CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

CHAPTER 4 ENVIRONMENTAL IMPACTS

4.1 Introduction

In accordance with 40 CFR 1502.16, this chapter presents the anticipated environmental consequences of the actions proposed under each of the alternatives described in Chapter 2:, Alternative A (No Action), Alternative B (Proposed Action Alternative), and Alternative C.

For the purposes of this document, an environmental impact is defined as a change in the quality and/or quantity of a given resource due to a modification in the existing environment resulting from decisions related to the Alton Coal Tract (hereafter also referred to as the tract). Impacts may be beneficial or adverse, may be direct or indirect, and may be permanent or temporary in a long-term or short-term duration. Unless otherwise specified, "short-term" is the period when the development of the mine and the mining of coal would occur. Under the Proposed Action, this would be approximately 25 years, and under Alternative C, this would be approximately 21 years. "Long-term" effects are defined as those effects that would occur or remain after the cessation of coal mining and during, or continuing into the period following, the reclamation and monitoring period (also referred to as the bond release period). Long-term effects would occur for 25–35 (or more) years under the Proposed Action beginning with the onset of mine development. Under Alternative C, long-term effects would occur for 21–31 (or more) years beginning with the onset of mine development. Impacts may vary in degree from a slightly discernible change in the environment to a total change in the environment. The significance of these impacts is determined using the criteria set forth by the Council on Environmental Quality (40 CFR 1508.27) and the professional judgment of the specialists doing the analyses. Impact significance may range from negligible to substantial and may be significant during mining but reduced to less than significant following reclamation. The context where impacts occur can be local, regional, and national.

Impacts on private land are analyzed because the tract under both action alternatives includes split estate lands. In the tract, where the surface estate is privately owned, the minerals beneath the surface estate are administered by the BLM. These lands are therefore eligible for inclusion in the tract and analysis of impacts to them is required to comply with NEPA. Likewise, where the surface estate is owned and administered by the BLM, the subsurface estate is also administered by the BLM, and these lands are also included in the tract and analyzed in this EIS.

4.1.1 Types of Effects

Direct and indirect effects (also referred to as impacts) are the primary and secondary results, respectively, of the No Action Alterative, the Proposed Action, or Alternative C. Direct impacts are caused by the action and occur at the same time and place. An example of a direct impact would be the removal of vegetation as part of the surface mining process on the tract. Indirect impacts from an action occur later in time and/or are removed in space. An example of an indirect impact would be an increase in recreational use on adjacent undisturbed and unrestricted land due to the direct impact of disturbing and/or precluding access on recreation lands in the tract. The impact analysis area for direct and indirect impacts can vary between the resources analyzed. However, at a minimum, the tract is in the impact analysis area for all resources, with the exception of transportation, which primarily considers the coal haul transportation route in the analysis of impacts. The coal haul transportation route is also considered in the impact analysis area for direct and indirect impacts to other resources, such as aesthetics (namely noise), air resources, cultural resources, hazardous materials and hazardous and solid waste, recreation, socioeconomics, water resources, and wildlife and special status species. Sections 4.2 through 4.17

describe the direct and indirect impacts of the No Action Alternative, the Proposed Action, and Alternative C for each resource brought forward for analysis in this EIS.

Cumulative impacts result from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts may result from individually minor, but collectively significant actions occurring over a period of time (40 CFR 1508.7). The cumulative impact assessment area (CIAA); a list and descriptions of other past, present, and reasonably foreseeable future actions; and the cumulative impact analysis for each resource are contained in Section 4.18 Cumulative Impacts. Impacts resulting from surface-mining operations on the adjacent Coal Hollow Mine and an additional potential private mine area north of the Coal Hollow Mine (see Map 1.1) are addressed in the cumulative impacts section. See Section 4.18 for a complete list of actions, including the private coal mines, which are analyzed in the cumulative impact analysis.

Unavoidable adverse impacts would result from the Proposed Action or Alternative C after the application of potential mitigation measures. Potential mitigation measures are intended to reduce impacts that are not already incorporated into the action alternatives as existing regulatory requirements (i.e., under State of Utah, federal, and or local law and standard or special lease stipulations) and that may be applied to further reduce impacts following the results of the impact analysis. Unavoidable adverse impacts may be permanent or may eventually subside or no longer result in adverse conditions over time. When unavoidable adverse impacts are permanent, the impacts are characterized as irreversible. Irreversible impacts are disclosed separately and described below.

The relationship between the short-term use of the environment or resource versus long-term productivity as it relates to the extraction of coal and resource-use sustainability are intertwined with direct and indirect effects. The mining of 44.9–49.1 million (Proposed Action) or 38.1–42.3 million (Alternative C) tons of coal from the tract would be a short-term use of the environment that would provide benefits in terms of the various potential uses of the coal resource in society. Following a lease sale, should BLM decide (as a result of this EIS) to offer the tract for competitive leasing, DOGM would have to permit mining on the tract prior to the beginning of mining activities. The permitting process is designed to 1) protect the long-term productivity of resources after the cessation of mining and 2) ensure that impacts to resources occurring during the mining process are minimized to the extent possible in the context of an economical, primarily surface-mining operation. Mining would alter many resources' ability to function naturally in the short term; however, the required topsoil salvaging and replacement, topographic recontouring to AOC, and revegetation (including seeding and, in some locations, planting seedlings) would promote the following long-term resource effects:

- Soil productivity reestablishment
- Native and suitable non-native vegetation reestablishment
- Wildlife and wildlife habitat rehabilitation
- Livestock grazing use
- Groundwater, surface water, and watershed function and stabilization
- Recreational use

Based on the analysis in this chapter, following mining activities the function of these resources and resource uses is expected to return to a condition approximating pre-mining conditions. To provide a clear context of the relationship between short-term use of the environment and long-term productivity, further discussions of these relationships are presented in each resource impact analysis section in this chapter.

Irreversible and irretrievable commitments of resources (in other words, irreversible and irretrievable impacts) are also disclosed in the impact analysis section for each resource. Irreversible impacts are those impacts that would result in changes to the environment that cannot be reversed, reclaimed, or repaired. An example of an irreversible impact would be the removal of coal from the tract. Once the in-place coal reserves present in the tract are removed, they can never be replaced or reclaimed. Irretrievable impacts, on the other hand, are those impacts that result in the temporary loss or degradation of the resource for a period of time. An example of an irretrievable impact would be the removal of vegetation from the tract as part of the mining process. During mining operations, the impact of vegetation removal would be irretrievable until the reclamation process is complete. Following reclamation, vegetative cover would be restored to the area.

Where possible, effects are quantified primarily through the use of geographical information systems (GIS) applications that allow for calculations of surface disturbance over portions of the tract under the Proposed Action and Alternative C, and through modeling and other analyses that provide estimates of loads, concentrations, noise and light levels, acres, and other measurable quantities.

4.1.2 Required Regulatory Actions, Mitigation and Monitoring Measures, and Lease Stipulations

All mining and reclamation operations would comply with SMRCA, Utah statutes, and BLM standard and special lease stipulations developed for the tract. This impacts analysis considers all standing measures required by federal, State of Utah, and local regulatory authorities as part of the Proposed Action and Alternative C. Table 2.3 in Chapter 2 presents a table summarizing the existing, required State of Utah, federal, and local mitigation and monitoring requirements inherent to the Proposed Action and Alternative C. This table also includes the required standard and special lease stipulations that would be inherent to the Proposed Action and Alternative C. Required regulatory actions, mitigation and monitoring measures, and lease stipulations particular to each resource are also identified in the impacts analysis section under each resource.

4.1.3 General Analytical Assumptions, Guidelines, and Notes

This EIS assumes that all required regulatory actions, mitigation and monitoring measures, and lease stipulations identified in Table 2.3 would be successfully implemented in the effectiveness limits of the measures undertaken. If such measures were not implemented, additional adverse impacts could occur. Additional assumptions that apply to all resource values and uses relate to 1) the analysis of impacts as a result of the placement of dispersed facilities on the tract and 2) the relocation of KFO Route 116 in the tract.

Because the exact location of dispersed facilities is not known at this time, the analysis of impacts as a result of the placement of dispersed facilities on the tract involved a set of assumptions that allowed for conservative estimates of the expected impacts. The estimated acreage necessary for dispersed facilities under each alternative (listed below and in Table 2.4 in Chapter 2 and tables in various resource sections) was provided by ACD based on experience and industry standards. Under the No Action Alternative, it was assumed that no dispersed facilities would be required because no mining would occur on the tract under this alternative. Under the Proposed Action it was assumed that

- dispersed facilities would include such items as water control structures (diversion ditches, sedimentation ponds, etc.), temporary light use roads (direct mine use and for transporting coal from areas of active mining to the centralized facilities), and temporary stockpiles of topsoil and/or overburden;
- dispersed facilities would require approximately 160 acres of land;

- dispersed facilities would be located wholly in the no-coal zone;
- acres of vegetation community type (or soil type, etc.) disturbed by dispersed facilities would be proportional to the percentage of each vegetation type in the no-coal zone;
- it would not be possible to avoid disturbance in established avoidance areas (sagebrush/grass communities and riparian areas); and
- standard mitigation measures would be required (e.g., BMPs) as part of the Proposed Action to reduce or eliminate impacts.

Analysis assumptions under Alternative C are the same as those described for the Proposed Action except that dispersed facilities would require approximately 135 acres of land under Alternative C.

As with dispersed facilities, the exact location of the KFO Route 116 relocation is not known at this time; therefore, the analysis of impacts from the KFO Route 116 relocation involved a set of assumptions that allowed for conservative estimates of the expected impacts. These assumptions allowed for the creation of a theoretical/conceptual road alignment used to generate acres of disturbance figures and to determine possible impacts due to this aspect of the mining operation. Under the No Action Alternative, it was assumed that no road relocation would be required because no mining would occur on the tract under this alternative. Under the Proposed Action it was assumed that

- the relocation of KFO Route 116 would be temporary (for the life of mine), and the road would be reestablished in its approximate original roadbed following mining;
- the temporary alignment of the relocated KFO Route 116 would generally be north–south because the current alignment of KFO Route 116 is generally north–south;
- the temporary relocation of KFO Route 116 would occur wholly in the no-coal zone except in the northwestern portion of the tract (Block NW). In Block NW, the road would be temporarily relocated onto previously mined surface prior to reestablishment in the approximate original roadbed following mining of this block (the road relocation in Block NW would only be for the life of mining operations in this portion of the tract);
- the temporarily relocated KFO Route 116 would be 100 feet from the pit disturbance line and centralized facilities;
- the temporarily relocated KFO Route 116 would take the shortest distance from point of departure from the existing road to point of reconnection with the existing road in the confines of the other assumptions listed;
- the temporary relocation of KFO Route 116 would avoid sagebrush/grass communities and riparian areas (defined as a 330-foot buffer on streams as per BLM riparian policy) to the extent possible;
- the temporary relocation of KFO Route 116 would occur on slopes of 30% or less only;
- standard mitigation measures would be required (e.g., BMPs) as part of the Proposed Action during road construction and maintenance for the life of the temporary road (life of mine);
- the temporary relocation of KFO Route 116 would occur within a 66-foot-wide ROW with a 24-foot-wide road surface;
- two stream crossings would be required (one for Robinson Creek and one for Kanab Creek) in addition to crossings of washes;
- appropriate culverts would be installed at stream crossings;
- road base materials (gravel and other rock) would come from on-site where available and from off-site otherwise.

Analysis assumptions under Alternative C are the same as those described for the Proposed Action, except that Block NW is not included in the tract configuration under Alternative C.

For purposes of analysis for certain resources, it was necessary to make additional assumptions particular to that resource analysis. These assumptions are listed and explained in the impacts analysis section for each resource, where they apply.

Impacts analyses generally considered pit disturbance as a total acreage of disturbance for the life of the mine under each alternative. It is important to note that pit disturbance would not occur all at one time. It would occur on a continuing basis concurrent with reclamation. This approach was taken primarily because the exact mine sequence is unknown at this time. As described in Chapter 2, under the Proposed Action at any one time, active mining operations (open surface-mining pits from which coal is being removed and/or areas where topsoil and overburden are being removed) would involve approximately 120 acres (1 open pit). An additional 120 acres or more would be in some stage of reclamation (overburden replacement and top-soiling, grading to AOC, or seedbed beginning). Under Alternative C, at any one time, active and suspended (due to seasonal timing restrictions) mining operations would involve an estimated 240 acres (2 pits). An additional 240 acres or more would be in some stage of reclamation.

Surface-disturbing impacts (513 to 211 in the tract plus 166 to 109 acres outside the tract[11]) resulting from subsidence in the portion of the tract that would be underground mined (approximately 717 to 412 acres) are considered primarily with respect to the analysis of geology and minerals (see Section 4.6) and water resources (see Section 4.16). For most resources, subsidence is not factored into calculations of surface disturbance because vegetation removal, soil removal, or overburden removal would not occur. No reclamation would occur in this area of the tract either, except for activities to eliminate or repair damage being done to other resources (for example, water resources).

Finally, in the impacts analysis, acres of impact are generally reported as a range. This is because surface mining would occur up to between approximately 200 and 300 feet of overburden removal (a range), and the approximate extent of overburden removal translates directly into the approximate extent of impact as a result of surface mining operations. Unless otherwise noted, where a range in acres of impact is provided, it corresponds to the range of overburden removal herein explained (also see Chapter 2). Further, where a range of acres that would be underground mined is provided, the larger acreage typically precedes the lesser acreage. These figures are reported in this fashion to remain consistent with the convention used elsewhere in the EIS of reporting the range of impacts that would occur as a result of surface mining up to approximately 200 to approximately 300 feet of overburden removal. The greater acreage subject to underground mining corresponds to 200 feet of overburden removal because less surface mining on the tract (i.e., only up to 200 feet of overburden removal, rather than 300 feet) would result in more underground mining (larger underground mining acreage). Likewise, the lesser acreage subject to underground mining corresponds to 300 feet of overburden removal because more surface mining on the tract (i.e., up to 300 feet of overburden removal, rather than 200 feet) would result in less underground mining (smaller underground mining acreage). See Maps 1.2 and 2.1 for a depiction of the approximate locations where surface mining would cease in the 200-foot and 300-foot overburden removal scenarios under each action alternative.

4.1.4 Notes on Data Sources and Tract Acreage

Data and information used to analyze impacts were gleaned from a variety of sources including internet sources, peer reviewed literature, government agency documents, current and historic permitting documents, and documents reporting the results of studies and data collection efforts completed for this EIS in specific. Greater detail related to these sources is provided in Chapter 3, Section 3.1.

[11] Two sets of acres numbers are used. One relates to underground mining acres, and the other is surface related due to subsidence, which is a portion of the underground mining.

As explained in Table 1.1 and 2.1 in Chapters 1 and 2, respectively, and reiterated in Section 3.1, in this analysis, a tract acreage of approximately 3,576 acres is used rather than the approximately 3,581.27 acres listed in the NOI. For an explanation of the reason for this 5-acre difference, see Table 1.1, Table 2.1, or Section 3.1.

4.2 Aesthetics Resources

The area of analysis for aesthetic resources consists of the Alton Coal Tract, the town of Alton, Dixie National Forest, Bryce Canyon National Park, and BLM-managed lands adjacent to the tract. Additionally, lands adjacent to the coal haul transportation route are analyzed for impacts to noise-sensitive receptors. Three different alternatives are analyzed in this section and each alternative presents a varying degree of impacts to aesthetic resources in the area of analysis. Each alternative considers different tract boundaries and levels of mining allowed. When impacts from elements of the Proposed Action and alternatives are similar, their effects are discussed together. Both adverse and beneficial impacts are discussed in this section. Additionally, both direct and indirect impacts are discussed.

Aesthetic resources would be impacted in the short term during the active mining period (life of the mine). In the case of noise and night sky conditions, resources would return to current conditions immediately upon conclusion of the active mining period. In the case of visual resources, conditions would be returned to a more natural landscape during both the active mining period (through ongoing reclamation) and the post-mining reclamation (10 years). Through the evaluation of aesthetic resources (sound, visual resources, and night skies), it was concluded that each have different thresholds for impacts to become significant. Those thresholds are described in more detail below.

4.2.1 Regulatory Framework

There are no state or local noise ordinances in place for the tract. The EPA, however, has defined standards to prevent hearing loss. The EPA has identified a 24-hour exposure level of 70 Ldn as the level of environmental noise to prevent measurable hearing loss over a lifetime (EPA 1974). The EPA further identified levels of 55 dBa outdoors and 45 dBa indoors to prevent annoyance to noise-sensitive receptors.

The MSHA also has health standards to prevent hearing loss. Under MSHA standards, mine employees are never permitted to be exposed to noise levels of 115 dBa or greater. MSHA requires exposure to noise levels between 85 and 115 dBa to be mitigated through hearing protection programs and personal protective equipment.

The Federal Land Policy and Management Act of 1976 requires that the BLM periodically prepare and update its land-use plans. In that process, the agency establishes objectives for management of visual resources, or landscape protection and change. The public lands in the tract are managed under VRM Class IV objectives. The objective of Class IV is to provide for management activities that require major modifications to the existing character of the landscape. These activities may dominate the view and may be the major focus of the viewer’s attention.

There are no legal or regulatory requirements with respect to skyglow. The KFO RMP does not prescribe any specific surface stipulations for management and protection of aesthetic resources in the tract. However, based on the analysis, the successful bidder would be required to employ skyglow minimization measures for nighttime mining operations. These would consist of:

- utilizing 250-watt metal halide lamps producing 25,000 lumens each, contained in fully shielded fixtures for fixed-position light poles (or equipment and measures that would further minimize skyglow as a result of these lights); and
- utilizing 1,000-watt metal halide lamps producing 110,000 lumens each and typically aimed at 30 degrees below the horizon, though at times (less than 10% of the time) directed straight sideways toward the horizon (or equipment and measures that would further minimize skyglow as a result of these lights).

4.2.2 Soundscape

The analysis of impacts to noise-sensitive receptors near the tract is an assessment of the changes in ambient noise levels caused by the Proposed Action and alternatives. Noise-sensitive receptors consist of residences, hospitals, libraries, recreation areas, churches, and similar locations. Noise-sensitive receptors only consider noise as it relates to the human environment. For a discussion of the impacts to wildlife health and behavior from changes in ambient noise levels caused by the Proposed Action and alternatives, refer to Section 4.17. Three different alternatives are analyzed in this section, and each alternative presents a varying degree of impacts to noise-sensitive receptors near the tract. Each alternative considers different tract sizes as well as different seasonal operational restrictions. Alternative C was developed in part to address concerns over impacts to noise-sensitive receptors in the town of Alton.

There are several management prescriptions and considerations common to both action alternatives that would have impacts on noise-sensitive receptors, including regulatory permit requirements such as MSHA inspections, short haul routes, and the coal loadout location and coal haul transportation route.

MSHA inspections would ensure that the mine is in compliance with the health standards set to minimize the risk of hearing loss among mine employees. Direct protection of the health and safety of mine employees resulting from MSHA inspections would occur under both action alternatives through the duration of the mining operation.

Ambient noise levels would increase as a result of coal truck traffic on the short haul route out of the tract. Impacts to noise-sensitive receptors would vary depending on the final short haul route selected. Locating the short haul route through the town of Alton would result in increases in ambient noise levels from truck traffic that would exceed 70 Ldn at noise-sensitive receptors. If the short haul route were through the town of Alton, noise-sensitive receptors within 40 feet of the route would include private residences and a church. Exceeding 70 Ldn increases the risk of measurable hearing loss and would therefore result in significant impacts. Moving the short haul route to avoid the town of Alton would reduce the risk of measurable hearing loss to a level less than significant.

Noise-sensitive receptors along the coal haul transportation route are located in the towns of Hatch and Panguitch. The coal haul transportation route average daily traffic (ADT) on US-89 through Hatch and Panguitch is currently 4,100 vehicles per day consisting of between 21% and 25% heavy trucks (Fehr and Peers 2008). This would increase to between 25% and 29% heavy trucks under the action alternatives. The ADT on SR-56 through Cedar City is 10% heavy trucks. This would increase to 12% under the action alternatives. Increases in ambient noise levels from coal truck traffic at

noise-sensitive receptors through Hatch and Panguitch are expected to exceed the 55 dBa necessary to prevent annoyance, particularly between 10:00 p.m. and 7:00 a.m. However, they would not exceed the 70 Ldn that would increase the risk of measurable hearing loss and therefore significant impacts, because the noise-sensitive receptors are located far enough (40–50 feet or more) from US-89 and SR-56 to reduce traffic noise levels.

4.2.2.1 ALTERNATIVE A: NO ACTION

Under the No Action Alternative, ACD's application to lease the coal included in the tract would not be approved, and the coal included in the tract would not be mined. Rejection of the application would not affect permitted mining activities on private land adjacent to the tract (the Coal Hollow Mine). No impacts to noise-sensitive receptors from increases in ambient noise levels would occur from the No Action Alternative.

Under the No Action Alternative, the current land uses would continue, including livestock grazing, backcountry driving, hunting, and vegetation treatments to maintain and enhance livestock forage, wildlife habitat, and watershed condition. These uses would result in a continued sound level of less than 50 Leq, which is within EPA standards to prevent annoyance to noise-sensitive receptors.

4.2.2.2 ALTERNATIVE B: PROPOSED ACTION

In addition to the management prescriptions and considerations common to the action alternatives, the following actions would be implemented under the Proposed Action and would result in impacts to noise-sensitive receptors.

- Heavy equipment, consisting of dozers, scrapers, excavators, front-end loaders, graders, and water trucks, would used be during surface-mining operations in the tract.
- Diesel generators would be used to power all necessary facilities, temporary and permanent light sources, and other facilities.
- Coal haul trucks would travel in the tract.
- A conveyer belt and crusher would be used in processing excavated coal.
- Blasting operations would occur in the mine area.

Ambient noise levels in and near the tract would increase as a result of heavy equipment use and coal truck traffic in the tract. Impacts to noise-sensitive receptors would vary depending on the location of active mining operations during the 25-year mine life. Airblast and ground vibration due to blasting operations would be at or below MSHA maximum limits and would not reach a level of significance. Increases in ambient noise levels at noise-sensitive receptors from the actions listed above would occur, but due to distance from the source, they would remain below the 55 dBa necessary to prevent annoyance. Although the cause of the noise would be different under the Proposed Action than with the No Action Alternative, the resultant effect on levels of noise to noise-sensitive receptors would be the same under both alternatives—less than the 55-dBa level that would create annoyance.

4.2.2.3 ALTERNATIVE C: REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS

In addition to the management prescriptions and considerations common to the action alternatives and additional actions described under the Proposed Action, the tract would be reduced in size under Alternative C to exclude areas closest to the town of Alton, and the life of the mine would be 21 years rather than 25. Because surface mine operations, including blasting, would occur a greater distance from noise-sensitive receptors in Alton, increases in ambient noise levels would be less than those described

under the Proposed Action, and would not reach a level of significance. When comparing the levels of noise resulting from implementation of Alternative C to the noise created by continuation of existing uses under No Action, the resultant level of noise to noise-sensitive receptors would be the same under both alternatives—less than the EPA standard of annoyance.

4.2.3 Visual Resources

The analysis of impacts to visual resources is an assessment of changes to the landscape caused by the Proposed Action and alternatives. The landscape near the tract is composed of landforms, water body, vegetation, and human modifications to the land. Those modifications include structures and changes to the land, water, and vegetation.

For each alternative, the analysis is three tiered. The first level of analysis consists of a discussion of changes to the landscape in the tract, resulting from the actions prescribed under each alternative. The second level of analysis consists of an assessment of impacts resulting from those same actions as seen from seven key observation points (KOPs) in and near the tract. The KOPs are critical viewpoints of typical landscapes in the tract that have been selected to represent the views of disturbances throughout the life of the mine and that are encountered by the greatest number of people. The third level of analysis consists of an assessment of whether the proposed changes to the landscape would meet the BLM's objectives for management of visual resources, as prescribed in the KFO RMP (BLM 2008b). The location and rationale for the selection of KOPs are identified below. Significant impacts would occur where the results of the Proposed Action and alternatives do not meet BLM objectives.

4.2.3.1 KEY OBSERVATION POINTS

Seven KOPs were identified to represent typical views of the tract to residents of Alton and visitors to the surrounding area. The KOPs were selected to geographically represent views of the entire tract, to represent views from places where the greatest number of people reside, and to represent views of people traveling through the area (Map 3.2; Appendix J).

KOP 1 is located on KFO Route 116 on the east side of the town of Alton. This location represents panoramic views of the northern area of the tract as seen by residents of Alton, and as seen by visitors traveling through Alton heading south on KFO Route 116.

KOP 2 is located at the south end of Main Street in the town of Alton. From this location, the view is south, and looks on the area proposed for underground mining activities. This location represents views of Alton residents and views of ranchers working in agricultural fields between Alton and the tract. The views from this KOP are of agricultural fields directly south of Alton and include the mountains and rolling hills across the tract. Views are wide open and panoramic, with few obstructions.

KOP 3 is located at the north end of Main Street in the town of Alton. From this location, the view is south and east and looks on a larger portion of the area proposed for mining activities compared to KOP 2. The views from this KOP are of structures in Alton and include the mountains and rolling hills across the tract. The homes, trees, and fence lines of Alton occur in the foreground. The rolling hills in the tract and surrounding mountains are in the middle ground and background. Views are generally wide open, but include some obstructions in the town of Alton.

KOP 4 is located along KFO Route 116 south of Alton. From this location, the view is to the north and west and looks on the broad sweeping hills of the tract. Sagebrush and sparse juniper dominate the foreground. The rugged horizon line of the surrounding low mountains and the Paunsaugunt Plateau are in the middle ground and background. This location represents the views of people traveling north on KFO Route 116 through the tract.

KOP 5 is located at a road junction along KFO Route 116 south of Alton. From this location, the view is to the south and looks on the broad sweeping hills of the tract. Low sagebrush, a narrow drainage channel, fence lines, patchy stands of juniper, and the curving road are in the foreground. The low and rugged horizon line of the Paunsaugunt Plateau occurs in the middle ground and background. This location represents the views of people traveling south from Alton on KFO Route 116 through the tract.

KOP 6 is located at a cattle guard and fence line along KFO Route 116 south of Alton. From this location, the view is to the north and looks on the Town of Alton and the tree-covered alluvial fans sweeping down into the tract. Juniper post fence lines in various directions and the curving road are in the foreground. The homes and taller trees in the Town of Alton occur in the middle ground. Background views are of distant low rising mountains. This location represents the views of people traveling north toward Alton on KFO Route 116 through the tract.

KOP 7 is located along KFO Route 116 at the far southern edge of the tract. From this location, the view is to the north and looks on the broad open meadows and tree-covered hills of the southern portion of the tract (Block S). Fence lines, homesteads, and the curving road are in the foreground. The fans and washes descending from the Paunsaugunt Plateau appear in the middle ground. Background views are of the steeper, rugged plateau itself. This location represents the views of people traveling into the tract from the south on KFO Route 116.

A visual contrast rating worksheet (BLM Form 8400-4) was prepared to analyze the effects that the proposed tract would have on the characteristic landscape, as viewed from each KOP. The analysis looked at the actions that would have the most potential to affect (change) the landscape under the action alternatives (Proposed Action and Alternative C). Those actions include surface-mining operations, installation of centralized facilities, installation of dispersed facilities, relocation of KFO Route 116, and surface rehabilitation. The analysis also looks at the actions that would continue under the No Action Alternative and how they affect the landscape. Under the No Action Alternative, existing uses and management actions would continue, including livestock grazing, back country driving, hunting, and vegetation treatments to maintain or improve livestock forage, wildlife habitat, and watershed condition, and to reduce unwanted wildfire. This analysis provides for comparison between the action alternatives and the No Action Alternative. See Appendix J for visual contrast ratings and site photographs.

4.2.3.2 ALTERNATIVE A: NO ACTION

Under the No Action Alternative, ACD’s application to lease the coal included in the tract would not be approved, and the coal included in the tract would not be mined. The characteristic landscape of the tract would remain unchanged by mining.

