton Amphitheater and Sink Valley regions.

The Phase I data recovery and research design places emphasis on a series of prehistoric period research domains, which include cultural affiliation and chronology, site function, use history, artifact distributions, subsistence, settlement patterns, and mobility (eg. Ahlstrom et al. 1999; Firor et al. 1998; Tipps 1995; Tipps et al. 1996; Westfall 1987; Westfall et al. 1987; among others). The historic period research domains include site level ethnography, consumer behavior patterns, and settlement patterns. The systematic approach, introduced to archaeology by Binford (1965), conceptualizes different components, or subsystems, of a society and analyzes them separately and then as part of the entire system. Redman (1973:62) outlines a systematic organizational strategy for field investigations that includes four fundamental principles: 1) the explicit use of both inductive and deductive reasoning in the drafting of research designs; 2) programmatic and analytical feedback; 3) explicit utilization of probability sampling; and 4) the formulation of analytical techniques that are appropriate to the hypotheses and the subject matter. The four principles are then applied to a multistage sampling design that includes general reconnaissance (Stage 1) of the region, intensive survey (Stage 2), a controlled surface collection (Stage 3), and excavations (Stage 4) (Redman 1973:64). Previous work in the Alton Amphitheater includes general reconnaissance and an intensive survey. This CRMP, the Phase I data recovery and research design, and subsequent phases of research rely heavily upon Redman's (1973) concepts of a systematic organizational strategy and multi-stage research design.

Phase II: Data Recovery for the Alton Coal Tract

The BLM is currently preparing an Environmental Impact Statement (EIS) for a federal coal lease application under the Lease by Application (LBA) process set forth at 43 CFR 3425. Should the Bureau of Land Management decide to offer the Alton Coal Lease Tract in Kane County for lease, it will be offered for competitive bid. If Alton Coal Development, LLC successfully acquires the Alton Coal Lease Tract, then research would proceed to Phase II. The second phase of the project will consist of archaeological testing of eligible sites located within the Alton Coal Tract. This proposed federal action is under the jurisdiction of the BLM and UDOGM must be in compliance with Section 106 of the National Historic Preservation Act, National Environmental Policy Act, the Archaeological and Historic Conservation Act, the Archaeological Resources Protection Act, and the American Indian Religious Freedom Act. Archaeological excavation for Phases II and III will require an Archaeological Resource Protection Act permit in consultation with the BLM. Phase II will consist of site testing based on the development of overarching research questions and testing plan utilizing statistical sampling methods. The overarching research questions will be influenced by the type and nature of the data collect during Phase I data recovery and the sampling design will be influenced by previous methods and techniques. At the inception of Phase II, MOAC and the BLM will seek public input regarding ideas for public involvement during Phase III mitigation and the dissemination of results to the public. Possible public involvement includes public education in the form of in-field open houses for tribal groups, local schools, community groups, and other interested parties. Possible options for the dissemination of the excavation results include, but are not limited to, a written publication in "laymen's terms" for the public and the publication of a website.

As in Phase I data recovery, Phase II testing will be designed towards the collection of data regarding geomorphology, site depositional processes, depositional preservation, and erosional processes that have been operative in the research area. The Phase II testing design will employ a statistical sampling method and testing at the eligible sites will be conducted to determine the nature, extent, and integrity of the site. This phase of the research is designed towards establishing which sites are most likely to provide information necessary for addressing the overarching research questions. Therefore, if features, activity areas, or multiple levels of occupational are discovered during the course of site testing, excavation of these discoveries will be stopped after the appropriate documentation and these sites will be recommended for further mitigation in Phase III or subsequent phases. Additionally, sites that yield data sufficient for addressing the overarching research questions will be recommended for further mitigation in Phase III or subsequent phases.

Phase III and Subsequent Phases: Mitigation of Selected Sites for the Alton Coal Tract

The third phase of the project will consist of the mitigation of the archaeological sites determined most likely to provide the necessary information for addressing the overarching research design and questions. As in Phase II, this research phase would only proceed in the event that the Alton Coal Lease Tract is made available for competitive lease and in the event that Alton Coal Development, LLC is the successful lessee. This portion of the research will be overseen by the BLM and UDOGM and will need to be in compliance with the federal regulations and mandates as described in Phase II. Prior to writing a Phase III research design, MOAC will conduct a self-review of the Phase I data recovery and Phase II testing to establish possible changes to the overarching research questions, research design, mitigation methods, sampling methods, and monitoring techniques. After a self-review is complete, a research design and data recovery plan will be produced and will include a sampling design for the selected sites. Phase III mitigation and data recovery will be conducted on sites are determined through Phase II testing as most likely to provide pertinent information needed to address the overarching research questions for the Alton Coal Tract area and which may provide further analytical and interpretive data regarding prehistoric behavior and land use within the region. Public involvement activities, as determined desirable by the public and as determined appropriate for the protection of cultural resources and in deference to public safety, will occur during this stage of research.

Production and Review of Mitigation Plans

The following stipulations are put forth regarding the production and review of mitigation plans associated with each of the project phases. Firstly, mitigation plans are site or phase specific. The selected sites will be tested and mitigated only after a determination of effects has been made. Secondly, changes made to the research design, excavation methods, sampling methods, and monitoring techniques will be specifically addressed in the subsequent research design and mitigation plan. Lastly, the review period for this cultural resource management plan, all research designs and mitigation plans, testing plans, and all other documents submitted in association with or appended to this document is 30 days from the day of receipt. This review period applies to all agencies and involved parties.

SUMMARY

The management plan will be implemented in a phased process that begins with immediate impacts to the cultural resources on private lands, and the subsequent phases of data recovery that will be conducted should a federal action proceed. Each phase of research, the research or testing design and data recovery will amend this document. This plan includes a systematic approach to the management of sites located in the project area and consists of three proposed phases of research and mitigation. Phase I consists of the mitigation of seven archaeological sites that will be impacted by Alton Coal Development's proposed Coal Hollow surface mining plan. This phase of the project is located entirely on private lands, is in consultation with UDOGM, SHPO, and PLPCO and in compliance with Utah Code 9-8-404. Phase I data recovery and research will serve to inform possible subsequent phases of research through the collection of data regarding geomorphology, site depositional processes, depositional preservation, and erosional processes that have been operative in the project area, as well as chronology, artifact distribution, site function, subsistence, technology, and settlement patterns. Phase II consists of an assessment of Phase I data and methods, the determination of comprehensive research questions, the development of a testing design, and the testing of eligible sites. Phase II accompanies a proposed federal action, which triggers compliance with Section 106 of the NRHP Act and NEPA and is in consultation with the BLM, UDOGM, and SHPO. Phase III consists of the refinement of overarching research questions and methods based on the results of Phases I and II, the selection of sites for mitigation, and the mitigation of the selected sites. Phase III also accompanies the proposed federal action consistent with Section 106 of the NRHP Act and NEPA and in consultation with the BLM, UDOGM, and SHPO.

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APPENDIX A:
PHASE I

Data Recovery Plan and Research Design for Sites
42Ka2042, 42Ka2068, 42Ka6104, 42Ka6105, 42Ka6106,
42Ka6107, and 42Ka6108, Kane County, Utah