Under this alternative, however, existing uses would continue. Under the KFO RMP (BLM 2008b), the BLM would continue to implement vegetation treatments in pinyon-juniper and sagebrush vegetation communities. Removal of pinyon and juniper trees and decadent sagebrush would create changes in the form of each vegetation community, introducing openings in continuous stands of vegetation. The growth of shrubs and grasses in the openings of pinyon-juniper woodlands and creation of mixed-age stands of sagebrush would introduce variety in the form, texture, and color of the vegetation communities. It would also introduce noticeable curvilinear lines in the pinyon-juniper woodlands. The creation of a harmonious variety in the landscape would result in a more visually pleasing scene.

4.2.3.3 ALTERNATIVE B: PROPOSED ACTION

Under the Proposed Action, the tract would encompass 3,576 acres, of which 2,280 acres are federal surface and mineral estate and 1,296 acres are split estate: private surface estate and federal mineral estate. Approximately 2 million tons of coal per year would be mined once topsoil stockpiling and initial overburden

removal has occurred. Reclamation would be concurrent with mining over the course of the estimated 25-year mine life and would be followed by a minimum 10-year reclamation and revegetation monitoring period.

Surface-mining operations would result in 1,750–2,152 acres of pit disturbance occurring at different times over the life of the mine. Where overburden is 300 feet or more in thickness, underground mining methods would be used to mine in-place coal reserves. At any time during the life of the mine, active surface operations would only involve approximately 120 acres (one open pit). Pits would be up to 300 feet deep and the associated highwall would be up to an additional 600 feet wide. Surface-mining operations would result in a noticeable contrast in landform, line, and color as the natural topography is altered, vegetation is removed, and soils that are lighter in color are exposed. The low rising hills dissected by shallow drainages throughout the tract would be altered during the excavation of pits and construction of highwalls. At any one time, up to 120 acres of rolling terrain common through the tract would be leveled, resulting in a contrasting long, straight horizontal line. Vegetation with varying shapes, colors, and heights would be cleared down to bare soil, removing those varying colors, and leaving a geometric, angular break (lines) in the vegetation. Additionally, at any one time during the 25-year mine life, closed pits would be in various stages of reclamation. Reclamation activities would reduce linear contrasts in topography by recontouring pits to a more natural sweeping line. Additionally, contrasts in texture and color of soil and vegetation would be reduced through revegetation with approved seed mixes.

Construction of the centralized facilities for the tract would be located on approximately 36 acres of public land. These facilities would consist of an office, maintenance shop, equipment wash bay, oil and fuel storage tanks, oil and fuel storage containment, truck unloading and coal sizing area, coal stockpile area, and truck loadout area. The buildings and other facilities would result in a noticeable contrast in landform, line, color, and texture on the landscape of that portion of the tract. In the long term, vegetation clearing would introduce a break in the medium/coarse texture and color of the tract. Additionally, construction of centralized facilities would introduce boxy, geometric shapes, hard edged lines, smooth textures, and contrasting colors into the natural, rolling terrain of the tract.

Dispersed facilities necessary to conduct mining operations consist of temporary light-use roads and haul roads, electrical poles and lines, various temporary ponds/water control structures, temporary topsoil and overburden stockpiles, and temporary berms and screens. These facilities would result in approximately 160 acres of disturbance. Construction of dispersed facilities, including roads, transmission lines, ponds and other water-control structures, stockpiles, and berms, would result in short-term changes to the landscape. Road construction would result in leveling of the landform, including some degree of cutting and filling. This would create horizontal lines and bench-like forms in the landscape. Ponds, water control structures, and berms would introduce horizontal and angular lines and low, mesa-shaped forms to the landscape. Topsoil and overburden stockpiles would introduce angular lines and conical forms to the landscape. Vegetation clearing for road construction would introduce curvy lines through relatively dense pinyon-juniper woodlands and dense stands of sagebrush, and expose varying (often lighter) soil colors. Construction of power lines would introduce vertical lines to the landscape. Following mine operations, however, these facilities would be removed from the site and disturbances would be reclaimed to their approximate original condition. In the short term, during construction, clearing would change the form and texture of vegetation cover. Currently, most of the tract has a continuous cover of varying vegetation types including perennial grasses and low gray-green shrubs interspersed with patches of dark green pinyon pine and juniper trees. Clearing would introduce breaks in the medium-textured element of the environment. As the dispersed facilities are relocated, if vegetation with larger shrubs and trees is reestablished, the texture would return to its original condition and the change in vegetation form would revert to its original condition. If the clearings in woodlands are managed for shrubs and grasses following relocation of the dispersed facilities, changes in the form of the pinyon-juniper woodland would remain and smaller shrubs and grasses would introduce softer textures and new colors to the landscape. These variations in the continuous vegetation cover would add variety to the landscape and new interest and appeal to the scene.

Actions proposed to prevent, minimize, and rehabilitate landscape disturbance consist of recontouring pits to a more natural topography and restoring vegetation with BLM-approved species. At any given time throughout the 25-year life of the mine, 120 or more acres would be in some stage of reclamation. The rehabilitation of disturbances by recontouring pits and planting vegetation would result in a less developed landscape that more closely resembles the surrounding undisturbed areas.

KOP 1–3. Actions proposed in the tract under Alternative B that would be visible from KOPs 1, 2, and 3 consist of surface-mining activities, underground mining activities, dispersed facilities, and rehabilitation of disturbances. These actions would have the same effects on the characteristic landscape as those described above.

KOP 4. Actions proposed in the tract under Alternative B that would be visible from KOP 4 consist of surface-mining activities and dispersed facilities. These actions would have the same effect on the characteristic landscape as described above.

KOP 5. Actions proposed in the tract under Alternative B that would be visible from KOP 5 consist of surface-mining activities, centralized facilities, and dispersed facilities. These actions would have the same effect on the characteristic landscape as described above.

KOP 6–7. Actions proposed in the tract under Alternative B that would be visible from KOPs 6 and 7 consist of surface-mining activities and dispersed facilities. These actions would have the same effect on the characteristic landscape as described above.

Under Alternative B, mining and construction of related facilities would noticeably change the landscape. However, as the 120-acre tracks of coal are removed and rehabilitated, the existing character of the landscape would be gradually restored. Depending on the BLM's objectives for management of vegetation, portions of the tract would eventually return to their original vegetation communities, and other parts would be reestablished to meet other objectives. The KFO RMP prescribes vegetation treatment areas with priority given to wildlife habitat. Incorporating this plan decision into the mine reclamation plan could result in returning pinyon-juniper woodlands to a mix of woodlands with openings of sagebrush and grasses. It may also include converting old growth sagebrush stands to a mix of age classes. These mining rehabilitation objectives would result in changes to the vegetation component of the landscape, and introduce some variety and appeal to the landscape scene. Under the No Action Alternative, no mining would occur, but the vegetation treatment objectives of the KFO RMP would continue to be implemented, resulting in the same long-term effect on the visual resources (landscape) of the tract. Thus, in the short- and mid-term, Alternative B would result in noticeable changes to visual resources. In the long term, the effect of the actions anticipated under Alternative B and the actions anticipated under No Action would have similar effect on the landscape scene; the creation of more variety and visual appeal.

4.2.3.3.1 BLM Visual Resource Management Objectives

VRM objectives for public lands in the tract are Class IV (BLM 2008b). Under the BLM VRM program, the objective of Class IV is to provide for management activities that require major modifications to the existing character of the landscape. These activities may dominate the view, and be the major focus of viewer attention (BLM 1986).

Under the Proposed Action, the level of change to the landscape was determined to be moderate to strong, based on the visual resource contrast analysis, and proposed activities were determined to be consistent with objectives. Although surface-mining activities would be apparent on the landscape, they would occur in the short term and would be reclaimed upon completion. Development of centralized and dispersed facilities would occasionally be visible on the landscape from KOPs during the active mining period. Dispersed facilities would be relocated throughout the tract during the active mining period and their disturbances

reclaimed. Dispersed and centralized facilities would be entirely removed from the tract at the end of the active mining period and the disturbances reclaimed. Because the level of landscape change resulting from actions proposed under this alternative would be consistent with VRM Class IV objectives, it would not reach a level of significance. See Appendix J for visual contrast ratings.

4.2.3.4 ALTERNATIVE C: REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS

Under Alternative C the tract would be modified to exclude Block NW located near the town of Alton. The modified tract encompasses 3,173 acres, of which 2,280 acres are federal surface and mineral estate and 893 acres are split estate: private surface estate and federal mineral estate.

Under this alternative, 1,662–2,064 acres of surface disturbance would occur in the tract. Of this, 1,454– 1,856 acres would be the result of surface-mining operations. Centralized facilities associated with mining activities in the tract would be located in the same area, would occupy the same acreage (36 acres), and would include the same items as the Proposed Action. Impacts from dispersed facilities necessary to conduct mining operations would also be the same as the Proposed Action, except that fewer acres (135 acres) would be required.

Contrasts in landform, line, color, and texture would be the same as described under the Proposed Action but would occur on 321 fewer acres (the acreage of Block NW) than the Proposed Action and over a shorter amount of time (21 years). Additionally, the tract would be modified to exclude 321 acres from mining those areas closest to Alton. This would result in less apparent contrast from KOPs in Alton due to the greater distance between Alton and the nearest disturbance. Due to sage-grouse timing restrictions, no surface-disturbing actions would be allowed between March 15 and July 15 in Block S. To allow work to continue year-round, two simultaneously open pits would be required. At any one time during the life of the mine, active and suspended mining operations would involve up to 240 acres (two pits) or double the level of visual contrast associated with the Proposed Action. Additionally, this would necessitate a 40- to 60-acre permanent EODA. In the long term, disturbances including the EODA would be recontoured and reclaimed to a more natural condition.

KOP 1–3. Actions proposed in the tract under Alternative C that would be visible from KOPs 1, 2, and 3 consist of surface-mining activities, dispersed facilities, and rehabilitation of disturbances. These actions would occur in the middle ground, and because of the distance involved, the contrast would not be as apparent as under the Proposed Action.

KOP 4, 6, and 7. Actions proposed in the tract under Alternative C that would be visible from KOPs 4, 6, and 7 consist of surface-mining activities, dispersed facilities, and rehabilitation of disturbances. These actions would have the same effect on the characteristic landscape as described above.

KOP 5. Actions proposed in the tract under Alternative C that would be visible from KOP 5 consist of surface-mining activities, centralized facilities, and dispersed facilities. These actions would have the same effect on the characteristic landscape as described above.

4.2.3.4.1 Bureau of Land Management Visual Resource Management Objectives

The level of change to the landscape in the long term under Alternative C is less than that described under the Proposed Action. Surface-mining activities would remain apparent on the landscape, but would occur over less acreage than the Proposed Action and at a greater distance from KOPs in the town of Alton. Just as in the Proposed Action, open pit mines would occur in the short term, but would cover twice the acreage at any one time in the process as the Proposed Action. Unlike the Proposed Action, an additional 40 to 60–acre EODA would be required where more than one pit is excavated. In the short term, the EODA would introduce

horizontal and angular lines, a blocky, rectangular form, and a coarser texture to the landform of the landscape. Measures to restore more natural characteristics and to further reduce contrasts with the current landscape are included under this alternative and are the same as under the Proposed Action. These measures would be applied to the EODA as well as other surface disturbances. As under the Proposed Action, development of centralized and dispersed facilities would occasionally be visible on the landscape from KOPs. Likewise, resulting under this alternative, the level of landscape change would be consistent with VRM Class IV objectives, and would not reach a level of significance.

4.2.4 Nighttime Lighting and the Extent of Skyglow

The analysis of impacts to the natural lightscape is an assessment of changes in brightness of the night sky caused by the Proposed Action and alternatives. A natural lightscape is characterized by the natural rhythm of sun and moon cycles, clean air, and of dark nights unperturbed by artificial lights. Changes to natural lightscapes result from changes in air quality and changes in sources of artificial lighting.

A computer model developed by Dark Sky Partners and based on the Garstang model for calculating sky brightness arising from artificial lighting was used to assess the impacts caused by the Proposed Action and alternatives on the night skies viewed from Brian Head Peak and Yovimpa Point. Under the BLM, there are no objectives for management of natural lightscapes or dark skies. NPS policy is to preserve the natural lightscapes of parks to the greatest extent possible. The NPS worked directly with Dark Sky Partners to verify all model input parameters, especially atmospheric clarity. It is the policy of the NPS to evaluate impacts based on the best 20% of night sky conditions as recorded during night sky monitoring. For each alternative, this impact analysis assesses whether the changes in artificial lighting and air quality would meet NPS objectives to preserve dark night skies and the natural lightscape surrounding the parks. Actions that result in a long-term reduction in night sky conditions as observed from Brian Head Peak and Yovimpa Point would result in significant impacts to the natural lightscape. The NPS considered points in Zion National Park also, however, due to its proximity to St. George, Utah and Las Vegas, Nevada night skies are brighter at Zion National Park than Bryce Canyon National Park and Cedar Breaks National Monument. However, most of Zion National Park occurs at a lower elevation and in steep walled canyons, minimizing the amount of potential light pollution visible from the tract. Any perceived change in night sky conditions as viewed from the canyons of Zion National Park would be proportionately less when compared with the existing conditions viewed from table lands and other lands adjacent to the park (Personal Communication, Moore 2008). The brightness of light from the tract under this alternative would be greatest on the horizon of the nighttime sky in the direction of the mine. As a person's view moves in an arc from the horizon to vertical overhead, the presence of the light from the tract decreases, as does its effect on the darkness of nighttime skies. Given the depth and steepness of the canyons of Zion National Park, the view of the nighttime sky is near vertical to vertical.

4.2.4.1 ALTERNATIVE A: NO ACTION

Under the No Action Alternative, ACD's application to lease the coal included in the tract would not be approved, and the coal included in the tract would not be mined. No impacts to night sky conditions over the tract or over Bryce Canyon National Park would result from coal mining under the No Action Alternative.

Under this alternative, however, existing land uses would continue, including livestock grazing, backcountry driving, hunting, and vegetation treatments. Although it has not been quantified, PM released into the sky in smoke from prescribed fire used to treat vegetation communities would temporarily increase the diffusion of artificial light in the nighttime sky, and result in infrequent and intermittent increases in skyglow.

4.2.4.2 ALTERNATIVE B: PROPOSED ACTION

Under the Proposed Action, surface-mining operations would result in 1,993–2,395 acres of surface disturbance occurring at different times over the estimated 25-year mine life. Surface-mining operations and motorized travel through the tract would result in increased airborne PM. Additionally, three types of artificial lighting are proposed during nighttime operations and would include one to four portable light towers located at each active pit and two to six fixed position light poles permanently located at the 36-acre centralized mine facilities. Portable light towers would be diesel powered with four to six lights (1,000 watts each) per tower. Each portable light tower would be approximately 30 feet tall and would be moved in accordance with the mining sequence. Fixed-position light poles would have similar dimensions as lights to the portable light towers. Additionally, equipment lighting would come from headlights, brake lights, and other safety lighting on mechanical equipment used during mining operations.

Portable and fixed-light towers would result in the greatest addition to artificial light under the Proposed Action. Fixed lights at the centralized mine facilities would use 250-watt metal halide lamps producing up to 25,000 lumens each. The fixed lights would be fully shielded and no light would be emitted upward. The portable lights would use 1,000-watt metal halide lamps producing 110,000 lumens each. Portable lights are adjustable, allowing them to be aimed in different directions and at different angles relative to the horizon. For the purpose of analysis, Dark Sky Partners assumed that portable lights would typically be aimed at 30 degrees below the horizon, directing 30% of light upward (Dark Sky Partners 2009). Equipment and vehicle lighting would represent a small contribution to artificial lighting. PM from surface-mining actions on up to 120 acres at any given time and from motorized travel on dirt surface roads would further diffuse artificial lighting through the night sky resulting in a less bright but more extensive skyglow (Carr 1989). As described in the Air Resources section of Chapter 4, the maximum impacts inside of Bryce Canyon National Park from increases in PM and NO_x associated with potential mine plumes under the proposed action would be less than the VISCREEN acceptance criteria for both color change (Delta E) and contrast (see Table 4.11). Due to the unpredictable variations in atmospheric dust content over time, and terrain relief produced by the proposed mining operations, the results of the night sky modeling analysis should only be used as a general indication of potential changes in absolute sky brightness (Dark Sky Partners 2009).

For the duration of active mining, the typical mine lighting scenario would result in a 1% increase in night sky brightness at an altitude of 10° above the horizon and a 10% increase 1° above the horizon visible from Yovimpa Point.

There would only be a fractional increase in sky brightness over the baseline condition visible from Brian Head Peak. In fact, the typical mine lighting scenario is fainter than all other artificial light sources visible from Brian Head Peak and considered in the study. A viewshed analysis shows a direct line of site to areas in the tract from Brian Head Peak and the northeast corner of Cedar Breaks National Monument (Dark Sky Partners 2009). While active mining is occurring in that area, there is the potential for direct visibility of portable lighting fixtures. Under the brightest scenario, and assuming that 24 of the portable mine lighting fixtures were aimed directly at Cedar Break National Monument, they would appear to be approximately as bright as the planet Venus. When portable lights are in place and pointed at Cedar Breaks National Monument, the impact to visitors is likely to be minor to moderate; however, because of the intermittent nature of these lights and their visibility, and the fact that glare would be visible in limited locations, the overall impact to Cedar Breaks National Monument would be negligible (NPS 2009). It is also expected that, at times, direct glare would be visible from Brian Head Peak in addition to other locations in the Dixie National Forest. In addition, the effects of direct glare would be reduced through the use of directional lighting and by installing shields on lights.

Additionally, as portable lights are located at pits adjacent to the community of Alton, some residents throughout the town may be impacted by glare from direct lighting. Glare would be reduced through the use of directional lighting and by installing shields on lights. Glare would also be reduced by placing portable lights in the pit disturbance using the change in terrain resulting from mining activity to block any potential direct lighting on the community of Alton.

The study conducted by Dark Sky Partners concluded that the predicted skyglow visible from Yovimpa Point in Bryce Canyon National Park would be less than that produced by several small towns in the general area. The study also concluded that the predicted skyglow visible from Brian Head Peak outside of Cedar Breaks National Monument would be much less than skyglow arising from St. George and Cedar City, Utah. Although the impacts of the Proposed Action do not reach a level of significance, there is a high value placed on night sky resources at Bryce Canyon. The mitigations listed in the Nighttime Lighting and the Extent of Skyglow section of this chapter are recommended to further reduce impacts to night sky conditions (Dark Sky Partners 2009).

4.2.4.3 ALTERNATIVE C: REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS

Under Alternative C, centralized facilities associated with mining activities on the tract would be located in the same area, occupy the same acreage (36 acres), and include the same artificial lighting sources as the Proposed Action. Additionally, the artificial lighting associated with dispersed facilities necessary to conduct mining operations would also be the same as the Proposed Action. Impacts to natural lightscapes would be the same as those described under the Proposed Action except that they would occur for 21 years (the life of the mine under Alternative C).

4.2.5 Potential Mitigation Measures

A number of BMPs and design features are required and included as part of the action alternatives described above. The following measures are discretionary, and if prescribed, would further reduce impacts to aesthetic resources.

- Shields could be placed on all lights to focus light downward and reduce light scatter.
- Portable light fixtures could be kept in the mine pit below the ground surface and aimed as far as possible below the horizon and away from Bryce Canyon National Park, Cedar Breaks National Monument, and Brian Head Peak.
- Measures to control dust could be implemented. See the Air Resources section of Chapter 4 for specific measures.
- Interpretive signs could be placed at overlooks along USFS (Dixie National Forest) trails to describe the mining and rehabilitation activities.

4.2.6 Unavoidable Adverse Impacts

The Proposed Action and alternatives would result in unavoidable adverse impacts to aesthetic resources even following implementation of protective measures and the mitigation measures described above.

Although BMPs and required mitigation measures would result in a reduced increase in ambient noise levels relative to noise-sensitive receptors, increased ambient noise levels from truck traffic, blasting, and other heavy machinery would still occur for the duration of mining activities. The changes to landform, vegetation, and structures on the landscape from pit disturbances and construction of facilities would be evident in the natural landscape of the tract and surrounding lands, even with mitigation. Following reclamation, the landform would be restored to a near-natural condition, centralized and dispersed facilities would be removed, and a more varied vegetation pattern would be rehabilitated. Reclamation would restore the existing landscape following mining. Even with mitigation, the addition of artificial lighting in the tract and the added airborne PM (dust) would result in greater light pollution and skyglow over the tract and surrounding lands.

4.2.7 Short-term Uses versus Long-term Productivity

As discussed throughout this section, there would be a short-term loss of the aesthetic resources in the tract over the 25-year mine life under the Proposed Action and over the 21-year mine life under Alternative C. Effective implementation of required BMPs and protective measures described in Chapter 2, as well as prescribed mitigation measures identified in Chapter 4, would prevent these short-term uses from substantially impacting the long-term quality of aesthetic resources. Even with mitigation, increased levels of noise and decreased darkness of nighttime skies would result.

4.2.8 Irreversible and Irretrievable Commitments of Resources

The BMPs and protective measures detailed in Chapter 2 require the reclamation of disturbed areas following completion of mining operations under either action alternative. Because surface disturbances (including the EODA under Alternative C) would be recontoured and vegetation resources would be reclaimed, there would be no anticipated, irreversible impacts on visual resources associated with the actions proposed for the tract. Additionally, because noise and light pollution would only occur for the duration of the mining operations, there would be no irreversible impacts on soundscapes and lightscapes. There would, however, be irretrievable impacts associated with surface-disturbing activities proposed throughout the tract. The changes in landscape, soundscapes, and lightscapes that would result are an irretrievable loss of these aesthetic resources until mining operations are completed and successful reclamation takes place.

4.3 Air Resources

The analysis area for air resources consists of an approximately 150-km area surrounding the Alton Coal Tract (see Map 3.4). It is also referred to as the dispersion model domain. A series of technical analyses were performed to assess potential impacts on ambient air quality in the air analysis area from mining on the tract and transportation of coal along the reasonably foreseeable transportation route. The following are addressed quantitatively or qualitatively in these analyses:

- Mine construction-related emissions
- Mine operation-related emissions
- Impacts to attainment of the NAAQS for the tract
- PSD review
- Air quality-related values: Visibility impacts to the Class I areas, acid deposition, flora, and fauna
- General conformity

The analysis was based on a conceptual mine design and a set of planned and known mitigation strategies. The analysis is intended to be conservative to accommodate foreseeable emissions under various mining scenarios. A detailed mine plan has not yet been developed. An approved, detailed mine plan would be subject to state permitting requirements and would be subject to appropriate dispersion modeling at that time, as well as detailed operation and mitigation strategies. Technical aspects of the air resources analysis are addressed in more detail in the *Air Resources Impact Assessment Technical Report for the Alton Coal Lease by Application* (MESI 2010; Appendix K).

4.3.1 Emission Inventory

Air emissions are quantified to determine the relationship between emissions released into the atmosphere from various sources and the ambient concentrations that result. An emissions inventory is a listing, by source, of the amount of air pollutants discharged into the atmosphere per unit of time. Ambient concentration refers to the mass of a pollutant per unit volume in the atmosphere. It is commonly expressed in units of micrograms per cubic meter ($\mu g/m^3$). Tract-related air quality impacts can be predicted using the emissions calculated in an emissions inventory as inputs to a dispersion model. Dispersion model outputs are predicted concentrations of air pollutants in the atmosphere at receptors (locations where the dispersion model estimates pollution concentrations).

Adverse impacts to air quality generated by construction and mining activities in general would largely be due to the dispersion of small-diameter dust particles from the action of prevailing winds, the turbulence caused by moving machinery and trucks, or both. These dust emissions are typically called “fugitive dust.” Other impacts include exhaust emissions from diesel engines (such as loaders and haul trucks) and from diesel-powered generators.

Initial construction activities for the tract would include development of an access road, site preparation for fixed (i.e., centralized) facilities (e.g., crushers, conveyors, generators, and office and maintenance buildings), development of the main haul road, delivery of materials and equipment to the mine, and other construction-vehicle activity. It is assumed that 36 acres would be disturbed for construction activities on the tract; approximately 6 acres would be disturbed each month for six months.

Pollutant emissions sources during coal production on the tract would include PM emissions and fuel-combustion emissions. Both surface and underground mining were considered in this analysis. Surface mining up to approximately 200-feet or 300-feet of overburden removal was considered for both the Proposed Action and Alternative C (these are generally referred to as the 200-foot and 300-foot overburden thickness scenarios throughout the air resources analysis). Emissions were calculated for 24 hours per day, seven days per week, and 52 weeks per year. The total number of operating days per year was assumed to be 365.

Emission estimates that would be associated with construction and mining activities and diesel-powered generators are provided in this section. Pollutants considered are PM less than a nominal 10 and 2.5 micrometers in aerodynamic size (PM_{10} and $PM_{2.5}$), NO_x, VOCs, CO, SO_2, CO_2, and HAPs. On-site emission sources on the tract would include

- construction activities;
- topsoil removal and replacement;
- overburden removal and replacement;
- topsoil, overburden, haul truck, service vehicle, and employee travel on unpaved roads;
- wind erosion of disturbed areas and coal and overburden piles;
- coal loading, handling, and processing;

- bulldozer and grading activities;
- blasting, mobile source gaseous exhaust; and
- diesel-powered generators.

Off-site emission sources would include

- haul truck and employee travel on paved roads;
- motor vehicle exhaust;
- coal handling and train loading; and
- wind erosion of coal piles.

Emission controls would be implemented to reduce PM (fugitive dust) emissions during construction and ongoing production activities. Fugitive dust (PM_{10} and $PM_{2.5}$) emissions from vehicles traveling on unpaved roads during the life of the mine would be controlled using water or a combination of a chemical suppressant and water. Most coal transfer points and processing activities during coal production would be enclosed and would limit fugitive emissions from these sources. To reduce windblown dust, portions of the site and overburden storage piles and coal storage piles would be watered prior to predicted high-wind events. The analysis also assumes that 1) ultra low-sulfur diesel fuel would be used for vehicles and generators and 2) generators and nonroad diesel engines would meet Tier 4 emission standards.

4.3.1.1 ALTERNATIVE A: NO ACTION

Alternative A would result in no increases in air emissions associated with the tract. Emissions associated with growth or other developments would likely increase over time.

4.3.1.2 ALTERNATIVE B: PROPOSED ACTION

Construction and operation of the tract under the Proposed Action would result in both temporary and ongoing increases in emissions to the atmosphere. Two topsoil removal options exist for this alternative: 1) topsoil removal and replacement with scrapers, and 2) topsoil removal and replacement with a bulldozer, front-end loader, and trucks. Two overburden thickness removal scenarios were evaluated: 1) 200 feet of overburden removal, and 2) 300 feet of overburden removal. Following completion of surface mining, underground mining would occur for two or more years. Emissions are divided into five distinct groups: 1) emissions from construction, 2) on-site emissions with scrapers for topsoil removal and replacement, 3) on-site emissions with topsoil removal using a bulldozer, front-end loader, and trucks, 4) off-site emissions, and 5) emissions from underground mining. The construction phase would occur first, and the underground mining would occur last. Off-site emissions would occur for the four on-site options and during the underground mining phase. Estimated pollutant emissions from the five groups for the 200-foot and 300-foot overburden removal scenarios are shown in Tables 4.1 and 4.2, respectively.

Table 4.1. Estimated Pollutant Emissions (tons per year), 200-foot Overburden Removal Scenario, Proposed Action

Pollutant	Construction	On-site Scrapers	On-site Front-end Loader/Trucks	Off-site	Underground Mining	Total
PM_{10}	13	154	146	1,079	99	1,491
$PM_{2.5}$	1.3	25	25	43	16	110.3
NO_x	–	223	229	171	73	696
VOC	–	35	35	18	26	114
CO	–	354	352	186	249	1,141
SO_2	–	0.58	0.58	0.19	0.38	1.73
CO_2	–	35,307	36,822	18,423	40,561	131,113
Benzene	–	0.07	0.07	–	0.26	0.40
Toluene	–	0.03	0.03	–	0.09	0.15
Xylenes	–	0.02	0.02	–	0.06	0.10
Formaldehyde	–	0.01	0.01	–	0.03	0.05
Acetaldehyde	–	0.00	0.00	–	0.01	0.01
Acrolein	–	0.00	0.00	–	0.00	0

Table 4.2. Estimated Pollutant Emissions (tons per year), 300-foot Overburden Removal Scenario, Proposed Action

Pollutant	Construction	On-site Scrapers	On-site Front-end Loader/Trucks	Off-site	Underground Mining	Total
PM_{10}	13	203	193	1,079	112	1,600
$PM_{2.5}$	1.3	32	31	43	18	125.3
NO_x	–	563	570	171	74	1,378
VOC	–	74	74	18	26	192
CO	–	700	698	186	249	1,833
SO_2	–	0.69	0.69	0.19	0.38	1.95
CO_2	–	57,214	58,730	18,423	40,712	175,079
Benzene	–	0.07	0.07	–	0.26	0.40
Toluene	–	0.03	0.03	–	0.09	0.15
Xylenes	–	0.02	0.02	–	0.06	0.10
Formaldehyde	–	0.01	0.01	–	0.03	0.05
Acetaldehyde	–	0.00	0.00	–	0.01	0.01
Acrolein	–	0.00	0.00	–	0.00	0

4.3.1.3 ALTERNATIVE C: REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS

As under the Proposed Action, construction operations and mining of the tract under Alternative C would result in both temporary and ongoing emission increases to the atmosphere. Pollutant emissions as a result of topsoil removal options, overburden thickness removal scenarios, and other components of mining the tract were evaluated for Alternative C in the same way as for the Proposed Action. Because there would be two open pits under Alternative C, fugitive dust emissions were doubled in the emissions inventory compared to the Proposed Action. This provided a better estimate of increased emissions resulting from the operational requirements of Alternative C (seasonal restrictions to address sage-grouse concerns). Estimated pollutant emissions under Alternative C are shown in Table 4.3 (200-foot overburden removal scenario) and Table 4.4 (300-foot overburden removal scenario).

Table 4.3. Estimated Pollutant Emissions (tons per year), 200-foot Overburden Removal Scenario, Alternative C

Pollutant	Construction	On-site Scrapers	On-site Front-end Loader/Trucks	Off-site	Underground Mining	Total
PM_{10}	13	163	156	1,079	108	1,519
$PM_{2.5}$	1.3	27	26	43	18	115
NO_x	–	223	229	171	73	696
VOC	–	35	35	18	26	114
CO	–	354	352	186	249	1,141
SO_2	–	0.58	0.58	0.19	0.38	2
CO_2	–	35,307	36,822	18,423	40,561	131,113
Benzene	–	0.07	0.07	–	0.26	0.40
Toluene	–	0.03	0.03	–	0.09	0.15
Xylenes	–	0.02	0.02	–	0.06	0.10
Formaldehyde	–	0.01	0.01	–	0.03	0.05
Acetaldehyde	–	0.00	0.00	–	0.01	0.01
Acrolein	–	0.00	0.00	–	0.00	0

Table 4.4. Estimated Pollutant Emissions (tons per year), 300-foot Overburden Removal Scenario, Alternative C

Pollutant	Construction	On-Site-Scrapers	On-site Front-end Loader/Trucks	Off-site	Underground Mining	Total
PM_{10}	13	215	193	1,079	124	1,624
$PM_{2.5}$	1.3	34	31	43	20	129.30
NO_x	–	563	570	171	74	1,378
VOC	–	74	74	18	26	192
CO	–	700	698	186	249	1,833
SO_2	–	0.69	0.69	0.19	0.38	1.95

Table 4.4. Estimated Pollutant Emissions (tons per year), 300-foot Overburden Removal Scenario, Alternative C

Pollutant	Construction	On-Site-Scrapers	On-site Front-end Loader/Trucks	Off-site	Underground Mining	Total
CO_2	–	57,214	58,730	18,423	40,712	175,079
Benzene	–	0.07	0.07	–	0.26	0.40
Toluene	–	0.03	0.03	–	0.09	0.15
Xylenes	–	0.02	0.02	–	0.06	0.10
Formaldehyde	–	0.01	0.01	–	0.03	0.05
Acetaldehyde	–	0.00	0.00	–	0.01	0.01
Acrolein	–	0.00	0.00	–	0.00	0

4.3.2 Near-field Air Resources Impacts

The near-field analysis for the tract comprises a 50 × 50–km area with the tract in the center (the near-field dispersion model domain, see Map 3.4). The near-field analysis was conducted to assess impacts to public health and welfare and to estimate potential impacts to lakes and viewsheds in nearby (near-field) national parks.

In particular, the near-field, ambient, air resources impact assessment was performed to quantify maximum-modeled pollutant impacts near the tract. To demonstrate that air quality standards and air quality-related values (AQRVs) would be protected, the following are required: the development of short-term (hourly and daily) and long-term (annual) emission rates of regulated pollutants, application of regulatory-approved models to quantify predicted concentrations of regulated pollutants, and a comparison of predicted concentrations and applicable background concentrations with applicable standards.

The EPA's guideline model, AERMOD, was the refined air dispersion model used to assess near-field impacts and to verify compliance with the applicable NAAQS in the ambient airshed that encloses the tract. The modeling analysis focused on the reasonable, maximum development year (i.e., the maximum emission year) for the mine. Using this anticipated, maximum, potential emission year, the AERMOD dispersion model was used to analyze potential near-field impacts of PM_{10}, $PM_{2.5}$, NO_2, CO, and SO_2.

Compliance with the respective annual NAAQS was based on the highest modeled value for each year of the four-year meteorological dataset added to the respective background concentrations. Compliance with the respective short-term NAAQS (24-hour, 8-hour, 3-hour, and 1-hour) for CO, NO_2, and SO_2 was based on the highest second-high modeled concentration for each year of the four-year meteorological period added to the respective background concentrations. Regulatory changes to the NAAQS NO_2 and SO_2 standards occurred during the tract analysis. Due to the timing of these regulatory changes in relation to the tract analysis, assessment of the new 1-hour NO_2 and SO_2 standards was not incorporated in the Draft EIS.

Compliance demonstrations with the 24-hour $PM_{2.5}$ standard use the average of the first-highest 24-hour concentration in each year over the length of the weather data period. Compliance with the 24-hour PM_{10} standard was verified against the highest fifth-high modeled concentration over the four-year period. All modeled concentrations were rounded to match the form of the appropriate NAAQS.

4.3.2.1 PM_{10} AERMOD RESULTS

Modeled PM_{10} concentrations associated with the maximum development year are summarized here. Both the 200-foot overburden removal and 300-foot overburden removal scenarios were modeled for compliance with the NAAQS under each action alternative. Model results—the highest fifth-high concentration over the four-year modeled dataset–are presented in Table 4.5.

Table 4.5. Highest Fifth-high PM_{10} 24-hour Modeling Results

Overburden Thickness (feet)	Alternative	Modeled concentration (µg/m^3)	Background concentration (µg/m^3)	Total concentration (µg/m^3)	NAAQS concentration (µg/m^3)
200	B	82.7	72	150	150
200	C	83.6	72	160	150
300	B	86.3	72	160	150
300	C	92.9	72	160	150

The 200-foot overburden removal scenario for Proposed Action complies with the NAAQS at all modeled receptors. However, the 200-foot overburden removal scenario for Alternative C and the 300-foot overburden removal scenario for both action alternatives do not show modeled compliance with the NAAQS. Modeled exceedances are off of the northwest side of the tract boundary near the boundary line. The public would only be exposed to lower concentrations of PM_{10}, because concentrations drop off quickly further away from the tract boundary.

4.3.2.2 $PM_{2.5}$ AERMOD RESULTS

Modeled $PM_{2.5}$ concentrations associated with the maximum development year are summarized here and in Table 4.6. Both the 200-foot overburden removal and 300-foot overburden removal scenarios were modeled for compliance with the NAAQS under each action alternative. Model results—both the highest, predicted annual concentration over all that was modeled and the 24-hour average first-high concentrations over the four-year meteorological dataset–are presented in Table 4.6.

Table 4.6. $PM_{2.5}$ Modeling Results

Overburden Depth (feet)	Alternative	Averaging Period	Modeled (µg/m^3)	Background (µg/m^3)	Total (µg/m^3)	NAAQS (µg/m^3)
200	B	Annual	4.7	3.6	8	15
		24-hour	19.3	8.6	28	35
	C	Annual	5.1	3.6	9	15
		24-hour	21.1	8.6	30	35
300	B	Annual	6.0	3.6	10	15
		24-hour	22.7	8.6	31	35
	C	Annual	6.5	3.6	10	15
		24-hour	24.5	8.6	33	35

The 200-foot and 300-foot overburden removal scenarios for both action alternatives comply with the NAAQS for modeled concentrations of $PM_{2.5}$ at all modeled receptors.

4.3.2.3 NITROGEN DIOXIDE AERMOD RESULTS

The maximum-modeled NO_x concentrations associated with the maximum development year are summarized here and in Table 4.7. Based on the recent promulgation date for the 1-hour NO_2 standard (January 22, 2010), no 1-hour modeling was performed. Both the 200-foot overburden removal and 300-foot overburden removal scenarios were modeled for compliance with the annual NAAQS. The estimated NO_x emissions for the Proposed Action and Alternative C are the same though emissions vary between the 200-foot and 300-foot overburden removal scenarios. A 75% ozone correction was applied to all modeled annual NO_x modeling results. This was done in accordance with EPA's Ambient Ratio Method (ARM) of estimating ambient annual NO_2 concentrations from modeled NO_x emissions. The intent is to account for the interaction of ambient ozone with emissions of NO_x, which can chemically interact to form NO_2.

Table 4.7. Annual Maximum Nitrogen Dioxide Modeling Results for the Proposed Action and Alternative C

Overburden Thickness (feet)	Modeled (µg/m^3)	Background (µg/m^3)	Total (µg/m^3)	NAAQS (µg/m^3)
200	31.6	17	49	100
300	99.9	17	117	100

The 200-foot overburden removal scenario under both action alternatives complies with the annual NAAQS for modeled concentrations of NO_2 at all modeled receptors. However, the 300-foot overburden removal scenario under both action alternatives does not show modeled compliance of the annual NAAQS.

4.3.2.4 CARBON MONOXIDE AERMOD RESULTS

The maximum-modeled CO concentrations associated with the maximum development year are summarized here and in Table 4.8. Both the 200-foot overburden removal and 300-foot overburden removal scenarios were modeled for compliance with the NAAQS. The estimated CO emissions for the Proposed Action and Alternative C are the same though emissions vary between the 200-foot and 300-foot overburden removal scenarios. Separate model runs were not necessary in each of the overburden removal depth scenarios.

Table 4.8. Carbon Monoxide Modeling Results

Overburden Thickness (feet)	Averaging Period	Modeled (µg/m^3)	Background (µg/m^3)	Total (µg/m^3)	NAAQS (µg/m^3)
200	8-hour	582	1,150	1,732	10,000
	1-hour	2,639	1,150	3,789	40,000
300	8-hour	1,383	1,150	2,533	10,000
	1-hour	5,643	1,150	6,793	40,000

The 200-foot and 300-foot overburden removal scenarios under both action alternatives comply with the 1-hour and 8-hour NAAQS at all modeled receptors.

4.3.2.5 SULFUR DIOXIDE AERMOD RESULTS

Modeled SO_2 concentrations associated with the maximum development year are summarized here and in Table 4.9. Though potential SO_2 emissions associated with mining activities would be nominal, modeling was completed to quantify potential concentrations. Based on the recent promulgation date for the 1-hour SO_2 standard (June 2, 2010), no 1-hour modeling was performed. Both the 200-foot overburden removal and 300-foot overburden removal scenarios were modeled for compliance with the 3-hour, 24-hour, and annual NAAQS. Because the estimated SO_2 emissions associated with the maximum development year for the Proposed Action and Alternative C are the same, separate model runs were not necessary in each overburden removal scenario.

Table 4.9. Sulfur Dioxide Modeling Results for the Proposed Action and Alternative C

Overburden Thickness (feet)	Averaging Period	Modeled (µg/m^3)	Background (µg/m^3)	Total (µg/m^3)	NAAQS (µg/m^3)
200	3-hour	1.64	20	22	1,300
	24-hour	0.47	10	10	365
	Annual	0.10	5	5	80
300	3-hour	1.90	20	22	1,300
	24-hour	0.47	10	10	365
	Annual	0.14	5	5	80

The 200-foot and 300-foot overburden removal scenarios under both action alternatives comply with the 3-hour, 24-hour, and annual NAAQS at all modeled receptors.

4.3.2.6 HAZARDOUS AIR POLLUTANTS IMPACT ASSESSMENT

HAPs can cause various adverse health effects, including respiratory problems and some forms of cancer. They are not part of the NAAQS, but high levels at the tract boundary could indicate the need for further analysis, mitigation strategies, or both. Therefore, HAPs have been included in the emission inventory and were modeled in the AERMOD near-field analysis. The modeled concentrations were compared with known health exposure levels as a means of assessing potential impacts.

The only quantifiable source of HAPs in the emissions inventory would be the generators needed to conduct mining operations. The HAP emissions from the generators would be the same for the 200-foot and 300-foot overburden removal scenarios under both action alternatives. No adverse impacts associated specifically with the tract HAP sources are anticipated based on modeled concentrations compared to threshold health exposure levels (Tables 4.10 and 4.11).

Table 4.10. Hazardous Air Pollutants AERMOD Modeling Results (noncarcinogenic)

Pollutant	Model Years	Avg. Period	Receptor Location		Modeled ($\mu g/m^3$)	Threshold ($\mu g/m^3$)[1]
			UTME	UTMN		
Benzene	2005–2008	1-hour	371800	4140300	0.440	1,300 (REL)
		24-hour	368400	4142500	0.046	53 (TSL)
		Annual	370060	4140000	0.003	30 (RfC)
Toluene	2005–2008	1-hour	371800	4140300	0.160	37,000 (REL)
		24-hour	368400	4142500	0.017	2,512 (TSL)
		Annual	370060	4140000	0.001	5,000 (RfC)
Xylenes	2005–2008	1-hour	371800	4140300	0.110	22,000 (REL)
		24-hour	368400	4142500	0.011	14,473 (TSL)
		Annual	370060	4140000	0.001	100 (RfC)
Formaldehyde	2005–2008	1-hour	371800	4140300	0.045	37 (TSL)
		Annual	370060	4140000	0.0003	9.8 (RfC)

[1] REL = recommended exposure limit; TSL = Toxic Screening Level; RfC = Reference Concentration.

Table 4.11. Hazardous Air Pollutants AERMOD Modeling Results (carcinogenic)

Analysis[1]	HAP Constituent	Carcinogenic Annual RfC (Risk Factor)[2] $1/(\mu g/m^3)$	Exposure Adjustment Factor	Modeled ($\mu g/m^3$)	Calculated Risk	Significance Criterion
MLE	Benzene	7.80E-06	0.0949	0.003	2.2E-09	1.00E-06
MLE	Formaldehyde	5.50E-09	0.0949	0.0003	1.6E-13	1.00E-06
MEI	Benzene	7.80E-06	0.33	0.003	7.7E-09	1.00E-06
MEI	Formaldehyde	5.50E-09	0.33	0.0003	5.4E-13	1.00E-06

[1] MLE = most likely exposure; MEI = maximally exposed individual.
[2] EPA Air Toxics Database, Table 1 (EPA 2007).

4.3.2.7 NEAR FIELD CLASS I AND CLASS II INCREMENTS

Under federal and state PSD regulations, increases in ambient air concentrations in Class I areas are limited by PSD Class I increments. Specifically, emissions associated with a particular development may increase ambient concentrations above baseline levels only within those specific increments developed for SO_2, PM_{10}, and NO_2. Modeling results for the maximum development year are presented in Table 4.12. For this air resources assessment, modeled concentrations are compared to the PSD increments. These comparisons are made for informational purposes only, and the analyses described herein are not intended to be, nor should they be interpreted as a regulatory increment consumption analysis.

Table 4.12. Near Field Class I (Bryce Canyon National Park) and Class II (Grand Staircase-Escalante) Results for the Maximum Emission Rate Case (300-foot overburden removal, Alternative C)

Pollutant	Averaging Period	Class I Analysis Results		Class II Analysis Results	
		Cumulative Concentration ($\mu g/m^3$)	Class I Increment ($\mu g/m^3$)	Cumulative Concentration ($\mu g/m^3$)	Class II Increment ($\mu g/m^3$)
PM_{10}	Annual	0.01	4	0.42	17
	24-hour	0.36	8	3.11	30
SO_2	Annual	0.00	2	0.00	20
	24-hour	0.00	5	0.02	91
	3-hour	0.01	25	0.15	512
NO_x	Annual	0.04	2.5	1.73	25
$PM_{2.5}$	Annual	0.00	n/a	0.10	n/a
	24-hour	0.07	n/a	1.15	n/a
CO	8-hour	5.3	n/a	67	n/a
	1-hour	32	n/a	497	n/a

Because modeling results displayed in Table 4.12 show values far below the relevant increments, results are only presented for the maximum emission rate case (300-foot overburden removal, Alternative C). Impacts from the other scenarios would be equal to or less than those presented here. Modeled concentrations are well below both the Class I and Class II increments. Even though there are no increments for $PM_{2.5}$ or CO, results are presented in Table 4.12 to convey a general impression of impact levels.

4.3.2.8 NEAR-FIELD VISCREEN ANALYSIS

VISCREEN was used to assess potential visibility impacts in the near-field modeling domain at Bryce Canyon National Park. The primary pollutants of concern that may impact visibility in the near-field are PM (PM_{10} and $PM_{2.5}$) and NO_x. The conservative Level-2 VISCREEN visual impacts category was used to assess visibility impacts inside of Bryce Canyon National Park. The results are summarized in Tables 4.13 and 4.14. This analysis was only performed for Alternative C because Alternative C represents the maximum emission rate case.

Table 4.13. Visual Impacts Inside of Bryce Canyon National Park, 200-foot Overburden Removal Results for Alternative C

Background	Theta	Azimuth	Distance from Alton (km)	Alpha	Delta E		Contrast	
					Criteria	Plume	Criteria	Plume
Sky	10	157	35	11	6.21	0.267	0.13	0.005
Sky	140	157	35	11	3.41	0.074	0.13	-0.002
Terrain	10	84	18	84	6.80	0.691	0.28	0.003
Terrain	140	84	18	84	4.05	0.029	0.28	0.00

Table 4.14. Visual Impacts inside of Bryce Canyon National Park, 300-foot Overburden Removal Results for Alternative C

Background	Theta	Azimuth	Distance from Alton (km)	Alpha	Delta E		Contrast	
					Criteria	Plume	Criteria	Plume
Sky	10	157	35	11	6.21	0.372	0.13	0.006
Sky	140	157	35	11	3.41	0.149	0.13	-0.003
Terrain	10	84	18	84	6.80	0.904	0.28	0.004
Terrain	140	84	18	84	4.05	0.041	0.28	0.000

These results demonstrate that the maximum impacts inside of Bryce Canyon National Park from a potential mine plume under the 200-foot and 300-foot overburden removal scenarios would be less than the VISCREEN acceptance criteria for both color change (Delta E) and contrast.

4.3.3 Far-field Analysis

The purpose of the far-field analysis is to quantify potential air resources impacts to both ambient air concentrations and AQRVs from air pollutant emissions of NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$ that are expected to result from mining operations on the tract.

The analyses were performed using the EPA-approved CALMET/CALPUFF/CALPOST modeling system to predict direct and indirect impacts to air resources at far-field PSD Class I areas and selected Class II areas. The term “CALPUFF” is generally used to represent the entire modeling system, including the pre- and post-processors.

4.3.3.1 CLASS I AND CLASS II INCREMENTS

Under federal and state PSD regulations, increases in ambient air concentrations in Class I areas are limited by PSD Class I increments. Specifically, emissions associated with a particular development may increase ambient concentrations above baseline levels only within those specific increments developed for SO_2, PM_{10}, and NO_2. The modeling results for the maximum development year are presented in Table 4.15. For this air resources assessment, modeled concentrations are compared to the PSD increments. These comparisons are made for informational purposes only, and the analyses described herein are not intended to be, nor should they be interpreted as a regulatory increment consumption analysis.

Table 4.15. Far Field Class I and Class II Results for the Maximum Emission Rate Case (300-foot overburden removal, Alternative C)

Pollutant	Averaging Period	Class I Analysis Results		Class II Analysis Results	
		Cumulative Concentration (µg/m^3)	Class I Increment (µg/m^3)	Cumulative Concentration (µg/m^3)	Class II Increment (µg/m^3)
PM_{10}	Annual	0.14	4	0.03	17
	24-hour	1.06	8	0.24	30
SO_2	Annual	0.00	2	0.00	20
	24-hour	0.00	5	0.00	91
	3-hour	0.00	25	0.00	512
NO_x	Annual	0.02	2.5	0.01	25
$PM_{2.5}$	Annual	0.01	n/a	0.00	n/a
	24-hour	0.04	n/a	0.02	n/a
CO	8-hour	2.27	n/a	0.93	n/a
	1-hour	5.60	n/a	1.78	n/a

Because modeling results displayed in Table 4.15 show values far below the relevant increments, results are only presented for the maximum emission rate case (300-foot overburden removal, Alternative C). Impacts from the other scenarios would be less than those presented here. Modeled concentrations are well below both the Class I and Class II increments. Even though there are no increments for $PM_{2.5}$ or CO, results are presented in Table 4.15 to convey a general impression of impact levels.

4.3.3.2 VISIBILITY

Atmospheric light extinction relative to background conditions is used to measure regional haze. Analysis thresholds for atmospheric light extinction are set forth in *The Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I report* (FLAG 2000). This FLAG document provides guidance for evaluating visibility. According to this document a threshold change of 10% or more of the reference background visibility (1.0 deciview) due to the effects of both mining operations on the tract and existing source impacts may require additional scrutiny. Visibility results are presented in Table 4.16 (200-foot overburden removal, Proposed Action and 300-foot overburden removal, Alternative C). These results represent both the lowest and highest emission cases and summarize method 6 processing. There are no extinction changes exceeding 10% in any of the areas of interest (maximum change of 5.5% at Grand Canyon National Park).

Table 4.16. Results for the Proposed Action 200-foot Overburden Removal Scenario and Alternative C 300-foot Overburden Removal Scenario

METHOD 6	200-foot Overburden, Proposed Action		300-foot Overburden, Alternative C	
Class I/Class II Area	**# Days > 10%**	**Max Change (%)**	**# Days > 10%**	**Max Change (%)**
Capitol Reef National Park	0	1.2	0	1.7
Grand Canyon National Park	0	1.3	0	5.5
Zion National Park	0	5.4	0	4.9
Grand Staircase-Escalante National Monument	0	2.1	0	2.7

4.3.3.3 DEPOSITION

Maximum predicted sulfur and nitrogen deposition impacts were estimated for the 200-foot overburden removal scenario in the Proposed Action and the 300-foot overburden removal scenario in Alternative C. As above, this approach provides for complete representation of impacts from both the lowest and highest emission scenarios for the tract.

Predicted, direct mine-related impacts were compared to the minimum “green line” deposition analysis values for total nitrogen and sulfur deposition in the western United States, which are defined as 3.0 kilogram per hectare per year (kg/ha-year) for both nitrogen and sulfur (Fox et al. 1989). The green line represents a value below which no significant change in the forest ecosystem would occur. These results are presented in Table 4.17. Impacts for sulfur and nitrogen deposition are below the minimum green line value in all cases.

Table 4.17. Deposition Results

Location	Overburden Thickness (feet)	Alternative	Alton Coal Tract			
			Maximum Dry and Wet Annual Sulfur Deposition(kg/ha-yr)	>Green Line?	Maximum Dry and Wet Annual Nitrogen Deposition (kg/ha-yr)	>Green Line?
Bryce Canyon	200	B	0.0001	No	0.0124	No
	300	C	0.0001	No	0.0262	No
Capitol Reef	200	B	0.0000	No	0.0004	No
	300	C	0.0000	No	0.0009	No
Escalante	200	B	0.0000	No	0.0013	No
	300	C	0.0000	No	0.0024	No
Grand Canyon	200	B	0.0000	No	0.0003	No
	300	C	0.0000	No	0.0006	No
Zion	200	B	0.0000	No	0.0038	No
	300	C	0.0000	No	0.0087	No
Navajo Lake	300	C	0.0000	No	0.0044	No

4.3.3.4 ACID NEUTRALIZING CAPACITY

CALPUFF was used to predict annual deposition fluxes of sulfur and nitrogen at Navajo Lake for the maximum emission rate case (300-foot overburden removal scenario, Alternative C). Impacts from the other scenarios would be less than those presented here. These results are shown in Table 4.17. Because no data on lake chemistry at Navajo Lake were available, no estimates of acid neutralizing capacity change in Navajo Lake were performed. However, maximum modeled annual sulfur and nitrogen deposition values for Navajo Lake are zero and 0.0044 kg/ha, respectively. Both of these values are well below the green line value of 3.0 kg/ha per year. Though acid neutralizing capacity change is ultimately specific to the water body in question, Leydecker et al.'s (1999) study of high altitude Sierra Nevada lakes found that although acid neutralizing capacity was depressed as a result of modeled snowmelt nitrate and sulfate deposition rates up to 150% above baseline conditions, no lakes experienced chronic acidification.

4.3.3.5 GREENHOUSE GASES

Naturally occurring GHGs include water vapor, CO_2, CH_4, nitrous oxide (N_2O), and ozone (O_3). Water vapor accounts for the largest percentage of the greenhouse effect. Next to water vapor, CO_2 is the most abundant GHG. Because CO_2 is relatively stable in the atmosphere and uniformly mixed throughout the troposphere and stratosphere, the climatic impact of CO_2 emissions does not depend on the CO_2 source location on earth. The action alternatives would produce GHG emissions from the combustion of fuel by vehicles and equipment.

Research on how emissions of GHGs influence global climate change and associated effects has focused on the overall impact of emissions from aggregate regional or global sources. This approach is required primarily because GHG emissions from single sources are small relative to aggregate emissions. The climate change research community has not yet developed tools specifically intended for evaluating or quantifying end-point impacts attributable to the emissions of GHGs from a single source. The current tools for simulating climate change generally focus on global and regional-scale modeling. Global and regional-scale models lack the capability to represent many important small-scale processes. As a result, confidence in regional- and sub-regional-scale projections is lower than at the global scale. Therefore, limited scientific capability exists in assessing, detecting, or measuring the relationship between emissions of GHGs from a specific single source and any localized impacts.

Globally, approximately 30,377 million metric tons of CO_2 was added to the atmosphere through the combustion of fossil fuels in 2008 (EPA 2010). The highest on-site and off-site CO_2 emission evaluated would occur in the 300-foot overburden removal scenario for both action alternatives. The 77,153 tons of CO_2 (0.07 million metric tons) calculated for these alternatives represents approximately 0.0002% of the 2008 global emissions.

Annual coal production from the tract would be approximately 2 million tons under both the Proposed Action and Alternative C. The annual worldwide primary coal production based on 2008 data is approximately 7.3 billion tons (EIA 2008). The coal produced from the tract would therefore be expected to account for approximately 0.028% of total worldwide annual production. Because heat content varies by coal produced, there is not a direct relationship to emissions produced. The percentage of emissions from burning the coal removed from the tract would be expected to be of about the same magnitude as the production relationship.

Because site-specific data are not available, EPA's default emission factor of 4,810 pounds per ton of subbituminous coal (EPA 1998) was used to approximate annual CO_2 emissions from combusting the 2 million tons of coal that would be produced from the tract. Based on this emission factor, the end user(s)

of the coal produced from the tract would emit 4.8 million tons of CO_2 per year (4.4 million metric tons). This represents 0.014% of the total CO_2 emissions from 2008 global fossil fuel combustion. Annual estimated CO_2 emissions as a result of mining operations on the tract (0.07 million metric tons) are small relative to the amount of estimated CO_2 emissions from end user annual combustion of the coal (4.4 million metric tons). The total of these two sources of annual CO_2 emissions (4.47 million metric tons) is approximately 0.015% of 2008 global emissions from fossil fuel combustion (Table 4.18).

Table 4.18. Carbon Dioxide Emission Comparisons

Comparison	Global	Alton Coal Tract (mining operations)	End User Annual Combustion of Coal Produced from the Tract	Total Emissions related to Alton Coal Tract
CO_2 Emissions from Fossil Fuel Combustion, MM metric tons/yr	30,377	0.07 (0.0002% of global emissions)	4.4 (0.014% of global emissions)	4.47 (0.015% of global emissions)
Annual Coal Production, million tons	7,271	2 (0.028% of global production)	–	–

4.3.4 Potential Mitigation Measures

Mitigation measures described in Section 4.3.1 (also see Appendix K) were incorporated into the analyses conducted as required measures under any action alternative. Potential mitigation measures may also be considered and incorporated at a later time to further reduce air resources impacts. If the BLM's decision is to offer the tract for competitive leasing under either action alternative the successful lessee would be required to obtain an air permit from the UDAQ. This air permit (and other permits that would be required prior to conducting mining operations on the tract) would be based on detailed mine plans (as described in Chapter 2, the analyses in this EIS are based on conceptual mine plans using conservative estimates and assumptions). The permit would include an approved dust control plan that may include potential mitigation measures such as vehicle speed limits, additional dust suppressants, additional prohibitions on surface-disturbing activities during high wind events, erecting artificial wind barriers, wetting materials prior to disturbing or processing, cleaning haul trucks, and/or other similar measures. Measures that would be included in a dust control plan may also be considered by the BLM in the leasing process.

4.3.5 Unavoidable Adverse Impacts

Unavoidable adverse impacts to air resources as a result of mining and transporting coal under either action alternative would consist of increases in concentrations of criteria pollutants and HAPs. As a consequence of increased concentrations of criteria pollutants some decrease in AQRVs would occur but would be within threshold values based on current regulations and guidance. Though concentrations would increase under the alternatives modeled values show compliance with all the NAAQS with the exception of

- PM_{10} 24-hour standard under the Proposed Action 300-foot overburden removal scenario and Alternative C both overburden removal scenarios, and
- NO_2 annual maximum under the Proposed Action 300-foot overburden removal scenario and Alternative C 300-foot overburden removal scenario.

Multiple mitigation measures have been incorporated into the analysis. Potential mitigation measures identified in Section 4.3.4 would further reduce emissions and associated impacts. These potential mitigation measures would likely reduce PM_{10} emissions and improve visibility impacts at the national parks, but would have no impact on CO_2 emissions.

4.3.6 Short-term Uses versus Long-term Productivity

The short-term use of the tract for mining operations would result in impacts to air resources in the analysis area for the duration of the mining operations. However, upon mine closure and reclamation, these impacts would be eliminated and would therefore not impact the long-term productivity of the air resource.

4.3.7 Irreversible and Irretrievable Commitments of Resource

The irreversible commitment of a resource means that, once committed, the resource is permanently lost to other uses. This type of commitment generally applies to nonrenewable resources (e.g., minerals, geologic features, or cultural resources) or to resources that are only renewable over a very long period of time (e.g., soil productivity or perhaps old-growth forest.). Irretrievable commitments of resources, on the other hand, are regained following cessation of the activity and reclamation. There would be no irreversible commitments of air resources as a result of mining the tract. All air resource impacts described would be irretrievable because air quality would cease to be impacted by mining operations following cessation of mining activities.

4.4 Cultural Resources

Inventories to identify and evaluate cultural resources in the Alton Coal Tract were conducted by Montgomery Archaeological Consultants, Inc. on behalf of ACD (Stavish 2007, 2008b) and by the BLM (Zweifel 2007). These inventories resulted in the identification of 132 prehistoric, historic, and multicomponent sites (a multicomponent site is one that contains both prehistoric and historic archaeological materials). Of these 132 sites, 107 are eligible for the NRHP (Table 4.19).

Table 4.19. Summary of Archaeological Site Types in the Tract

Cultural Association	Eligible	Not Eligible	Total
Historic	0	6	6
Multicomponent	7	0	7
Prehistoric	100	19	119
Total	**107**	**25**	**132**

In addition to these archaeological sites, other cultural resources that may be affected by the Proposed Action and alternatives include the Panguitch Historic District, which is listed on the NRHP, and Utah Heritage Highway 89 with its associated Mormon Pioneer Heritage Area. Finally, the Proposed Action and alternatives may affect TCPs identified by Native American groups during consultation with the BLM.

Impacts to these cultural resources under the Proposed Action and alternatives are analyzed here. Impacts for the Proposed Action and Alternative C are considered by type of disturbance: surface mining, underground mining, construction of centralized facilities, KFO Route 116 relocation, short haul route,

construction of dispersed facilities, increased human presence, other indirect effects, and coal truck traffic. It should be noted that not all 132 sites would be disturbed by each of the individual mining activities. Therefore, the following impact sections disclose the number of sites impacted by each activity. Methods and assumptions for the analysis are described next.

4.4.1 Regulatory Framework

According to the KFO RMP, the identification, preservation, and protection of significant cultural resources are necessary to ensure their appropriate uses for future generations (BLM 2008b). The Federal Land Policy and Management Act Sections 1039I, 201(a), and (c); the NHPA Section 110(a); and Archaeological Resources Protection Act Section 14(a) provide the regulatory framework that ensures cultural resource protection.

Prior to any mining disturbance, consultation with the State Historic Preservation Office (SHPO) would occur to evaluate the NRHP eligibility of cultural properties and to evaluate the effects of mining on historic properties. Cultural properties determined eligible for the NRHP would be avoided; if avoidance is not be possible, a data recovery plan would be implemented prior to disturbance.

Lease stipulations with regard to cultural resources include the following:

- Conducting Class I and III surveys to identify cultural properties on all state and federal lands and on private lands affected by federal undertakings
- Consulting with the SHPO to evaluate eligibility of cultural properties for the NRHP
- Consulting with the SHPO to evaluate effects of mining on historic properties
- Avoiding or recovering data from significant cultural properties identified by surveys, according to the approved cultural resources mitigation plan
- Notifying appropriate federal personnel if historic or prehistoric materials are uncovered during mining operations
- Instructing employees on the importance of cultural resources and the regulatory obligations to protect those resources
- Consulting with Native American tribes that have known interests in this area of leasing action and requesting assistance with identification of potentially significant religious or cultural sites
- Avoiding or recovering data from significant cultural properties identified by surveys, according to the approved cultural resources management plan (CRMP)
- Complying with the Native American Graves Protection and Repatriation Act

4.4.2 Impact Indicators and Thresholds

Impacts to cultural resources are analyzed by evaluating the extent to which NRHP-eligible properties would be affected directly or indirectly by any of the actions included in each alternative. The criteria used to assess adverse effects to NRHP-eligible properties are set forth in 36 CFR 800.5. An adverse effect consists of any impact that may alter one or more of the characteristics of a historic property that make the property eligible for the NRHP. Characteristics that must be considered with regard to NHRP criteria include the integrity of the property's setting, feeling, location, design, materials, workmanship, and association. In addition, consideration must also be given to effects that may alter the property's eligibility under any of the four NRHP Criteria (A to D). Criterion A refers to a property's association with events that have made a significant contribution to the broad patterns of our history. Criterion B refers to a property's association with the lives of persons significant in our past. Criterion C refers to properties that embody the distinctive characteristic of type, period, or method of construction, or that

represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction. Criterion D refers to properties that have yielded or may be likely to yield information important in prehistory or history. Most of the 132 sites that would likely be adversely affected under either action alternative are eligible under Criterion D.

Direct effects consist of any physical destruction or damage to all or part of the property, such as the creation of roads or trails through the resource, the selling or leasing of the land where the resource is located, development that would alter the physical landscape of the resource, and any other types of human activity that could affect the physical integrity of the landscape where the resource is located. Direct effects may also result from activities in areas adjacent to the resource, such as when the creation of a road, trail, or recreational facility denudes vegetation in the area or changes water drainage patterns and causes erosion of the resource.

Some of the more substantial indirect effects on cultural resources typically result from increased human activity in the area, which can increase the risk of vandalism, looting, or unintentional destruction of a property. Prehistoric sites are especially vulnerable to these effects. Other types of indirect effects can impact a property's integrity of setting, feeling, or association, rather than its physical integrity. These characteristics can be affected by visual intrusions such as buildings and transmission lines, by alteration of the surrounding landscape, or by atmospheric intrusions such as dust clouds or smog. They can also be affected by substantial changes to the audible environment; such changes can result from increased vehicle or air traffic, the operation of heavy machinery, blasting, or elimination of the natural sounds that would have created the historical audible environment.

Finally, cumulative impacts are those that occur when the effects of an action are added to or interact with the effects of other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts may result from individually minor, but collectively significant actions occurring over a period of time. For example, if cultural resources are being affected by development in areas adjacent to or nearby an area that is the subject of an action, then that action may contribute to a larger pattern of impacts in the region. Sites of specific types or from specific time periods may not have great individual significance, but if several such sites are being impacted by a variety of developments, they may become a rare and a much more valuable resource.

In this general framework, the effects of the Proposed Action and the alternatives on cultural resources are analyzed by considering these specific impact indicators:

- For archaeological sites and/or TCPs located in the tract, the number of sites completely or partially physically destroyed (e.g., by surface-mining activities or construction of facilities)
- For archaeological sites and/or TCPs located in the tract that are not physically destroyed, the loss of integrity, as defined above due to other direct and indirect effects
- For the Panguitch Historic District, Utah Heritage Highway 89 and the associated Mormon Pioneer Heritage Area, and Native American sacred sites or other TCPs not located in the tract, the loss of integrity of setting, feeling, and association

The first of these indicators can be analyzed quantitatively using data on cultural resource sites identified in the tract. The remaining two, which involve loss of integrity, must be analyzed qualitatively.

4.4.3 Analysis Assumptions

This analysis assumes that impacts to sites in areas of surface disturbance would be mitigated following procedures outlined in a CRMP created especially for the tract. It also assumes that impacts to sites that have not yet been identified but that may be encountered during the course of mining or construction activities (e.g., deeply buried sites without surface manifestations that allowed them to be identified during inventory) would be mitigated through monitoring procedures similar to those described in the data recovery plan. This plan has been prepared for archaeological sites in the fee coal areas adjacent to the tract. It can be found in Appendix A of the *Cultural Resource Management Plan for Alton Coal Development's Proposed Development of the Alton Amphitheater and Sink Valley* (Stavish 2008b) (Stavish 2008a:34).

4.4.4 Alternative A: No Action

Under the No Action Alternative, ACD's application to lease the coal included in the tract under the Proposed Action or Alternative C would not be approved, the tract would not be offered for competitive lease sale, and the coal included in the tract would not be mined. As such, no coal mining activities or infrastructure development would occur under the No Action Alternative, and therefore no archaeological sites or other cultural resources would be directly affected by these activities. Likewise, no cultural resources located either inside or outside of the tract would be indirectly affected by increased vandalism, looting, or unintentional damage resulting from increased access associated with mining activities from the action alternatives, nor would the integrity of setting, feeling, or association of such resources be affected. Under the No Action Alternative, current land uses such as recreation, livestock grazing, and vegetation treatments may impact archaeological sites or cultural resources in the tract.

Management of cultural resources on BLM-administered lands in the tract would continue at the discretion of the BLM under the KFO RMP. The objectives of the RMP with regard to cultural resources are 1) to identify, preserve, and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations, 2) to seek to reduce imminent threats and resolve potential conflicts by ensuring that all authorizations for land use and resource use comply with NHPA Section 106, 3) to provide opportunities for scientific and educational uses of cultural resources, 4) to provide opportunities for traditional (Native American) uses of cultural resources, and 5) to ensure compliance with the Native American Graves Protection and Repatriation Act (BLM 2008b).

4.4.5 Alternative B: Proposed Action

Under the Proposed Action the tract would be offered for lease at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the tract. The boundaries of the tract would be reasonably consistent with the tract reconfiguration completed by the BLM after ACD's original license by application (LBA) submittal (see Map 1.2). Approximately 1,993–2,395 acres of surface disturbance (surface mining and infrastructure development) would occur in the tract under the Proposed Action. In addition, underground mining would occur on 412–717 acres of land in the tract.

Surface mining methods with up to 200 feet of overburden removal would result in fewer disturbed acres, which would decrease the number of sites affected by the surface-mining process. Employing surface mining methods with up to 300 feet of overburden removal would result in more disturbed acres, which would increase the number of sites affected. The lower range of numbers detailed in the following sections relates to a 200-foot overburden removal scenario, whereas the higher range of numbers relates to a 300-foot overburden removal scenario.

4.4.5.1 EFFECTS OF SURFACE-MINING ACTIVITIES ON CULTURAL RESOURCES

Of the 1,993–2,395 acres of surface disturbance that would occur in the tract under the Proposed Action, 1,750–2,152 acres would be the direct result of surface mining (see Map 1.2). There are 81–85 known archaeological sites located either partially or wholly in the areas that would be surface mined; of these, 69 or 70 are eligible for the NRHP. These sites, or portions of them, would be destroyed by the surface-mining process. As described in the CRMP, a sample of these sites would undergo archaeological data recovery (i.e., excavation as well as other methods of collecting data) before being disturbed by surface mining. Thus, the loss of archaeological sites to surface mining would be offset to some degree by the acquisition of new information about the area's history and prehistory.

It is also possible that an unknown number of previously unidentified sites would be encountered during surface mining and may thus be affected. Implementation of a monitoring plan would mitigate impacts to NRHP-eligible sites and allow for the possibility of conducting data recovery at them.

4.4.5.2 EFFECTS OF UNDERGROUND MINING ACTIVITIES ON CULTURAL RESOURCES

Under the Proposed Action, underground mining would result in subsidence on 513 to 211 surface acres of the tract (see Map 1.2). An additional 166 surface acres (200-foot overburden removal scenario) to 109 surface acres (300-foot overburden removal scenario) outside the tract boundary but within the angle of influence would be disturbed by subsidence due to underground mining (see the Geology and Minerals section for more information on subsidence and angle of influence). At present, there are no known archaeological sites on the 412 surface acres of underground mining activity under the 300-foot overburden removal scenario. However, some possibility exists that there are buried sites or previously unrecognized surface sites in this region, and determination of underground mining effects on surface and near-surface deposits is evaluated here. Under the 200-foot overburden removal scenario, four sites occur within the 717 surface acres proposed for underground mining activity. One site is eligible for the NRHP.

The specific method of underground mining that would be used is not yet known, but regardless of the method, any surface disturbance associated with underground mining would occur in the pit disturbance areas discussed in the previous section (e.g., accessing subsurface coal from a high-wall exposed in a pit). Thus, compared to archaeological sites located in surface-mining areas, the impacts to sites located on the surface in the underground mining area would be relatively low. The main effect that underground mining may have on archaeological sites would occur through subsidence. Until a detailed mining plan is developed, the extent of subsidence that would occur cannot be estimated. However, the integrity of sites could possibly be diminished as a result. In particular, subsidence could alter spatial and stratigraphic relationships among artifacts and other materials, reducing their potential to provide archaeologically important information. Subsidence might also cause architectural damage to prehistoric or historic structures, although it is unlikely that such structures exist in the underground mining area because no archaeological sites were identified in this area, and sites with structures are generally the most visible type of archaeological site.

4.4.5.3 EFFECTS OF CENTRALIZED FACILITY CONSTRUCTION ON CULTURAL RESOURCES

Under the Proposed Action, centralized facilities associated with mining activities in the tract would be located on approximately 36 acres of BLM-administered land in the tract's no-coal zone (see Map 1.2). There are four archaeological sites located either partially or wholly in the centralized facility area; all four of these sites are eligible for the NRHP.

These sites would likely be destroyed by facilities construction. These sites would be considered for inclusion in the sample of sites that would undergo archaeological data recovery before construction begins. Thus, as with archaeological sites lost to surface mining, the loss of these sites would be offset to some degree by the acquisition of new information about the area's history and prehistory.

In the surface-mining areas, it is possible that some unknown number of previously unidentified sites would be encountered during construction of centralized facilities. Implementation of a monitoring plan would mitigate impacts to NRHP-eligible sites discovered in this way and would allow for the possibility of conducting data recovery.

4.4.5.4 EFFECTS OF KANAB FIELD OFFICE ROUTE 116 RELOCATION ON CULTURAL RESOURCES

Based on a series of assumptions discussed in Section 4.1 (Analysis Assumptions), relocation of KFO Route 116 under the Proposed Action would affect as many as four archaeological sites, two of which are eligible for the NRHP. These sites are located within potential ROWs for the relocated road and would be partially or completely destroyed by road construction. However, it might be possible to mitigate impacts to these sites during final road design by locating the road and associated construction areas to avoid them. If avoidance is not possible, these sites would be considered for inclusion in the sample of sites that would undergo archaeological data recovery before road construction begins, and their loss would be offset to some degree by the acquisition of new information about the area's history and prehistory.

4.4.5.5 EFFECTS OF DISPERSED FACILITY CONSTRUCTION ON CULTURAL RESOURCES

Dispersed facilities would be constructed under the Proposed Action on an estimated 160 acres; these 160 acres would be located within the 1,183 acres of the tract's no-coal zone outside of the 36-acre centralized facility area. There are 45 archaeological sites located either partially or wholly in the area available for dispersed facility construction, 35 of which are eligible for the NRHP. It is unlikely that it would be possible to avoid all archaeological sites in the construction of dispersed facilities, but because the locations of dispersed facilities are not yet known, it is not possible to determine the exact number of sites that would be impacted by them. However, it can be assumed that impacts to archaeological sites from dispersed facilities would be proportionate to the percentage of the area available for dispersed facilities that would actually be occupied by them (13.5%). Applying this percentage to the number of known archaeological sites in the area available for dispersed facilities, it is likely that approximately six archaeological sites would be impacted by dispersed facilities, and that approximately five of these would be eligible for the NRHP.

As with sites located in the surface-mining and centralized facilities areas, those impacted by construction of dispersed facilities would likely be partially or completely destroyed. However, these sites would be considered for inclusion in the sample of sites that would undergo archaeological data recovery before construction begins, and the loss of these sites would be offset to some degree by the acquisition of new information about the area's history and prehistory.

In addition, it is possible that some unknown number of previously unidentified sites would be encountered during construction of dispersed facilities, and may thus be affected. Implementation of a monitoring plan would minimize or mitigate impacts to NRHP-eligible sites discovered during construction by allowing facilities to be moved to avoid them, or by allowing for the possibility of conducting data recovery at them.

4.4.5.6 INDIRECT EFFECTS OF INCREASED HUMAN ACTIVITY IN THE TRACT ON CULTURAL RESOURCES

Under the Proposed Action, an estimated 160 employees would work at the mine, with operations occurring 24 hours a day, six days a week, over a projected mine life of 25 years. This increased human presence would have an unquantifiable but potentially great impact on the integrity of NRHP-eligible archaeological sites in the tract that occur on the surface but are not directly affected by pit disturbance or facilities construction. In particular, it could increase vandalism, looting, or unintentional destruction of archaeological sites during the course of mine operations.

As noted in the previous section, there are 45 archaeological sites, 35 of which are eligible for the NRHP, located either partially or wholly in the tract's no-coal zone outside of the centralized facility area. All these sites could be affected by vandalism, looting, or unintentional destruction to a much greater degree than would be the case under the No Action Alternative, although the magnitude of such impacts cannot be estimated precisely.

4.4.5.7 OTHER INDIRECT EFFECTS ON CULTURAL RESOURCES IN THE TRACT

As noted in the Native American Consultation section, natural landscape features (e.g., springs and creeks), resource harvesting and processing areas, and archaeological sites are significant to the Native American tribes in the region for cultural and spiritual reasons (Personal Communication, Zweifel 2008). As such, visual, auditory, and other atmospheric impacts from surface-mining activity under the Proposed Action may substantially degrade the integrity of setting, feeling, and association of TCPs that are not directly affected by pit disturbance or facilities construction. These are not impacts that can be quantified, but they would be a major concern for consulting tribes.

4.4.5.8 EFFECTS OF COAL TRUCK TRAFFIC ON CULTURAL RESOURCES

As discussed in the Cultural Resources along the Coal Haul Transportation Route section, the coal haul transportation route under the Proposed Action (see Map 2.4) would pass through the NRHP-listed Panguitch Historic District and would follow Utah Heritage Highway 89, which is part of the Mormon Pioneer Heritage Area. The Panguitch Historic District is significant under NRHP Criterion A for its association with the early settlement of Panguitch and with the subsequent economic development of the area, and it is significant under Criterion C for its intact concentration of historic buildings. The Mormon Pioneer Heritage Area was established in recognition of the role that Mormon settlement played in the Euro-American colonization of the West, and its purpose includes fostering conservation and interpretation of cultural and natural resources, as well as economic development related to the region's heritage.

Under the Proposed Action, it is projected that 153 coal truck round-trips per day would occur six days per week over a projected mine life of 25 years. A traffic analysis conducted for this EIS indicates that the portion of US-89 that corresponds to the coal haul transportation route presently experiences average traffic volumes ranging in various locations from approximately 3,600 to 4,100 vehicles per day, of which between 720 and 900 vehicles per day are heavy trucks (Fehr and Peers 2008). Projected total traffic volumes for the year 2020 on US-89 (without the addition of coal trucks) range from 4,400 to 5,850 vehicles per day (Fehr and Peers 2008). The coal truck traffic that would result from the Proposed Action would be an incremental addition to the existing and projected future traffic volumes. Compared to present levels, it would represent an increase in truck traffic volume of approximately 17%–21%, six days per week. Possible impacts to cultural resources from this incremental increase in truck traffic could include physical damage to historic buildings from traffic-generated vibrations, as well an alteration of the integrity of setting, feeling, and association of the Panguitch Historic District and the Utah Heritage Highway 89/Mormon Pioneer Heritage Area.

The California Department of Transportation has presented a technical advisory on transportation-related vibrations (Caltrans 2002). The results in this advisory suggest that neither existing truck traffic nor the addition of further coal truck traffic should physically affect historic buildings. This technical advisory suggests that a peak particle velocity (i.e., velocity of soil particles) of 5.0 millimeters/second (mm/s) is the threshold at which there is a risk of architectural damage (i.e., damage to finish materials) to "normal dwellings," such as houses with plastered walls and ceilings. The advisory further suggests that minor structural damage would not occur until peak particle velocities of 10–15 mm/s are reached. Finally, the advisory recommends that "ruins and ancient monuments" not be subjected to peak particle velocities of greater than 2.0 mm/s. In contrast to these threshold levels, the advisory reports that the highest measured traffic-generated vibrations from heavy trucks, measured on freeway shoulders at a distance of 5 m (16 feet, five inches) from the center line of the nearest lane, have never exceeded 2.0 mm/s. Vibration velocity declines exponentially with distance from the source, and because buildings along the coal transportation route are located much farther than 5.0mm/s m from the center line of the closest traffic lane, it is unlikely that buildings along the route would ever experience vibrations that even approach the recommended maximum for "ruins and ancient monuments," much less the threshold at which architectural damage to "normal dwellings" might occur. Vibration velocity does depend on the road surface, and vibrations could be further minimized by filling potholes and cracks (Caltrans 2002).

Although it is unlikely that the additional truck traffic would result in physical damage to historic buildings along the coal haul transportation route, there is perhaps a greater chance that it could adversely affect the integrity of setting, feeling, and association of the Panguitch Historic District, the Utah Heritage Highway 89/Mormon Pioneer Heritage Area, or both. In particular, the increased traffic could result in increases in noise, air pollutants, and traffic congestion in downtown Panguitch and along US-89, thereby adversely affecting the historic feeling of the area for residents and visitors; such impacts are considered in greater detail in the aesthetic resources, air resources, and traffic sections of this document. Portions of US-89 along the coal haul transportation route currently experience heavy truck traffic of between 720 and 900 vehicles per day. As such, heavy truck traffic is part of the experience of the Panguitch Historic District and the Utah Heritage Highway 89, and the additional volume of 153 trucks per day would represent only an incremental increase against this baseline. In addition, mining is one of the historic uses of the region that was considered in establishing the region as a heritage area, and from this perspective coal truck traffic is not inconsistent with the heritage of the area.

4.4.5.9 SUMMARY OF EFFECTS ON CULTURAL RESOURCES UNDER THE PROPOSED ACTION

Under the Proposed Action, 69 or 70 NRHP-eligible archaeological sites would be completely or partially destroyed by surface mining on 1,750–2,152 acres, and four NRHP-eligible archaeological sites would be completely or partially destroyed by construction of centralized facilities on 36 acres. The range of NRHP-eligible sites destroyed is based on the 200-foot or 300-foot overburden removal scenario. As many as two NRHP-eligible archaeological sites would be impacted by the relocation of KFO Route 116, and an estimated five NRHP-eligible sites would be impacted by the construction of dispersed facilities on 160 acres out of 1,183 acres available for dispersed facility construction. The complete or partial destruction of archaeological sites under the Proposed Action are impacts that would not occur under the No Action Alternative because the No Action Alternative would not result in mining the tract. However, it is uncertain how many sites would be completely or partially destroyed when considering impacts from the current land uses discussed in the No Action Alternative.

Mitigation for the loss of eligible archaeological sites would be the information about regional prehistory and history that would be gained from data recovery to be conducted at a sample of sites. An unknown number of archaeological sites not identified during the cultural resources inventory for the tract (e.g., buried sites without surface manifestations) might be impacted by pit disturbance, construction of

centralized or dispersed facilities, or KFO Route 116 relocation, but such impacts would be mitigated by avoidance if possible (in the case of KFO Route 116) or through monitoring and possibly data recovery (if selected to be added to the sample of sites for data recovery). At present, no known archaeological sites have been identified within the 717 surface acres where underground mining would occur under the 300-foot overburden removal scenario, and the specific method of underground mining to be adopted is unknown. Thus, the effects of subsidence on archaeological sites cannot be evaluated quantitatively, although there is some chance that they could occur. Under a 200-foot overburden removal scenario, four sites occur in the area prone to subsidence. One site is eligible for the NRHP.

Sites that are not directly impacted by surface mining or facilities construction would be subject to a greater degree of threat for vandalism, looting, or unintentional destruction due to an increased human presence in the area. Native American TCPs, which include natural features as well as archaeological sites, would be subject to adverse effects to their integrity of setting, feeling, and association due to visual, auditory, and other atmospheric impacts from mining activity. Although not quantifiable, these impacts would be a major concern for the tribes that would be consulted.

The incremental increase in truck traffic through the Panguitch Historic District and along the Utah Heritage Highway 89 that would occur under the Proposed Action would likely not cause physical damage to historic buildings along the route. However, it likely would have some adverse effect on the integrity of setting, feeling, and association of these resources.

4.4.6 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Under Alternative C, total projected surface disturbance would occur from 1,662 to 2,064 acres. The number of archaeological sites impacted by surface mining would be 76, of which 63 are eligible for the NRHP (compared to 69 or 70 NRHP-eligible sites affected by surface mining under the Proposed Action). Based on assumptions described for Alternative C in Section 4.1, the number of sites affected by the relocation of KFO Route 116 would be reduced from a maximum of four to a maximum of three, of which two are eligible for the NRHP (the same maximum number of NRHP-eligible sites affected by road relocation under the Proposed Action). The number of sites that would be located either partially or wholly in the area available for construction of dispersed facilities under Alternative C would be reduced from 45 to 43, of which 34 (rather than 35) are eligible for the NRHP. Applying the same percentage used to estimate impacts from dispersed facilities under the Proposed Action (13.5%), it can be estimated that the number of sites affected by dispersed facilities would not differ appreciably from the Proposed Action—that is, six sites would be affected, including five that are NRHP eligible. Impacts from underground mining and centralized facility construction would be the same as those described for the Proposed Action. Effects of increased human activity in the tract (e.g., increased threat of looting through increased access), other indirect effects (e.g., effects on the setting and feeling of TCPs), and effects from coal truck traffic would be reduced in proportion to a reduction in mine life from 25 to 21 years. Impacts from surface mining, facilities construction, and road relocation activities to sites not previously identified during cultural resource inventories would be reduced roughly in proportion to the reduction in total surface disturbance from the range of 1,993–2,395 acres to 1,662–2,064 acres. Alternative C would increase the complete or partial destruction of archaeological sites on the tract compared to the No Action Alternative because no mining would occur on the tract under No Action. However, it is not known how many sites would be completely or partially destroyed when considering impacts from the current land uses discussed for the No Action Alternative.

4.4.7 Potential Mitigation Measures

Mitigation measures would consist of a combination of avoidance, monitoring, and conducting data recovery at a sample of the sites that would be affected by the Proposed Action and outlined in a CRMP. The data recovery component of a CRMP would likely be proposed to be initiated in three major stages corresponding to stages of the Proposed Action. Phase I would cover actions on private land (i.e., Coal Hollow) and consist of the mitigation of adverse impacts through data recovery in compliance with Utah Code 9-8-404 in consultation with DOGM, SHPO, and Public Lands Policy and Coordination Office (Personal Communication, Stavish 2008c). Importantly, Phase I would need to adopt an adaptive field strategy, and any unanticipated field discoveries made during this phase would require immediate attention. At the completion of Phase I data recovery, archaeological monitoring would occur to further collect any unanticipated data or discoveries. Following the completion of Phase I mitigation, an internal review and consultation with participating agencies would be undertaken. Phase II and Phase III would be structured to address the Proposed Action analyzed in this document in compliance with Section 106 of the NRHP and NEPA, and in consultation with the BLM, DOGM, and SHPO. Phase II would be structured based on results of the Phase I data recovery program. Phase III would consist of the refinement of research methods and questions based on Phase I and Phase II data recovery and testing. Importantly, Phase III would also consist of a selection of a sample of eligible sites for mitigation of those that are being adversely affected. A public outreach component would also be incorporated into the Phase I, II, and III plans.

Employee education regarding the treatment of cultural resources and the restriction on access to inactive mining areas could also be included as an potential mitigation measure when managing cultural resources.

4.4.8 Unavoidable Adverse Impacts

Unavoidable impacts, or impacts that exist even after mitigation measures have been taken, would principally manifest through the destruction of all cultural resources in areas targeted for open pit disturbance. For previously identified sites that are included in the sample of sites to be excavated, even though impacts would be mitigated through the collection of information about the prehistory and history of the area, materials from those sites would forever be removed from their original context. Unavoidable damage to cultural resources could also occur if resources not identified during surveys were affected during ground disturbance, despite the implementation of a monitoring plan for mitigation purposes. Unavoidable loss of cultural resources due to nonrecognition, lack of information and documentation, increased erosion, and inadvertent damage or use could also occur.

4.4.9 Short-Term Uses versus Long-Term Productivity

Cultural resources that are wholly eliminated due to short-term uses such as scientific data recovery efforts and data recovery supporting surface-disturbing activities would no longer be available for further study. Therefore, the long-term productivity of the resources (e.g., their ability to provide additional data) is also reduced. Short-term uses comprising the actual mining of coal would have the combined effect of destroying sites as well as increasing threats (such as looting) to sites outside of the actual disturbance areas through increased traffic and public access. Those sites not affected by looting during the active life of the mine may still have some reduced long-term productivity through continued looting or inadvertent destruction as a result of increased access to the region. Natural forces such as erosion would also continue to affect cultural resources, and it is likely that these resources would suffer deterioration and loss of data as a result.

4.4.10 Irreversible and Irretrievable Commitments of Resources

The implementation of laws that protect cultural resources would provide mitigation of impacts from permitted activities. However, the development of a surface coal mine would impact a large number of sites. Such a large number of NRHP-eligible sites would make mitigation through full data recovery an impractical solution for every resource, and a sampling strategy for data recovery would consequently be implemented, as described in the CRMP. Loss of the sites that are not included in the sample to be excavated would result in an irreversible loss of the data from these sites. In addition, for sites that are excavated, even though data would be recovered through scientific research, excavation and subsequent destruction through mining activities would result in an irreversible commitment of resources.

Several irretrievable commitments of resources would also occur. During the active lifetime of the mine, cultural resources not otherwise impacted by direct mining effects would be under increasing threat of looting for a period of time. In addition, cultural resources in the tract would not be available to Native Americans for traditional uses or to scholars for research purposes for a period of time. The loss of integrity of setting and feeling that the Panguitch Historic District and the Utah Heritage Highway 89/Mormon Pioneer Heritage Area would experience during transportation of coal to markets would also constitute an irretrievable commitment of resources. Because these impacts would be temporary, lasting only for the life of the mine, they would be irretrievable rather than irreversible.

4.5 Fire Management

This section discusses the impacts of the Proposed Action and alternatives as described in Chapter 2 on FRCC acreages in the Alton Coal Tract. Impacts would vary by alternative and would depend on specific actions that could directly or indirectly reduce or contribute to fuels loading or increase or decrease the risks of wildland fire.

4.5.1 Regulatory Framework

Although no specific regulations or lease stipulations are in place for fire activities, the successful bidder would follow internal protocol and BLM BMPs to reduce and mitigate fire risk.

4.5.2 Impact Indicators and Thresholds

Acres of surface disturbance in vegetation communities in each FRCC would be used as the primary indicator of impacts from implementation of the alternatives. Surface disturbance would mainly be incurred by minerals development and by the construction of facilities and roads as planned under the action alternatives.

FRCCs are categories that describe the degree of departure of vegetation communities from the central tendency of reference ecosystems (see Section 3.5.3.1 in Chapter 3). Central tendency is a composite estimate of fuel composition, fire severity and frequency, and other characteristics of an ecosystem. There are three FRCC categories: FRCC 1 consists of areas having no to low departure from reference communities, FRCC 2 consists of areas with moderate departure, and FRCC 3 consists of areas with high departure (Hann and Bunnell 2001). These departures are largely caused by changes to vegetation structure and composition through improper grazing, fire suppression, and exotic annual weed invasion. In the tract, 99.9% of all the vegetation types (excluding open water and acres of roads) are in FRCC 3 (see Map 3.8).

A secondary indicator of impacts to fire regimes in the tract would be the construction and presence of new roads. Because of the potential for vehicle traffic to start wildfires, increased travel in the tract could lead to a greater risk of human-caused wildfires. Also, increased machinery operation during construction of facilities could lead to a greater wildfire risk. Acres of land designated for facilities construction would also be a secondary indicator of impacts to fire regimes in the tract.

4.5.3 Analysis Assumptions

Lightning accounts for 78% of all fires in the KFO area. Human activity such as careless smoking, vehicle exhaust, sparks from machinery or vehicles, escaped agricultural burning, and unattended campfires accounts for the remaining 22% (2004b). However, alterations to vegetation community structure and composition that create conditions for frequent wildfires are, to some extent, all a result of human activity. Regardless of the initial cause of the fire, wildfires in unreclaimed disturbed areas (i.e., FRCC 2 and 3) tend to occur more frequently and cause more damage than wildfires in natural or reference conditions (BLM 2004b). For the purposes of this analysis, vegetation disturbance and FRCC rating would be considered the most important factors in determining wildfire risk, although risk due to new road and facilities construction is also discussed.

For this analysis, it is assumed that post-operational revegetation would be successful and that revegetated vegetation communities would be less susceptible to wildfires than they are currently. Under both of the action alternatives, approximately 43%–62% of pinyon-juniper communities in the tract would be cleared for mine or facilities construction (see Section 4.15). Because all pinyon-juniper communities in the tract are considered to be a result of invasive plant encroachment, these areas would not be restored to current vegetation community structures post-operation but would be revegetated with sagebrush and perennial grassland species. Permanent removal of 43%–62% of the vegetation in these communities would greatly reduce the overall fuel load in the tract. It is possible that the FRCC rating would be improved following revegetation, and the risk of catastrophic wildfires in the tract would be reduced in the long term.

It is also assumed that revegetated areas would only be subject to minimal, long-term invasive, annual weed species encroachment. This assumption is based on agency objectives for reclamation and on the relatively small amounts of invasive annual weed species observed in past revegetation projects in the area (Personal Communication, Reese 2008).

Preventive SOPs would be followed during all mine operations to minimize risk of equipment-started fires.

4.5.4 Actions that Would Cause Change to Existing Fire Conditions

Clearing of vegetation for mines, roads, and facilities would create a short-term reduction in fuel loading and fire frequency. There would be less risk of wildfires prior to reclamation, when these areas are not occupied with vegetation. These cleared areas would also act as firebreaks between vegetated areas. Increased vehicle traffic to and from mining operations would result in an increased risk of vehicle-caused ignitions that could start wildfires. However, new roads would also provide better access for firefighters in the case of a wildfire.

Because 99.9% of land in the tract is classified as FRCC 3, restoration of native vegetation communities would be expected to improve vegetation community quality and fire regime classifications. If the revegetation of vegetation communities at the completion of mining activities is successful, it could shift the lands' FRCC rating from high to low levels of departure from central tendencies of reference ecosystems.

Impacts of actions under each alternative are discussed in the following sections.

4.5.4.1 ALTERNATIVE A: NO ACTION

Under the No Action Alternative, ACD's application to lease the coal included in the tract under the Proposed Action or Alternative C would not be approved, the tract would not be offered for competitive lease sale, and the coal included in the tract would not be mined.

No coal-mining activities or infrastructure development would occur under the No Action Alternative on the tract. Likewise, no acres of vegetation communities would be disturbed by these activities, and no change in the FRCC rating would result. Furthermore, no acres in the tract would be revegetated or have the potential to decrease in FRCC rating as a function of mining.

Management of vegetation on BLM-administered lands in the tract would continue at the discretion of the BLM under the KFO RMP. These treatments are generally used to restore sagebrush grasslands that have been invaded by pinyon-juniper woodland for ecosystem restoration and watershed health. In the short term, vegetation treatments could increase the risk of invasion by noxious weeds and invasive species by vegetation removal and ground disturbance. Under the No Action Alternative, the removal of pinyon-juniper woodlands would reduce fuel loads in the tract. However, the approximate percentage of tract to be treated under the No Action Alternative in the short and long term is not known at this time.

Implementing general treatment stipulations such as 1) using prescribed burning in lieu of mechanical treatment when deemed suitable, 2) evaluating treatment sites for soil suitability and stability prior to manipulation, and 3) excluding livestock from all treatment areas until seedlings are established would help facilitate reestablishment of vegetation communities. Using desired species of grasses, forbs, and browse in the rehabilitation and reseeding of treated areas would facilitate vegetation reestablishment and avoid creating single-species communities.

Vegetation treatments, if successful, would have long-term benefits to the ecology of the area by removing undesired species, increasing species diversity and age class of certain communities, improving vegetation composition and structure, increasing overall vegetation cover, and improving FRCC rating. This could result in healthier woodlands, upland communities, and riparian areas that are more capable of retaining moisture and nutrients and resisting disease, invasive species, drought, fire, and other natural disturbances and/or stressors.

4.5.4.2 ALTERNATIVE B: PROPOSED ACTION

Under the Proposed Action, the tract would be offered for lease at a sealed-bid, competitive lease sale subject to standard and special lease stipulations developed for the tract. The boundaries of the tract would be reasonably consistent with the tract reconfiguration completed by the BLM after ACD's original LBA submittal (see Map 1.2).

4.5.4.2.1 Vegetation Removal

Approximately 1,732.9–2,134.8 acres of surface disturbance in vegetation communities would result from surface-mining operations (pit disturbance) under the Proposed Action. Centralized facilities associated with mining activities on the tract would remove approximately 36 acres of vegetation on BLM-administered land in the tract's no-coal zone (see Map 1.2). Other dispersed facilities would result in approximately 160 acres of vegetation removal. Relocation of KFO Route 116 in the tract would also remove approximately 47 acres of vegetation. This leads to approximately 1,815–2,217 acres of vegetation removed due to mining and facilities construction. This is 51%–62% of the vegetation in the tract.

Under the management objectives described in Chapter 2, this entire acreage (1,815–2,217 acres) would be revegetated with suitable native and non-native species. Invasive annual grasses such as cheatgrass would be suppressed. This could lead to an improved FRCC rating on these revegetated areas due to the suppression of cheatgrass and the return of the vegetation community to one with a fire regime of less frequent and lower intensity fires.

4.5.4.2.2 Wildfire Risk Due to Increased Access to Tract and Construction of Facilities

Under the Proposed Action, approximately 6.5 miles of new roads would be constructed due to the relocation of KFO Route 116. This increase in new road, when compared to the No Action Alternative, would result in an increased risk of human-caused wildfires from construction activities.

The construction of centralized and dispersed facilities on 196 acres under the Proposed Action could lead to an increased risk of human-caused wildfires from construction activities in undisturbed vegetation on and adjacent to the tract as compared with the No Action Alternative, where no facilities would be constructed.

The Western Utah RWPP does not consider the town of Alton as a state-identified community at risk of wildfire. However, the RWPP does identify WUI areas immediately west of the town, along the length of US-89, as well as the Spencer Bench, Spencer Cliff Estates, and Stout Canyon area. The RWPP risk assessment identifies a high wildfire risk in these areas (FCAOG 2007b), which include portions of the coal haul transportation route.

4.5.4.2.3 Wildfire Risk Due to Increased Vehicle Trips

Increased movement to and from the tract by construction equipment and coal haul trucks would increase the risk of fuel leakage and/or sparking that could lead to wildfires in the tract and adjacent transportation corridors. An estimated 153 coal haul vehicle round-trips per day are expected under the Proposed Action.

The number of projected employee vehicle trips is expected to increase under this alternative as compared to the No Action Alternative. These trips would also lead to increased wildfire risk due to fuel leakages and sparking.

The risk of spontaneous combustion of coal in haul trucks, coal storage piles, refuse piles, and exposed coal faces would also increase as a result of mining activities. Under the DOGM's coal-mine permitting application requirements (Rule R645-301), the successful bidder would be required to follow all regulations regarding fire prevention and response.

4.5.4.3 ALTERNATIVE C: REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS

Under Alternative C, the tract would be modified to exclude Block NW of the tract near the town of Alton (see Map 2.1). Furthermore, certain mining activities in Block S would be subject to seasonal restrictions to reduce impacts to the local sage-grouse population. The boundaries of the modified tract would be reasonably consistent with the configuration shown in Map 2.1.

4.5.4.3.1 Vegetation Removal

Approximately 1,443–1,845 acres of surface disturbance in vegetation communities would result from surface-mining operations (pit disturbance) under Alternative C. Centralized facilities associated with mining activities on the tract would remove approximately 36 acres of vegetation on BLM-administered land (see Map 2.1). Other dispersed facilities would result in approximately 135 acres of vegetation removal. Relocation of KFO Route 116 in the tract would also remove approximately 37 acres of vegetation. This leads to 1,515–1,917 acres of vegetation that would be removed due to mining and facilities construction. This is 48%–61% of the vegetation in the tract.

Under the management objectives described in Chapter 2, this entire acreage (1,515–1,917 acres) would be revegetated with suitable native and non-native species. Invasive annual grasses such as cheatgrass would be suppressed. This could lead to an improved FRCC rating on these revegetated areas due to the suppression of cheatgrass and the return of the vegetation community to one with a fire regime of less frequent and lower intensity fires.

4.5.4.3.2 Wildfire Risk Due to Increased Access to Tract and Construction of Facilities

Under Alternative C, approximately 4.6 miles of new roads would be constructed due to the relocation of KFO Route 116. This increase in new roads, when compared to the No Action Alternative, would result in an increased risk of human-caused wildfires from construction activities.

The construction of centralized and dispersed facilities on 171 acres under Alternative C would lead to an increased risk of human-caused wildfires from construction activities in undisturbed vegetation on and adjacent to the tract when compared to the No Action Alternative, where no facilities would be constructed.

4.5.4.3.3 Wildfire Risk Due to Increased Vehicle Trips

Increased movement to and from the tract by construction equipment and coal haul trucks would increase the risk of fuel leakage and/or sparking that could lead to wildfires in the tract and adjacent transportation corridors. An estimated 153 coal haul vehicle round-trips per day are expected under Alternative C.

The number of projected employee vehicle trips would be greater than under the No Action Alternative and the same as the Proposed Action; however, the number of trips would last for 21 years as opposed to 25 under the Proposed Action. These trips would also lead to increased wildfire risk due to fuel leakages and sparking.

4.5.5 Potential Mitigation Measures

No potential mitigation measures are proposed for fire management.

4.5.6 Unavoidable Adverse Impacts

The risk of wildfire ignition would be an unavoidable impact under the Proposed Action and Alternative C. Restoration of native vegetation communities would be expected to improve vegetation community quality and fire regime classifications.

4.5.7 Short-term Uses versus Long-term Productivity

In the short term, areas cleared of vegetation for construction of mined areas, facilities, or roads would be removed from FRCC rating. These areas would serve as firebreaks in the event of wildfires in adjacent areas. At the completion of mining activities, these areas would be revegetated under the mitigation measures set out in Chapter 2. Revegetation has the potential to improve the tract's FRCC ratings. In the long term, the revegetation of 1,975–2,377 acres of land (55.6%–66.9%) under Proposed Action and 1,649.8–2,051.6 acres of land (52.2%–64.9%) under Alternative C would remove a large area of land from this high FRCC rating and therefore help this area move toward a more natural fire regime.

4.5.8 Irreversible and Irretrievable Commitments of Resources

The protective measures detailed in Chapter 2 require the reclamation of disturbed areas following the completion of mining. Because vegetation resources would be restored or rehabilitated after the proposed disturbance and/or development, there would be no anticipated irreversible impacts on native vegetation resources or fire regimes associated with the management decisions proposed for the tract. However, there would be irretrievable impacts associated with the surface-disturbing activities proposed throughout the planning area. Any native, fire-resistant vegetation that would be removed or disturbed would be an irretrievable loss until successful restoration took place.

4.6 Geology and Minerals

Each action alternatives analyzed below includes a range of numbers relating to the 200-foot and the 300-foot overburden removal scenarios. Either scenario could result in a difference in impact numbers. Numbers are given as a range, with the first number referencing the 200-foot scenario and the second number referencing the 300-foot scenario.

The analysis area for geology and minerals is primarily the Alton Coal Tract under both the Proposed Action and Alternative C. However, the area north and northeast of the tract's underground mining portion, extending 405 feet beyond the tract boundaries (an area of approximately 166 to 109 acres outside the tract boundary) along its northern and northeastern edge, is also included (Map 4.1). This area is within what is known as the "angle of draw" or "angle of influence" (hereafter referred to as the angle of influence) for the underground mine portion of the tract. The angle of influence defines the extent of the surface area affected by ground movement that occurs as a result of removing coal from an underground mine where overlying rock layers are no longer supported by underlying coal removed during mining. Above the mine workings of an underground mine, rock movements occur vertically and at angles projected away from the mined-out area (PDEP 2008). The angle of influence varies from approximately 8°–45° depending on the coal field (Bell and Donnelly 2006). This analysis assumes that the angle of influence in this portion of the Alton Coal Field is a maximum of approximately 30°. This is the angle of influence presumed by the DOGM to be the maximum angle in the permitting process unless the permit applicant can demonstrate, and the DOGM can determine, that a site-specific angle of influence would be more appropriate (DOGM 2008a). Assuming 1) a 30° angle of influence (as stated), 2) that the overburden depth at the tract boundary is approximately 700 feet, and 3) that the land surface extending beyond the tract boundary is flat, approximately 405 feet of land surface (or approximately 166 to 109 total acres) beyond the north and northeastern edge of the tract (as mentioned above) would be affected by underground mining operations in the tract (see Figure 4.1 for an illustration of the angle of influence and an explanation of calculations).

4.6.1 Regulatory Framework

4.6.1.1 FEDERAL REGULATIONS

- The MLA authorizes and governs the leasing of public lands for developing coal, petroleum, natural gas, and other hydrocarbons, phosphates, and sodium in the United States.
- The Mineral Materials Act of 1947 authorizes the United States government to sell and lease mineral rights to common varieties of minerals.
- The Federal Land Policy and Management Act of 1976 requires that public lands be managed in a manner that will protect scientific, environmental, air and atmospheric, and water resource values. It also requires land-use plans to be in compliance with applicable pollution control laws, including state and federal air, water, and other pollution standards.

4.6.1.2 STATE REGULATIONS

- The Coal Mining Reclamation Act of 1979: Utah Rule R645 provides provisions pertaining to the effects of coal mining and reclamation operations and pertaining to coal exploration.
- Coal Mining and Reclamation; Utah Administrative Code 40-10 assures that surface coal mine operations are conducted to protect the environment, that reclamation of mine lands occurs promptly, and that mining operations are not conducted where reclamation is not economically or technologically feasible.
- The DOGM requires the identification of unsuitable overburden materials and selectively placing, mixing chemically, or mixing physically this material to minimize adverse effects to vegetation or groundwater.
- The DOGM requires analysis before mining to detect unsuitable overburden.
- The DOGM requires that topography be restored to AOC.

4.6.2 Alternative A: No Action

Under the No Action Alternative, the BLM would not issue a lease for coal in the Alton Coal Tract. Therefore, the geomorphological surface features, subsurface stratigraphy, and chemical and physical characteristics of the area would not change as a function of coal mining. The current land uses in the tract, which consist of recreation, livestock grazing, and vegetation treatments, would continue in a similar manner to current conditions. Their impacts to the area's geomorphology would remain similar to current conditions. The BLM's current management of burnt shale, gravel, fluid materials, and locatable minerals in and adjacent to the Alton Coal Tract would also remain unchanged as a function of coal mining.

4.6.3 Alternative B: Proposed Action

Under the Proposed Action, the BLM would hold a competitive lease sale for 49 million tons of coal in the Alton Coal Tract. Under this alternative, the tract includes approximately 3,576 surface acres, roughly 1,296 acres of which are private surface and 2,280 acres of which are federal surface. All coal resources contained in the tract are federally owned. Approximately 1,132 acres of the tract under the Proposed Action do not contain coal (the tract's no-coal zone). Under the Proposed Action, approximately 1,993– 2,395 surface acres would be disturbed. Of this total acreage, approximately 1,750–2,152 acres would be disturbed from pit disturbance (active mining operations), 36 acres would be disturbed for centralized facilities, 160 acres would be disturbed for dispersed facilities, 17 acres would be disturbed to temporarily relocate KFO Route 116. Additionally, subsidence disturbance could occur over approximately 211 to 513 acres of the underground mining area and approximately 166 to 109 acres outside the tract boundary but within the angle of influence.

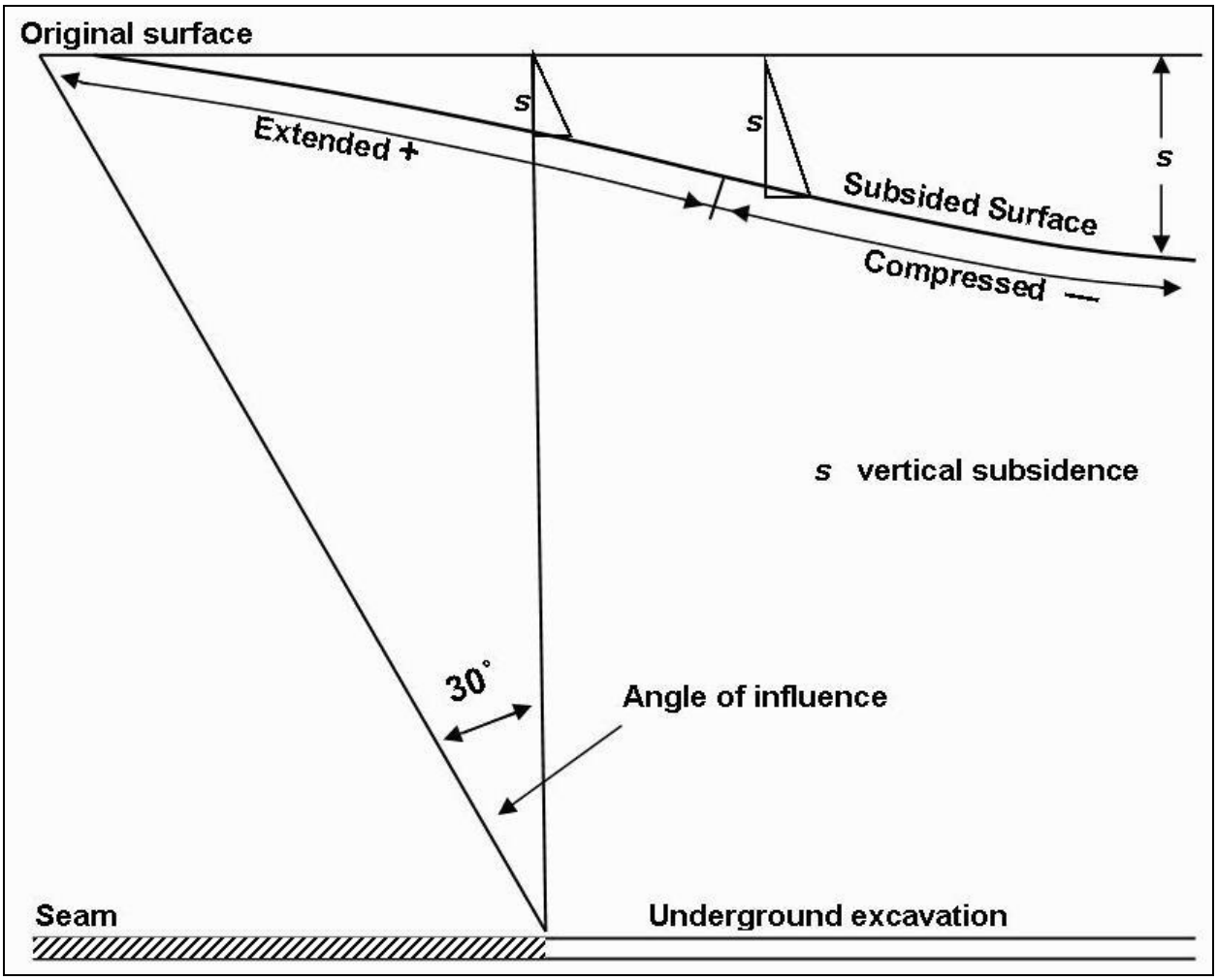

Figure 4.1. Angle of influence for underground mining (Modified from Bell and Donnelly 2006:91).
Note: The length of the land surface affected by underground mining operations, assuming that the surface is flat, was determined using the tangent function (tan A = o / a). Because the assumed angle of influence (A = 30˚) and the assumed length of the adjacent side or the overburden depth (a = 700′) are available, the length of the opposite side (o) or the land surface affected by underground mining operations was calculated by put ing the known numbers into the function to solve for the length of the opposite side equaling 404.13′.

4.6.3.1 IMPACTS TO GEOLOGY, INCLUDING TOPOGRAPHY, PHYSIOGRAPHY, AND STRATIGRAPHY

4.6.3.1.1 Impacts Due to Surface Mining

The surface-mining operation would remove coal and return noncoal material back into the pit on an estimated 1,750–2,152 acres (pit disturbance) under the Proposed Action. The geology of the mine pit area would be permanently altered. The replaced overburden material would be similar to pre-mining lithologies; however, the physical characteristics of the material, including permeability and stratigraphy, would be altered through the placement of a mixture of sizes and rock types back into the mined-out pit. The removal and relocation of the overburden would create a blend of the original geologic units. The stratigraphy of the area would also be permanently altered by the removal of the coal layer itself, which is currently a component of the stratigraphic arrangement of rock layers in the tract.

Like the geology of the mine pit area, the topographical expression of the land surface would be permanently altered. The PMT would be determined during the DOGM permitting process, but in general terms the land would be returned to AOC (unless a variance or exemption is granted by the DOGM). Alterations in final topography may be approved to improve wildlife habitat for species such as greater sage-grouse, mule deer, and elk. Other alterations in final topography may be approved based on the desires of private surface owners. According to DOGM regulations and procedures, variances or exemptions granted by the DOGM to approve alterations in final topography must follow a process that includes the opportunity for public comment. The removal of the coal seam (approximately 15 feet thick) would not significantly alter the original elevation of the area following reclamation because overburden and topsoil (after excavation and replacement in the mined-out pit) swell by a factor of approximately 30% (Personal Communication, Powell 2008). This swelling would compensate for the coal seam's removal. Although the replaced overburden and topsoil would settle slightly over time, the final ground surface elevation would not be significantly different from the tract's original elevation (Table 4.20).

Table 4.20. Calculation of Pre- and Post-mining Coal and Overburden Depths

	Current Conditions (feet)	Post Mining, Proposed Action (feet)	Post Mining, Alternative C (feet)
Overburden depth (approximate average)	100	120 (100 feet × 1.2 swell factor)	120 (100 feet × 1.2 swell factor)
Coal seam thickness (approximate average)	15	0	0
Total	**115**	**120**	**120**

Reclamation would therefore result in the replacement of overburden and topsoil and the regrading to AOC (or a contour suitable for post-mining land use subject to the DOGM's variance or exemption regulations and procedures), and may also include the forming of pits and valleys (gouging) on the surface. The outcome would be a gradual overall topography with moonlike surface microbasins of varying depth and width. The DOGM and BLM would approve the final gouge specifications as a function of growth medium properties.

Under the Proposed Action, surface-mining impacts to geology as described above would be long term and adverse because the tract's topography, physiography, and stratigraphy would be permanently altered after mining operations have ceased and after reclamation is complete.

4.6.3.1.2 Impacts Due to Underground Mining

Assuming that surface mining on the tract would be economically and technically feasible up to roughly 300 feet of overburden removal, underground mining would occur beneath approximately 211 surface acres of the tract under the Proposed Action. Assuming that surface mining would be feasible up to 200 feet of overburden removal, underground mining would occur beneath approximately 513 acres. Surface impacts from underground mining would generally be limited to the short-term placement of associated surface facilities and subsidence of the land above mined-out portions of the underground mine area and within the 30° angle of influence described above. At a minimum, underground mining operations on the tract would include building a portal, associated pad, and access route. The construction and placement of these facilities would typically require removing and stockpiling topsoil and overburden. However, because surface facilities for underground mining would be placed in areas previously surface mined, these impacts do not represent additional disturbances outside of those previously discussed. Upon completion of mining activities, just as with surface-mining operations, the facilities site would be reclaimed; facilities would be removed and the pit backfilled.

As underground mining operations proceed, removal of the coal would cause subsidence on portions of the Alton Coal Tract overlying the area of coal removal. Subsidence would be in the form of troughs and/or sink holes formed on the surface, depending in part on the underground mining method used. Overburden geological characteristics (the overall structure and strength of the materials contained in the overburden) also affect subsidence. Sink holes occur more commonly when room and pillar methods are used, whereas troughs are more typical of long-wall mining operations (PDEP 2008). The maximum extent of subsidence is a function of the coal seam thickness removed and a (unit-less) subsidence factor that ranges from 0.1 to 0.9 (Bell and Donnelly 2006). Subsidence factors in the western United States range from 0.33 to 0.65 (Bell and Donnelly 2006). To be conservative concerning potential impacts, this analysis assumes the higher of these values (0.65). Assuming that approximately 100% of the coal seam was removed (a conservative assumption for purposes of analysis), surface subsidence in the form of sinkholes and/or troughs directly above the area of coal removal would be up to approximately 9.75 feet. This is calculated by multiplying the thickness of the coal seam removed (15 feet) by the subsidence factor (0.65). In Utah, the effects of subsidence usually consist of surface cracks, general ground lowering, and cliff fracture or failure (Personal Communication, Smith 2008). Based on the 30° angle of influence previously described, the effects of subsidence would extend approximately 405 feet beyond the north and northeastern edge of the tract (for a range of 166 acres under a 300-foot overburden removal scenario to 109 acres under a 200-foot overburden removal scenario). A total of 679 to 320 acres including the 211 to 513 acres contained in the tract and the 166 to 109 outside of the tract boundary would be disturbed. Subsidence in this area would generally be less pronounced than in areas directly overlying those of coal removal (as illustrated in Figure 4.1), and would gradually taper toward the outside extent of this area. Surface impacts of underground mining as described would be permanent (long term) and adverse to the topography of the area because it would not be possible to resupport subsided areas. Impacts to stratigraphy from underground mining would also be permanent (long term) and adverse because the removal of the coal seam (a layer making up the stratigraphy of the area) and the lowering of subsided rock layers compared to surrounding rock layers that remain supported cannot be reversed. No mitigation measures for impacts to topography and/or stratigraphy are required by the DOGM. However, impacts to associated resources (e.g., water—surface and groundwater—which is the resource most commonly impacted by subsidence) would be repaired in accordance with DOGM rules and regulations and federal lease terms and stipulations. Mechanisms and methods used to repair damage to resources vary depending on the nature of the damage and the resource (Personal Communication, Burton 2008).

4.6.3.2 IMPACTS RELATED TO GEOLOGIC HAZARDS

4.6.3.2.1 Faults

The area around the tract has been shown to experience seismic activity of low frequency, ranging from magnitudes of 1.0–3.6 on the Richter Scale. The probability of seismic events associated with any or all of the faults in the area (see Section 3.6) impacting mining and reclamation operations at the Alton Coal Tract is fairly low (Personal Communication, DuRoss 2008). However, depending on the frequency and magnitude of seismic events and the stability of mine highwall construction, earthquakes could cause highwall failure (DuRoss 2008). Also, blasting activities would have the potential to initiate seismic activities on the tract. All highwalls and other mine-related structures would be required to comply with DOGM and MSHA safety regulations. Compliance with these regulations would limit or eliminate safety concerns with respect to seismic activity in the area.

The tract is shown on the USGS National Seismic Hazard Maps (USGS 2008) as having a 2% probability of exceeding a peak horizontal acceleration of between 20% and 30% of the acceleration due to gravity. This is above the 10% of gravity that is often assumed to be the threshold for damage to weak construction, such as unreinforced masonry buildings (Personal Communication, Pechmann 2008). Although these are not particularly high hazards, large earthquakes are possible throughout Utah. The hazard to workers and equipment in a mine from seismic events is highly dependent on local conditions. Where coal is exposed and

under considerable pressure, small events may cause considerable spalling (breaking up into chips or fragments) and other damage. If mines are stable, they may not experience any damage from large events (Personal Communication, Pechmann 2008).

In many parts of Utah where mining is common, the seismic hazard from mining-induced seismic events can be greater than that from natural events (Personal Communication, Pechmann 2008). The coal-mining process often induces seismic events due to subsidence, room collapse, and forces from the removal of coal and overburden. Seismicity associated with underground longwall mining of coal is strongly influenced by depth of cover, lithology of strata above and below the coal seam, and coal strength. Events ranging from 3.3 to 4.2 in magnitude have been observed at mines in the Wasatch Plateau–Book Cliffs region. Mining-induced events of up to magnitude 3.9 have been estimated as possible elsewhere in Utah (Arabasz et al. 2002), and would be possible under the Proposed Action.

4.6.3.2.2 Landslides

Landslide deposits are present at the Straight Cliffs/Tropic Shale contact (see Section 3.6). The deposits are located in a small portion of the tract's northwestern-most corner (see Map 3.9). At this contact, sandstone blocks of the Straight Cliffs Formation have moved onto the Tropic Shale. This condition has been facilitated by the presence of perched groundwater that has created a broad area of hummocky topography at the base of and adjacent to the Straight Cliffs (at the east of the Alton Amphitheater). Because these hummocky areas tend to hold moisture and because seeps are common, the potential for landslides exists where the Straight Cliffs/Tropic Shale is at or near the surface (Tilton 2001). Furthermore, blasting activities on the tract can initiate landslides in this area of the tract. Therefore, landslide hazards exist under the Proposed Action for structures that are built on or next to landslide deposits.

4.6.3.3 IMPACTS TO MINERAL RESOURCES

4.6.3.3.1 Leasable Minerals

4.6.3.3.1.1 Coal

The direct impact of the Proposed Action would be the production of up to approximately 44.9–49.1 million tons of recoverable coal from federal mineral reserves in the Alton Coal Tract over the 25-year life of the mine (2 million tons per year of coal removal). This would represent the removal of approximately 4%– 5% of the total estimated recoverable coal reserves (1 billion tons) in the Alton Coal Field. Impacts to coal reserves would be permanent and adverse because coal resources extracted from the tract cannot be replaced, and extraction would result in a permanent depletion from the total coal reserve in the Alton Coal Field.

4.6.3.3.1.2 Oil and Gas

Under the Proposed Action, the primary impact on oil and gas resources would be their temporary unavailability for extraction due to coal mining (unless directionally drilled from beyond active coal-mining areas). If oil and gas resources are currently present in geologic formations beneath the tract (well below the Smirl Coal Zone that would be mined), they would remain in these formations for the life of the mine or longer under the Proposed Action. The development of oil and gas resources would be more likely under the No Action Alternative than under the Proposed Action because no conflict between coal development and oil and gas exploration and development would occur under No Action.

Although coal-mining operations on the tract under the Proposed Action would not result in releases of oil and gas reserves, operations would cause the direct release of CH4 located in air pockets of the coal reserves (referred to as coalbed CH4). This CH4 is not currently considered recoverable; therefore, there

would be no impact to commercial coalbed CH4 based on its current market conditions. However, a long-term adverse impact to this resource would result because, once released, coalbed CH4 contained in the Smirl Coal Zone cannot be restored, and any potential for recovery would be lost.

4.6.3.3.2 Salable Minerals

4.6.3.3.2.1 Burnt Shale

Because most of the burnt shale deposits in the tract have been or would be mined by the time a decision is made by the BLM on this EIS, direct impacts to burnt shale resources are unlikely. However, if mining operations expose burnt shale in the tract, they would likely be lost as economically recoverable resources due to mixing with other overburden during reclamation. If segregated from other overburden sufficiently, they may remain usable.

Although most of the salable burnt shale deposits have been previously mined, there are other known, unmined deposits west of the tract. The BLM may need to resolve any conflicts that could arise if there is interest in this deposit in the future (such as the proposed access route to the site) that could interfere with burnt shale mining operations. Thus, the only impacts to burnt shale deposits beyond the tract would be more difficult access; the actual resource would not be adversely impacted or removed. Impacts to access and local economies are discussed in Section 3.8, Land Use and Access, and Section 3.12, Socioeconomics.

4.6.3.3.2.2 Gravel

Salable pediment gravels in the tract would be directly impacted under the Proposed Action due to mixing with other overburden following surface mining. It is not known how many areas of salable gravel are present in the tract; therefore, impacts to gravel are assumed to correspond to the total acreage that would be surface mined and uniformly spread over the entire area.

4.6.3.3.3 Locatable Minerals

4.6.3.3.3.1 Septarian Nodules

It is not known how common septarian nodules are in the tract, or if they are present in sufficient density to be economically viable for development. However, any nodules present at or near the surface in areas that would be surface mined would be at risk of burial during reclamation, and therefore may be less accessible for development. The nodules would not be removed and would therefore still be available as a resource, but their development would likely be less economically viable and their concentration in any area would likely be reduced.

4.6.3.4 UNDERGROUND COAL FIRES

The likelihood of spontaneous combustion and underground fires on the tract was assessed by the BLM Utah State Office in November 2010 using two points 1) the U.S. Bureau of Mines software program (now under the National Institute for Occupational Health and Safety [NIOSH]) and 2) historical data and coal history of the tract. This technical report can be found in the *Alton LBA EIS – Coal Spontaneous Combustion Technical Report*, which is part of the administrative record for this EIS.

Multiple runs of the NIOSH software resulted in a spontaneous combustion rating of “high” for the Smirl Coal Zone (the seam proposed for mining under both the Proposed Action and Alternative C). This indicates that the coal is highly susceptible to spontaneous combustion and rapid oxidation leading to smoke or open flames. However, historical reviews of the coal history prepared by Doelling and Graham (1972b) and site visits have not shown any indication of past coal mine fires near the tract. In addition, past mining of the Smirl Coal Zone

in and near the tract has occurred at very shallow depths with more exposure of the coal to atmospheric oxygen. These shallow mines have a higher potential for spontaneous combustion than the deeper underground mining that would occur under both action alternatives. The lack of evidence of fires at this site suggests that the risk is lower for the Alton Coal Tract than shown in the NIOSH results (McKenzie 2010).

The BLM required R2P2 would address:

- The monitoring and prompt control of any coal fires in surface coal pits, spoil piles, and surface coal stockpiles.
- Standard and, as necessary, enhanced monitoring of underground mine conditions to provide warning of possible mine fires (for both mine safety and environmental considerations).
- The design of underground workings to provide necessary, minimum overburden cover prior to commencing full extraction mining techniques and to ensure first mining efforts do not lead to introduction of atmospheric oxygen along fractures and/or bedding planes unless the actual conditions show the coals are stable.

This risk would be the same under Alternative C.

4.6.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Impacts to geology (topography, physiography, and stratigraphy), impacts related to geologic hazards, and impacts to mineral resources would be the same in nature under Alternative C and the Proposed Action. Impacts would vary between Alternative C and the Proposed Action in terms of the total amount of coal mined, the total amount of disturbed acres, and the life of the mine. The key differences between Alternative C, the Proposed Action, and the No Action Alternative are shown in Table 4.21.

Table 4.21. Comparison of Impacts under the No Action Alternative, the Proposed Action, and Alternative C

Resource Type	Impact Type	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Topography, physiography, and stratigraphy	Acres surface mining	0	1,750–2,152	1,454–1,856
	Acres underground mining	0	513–211	513–211
	Acres within the angle of influence	0	166–109	166–109
Geologic hazards	Fault hazard from underground mining	No	Yes	Yes
	Landslide risk	Low	Low	Low
Leasable mineral resources	Production of coal	None	44,900,000–49,100,000 tons	38,100,000–42,300,000 tons
	Impacts to fluid minerals	None	Decreased likelihood of removal due to mining activities	Decreased likelihood of removal due to mining activities
Salable mineral resources	Burial of burnt shale	None	Possible burial	Poss ble burial
	Burial of gravel	None	Possible burial	Poss ble burial
Locatable mineral resources	Damage or burial of septarian nodules	None	Poss ble damage or burial	Possible damage or burial

Under Alternative C, the BLM would hold a competitive lease sale for 38–42 million tons of federal, recoverable coal reserves (approximately 4% of the estimated one billion tons of recoverable coal reserves present in the Alton Coal Field, and 14%–15% less than under the Proposed Action) in a modified tract; the tract would exclude Block NW under the Proposed Action. Mining operations under Alternative C would result in approximately 1,454–1,856 acres of disturbance from surface mining (14%–17% less than under the Proposed Action), approximately 36 acres of disturbance for centralized facilities (the same as under the Proposed Action), approximately 135 acres of disturbance for dispersed facilities (16% less than under the Proposed Action), approximately 13 acres of disturbance for relocation of KFO Route 116 (24% less than under the Proposed Action), and approximately 679 to 320 acres (including the 211 acres in the tract) of surface disturbance from underground mining operations (the same as under the Proposed Action). The life of the mine under Alternative C would be approximately 21 years, or 16% less than under the Proposed Action. The no-coal zone under Alternative C would be approximately 1,034 acres. The suite of impacts associated with Alternative C would be smaller than that of the Proposed Action because the total acreage of the tract would be smaller.

4.6.5 Potential Mitigation Measures

The following mitigation measures could be used to reduce geologic hazards or impacts to geology and minerals associated with the implementation of the Proposed Action or Alternative C.

- Consider the mine and reclamation plan sediment pond location in relation to geologic hazards to reduce the risk of failure in the event of a seismic event.
- Develop a regularly scheduled subsidence survey and post a bond commitment to repair damage.
- Segregate the deposits if mining operations expose burnt shale.
- Segregate the deposits if mining operations expose gravel.

4.6.6 Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts under the No Action Alternative. Under the action alternatives, the following adverse impacts would be unavoidable (i.e., they could not be mitigated):

- Mining operations would unavoidably remove between 42.3 and 44.9 million tons of coal from the tract. This coal would not be replaceable and mining operations would result in a permanent depletion of the coal reserves in the tract.
- The topography, physiography, and stratigraphy of the tract would be permanently altered after mining operations ceased and reclamation was complete.
- Subsidence due to underground mining would adversely impact the topography of the area; it would not be possible to resupport subsided areas. Impacts to stratigraphy as a function of underground mining would also be unavoidable due to removal of the coal seam and the lowering of subsided rock layers compared to surrounding rock layers.
- Coalbed CH_4 contained in the Smirl Coal Zone would be released.

4.6.7 Short-term Uses versus Long-term Productivity

In the short term, the removal of between 42.3 and 44.9 million tons of recoverable coal would eliminate the future production of the Alton Coal Tract in this specific area. A defining characteristic of nonrenewable resources such as coal is that their use in the near-term eliminates their future use. However, the short-term use of the coal in the tract would not impact the long-term productivity of the remaining coal present in the Alton Coal Field.

4.6.8 Irreversible and Irretrievable Commitments of Resources

There would be no irretrievable impacts to geology and mineral resources under the Proposed Action or Alternative C. However, the following commitments of geological and mineral resources would be irreversible and could not be recovered under the action alternatives:

- The topography, physiography, and stratigraphy of the tract would be permanently altered after mining operations ceased and reclamation was complete.
- Subsidence due to underground mining would adversely impact the topography of the area; it would not be possible to resupport subsided areas.
- Impacts to stratigraphy from underground mining would also be irreversible due to production of the coal seam (a layer making up the stratigraphy of the area) and the lowering of subsided rock layers compared to surrounding rock layers.
- If mining operations expose burnt shale in the tract, these resources would likely be lost as economically recoverable resources due to mixing with other overburden during reclamation. If segregated from other overburden sufficiently, they may remain usable but may be reduced in value.
- Once released, coalbed CH_4 reserves contained in the Smirl Coal Zone cannot be regained.
- The production of up to approximately 42 or 49 million tons of recoverable coal from federal mineral reserves in the Alton Coal Tract over the 21- or 25-year life of the mine would be permanent and adverse because coal resources extracted from the tract cannot be replaced once mined, and extraction would result in a permanent depletion from the total coal reserve in the Alton Coal Field.
- Without potential mitigation, pediment gravels, derived mostly from the erosion of the Tropic Shale, would be irreversibly mixed with other overburden following surface mining.

4.7 Hazardous Materials and Hazardous and Solid Waste

Under the action alternatives, sources of hazardous materials on the Alton Coal Tract would include liquid wastes, fuels such as diesel fuel and gasoline (potentially containing benzene, toluene, xylene, methyl tert-butyl, ether, and tetraethyl lead), coolants, antifreezes, lubricants such as motor oil and grease (potentially containing complex hydrocarbons and lithium compounds), paints, solvents, and solid wastes. Nonhazardous solid wastes would include floor sweepings, shop rags, lubricant containers, welding rod ends, metal shavings, worn tires, packing material, used filters, and office and food wastes. Solid wastes would include human waste from portable toilets and waste pumped from permanent toilets with sealed containment tanks.

Hazardous and solid materials and their related impacts are assessed using the number of vehicles in use at the site, the number of vehicles refueling, and the number of vehicles transporting hazardous materials to and from the site. Impacts under the action alternatives would be minimal because solid and hazardous wastes would be controlled through SOP. In addition, management of hazardous materials, substances, and waste, in addition to nonhazardous solid waste practices (including storage, transportation, and spills) would be conducted on the tract according to the procedures listed in Section 2.3.2.7 and in compliance with 29 CFR 1910, 49 CFR 100–185, 40 CFR 100–400, Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation and Recovery Act, Superfund Amendments and Reauthorization Act, Toxic Substances Control Act, CWA, and other federal and state regulations and policies regarding hazardous materials management and solid waste management. Public land sites contaminated with hazardous and/or solid wastes would be reported, secured, and remediated according to applicable federal and state regulations and contingency plans (BLM 2008b).

4.7.1 Regulatory Framework

Minimizing the risks associated with hazardous materials is required by federal law (see Section 2.3.2.7 and Table 2.3). The measures listed below would be common to both action alternatives and are also discussed in Chapter 2. The minimization of risks would require the application of safety precautions during their transport, use, storage, and disposal. As required by law, the following precautions would be implemented as mitigation and prevention of hazardous materials and liquids spills or leakages.

- Used oil would be contained and recycled according to Utah Department of Environmental Quality Solid and Hazardous Waste Division guidelines.
- Solid waste and sewage within permit boundaries would be disposed of according to approved plans.
- All production, use, storage, transport, and disposal of hazardous waste would be in accordance with applicable existing or hereafter promulgated federal, state, and government requirements.
- Emergency reporting requirements for releases of hazardous materials, as established in Comprehensive Environmental Response, Compensation, and Liability Act, as amended, would be complied with.
- Files containing Material Safety Data Sheets for all chemicals, compounds, and/or substances used during the course of mining would be maintained.

The lessee would be expected to prepare and implement several plans and/or policies to ensure environmental protection from hazardous and extremely hazardous materials. These plans and/or policies would include the following:

- Spill prevention control and countermeasure plans
- Spill response plans
- Inventories of hazardous chemical categories pursuant to Section 312 of the Superfund Amendments and Reauthorization Act, as amended
- Emergency response plans

4.7.2 Alternative A: No Action

Under the No Action Alternative, ACD’s application to lease the coal included in the tract would not be approved, the tract would not be offered for competitive lease sale, and the coal included in the tract would not be mined.

No coal mining activities or infrastructure development would occur on the tract under the No Action Alternative, and therefore there would be no transportation, use, production, or risk of hazardous materials or hazardous and solid waste spills or leaks as a function of mining. Under the No Action Alternative, lands in the tract would continue to be managed in accordance with the KFO RMP. Land management in the tract currently includes livestock grazing, recreation (primarily OHV use and hunting), and vegetation treatments. These current uses could result in the introduction of fuel and lubricants to the tract. However, quantities would be minimal, largely resulting from minimal, dispersed use of the area by motorized recreationists and livestock grazing permittees accessing allotments by vehicle (generally truck or OHV).

4.7.3 Alternative B: Proposed Action

Mining activities under the Proposed Action would take place over approximately 25 years. Centralized facilities would occupy approximately 36 acres of land under this alternative. Another 160 acres would be used for construction of dispersed facilities, leading to 196 acres of constructed facilities. Under the Proposed Action, these acres would be subject to hazardous materials exposure for 25 years. However, adherence to SOPs and legal requirements would minimize or eliminate risks of hazardous material spills and contamination.

Under the Proposed Action, an estimated 153 coal haul vehicle round-trips per day would occur on the coal haul transportation route. In addition, service vehicle visits to the tract would supply the mine with diesel fuel, machine equipment, office supplies, and other necessary materials. Service vehicle visits would also remove solid waste from dumpsters, remove other nonsolid wastes (such as used motor oil), and would service portable toilets and permanent toilet sealed containment tanks. This increased movement to and from the tract by service vehicles and coal haul trucks has the potential to increase the risk of fuel leakage or solid waste spills in the tract and adjacent transportation corridors. Risks of fuel leakage and spills are associated with coal truck accidents, transportation during service, refueling of vehicles, and the maintenance of vehicles used on-site. Transportation during service operations on the tract would include delivery of diesel fuel and machine and equipment parts (daily or weekly), servicing of portable toilets (weekly or biweekly), servicing of permanent toilet facilities (monthly or bimonthly), and removal of waste oil (weekly or biweekly), as necessary. Maintenance and major oil changes for most moveable equipment would take place inside the maintenance shop, and used oil would be contained and disposed of or recycled in accordance with Utah Department of Environmental Quality Solid and Hazardous Waste Division guidelines. Accidental or inadvertent leakages from storage tanks would also be possible.

If they are not contained and quickly cleaned up, leaks or spills of hazardous materials from the aforementioned activities would impact vegetation and wildlife by killing individuals and/or poisoning habitat resources or prey. Spills would also contaminate soil and water resources. Spilled fuel or other hazardous waste or materials could be transported through soils or water to aquifers or to surface waters in or outside of the tract, increasing the potential for both short-term and long-term adverse effects on vegetation, terrestrial and aquatic wildlife, and habitat quality in the tract.

4.7.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Impacts would be the same as those described under the Proposed Action with the following exceptions. Under Alternative C, the tract would be modified to exclude Block NW (see Map 2.1). The acreage of dispersed facilities constructed would be fewer than under the Proposed Action, and therefore the associated risks, such as fuel leakage and storage tank leakage, would be smaller under this alternative.

Mining activities under this alternative would take place over approximately 21 years, which is three years shorter than under the Proposed Action. Centralized facilities would occupy approximately 36 acres of land under this alternative. Another 135 acres would be used for construction of dispersed facilities, leading to 170 acres of constructed facilities. Under Alternative C, adherence to SOPs and legal requirements would minimize or eliminate risks of hazardous material spills and contamination.

4.7.5 Potential Mitigation Measures

No potential mitigation measures, beyond legal and regulatory requirements, have been identified for hazardous materials and hazardous and solid waste.

4.7.6 Unavoidable Adverse Impacts

No unavoidable adverse impacts would occur because SOPs and mitigation measures would be followed.

4.7.7 Short-term Uses versus Long-term Productivity

No further risk of hazardous materials or liquid spills or leakages would exist at the close of mining operations, and therefore no long-term adverse effects on productivity of the site are anticipated.

4.7.8 Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable commitments of resources with respect to hazardous materials and hazardous and solid waste associated with mining.

4.8 Land Use and Access

4.8.1 Land Use and Ownership

Primary land uses in and adjacent to the Alton Coal Tract include tourism, farming, livestock grazing, and dispersed recreation including hunting. In addition, Alton Coal operates the Coal Hollow Mine east of Block S.

Impacts to land use and access were analyzed by determining which existing land uses would conflict with proposed mining activities. Land uses would be affected because public access would be eliminated during the life of the mine to ensure public safety. Land use would also be restricted during the post-mining reclamation period (10 years) to assist in the establishment of suitable vegetation. Disturbance from mine-related activities would include pit disturbance, grading for the construction and maintenance of centralized and dispersed facilities, and the relocation of KFO Route 116. Impacts from these activities are grouped together because the impacts to land use would result from a combination of all mine-related activities, and not specific aspects of each activity. Grazing and recreational activities in the tract would be prohibited from active mine areas for the life of the mine and the 10-year reclamation period. Tourism (sightseeing) would not be prohibited or restricted by mining activities because access to other federal lands in the area would still be available.

4.8.2 Regulatory Framework

The Federal Land Policy and Management Act of 1976 ensures that public lands are managed for multiple uses to best meet the present and future needs of the public. The KFO RMP identifies management direction for land uses in the area in the form of goals and objectives; “Make public lands available for ROWs, permits, and leases. The suitability for these land actions would be judged on a case-by-case basis.” (BLM 2008b; 2-44)

Although private lands in the tract are zoned for agriculture under the Kane County, Utah General Plan (FCAOG 1998a), uses are regulated by land-use ordinances and the general plan is used as an advisory guide for land-use decisions.

Under both action alternatives, BLM-administered lands in the tract would be reclaimed and suitably restored for historic uses such as livestock grazing, wildlife habitat, and recreation. Private lands would be reclaimed and suitably restored to allow existing land uses to be resumed following mining. Post-mining land uses may differ from those presented here; however, their approval would require a process and approval by DOGM.

4.8.3 Alternative A: No Action

Under the No Action Alternative, land use, ownership, and prior rights to the tract would remain unchanged. The tract would not be mined and activities in the area would continue under their current condition. Dominant activities such as grazing, recreation, and vegetation treatments in the area would not be impacted as a function of mining on the tract.

4.8.4 Alternative B: Proposed Action

Under the Proposed Action, 3,576 acres of surface disturbance would occur on federal and private lands (Table 4.22). Because the area is of mixed uses, some of the acres of impacts overlap.

Surface-mining activities would results in short-term impacts under the Proposed Action; livestock grazing would be restricted, wildlife habitat would be reduced, and public access and associate recreational use would be restricted. During the life of the mine, adjacent federal lands would support livestock grazing and recreation (e.g., hunting and OHV use).

There would be no long-term impacts under the Proposed Action; surface and vegetation in the tract would be reclaimed, and the land would be returned to a condition similar to its original status. The land would reopen to grazing, hunting, and other recreational opportunities that existed before the mine.

Table 4.22 illustrates the dominant land uses in the tract and the impacts that would occur from mining activities under the Proposed Action.

Table 4.22. Land Uses Impacted in the Alton Coal Tract under the Proposed Action

Affected Land Use	Type of Use	Impact
Grazing	Livestock, mainly cattle, for grazing and forage.	Loss of or unavailable access to approximately 92 AUMs annually (3,220 AUMs over the life of the mine and the 10-year reclamation period), due to mining activities (see Section 4.9 for additional information).
Agriculture	Farming	Loss of acres available for agriculture during the active mining period.
Recreation	Hunting and OHV use, common in and adjacent to the tract.	Unavailable access to lands for recreational use (throughout the life of the mine). Impacts to recreation experience by increased traffic, noise, and dust (see Section 4.11 for additional information).
Tourism	Visits to nearby park areas such as Bryce Canyon National Park, Grand Staircase-Escalante National Monument, and two scenic highways.	Neglig ble impacts to tourism from mining activities (see Section 4.12 for additional information).

4.8.4.1 FEDERAL LANDS

Under the Proposed Action, the primary use of federal lands would be coal extraction. Coal mining would preclude other possible uses of the land, making them unavailable during the life of the mine. Approximately 2,280 surface acres (64%) of the tract that would be unavailable for other uses under the Proposed Action are federally owned. Surface-disturbing activities to these lands would include the removal of vegetation, which would result in

- impacts to agriculture by removing acres available for crops,

- impacts to grazing by decreasing AUMs available for forage, and
- impacts to recreation from increased traffic, noise, and dust, diminishing the experience and opportunities available.

Although mining activities may be noticeable to those visiting the nearby Dixie National Forest, Bryce Canyon National Park, and Grand Staircase-Escalante National Monument, it is not anticipated that the increased traffic, noise, and dust resulting from the mine would decrease the overall experience of visitors enough to affect visitation to these areas. Two-track roads also exist throughout the tract for OHV use and hunting access.

4.8.4.2 PRIVATE LANDS

All coal reserves in the tract are federally owned, though surface ownership is mixed and mine activity would result in surface disturbance to private lands. Approximately 1,296 surface acres (36%) of the tract under the Proposed Action are privately owned, consisting of eight different private surface owners. Private land uses in the tract and surrounding land include agriculture, domestic grazing, and dispersed recreation. Two-track roads also exist throughout the tract for private landowner access to private surface lands.

Impacts resulting from surface disturbance on private lands would be the same as those described under federal lands. Impacts to counties from mining activity would be the temporary loss of lands that are zoned for activities such as agriculture, grazing, and recreation. Lands available for these uses would be removed for 25 years while mining activities took place; however, they would be available for use during the 10-year post-mining reclamation period. These activities are in compliance with the *Kane County, Utah General Plan*, which allows lands to be open for mineral exploration and development (FCAOG 1998a). Additionally, the Alton town cemetery is located 780 feet from the tract boundary. At this distance, it is not anticipated that any impacts would occur to the cemetery from mining activities.

4.8.5 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Impacts to land use under Alternative C would be similar to those described under the Proposed Action, but to a slightly lesser degree. The nature of activities would be the same under both alternatives; however, Alternative C would propose to mine 403 fewer acres (removal of Block NW) of private lands than Proposed Action. Additionally, the life of the mine would be 21 years plus the 10-year reclamation period (31 years).

The shorter timeframe would result in a loss of 2,852 AUMs, which is 368 fewer than under the Proposed Action over the life of the mine and reclamation period. Additionally, the Alton town cemetery would be located 6,380 feet from tract boundary, which would create less of an impact than under the Proposed Action.

4.8.6 Potential Mitigation Measures

No potential mitigation measures are proposed to address land-use conflicts resulting from mining activities.

4.8.7 Unavoidable Adverse Impacts

Unavoidable adverse impacts would include the loss of use and access to the tract for described land uses during the life of the mine. After mitigation, the described land uses would be lost until reclamation is complete.

4.8.8 Short-term Uses versus Long-term Productivity

It is not anticipated that the short-term use of the area for mining would adversely affect the long-term productivity of land uses. Mining activities would temporarily make the area unavailable for the existing land uses and access for agriculture, grazing, and recreation; however, in the long term, the area would be reclaimed to its approximate original condition, and uses would resume as they had previously existed.

4.8.9 Irreversible and Irretrievable Commitments of Resources

The removal of coal from the tract would be an irreversible commitment of resources because this coal cannot be regenerated. Measures would be implemented to return the area to its approximate pre-mining condition following coal mining, making the loss of opportunities for other land uses irretrievable, but not irreversible. The land status and prior rights to the land would remain unchanged during the life of the mine.

4.9 Livestock Grazing

Impacts to livestock grazing were analyzed by determining how proposed mining activities would conflict with existing grazing activities. Grazing and access would be eliminated during the active mining period to ensure public safety. It would also be restricted during post-mining reclamation to assist in establishing suitable vegetation. Because access to the tract would be restricted, the livestock grazing analysis area consists of all acres of allotments on the tract; impacts were not analyzed by specific acres of vegetation removed (these impacts are discussed in Section 4.15, Vegetation). Disturbance from mine-related activities would include pit disturbance, grading for the construction and maintenance of centralized and dispersed facilities, and the relocation of KFO Route 116. Impacts from these activities are grouped together because the impacts to land use would result from a combination of all mine-related activities, and not specific aspects of each activity.

4.9.1 Regulatory Framework

The Federal Land Policy and Management Act of 1976 ensures that public lands are managed for multiple uses, including livestock grazing, to best meet the present and future needs of the public. The KFO RMP includes standards and guidelines for grazing management. These standards and guidelines provide management direction and the necessary regulatory framework for livestock grazing. Alternatively, they can be found on the Utah BLM website (BLM 2008b). If changes to public land use restrict livestock grazing, 43 CFR 4110.4-2 requires that permittees be notified two years in advance and receive compensation for authorized permanent range improvements.

4.9.2 Alternative A: No Action

Under the No Action Alternative, ACD's application to lease the coal in the Alton Coal Tract would not be approved, the tract would not be offered for competitive lease sale, and the coal included in the tract would not be mined. Therefore, under the No Action Alternative, there would be no impacts to livestock grazing as a function of coal mining; vegetation would be unaffected by mining, and grazing practices would remain unchanged. Grazing activities would continue to be managed as described in the KFO RMP (BLM 2008b). Impacts to livestock grazing from other land uses such as recreation and vegetation treatments would continue similar to current conditions.

4.9.3 Alternative B: Proposed Action

Mine-related surface activities on the tract would consist of land clearing, the construction of dispersed facilities, and the relocation of KFO Route 116. These would result in a short-term loss of vegetation access because livestock would be restricted to areas without mining activity throughout the life of the mine (25 years) and during the 10-year reclamation period. For purposes of analysis, it is assumed that grazing in the tract would be unavailable for 35 years; therefore, the allotments in the tract would be considered nonuse. Therefore, even in areas in the tract that would not be disturbed for mine-related activities, it is assumed that the use of available AUMs, existing water sources, and livestock facilities would be lost for the life of the mine and reclamation period. This approach provides the most conservative estimate of livestock grazing impacts for phased mining operations given that specific locations and timing of mining and reclamation activities are not available at this time.

Table 4.23 illustrates the total acres of disturbance and the percentage of allotments that would be affected by the Proposed Action.

Table 4.23. Acres of Vegetation Impacted by Mining Activities, by Alternative

	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Acres of vegetation disturbance	0	1,815–2,217	1,515–1,917
Percentage of total allotments*	0%	22%–27%	18%–23%

*The total federal acreages of allotments is 8,222.

Assuming that that the annual disturbance would remain the same throughout the life of the mine, the Proposed Action would result in the loss of or restricted access to 1,815–2,217 acres of vegetation. This represents 22%–27% of the total acres in all seven allotments (see Table 4.23).

Total acres of allotments are used to calculate the number of AUMs using the number of AUMs allocated and the percentage of AUMs that lie in the tract. To determine overall impacts to forage available for grazing (AUMs) from the Proposed Action, the number of AUMs impacted is compared to the total number of AUMs available in each of the allotments. Table 4.24 shows the number of AUMs that would be lost per grazing allotment from restricted access, as well as the overall percentage that those AUMs represent for the entire allotment.

Table 4.24. Allotment Acreages and Animal Unit Months in Alton Coal Tract

Allotment	Season of Use	Number of Permittees	Total AUMs Allocated to Livestock Annually	Percentage of Allotment in the Tract	Calculated AUMs in the Tract	AUMS Allocated to Livestock over the Life of the Mine and the Reclamation Period		AUMS lost over the Life of the Mine and the Reclamation Period	
						B (35 years)	C (31 years)	B (35 years)	C (31 years)
Alton	6/1/2010–10/31/2010	1	5	99%	5	175	155	175	155
Cove (Alton)	6/1/2010–10/31/2010	1	10	99%	10	350	310	350	310
Isolated Tracts	5/16/2010–10/31/2010	1	67	24%	16	2,345	2,077	560	496
Levanger Lakes	6/1/2010–11/15/2010	1	33	23%	8	1,155	1,023	280	248
Robinson Creek	6/1/2010–11/30/2010	1	24	40%	10	840	744	350	310
Syler Knoll	5/1/2010–10/31/2010	1	6	82%	5	210	186	175	155
Upper Sink Valley	6/1/2010–10/15/2010	1	311	12%	38	10,885	9,641	1,330	1,178
Total		**7**	**456**	**26%**	**92**	**15,960**	**14,136**	**3,220**	**2,852**

The Proposed Action would restrict or prohibit access to approximately 92 AUMs annually for seven permittees (see Table 4.24). Assuming that permits and seasons of use would remain the same over the life of the mine, approximately 3,220 AUMs would be lost over 35 years. The Proposed Action would have greater impacts to grazing than both Alternative C and the No Action Alternative. During mine-related activities, the direct loss of livestock from vehicle collisions along transportation routes would be uncommon.

Indirect effects resulting from the spread of noxious weeds would adversely affect livestock because they cannot depend on these species for forage (BLM 1996). Additionally, effects to vegetation resulting from tract construction may result in increased dust on vegetation, which can also reduce forage palatability.

4.9.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Impacts under Alternative C would be similar to those under the Proposed Action because the activities and acres of allotments and restrictions are the same for livestock grazing resources. However, access under Alternative C would be restricted for 31 years (21-year mine life plus 10-year reclamation period) instead of the 35 years under the Proposed Action. Alternative C would therefore impact 368 fewer AUMs and 290 fewer vegetation acres over the life of the mine and reclamation period. The impacts from Alternative C would have greater impacts to grazing than the No Action Alternative, which would impact 0 AUMs.

4.9.5 Potential Mitigation Measures

Although no specific mitigation measures have been proposed for livestock, measures committed for vegetation reclamation would benefit livestock through either preservation or reclamation of forage. Reclamation measures proposed for vegetation that would benefit livestock consist of

- permanently revegetating reclaimed areas according to a comprehensive revegetation plan using approved reclamation seed mixtures consisting of suitable native and non-native species;
- using native shrubs for reclamation;
- prior to seeding with final seed mixture, controlling erosion on reclaimed lands using mulching, cover crops, or other approved measures;
- chemically and/or mechanically controlling weed infestation;
- selectively planting shrubs in riparian areas; and
- planting sagebrush seedlings in addition to seeding with sagebrush.

4.9.6 Unavoidable Adverse Impacts

The loss of access and land available for livestock grazing during the life of the mine would result in unavoidable adverse impacts to livestock grazing during the life of the mine and during reclamation.

4.9.7 Short-term Uses versus Long-term Productivity

Short-term uses associated with proposed mine-related activities (e.g., roads, grading, and vegetation removal) would reduce the forage productivity and available AUMs until the disturbances were successfully reclaimed. Overall, impacts to long-term productivity resulting from these activities would be minimal due to the limited overall percentages that would be impacted by both action alternatives.

4.9.8 Irreversible and Irretrievable Commitments of Resources

Assuming that the entire tract would be unavailable for access and any activities other than mining during the life of the mine, irretrievable impacts would include the loss of livestock forage and access to allotments for several years until reclamation is successful. Irreversible impacts would include livestock mortality from collisions, should any occur.

4.10 Paleontology

Direct impacts to fossil resources from the Proposed Action and Alternative C would consist of the following:

- The physical loss of the resources through physical damage, destruction, and/or through extraction, weathering, or unauthorized collection after extraction.
- The loss of important contextual data for the resources if they are excavated without documentation of their stratigraphic horizon (age) and environment of deposition (taphonomy). Their value to science and to the public would be permanently degraded.

Either outcome would significantly impact the value and state of paleontological resources in the area. For paleontological resources, all impacts would be long term because they would persist for the life of the mine and following reclamation.

Surface mining methods under the 200-foot overburden removal scenario would result in fewer disturbed acres from surface mining. Surface mining methods under the 300-foot overburden removal scenario would result in greater disturbed acres.

4.10.1 Regulatory Framework

Certain types of mitigation would be mandatory because of the significance of the fossil resource in the Alton area. Three mitigation measures would be employed to ensure reasonable benefit to the fossil resource.

As per the Federal Land Policy and Management Act, 43 CFR, 8365.1–5, and the BLM Manual H-8270-1 (General Procedural Guidance for Paleontological Resource Management), the first measure would be to salvage significant in-situ specimens if they are discovered by mining personnel or qualified monitors during mining operations. Significant in-situ specimens are the most important specimens from both a scientific and public perspective because they have the most potential to be complete and in their original context. If potentially significant fossil remains are discovered, the mine operator (successful bidder) or qualified paleontological monitor would immediately notify the BLM-KFO paleontologist or their designated authority and protect the discovery from damage or looting, suspending all activities in the immediate vicinity of such discovery until the site can be evaluated by the BLM-KFO paleontologist or their designated authority. Next, a determination would be made as to whether the specimen is worth salvaging. Under normal circumstances, determinations would be completed within 24 hours of notification by the mine operator. If the specimen is determined to be of scientific significance and worth collecting, the BLM-KFO paleontologist, their designated authority, or a qualified paleontological consultant chosen by the mine operator would initiate scientific collection of the specimen. This would be completed within 72 hours of determination. Specimens would be housed at the Utah Museum of Natural History (UMNH) for the public benefit. Collection and curation costs of large specimens, which averaged $2,000–$5,000 in 2008 for a large specimen, would be borne by the mine operator. Costs for surface collection and curation of small specimens (1 m or less) would be borne by the BLM and the UMNH, the official BLM repository for Utah. Final determination on significance of smaller in-situ specimens would be made by the UMNH.

The second measure of mitigation would involve monitoring both the overburden piles and pits by the BLM-KFO paleontologist or their designated authority. Any significant material found in the overburden piles would be collected with as much data as possible and reposited at the UMNH. Final determination on the significance of ex-situ specimens would also be made by the UMNH.

The third mitigation measure would help offset the unavoidable loss of significant resource in the course of operations (see discussion below of the monetary value of the ammonite fossils) by enhancing research and public enjoyment of similar resources off-site. A $100,000 donation would be made by the mine operator to support scientific research on Late Cretaceous paleontology on the Paunsaugunt Plateau within the BLM-KFO. This would also make the region's Late Cretaceous fossil resources more accessible to the public through exhibits and other forms of education and outreach. The BLM would administer this fund in cooperation with the mine operator, through a third party such as a Natural History Association or other nonprofit group. Each year for the first five years of the mine's operation, calls for proposals for research and/or public outreach projects would be made, with all awards each year totaling approximately $20,000. Winning proposals from qualified scientific or public institutions would be awarded funds to complete a research or outreach project, with a report due at the end of the calendar year for research projects and an educational or exhibit product due for the outreach projects. The mine operator would be named as a partner in these projects.

4.10.2 Alternative A: No Action

Under the No Action Alternative, subsurface paleontological resources in the Alton Amphitheatre, including the Alton Coal Tract, would be unaffected by mining activities; therefore, there would be no significant impact to their condition or context. Permitted and unauthorized collections of ammonites would continue, which would result in a minor loss of fossil resources in the tract. Resources currently exposed at the surface would continue to weather and degrade over time, also causing a minor loss.

4.10.3 Alternative B: Proposed Action

Under the Proposed Action, approximately 1,750–2,152 acres of Tropic Shale overburden would be removed to access coal resources in the Smirl Coal Zone through pit disturbance. This amount is equal to the amount of surface disturbance that would occur from the pits because the Tropic Shale occurs under the surface where coal is present. An additional 717 to 412 acres of coal is potentially minable through subsurface techniques, but this would directly affect only the Smirl Coal Zone and not the overlying Tropic Shale. Because mining activity would go deep into the subsurface into fresh geologic bedrock units, accurate modeling of the impact to subsurface resources is difficult.

A total of 196 acres would be disturbed for operational facilities. This would consist of centralized and dispersed facilities. Centralized facilities would be present on approximately 36 acres for the 25-year life of the mine under the Proposed Action. Dispersed facilities, which would likely shift as coal extraction activities progress, would be located on approximately 160 acres. In addition, 17 acres would be disturbed for the relocation of KFO Route 116 into the no-coal zone. Exposures of the middle member of the Dakota Formation would be affected almost entirely by road and facility construction rather than by the operations in the mine pit. The centralized facilities would be located on the higher elevations of the tract divided by Sections 24 and 19, north of Lower Robinson Creek. They would cover both the lower Tropic beds and the middle and upper portions of the Dakota Formation. Ground-disturbing activities associated with the construction of centralized facilities and the rerouting of KFO Route 116 would potentially impact vertebrates and significant invertebrates in the middle member of the Dakota Formation and the Tropic Shale. The nature of impacts to fossils in this area would be the same as described at the beginning of this section. The amount of Tropic Shale disturbance under the Proposed Action would be 1,750–2,152 acres.

The most profound impacts to paleontological resources would be to fossils contained in the Smirl Coal Zone and fossils overlying the Tropic Shale overburden inside the pit disturbance areas. Quantifying the resource impacts in the Smirl Coal Zone is difficult because paleontology knowledge about the Smirl Coal Zone is limited. As stated earlier in Chapter 3's Paleontology section, the Smirl Coal Zone has the potential to preserve articulated vertebrates with soft tissue remains and delicate invertebrates such as insects (Konservat-Lagerstatte). However, such occurrences are rare in the Dakota Formation, and the presence of such resources in the pit disturbance areas associated with the Proposed Action would likely be revealed through the mining process. If such resources exist in the Dakota Formation, their importance to science and to the public cannot be overstated. They would be the only known example of a Cenomanian-age terrestrial Lagerstatte in the world, and its loss due to mining operations would be significant.

Increasing knowledge of the Tropic Shale's paleontology allows for some rough quantitative assessment and a better evaluation of impacts to fossil resources. Within 15 miles of the tract, there is 30,870 acres of Tropic Shale. A total of 1,790–2,192 acres of Tropic Shale would be disturbed in the tract under the Proposed Action. Therefore, 6% of the Tropic Shale's paleontology within a 15-mile band would be adversely impacted over the long term.

The density of well-preserved ammonites or other invertebrate fossil material in the lower ironstone interval of the Tropic Shale is low; however, occasional pockets of significant three-dimensional specimens in concretions do occur. Up to 12 such pockets would be expected to occur in pit disturbance areas. Well-preserved ammonites from the Vascoceras diartianum zone are rare in the region; therefore, they are scientific significance and their loss through physical degradation and destruction would be an adverse impact. Fortunately, the concretionary horizons that contain most of the ammonites are fairly well defined. Each zone is typically distinctive enough that loss of contextual data would not be a great issue for specimens salvaged off of spoils piles.

The overlying Euomphaloceras septemseriatum zone contains a high density of well-preserved ammonite and other fossil material. Examining nondisturbed exposures of concretions from this zone in the Alton area, large Metoicoceras geslinianum and Placenticeras cumminsi ammonites can be encountered approximately every 10–30 feet. Using one ammonite per 1,000 square feet as an extremely conservative estimate of specimen density, 76,230–93,741 significant ammonite specimens would potentially be destroyed or damaged in the pit disturbance area during mining operations under the Proposed Action. Although these specimens have only moderate scientific value, they have great significance to amateur fossil enthusiasts who eagerly seek them out. Even though these specimens cannot be mined commercially and sold from public lands, one way to estimate the magnitude of loss to the public is to assign a conservative $50 commercial value for each individual ammonite specimen (these specimens actually sell for $100 or more when collected from private lands) as a way to calculate loss to the public. This results in the ammonites having a surprising $3,811,500.00 to $4,687,050.00 cash value ($50 multiplied by the estimated number of specimens of 76,230–93,741). The density of vertebrates in this interval is not as high as it is in the overlying zones; therefore, only one or two larger vertebrate sites might be damaged during the course of mining operations. However such specimens have very high scientific significance. Several dozen articulated fish might also be damaged or removed from context. Little is known about Cenomanian fish from Utah; therefore, any of these specimens would be scientifically significant. Unfortunately it would be difficult to recover contextual data (i.e., placement into stratigraphic order) for any of the vertebrates if they were collected from overburden piles, because they typically create their own concretionary halos that do not contain diagnostic invertebrates.

The remainder of the Cenomanian concretionary interval would mostly suffer loss of rare and scientifically significant ammonite specimens from the Euomphaloceras costatum through Neocardioceras juddi zones. However, in similar fashion to the E. septemseriatum zone, several dozen articulated fish specimens and one or two larger vertebrate skeletons might also occur in the pit disturbance areas and therefore be damaged or removed from context. The overlying lower Turonian interval (Watinoceras coloradoense-Fagesia catinus

through Mammites nodosoides Ammonoid zones) is the opposite. Here, well-preserved invertebrates are not expected to be significantly impacted, but the density of larger marine vertebrate fossils is probably two or three times higher than it is in the underlying Cenomanian. As a result, four to six large vertebrate skeletons might be damaged in this interval over the life of the mine. Dozens of smaller fish skeletons could also be destroyed or salvaged out of context. Because the headwall of the mine would not exceed 300 feet in height above the Smirl Coal Zone, its impacts would probably be limited to lower Turonian strata, and the Collignoniceras woolgari and Prionocyclus hyatti zones would not be affected.

When compared to the No Action Alternative, disturbance to the Smirl Coal Zone and overlying Tropic Shale overburden and estimated monetary impacts would be much greater under the Proposed Action, because the No Action Alternative proposes no disturbance to existing paleontological resources.

4.10.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Impacts would be similar to those discussed under the Proposed Action, except there would be approximately 1,454–1,856 acres of pit disturbance, 171 acres of disturbance from centralized and dispersed facility activities, and 13 acres of disturbance due to the relocation of KFO Route 116. The shorter time duration of mining activities under Alternative C (21 instead of 25 years) would not change impacts on paleontological resources because the impacts would occur from acreages disturbed regardless of the timeframe of when they occur.

The 16%–20% smaller footprint of the mine would lower the overall impact to paleontological resources affected by pit operations. For example, the monetary value of the estimated number of ammonites damaged or destroyed would be decreased from the range of $3,811,500.00 to $4,687,050.00, to the range of $3,619,850.00 to $4,495,400.00. For vertebrate resources, the estimated number of sites potentially affected by facilities construction, pit operations, and the rerouting of KFO Route 116 for Alternative C would be within the margin of error for the estimates made for the Proposed Action and would therefore be the same.

The total amount of disturbance to the 30,870-acre, 15-mile band of Tropic Shale in the area would be 1,662–2,064. Thus, a 5%–7% disturbance of the Tropic Shale's paleontology would occur under Alternative C.

When compared to the No Action Alternative, the 1,454–1,856 acres of pit disturbance, 171 acres of facilities, and 13 acres of road relocation would have a greater impact on the Smirl Coal Zone and overlying Tropic Shale overburden because 0 acres would be impacted under the No Action Alternative. The $3,619,850.00–4,495,400.00 estimated loss to the public would not occur under the No Action Alternative.

4.10.5 Potential Mitigation Measures

No potential mitigation measures are proposed or recommended.

4.10.6 Unavoidable Adverse Impacts

The loss of a percentage of significant fossil resource or their contextual data is an unavoidable impact under both action alternatives. In many other regions of Utah, such as the Book Cliffs or Price areas, the commercially viable coal seams are not directly associated with such highly fossiliferous marine or terrestrial units, and therefore impacts to fossil resources are minimal. In the Alton area, it is anticipated that a large number of significant fossils would be destroyed or removed from context particularly in the Tropic Shale.

4.10.7 Short-term Uses versus Long-term Productivity

The short-term use of the tract for purposes of coal extraction would result in adverse impacts to the long-term productivity of paleontological resources. The coal extraction process would result in the permanent removal of fossils from the Dakota Formation and the Tropic Shale in the tract resulting in a long-term decrease in the productivity of paleontological resources in the area.

4.10.8 Irreversible and Irretrievable Commitments of Resources

All impacts to paleontological resources in the tract would be irreversible. Once disturbed and removed, fossils currently present in formations where disturbance would occur to facilitate the extraction of coal cannot be replaced or restored. They would be permanently removed.

4.11 Recreation

The recreation resources analysis area for the tract is 92,573 acres. It consists of the tract, linear features such as roads and OHV trails affected by mining activity, and all adjacent lands within a 5-mile radius of the tract (see Map 3.11). A 5-mile radius was chosen on the assumption that recreational users affected by mining activity would move to lands immediately adjacent to the tract that would provide similar recreation opportunities. Outside the 5-mile radius, additional recreation activities, areas, and opportunities were identified to describe the indirect and cumulative impacts of the alternatives. These areas were identified from BLM and USFS land-use plans; NPS general management plans; UDWR management areas; discussions with BLM, USFS, and UDWR resource specialists; and county and municipality plans.

For all alternatives, short-term impacts to recreation resources are those impacts that would occur throughout the duration of mining operations. Long-term impacts are those impacts that would occur after mining operations and once reclamation activities are complete. With proper reclamation procedures, there would be no long-term impacts to recreation resources for all alternatives, and existing recreation opportunities would resume in areas affected either directly or indirectly by mining operations.

Impacts to recreation resources as a result of coal truck traffic on the coal haul transportation route (see Section 2.5.4) are not discussed under the alternatives sections because based on the transportation analysis (see Section 4.14), impacts would be negligible. LOS is a measure of the quality of service on transportation infrastructure. It generally indicates the level of traffic congestion. LOS measurements vary from LOS A (the best) to LOS F (the worst); see Table 4.33 for a description of LOS A–F. Transportation analyses illustrate that the existing LOS on the transportation route is LOS A for most segments and intersections and LOS B and C for others. These LOS would be maintained even with the addition of coal truck traffic. Transportation analyses also project LOS on the transportation route in the year 2020. Conditions in the year 2020, with the addition of coal trucks, would result in a LOS D on SR-20 between US-89 and I-15. All other segments and intersections would be LOS A, B, or C. LOS D conditions are those that are approaching unstable flows of traffic, tolerable delays of 25–35 seconds per vehicle at unsignalized intersections, and delays of 35–55 seconds per vehicle at signalized intersections. LOS changes would be minimal with additional truck traffic added to existing traffic conditions and with additional truck traffic added to 2020 conditions; therefore, changes to time spent traveling to recreational resources, and changes to the settings, experiences, and activities of recreationists using the transportation route for sightseeing and/or to travel to and from recreation destinations, would also be minimal.

4.11.1 Regulatory Framework

Public lands in and surrounding the proposed tract are managed for dispersed recreation. The goals and objectives for recreation management, including OHV use, are discussed in the KFO RMP (BLM 2008b). Hunting regulations on the PPMA are maintained and enforced by UDWR.

4.11.2 Alternative A: No Action

Under the No Action Alternative, ACD's application to lease the coal included in the tract under the Proposed Action or Alternative C would not be approved, the tract would not be offered for competitive lease sale, and the coal included in the tract would not be mined.

Rejection of the application would not affect permitted mining activities on private land adjacent to the tract (the Coal Hollow Mine). The Coal Hollow Mine consists of approximately 635 acres of land and approximately 5 million short tons of recoverable coal leased from private surface and mineral owners. Discussion of impacts to recreation resources from the Coal Hollow Mine is included in Section 4.18 Cumulative Impacts.

Under the No Action Alternative, recreation use—predominantly big game hunting in and near tract—would continue at present or slightly increasing levels (Personal Communication, Aoude 2008). Hunting in the Alton CWMA would continue, and the same amount of big game permits would be issued as in years past. No acres of big game hunting would be affected by mining under the No Action Alternative.

Other than hunting, little recreation would occur on lands directly affected by the tract (Personal Communication, Christenson 2008; Personal Communication, Rechsteiner 2008). According to adjacent land managers, some OHV use occurs on approximately 13 miles of OHV-accessible routes in the proposed tract. In addition, visitors traveling along KFO Route 116 engage in sightseeing when traveling between known destinations such as Bryce Canyon National Park and Grand Staircase-Escalante National Monument. These uses would not be affected by mine-related activities under the No Action Alternative because the tract would not be offered for competitive lease sale and no mining would occur.

Existing conditions for other types of dispersed recreation (e.g., camping, picnicking, and hiking) would continue on lands in the recreation analysis area. Because the No Action Alternative would not decrease the amount of land available for dispersed recreation, it would not decrease the recreational experience of those recreational users who engage in recreational activities in the analysis area. Because there are no estimates of recreation use for public or private lands affected by mining activity, there is no way to quantify the amount of recreation users either directly or indirectly affected.

Under the No Action Alternative, other land uses would continue, including livestock grazing, backcountry driving, and vegetation treatments to maintain and enhance livestock forage, wildlife habitat, and watershed condition. These presently occurring land uses would continue to interact with recreation trends in the analysis area similar to current conditions under this alternative.

4.11.3 Alternative B: Proposed Action

Under the Proposed Action, the tract would be offered for lease at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the tract. The Proposed Action would directly affect 3,576 acres of land, including 2,280 acres of public land (federal surface and subsurface) on the tract and 1,296 acres of split estate: private surface and federal subsurface land. Under the Proposed Action, the life of the mine would be approximately 25 years.

Under the Proposed Action, some recreation use, predominantly big game hunting, would be displaced from the tract. Approximately 3,576 acres of potential big game hunting areas would be directly affected by the Proposed Action. Hunter access to big game habitat (predominantly mule deer) on the tract would be restricted, displacing them from the tract. It is assumed that all 3,576 acres would be unavailable for recreational use over the life of the mine (25 years). This represents approximately 0.4% of all big game hunting areas in the PPMA (approximately 957,122 acres) and 3.9% of the recreation resources analysis area (92,573 acres). Users would move onto adjacent public lands (public lands and the Dixie National Forest) for hunting opportunities. This could affect the recreational experiences of hunters displaced from the tract and hunters in the analysis area because of a slight increase in crowding in those areas. However, a 0.4% displacement of hunters would not likely lead to overcrowding on other lands in the PPMA.

Hunting in the Alton CWMA would continue, and the same amount of big game permits would be issued as in years past. Because no big game kills have occurred in the proposed tract in the last 20 years, adverse impacts to hunters who use the CWMA are not anticipated. See Section 4.17 for a description of direct and indirect impacts to big game species as a result of the Proposed Action.

Outside of hunting, little recreation use occurs on lands that would be directly affected by the tract (Personal Communication, Christenson 2008; Personal Communication, Rechsteiner 2008). Because access would be restricted on the tract, these recreationists, like hunters, would be displaced from the tract for the 25-year mine life. The short-term loss of 3,576 acres for OHV use represents 3.9% of the recreation analysis area (92,573 acres). Further, there is an estimated 13 miles of OHV routes on the proposed tract. Some of this would be removed for mining activity (and replaced post mining), and all would be inaccessible for the life of the mine. The temporary loss of these routes represents a 0.7% reduction in routes available for OHV use across the BLM-KFO (1,402.7 miles of routes are currently available for OHV use in the BLM-KFO). KFO Route 116, an OHV-accessible route, would remain accessible to OHVs during mining operations. However, it is assumed that the road would be relocated to the no-coal zone to allow mining operations to occur. Also, the experiences and settings of OHV users traveling on KFO Route 116 adjacent to the tract would be modified from one characterized as semiprimitive and natural to one characterized by coal mining activities.

Other visitors traveling along KFO Route 116 engage in sightseeing when traveling between known destinations such as Bryce Canyon National Park and Grand Staircase-Escalante National Monument. Mining activity under this alternative would have an adverse effect on users seeking natural visual resources through the loss of natural visual resources over the life of the mine (25 years). However, new sightseeing recreational opportunities would be created under this alternative through the viewing of active mining operations and through the interpretation of coal mining on public lands along rerouted KFO Route 116.

Under this alternative, the direct loss of lands available for other types of dispersed recreation (e.g., camping, picnicking, hiking) would lead to increased use and diminished recreational experiences on lands in the analysis area adjacent to the tract. Up to 92,573 acres (the recreation analysis area) could be indirectly affected by mining operations. Desired recreational experiences for lands in the analysis area include opportunities for undeveloped and self-reliant recreation, a natural environment, and a high probability of solitude. Over the life of the mine, increased use in the analysis area would diminish those recreational experiences. Quantifying the amount of recreation users that would be directly or indirectly affected by this alternative is impossible because of the following: 1) the analysis area is not a known destination point for recreation, 2) there are no known attractions in the analysis area, and 3) there are no estimates of use for public or private lands affected by mining activity.

Because all acres in the tract would be unavailable for hunting, OHV use, and dispersed recreation over the 25-year mine life, the loss of 3,576 acres to recreation opportunities under the Proposed Action would result in a complete decrease in lands available for recreation on the tract when compared to the No Action Alternative.

4.11.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Under Alternative C, the tract would be modified to exclude Block NW (see Map 2.1). Furthermore, certain mining activities in Block S would be subject to seasonal restrictions to reduce impacts to the local sage-grouse population. Under Alternative C, the modified tract would be offered for lease at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the tract. The boundaries of the modified tract would be reasonably consistent with the configuration shown in Map 2.1.

The modified tract under Alternative C would encompass approximately 3,173 acres, of which approximately 2,280 acres are federal surface and mineral estate and 893 acres are split estate: private surface estate and federal mineral estate (Map 2.1 depicts private and BLM surface in the modified tract). Alternative C also anticipates approximately 153 truck round-trips per day to a coal loadout location west of Cedar City. The life of the mine under Alternative C would be approximately 21 years.

Alternative C and the Proposed Action would result in the same types of impacts to recreational resources. However, Alternative C would result in fewer acres of impact based on the smaller acreage of the tract and fewer years of impact based on the shortened mine life. Hunting in the Alton CWMA would continue, and the same amount of big game permits would be issued as in years past. Because no big game kills have occurred in the tract in the last 20 years, adverse impacts to hunters who use the CWMA are not anticipated. Under Alternative C, hunters would be displaced from the tract because an estimated 3,173 acres of potential big game hunting areas would be unavailable for recreational use over the 21-year mine life. This represents approximately 0.3% of all big game hunting areas in the PPMA (approximately 957,122 acres) and 3.4% of the analysis area (92,573 acres). Assuming that access on the tract would be restricted for the 21-year mine life, OHV users would lose 3,173 acres for OHV use, representing 3.4% of the analysis area (92,573 acres). Likewise, the 13 miles of OHV-accessible routes present on the tract would be inaccessible for the life of the mine and would represent a 0.7% reduction in routes available for OHV use across the BLM-KFO (1,402.7 miles of routes are currently available for OHV use in the BLM-KFO). As under the Proposed Action, KFO Route 116 would remain accessible to OHVs during mining operations, though it is assumed that it would be relocated to the no-coal zone. The experiences and settings of OHV users traveling on KFO Route 116 through the tract would be modified from one now characterized as semiprimitive and natural to one characterized by coal mining activities.

Other visitors traveling along KFO Route 116 engage in sightseeing when traveling between known destinations such as Bryce Canyon National Park and Grand Staircase-Escalante National Monument. Mining activity under this alternative would have an adverse effect on those users and their sightseeing experience through the loss of natural visual resources over the life of the mine (21 years). However, new sightseeing recreational opportunities would be created under this alternative through the viewing of active mining operations and through the interpretation of coal mining on public lands along rerouted KFO Route 116.

Finally, as under the Proposed Action, up to 92,573 acres (the recreation analysis area) could be indirectly affected by mining operations. Recreation users would be displaced from areas directly affected by mining activities and would likely recreate on nearby areas. This would increase the amount of use in those areas and would result in a reduction of the desired recreational experiences in those areas.

Because all acres in the tract would be unavailable for hunting, OHV use, and dispersed recreation over the 21-year mine life, the loss of 3,173 acres to recreation opportunities under Alternative C would result in a complete decrease in lands available for recreation when compared to the No Action Alternative.

4.11.5 Potential Mitigation Measures

During mining operations, mitigation measures to offset the loss of sightseeing opportunities could include installing viewing pull-off areas and interpretation panels along rerouted KFO Route 116. This would create new opportunities for sightseeing in the short term.

4.11.6 Unavoidable Adverse Impacts

Adverse impacts from both action alternatives would include a direct short-term loss of land available for recreation opportunities, predominantly hunting. In addition, there would be an indirect adverse impact to other recreational users from the displacement of recreational users, directly affected by mining activity, onto adjacent public and private lands. Following reclamation, existing recreation activities would return to areas previously affected by mining operations. This reclamation could enhance wildlife habitat and increase opportunities for hunting and wildlife viewing.

4.11.7 Short-term Uses versus Long-term Productivity

Mitigation and reclamation measures would be applied to areas affected by the mine; therefore, the long-term productivity of the tract to provide recreation opportunities would not be diminished once mining operations and reclamation are complete.

4.11.8 Irreversible and Irretrievable Commitments of Resources

As a result of mining operations, recreation resources and uses would be irretrievable over the life of the mine. Following completion of mining operations and reclamation, those uses and resources would be reestablished. No irreversible commitments of recreation resources are expected as a result of mining activity.

4.12 Socioeconomics

The socioeconomics analysis area for the tract consists of Kane, Garfield, and Iron counties. It is hereafter referred to as the SESA. The socioeconomic analysis depends in part on the findings of other resource sections, primarily the analysis of impacts to recreation (see Section 4.11) and transportation (see Section 4.14). This analysis does not include an in-depth discussion comparing impacts between Alternative A (No Action) and the action alternatives. Both action alternatives would result in impacts to socioeconomics than would not occur under the No Action Alternative because selection of the No Action Alternative would not result in mining the tract.

4.12.1 Regulatory Framework

Federal, state, and local regulations require that surface mines obtain reclamation bonds, pay royalties, and taxes based on the amount of coal extracted from the mine. Further, the Coal Mine Safety Act: Utah Administrative Code 40-2 of 2008 established the Office of Coal Mine Safety, which recommends to the governor measures that ensure the safety of those involved in Utah’s coal mine industry.

4.12.2 Alternative A: No Action

Under the No Action Alternative, coal in the tract would not be mined; therefore, no impacts would occur to the social and economic conditions of nearby communities in Kane, Garfield, and Iron counties as a function of mining the tract. The local population, employment, fiscal conditions, tourism rates, and social climate would remain similar to current conditions. Revenues from livestock grazing and recreation opportunities in the tract would continue. When compared to the Proposed Action, the No Action Alternative would result in the potential for forgone income for the successful bidder and revenue and royalties to federal, state, and local governments because the coal would not be mined and this revenue would not be generated.

4.12.3 Alternative B: Proposed Action

Under the Proposed Action, approximately 44.9–49.1 million tons of coal would be mined over a 25-year period (this equates to approximately 1.8–1.9 million tons annually though the target production rate, which is reflected in the socioeconomic analysis in this section, is 2 million tons per year). To conduct mining and transportation operations over the life of the mine approximately 160 employees would be required. An estimated 153 truck round-trips per day to and from the mine and along the coal haul transportation route would occur. Mine operations would occur 24 hours a day, five to seven days a week, for the life of the mine. The Proposed Action would directly affect (by surface disturbance, precluded access, or both) 3,576 acres of land consisting of 2,280 acres of BLM-administered land (federal surface and subsurface) and 1,296 acres of private land (private surface and federal subsurface).

The projected (target), annual coal production under both action alternatives would be approximately 2 million short tons. This analysis considers this target amount under both action alternatives. It also provides recovery values and revenues for the range of recoverable coal reserves throughout the life of the mine under each action alternative (44.9–49.1 million short tons over approximately 25 years under the Proposed Action and 38.1–42.3 million short tons over approximately 21 years under Alternative C).

To understand the amount of electrical energy that would be generated from the projected annual amount of coal (2 million short tons) produced under the action alternatives, the following statistics are provided. These numbers are for perspective use only because it is not assumed that the coal mined from the tract would be used solely to supply electric energy to residential customers. Under the Action Alternatives, the number of United States households provided with one year of residential energy would be approximately 185,010. According to the United States Census Bureau 2000 Census, there are 2.59 persons per household on average in the United States. As such, 2 million tons of coal would provide 479,176 individuals with one year of residential electrical energy (Personal Communication, McKenzie 2008).

When compared to the No Action Alternative, the Proposed Action would result in an increase in employment, personal income, and government revenues. A slight increase in population is anticipated (as illustrated in the analysis below), but this would not lead to an increased need for public services. Under the No Action Alternative, no mining would occur, and therefore an increase in local employment, income, and government revenues as a result of mining would not occur. Under the Proposed Action, there would be a slight decrease in grazing revenues as a result of a decrease in AUMs (as illustrated in the analysis below). Also, any recreation-related economic contributions from individuals who choose to recreate on the tract would be foregone under the Proposed Action.

4.12.3.1 EMPLOYMENT AND INCOME

4.12.3.1.1 Employment

Under the Proposed Action, approximately 160 people would be employed to conduct mining operations. It is estimated that 100 workers would be needed at the mine for mining operations, and 60 workers would be required for trucking the coal to the loadout location. Approximately 10% (16 employees) of the mine employees would be specialists in coal mining operations and would relocate to the area specifically to work at the mine (Personal Communication, McCourt 2008).

Employment related directly to coal mining operations would generate indirect jobs in the local economy. Indirect employment associated with the mine would include jobs in wholesale and retail trade, local government, and service sectors. Assuming a 3.0 multiplier (indirect employment to direct employment), it is estimated that approximately 320 additional jobs (full-time equivalents) would be generated as a result of mining operations on the tract.

Because a large portion of services directly and indirectly related to mining (e.g., fuel, equipment purchases and repairs, food, and retail services.) would be located in or around Cedar City in Iron County, it is likely that the indirect employees would be concentrated in this area as well.

4.12.3.1.2 Income

The range in salary for miners on the tract would be $18 to $21 per hour, not including benefits (Personal Communication, McCourt 2008). Using $20 as an average, the approximate annual wage for coal miners on the tract would be $41,600. Thus, the 160 employees of ACD would generate $6.65 million in total annual wages in the SESA and $166 million over the life of the mine. Employment and income impacts are shown in Table 4.25.

Table 4.25. Employment and Income Impacts under the No Action Alternative, the Proposed Action, and Alternative C (in 2008 dollars)

	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Direct employment	0	160 employees	160 employees
Indirect employment	0	320 employees	320 employees
Total annual wages (for direct employment)	**$0**	**$6.65 million**	**$6.65 million**
Total life-of-mine wages (for direct employment)	**$0**	**$166 million**	**$140 million**

4.12.3.2 GOVERNMENT AND PUBLIC FINANCE

Over the 25-year mine life, approximately 44.9–48.2 million tons of recoverable coal would be mined. Under the Proposed Action, 1.8–1.9 million tons of coal would be mined each year. The 10-year average spot price for 11,700 BTU per pound of coal is $33.00 per ton from 2000 to 2010 (2008). The spot price for coal recovered in the tract would be slightly lower given that this coal is closer to approximately 10,000 BTU per pound. However, this analysis uses $33.00 per ton as the spot price of coal because the heat content of coal in the tract is closer to that referenced above than to the coal found in the Powder River Basin, which contains an estimated 8,800 BTU per pound. Spot prices for coal with a heat content more closely approximating the coal in the tract were not available to use in the analysis.

The annual recovery value for 1.8–1.9 million tons of coal would be approximately $59.4 to $62.7 million (1.8 million tons of coal × $33.00 and 1.9 million tons of coal × $33.00). Over the 25-year mine life, recovery values would be approximately $1.49 to $1.57 billion (1.8 million tons × $40.00 × 25 and 1.9 million tons × $33.00 × 25 years).

4.12.3.2.1 Federal Royalties

Coal producers in the State of Utah must pay royalties to the United States government for coal mined on federal lands. The current royalty rate for coal is 12.5% of sales value and is paid to the DOI Office of Natural Resources Revenue (ONRR). Fifty percent of the royalties are returned to the state where the mineral production occurs.

Assuming the annual recovery value for the coal produced under the Proposed Action would be $59.4 to $62.7 million per year, $7.46 to $7.89 million in royalties would be paid to ONRR ($59,400,000 × 0.125), and the State of Utah would receive approximately $3.73 to $3.95 million ([$62,700,000 × 0.125]/2) per year. Under the Proposed Action, $186.62 to $197.30 million in royalties would be paid to ONRR and $93.31 to $98.64 million would be disbursed to the State of Utah over a 25-year period.

Upon disbursement of royalty revenues to the State of Utah, more than 75% of the mineral revenue receipts are routinely appropriated to several state agencies. The distribution is as follows: 32.5% to the Permanent CIB, 40.0% to the UDOT for distribution to counties and county special service districts, and 5.0% to the Utah Department of Community and Culture for distribution to counties and special service districts. Projected appropriations as a result of mining the tract under the Proposed Action are listed in Table 4.26.

Table 4.26. Estimated Recovery Value and Royalty Revenue under the No Action Alternative, the Proposed Action, and Alternative C (2010 dollars)

	Alternative A (No Action) Annual and Life of Mine Values	Alternative B (Proposed Action) and Alternative C Annual Values (2 million short tons)	Alternative B (Proposed Action) Life of Mine Value (25-years of development)	Alternative C Life of Mine Value (21-years of development)
Recovery value	$0	$66.10 million	$1.49–$1.57 billion	$1.25–$1.32 billion
Total federal royalty revenue	$0	$8.26 million	$186.62–$197.30 million	$103.44–$111.43 million
Royalties disbursed to state (50% of federal royalties)	$0	$4.13 million	$93.31–$98.64 million	$78.38–$82.11 million
Appropriation to CIB (32.5% of state revenue	$0	$1.34 million	$30.20–$32.04 million	$25.49–$26.71 million
Appropriation to UDOT (40% of state revenue	$0	$1.70 million	$37.32–$39.46 million	$31.40–$32.84 million
Appropriation to Utah Department of Community and Culture (5% of state revenue)	$0	$206,615	$4.69–$4.96million	$3.95–$4.10million

Under the Proposed Action, 92 AUMs allocated to livestock grazing would be lost annually. This loss of AUMs would total 3,220 over the life of the mine. The 2010 value of an AUM, according to the BLM, is $1.35. Thus, over the life of the mine (35 years for livestock grazing, 25 years for the mining activities,

and 10 years for reclamation) a $4,347.00 (or $124.20 annually) decrease in contributions to the BLM would result. Should livestock permittees need to decrease livestock numbers as a result of the decrease in AUMs, this could result in lost revenue for permittees and a potential decrease in the workforce required to manage the livestock. However, with annual rotations in the tract over the life of the mine, adverse impacts to permittees would be minimized.

4.12.3.2.2 Additional Taxes and Fees

Black Lung Tax: The Black Lung Excise Tax on coal has been in effect since 1978. The tax finances the Black Lung Disability Trust Fund, which compensates miners (and their survivors and dependants) that have contracted "black lung disease" or pneumoconiosis. The current Black Lung Excise Tax rate for surface mines is $0.55 per ton. Under the Proposed Action, approximately $990,000 to $1.0 million annually and $24.7 to $26.1 million over the life of the mine would be paid to the Black Lung Disability Trust Fund (Table 4.27).

Table 4.27. Additional Taxes and Payments Associated with the No Action Alternative, The Proposed Action, and Alternative C (in 2008 dollars)

	Alternative A (No Action) Annual and Life of Mine Values	Alternative B (Proposed Action) and Alternative C Annual Values (2 million short tons)	Alternative B (Proposed Action) Life of Mine Value (25-years of development)	Alternative C Life of Mine Value (21-years of development)
Black Lung Tax	$0	$1.1 million	$24.7–$26.1 million	$20.8–$21.0 million
Abandoned Mine Land Tax	$0	$300,000	$6.8–$7.1 million	$5.7–$5.9 million
Bonus bid payment	$0	n/a	$28.3–$30.4 million	$24.0–$26.1 million
Bonus bid payment disbursed to state (50% of federal payment)	$0	n/a	$14.2–$15.2 million	$12.0–$13.1 million

Abandoned Mine Lands: A reclamation fee of $0.15 per ton is assessed by the federal government on domestically produced, underground-mined coal to pay for the cleanup of abandoned mine lands. The fund was designed to be split evenly between the federal government and the state from which the money was generated. Assuming 1.8–1.9 million tons of coal are mined annually, $270,000 to $285,000 would be paid to the abandoned mine lands program and $6.8 to $7.1 million would be paid over the 25-year mine life.

Bonus Bid Payments: Before mining can begin in the tract, a company (or companies) must submit a sealed bid for the coal. The successful bidding company must pay one fifth of the total bonus at the time of the sale and would continue to pay one fifth every year for the next four years. The bid money would be paid to the federal government regardless of the production taxes and royalties that are paid by the mining company as the coal is mined. The federal government would keep half of this bonus bid payment and the State of Utah would receive the other half.

Although the exact amount of bid money anticipated through the lease of the tract is unknown, recently awarded bonus bids can be used to estimate potential federal and state revenue. In January 2008, the successful bidder on a new coal tract paid $0.631 per ton of recoverable coal (BLM 2008f). Using the same amount per ton and the assumption that 44.9–48.2 million tons of coal would be recovered over the life of the mine (under the Proposed Action), the successful bidder on the tract would pay approximately $28.3 to $30.4 million to the federal government. Of the total bonus bid, $14.2 to $15.2 million would be disbursed to the State of Utah.

Property and Sales Tax: The Utah Property Tax Division centrally assesses the ad valorem tax based on coal production, assessed property values, and current tax rates. Ad valorem taxes assessed on property and production generate revenue for local counties. The greater the production of coal, the greater the generation of property taxes for Kane County.

Sales and use taxes are levied by state and local governments on purchases of goods and services related to coal mining. The sales tax rate for Iron County is 5.90% and the sales tax for Kane and Garfield counties is 6.90%. The tax payments would indirectly benefit the local and national businesses supporting the coal mine operations. These economic impacts would be present throughout the life of the mine and to a lesser extent during the reclamation activities. It should be noted that because such a large percentage of mine-related services would be found in Cedar City, increases in sales tax revenues would be disproportionately higher in Iron County when compared to Kane and Garfield counties.

Permanent CIB: As previously mentioned, Kane, Garfield, and Iron counties receive a portion of federal mineral lease monies returned to the State of Utah by the federal government through the CIB. The funds received by counties in the SESA for infrastructure projects would likely continue in amounts similar to current contributions regardless of the alternative selected, because CIB funding is not directly correlated with mineral production by county but rather by applicant eligibility. An estimated appropriation to the State of Utah as a result of the Proposed Action is given in Table 4.26.

Payments in Lieu of Taxes Program: Given that none of the alternatives would result in changes in federal land ownership in the SESA, Payments in Lieu of Taxes payments to Kane, Garfield, and Iron counties would remain similar to current conditions under all alternatives, including the No Action Alternative.

4.12.3.3 POPULATION AND HOUSING

As mentioned earlier, it is assumed that 90% (144 employees) of employees would commute from in the SESA and 10% (16 employees) of the 160 employees would relocate to the SESA. The average size of a family in the United States is 3.14 according to the United States Census 2000 (U.S. Census Bureau 2000b). Assuming in-migrants family size is similar to the United States average, approximately 50.24 additional people would move into the SESA during the life of the mine. Adding an additional 16 workers and their families concentrated in Kane County or dispersed throughout the SESA would have negligible impacts on population. Using the population data given in Section 3.12, the total population in the SESA is 58,714. An additional 50.24 people in the SESA would result in a 0.09% increase in the population of the SESA.

Although 16 employees would likely come from outside the SESA, the remaining employees would likely come from local communities. Given that 90% of the potential workforce is currently living in Kane, Garfield, and Iron counties, it is not anticipated that the demand for housing in the area would increase under the Proposed Action. The current housing market would accommodate the small percentage (0.09%) of in-migrants for short- or long-term housing because accommodations for 16 families in the SESA would likely be present at any given time.

As noted in Section 3.12 second-home ownership is largely influenced by scenic beauty and recreation opportunities. For many individuals, mining operations on the tract would detract from the desirable qualities associated with scenic views and recreation. As such, individuals may choose not to obtain second homes near the tract. However, because most of the second homes in Kane County are located on Cedar Mountain (approximately 30 miles away from the tract), it is unlikely that most of the potential second-home purchases would be adversely impacted. Potential second-home purchases in Iron and Garfield counties are not likely to be adversely impacted by the Proposed Action given the distance from the tract.

Should mining operations on the tract be perceived as an undesirable land use, adverse impacts to the value of nearby property could be experienced. Several studies indicate that undesirable land uses, such as a power plant, superfund site, hazardous waste site, or landfill, do have a tendency to decrease the reported dollar value of a residence. The decrease in value was dependant on the distance (miles) from the site and varied considerably depending on the land use. One study cited that properties within 2.5 miles of a power plant have a 6.3% lower value. Others indicate that that an increase in distance of 1.0 mile from the site increased values by $451 to $10,034 (inflated to 2010 dollars) (Boyle and Kiel 2001).

4.12.3.4 RECREATION AND TOURISM

Section 4.11 identifies potential impacts to recreation due to the implementation of the Proposed Action. As stated in Section 4.11.2, there are currently no estimates for the amount and type of recreation use on or near the tract. Therefore, it would be speculative to make quantitative estimates of the potential economic impact to the region from a potential decrease in use of recreation resources in the area.

The Proposed Action would displace 3,576 acres of potential big game hunting. This represents approximately 0.4% of all big game hunting areas in the PPMA. Users would likely move onto adjacent public lands (BLM-administered lands and the Dixie National Forest) for hunting opportunities. Because hunters would be able to hunt on adjacent public lands and because the overall percentage of lands unavailable to big game hunting in the PPMA is less than 1%, it is unlikely that hunters would be adversely impacted by the Proposed Action. Direct and indirect sales and revenue generated by this recreational user group would continue similar to current conditions.

As stated in Section 4.11.2, there is little recreation use that occurs on lands that would be directly affected by the tract. In addition to big game hunting, OHV use is the only other identified recreation use on the proposed tract. For the 25-year mine life, OHV users would be displaced from 3,576 acres (assuming that access to the tract would be precluded for the life of the mine); although, KFO Route 116 (an OHV accessible route) would remain accessible to OHVs during mining operations. The experiences and settings of OHV users traveling on KFO Route 116 through the tract would be modified from one now characterized as semiprimitive and natural to one characterized by coal mining activities. It would be speculative to assume that a change in landscape characterization along KFO Route 116 would preclude future OHV use.

From a qualitative perspective, the shift in landscape characterization from semiprimitive and natural to one characterized by coal mining would also be absorbed by local residents in the area who enjoy and/or depend on the naturalness of the area for their livelihood. An increase in truck traffic in and near Alton would likely alter the essence of the rural community. Individuals who moved to the area specifically because of the rural feel and semiprimitive landscape, or those who operate tourist-related businesses, would likely notice a change in the social climate of the area. Although the transportation analysis anticipates negligible impacts to traffic flow or the ADT from a quantitative perspective (see Section 4.14), the frequency and noise of the daily truck traffic would adversely impact the quaint, small-town feel of Alton. Altering the essence of the community through daily truck traffic, noise, artificial lighting, and other mine-related operations could deter tourists from visiting Alton and the surrounding communities. If tourists choose not to visit the area because of the mining operations, tourist-related revenue would not be generated and tourist-dependent businesses would be adversely impacted. Under the Proposed Action, there would be a possibility that the mine would draw tourists to the area. Tourist-related revenue from those who view the mine as an attraction would be realized by the town of Alton and the surrounding communities.

Local recreation and tourism can be adversely and indirectly impacted by the mining industry if local lodging is disproportionately used by the mining employees, displacing visitors seeking hotel accommodations. Under both action alternatives, this is not likely to happen because nearly all of the 160 employees would be residents of Garfield, Iron, or Kane counties; thus, the existing stock of motel rooms in the SESA would continue to meet the demands of tourists to the area.

4.12.3.5 PUBLIC HEALTH AND SAFETY

4.12.3.5.1 Transportation

The transportation analysis in Section 4.14.2 identifies a potential 4% increase in ADT on US-89 through Hatch and Panguitch and a 2% increase on SR-56 through Cedar City. A traffic study conducted by Fehr and Peers shows that LOS C or better would be maintained on all road segments and intersections of the coal haul transportation route (2008) (See Section 3.14 for definitions of LOS levels). Given the slight increase in ADT and the limited congestion as reflected in the expected LOS levels, adverse impacts to public health and safety are not likely. Although it is plausible to consider that an increase in traffic on any given roadway would increase the potential risk for an accident, the findings of the transportation analysis do not suggest a measurable increase in transportation-related accidents.

4.12.3.5.2 Law Enforcement

A growth in population, which could occur to some extent in the SESA, could cause proportionate increases in crime. As mentioned earlier, 16 of the anticipated 160 employees and their families would relocate to the area specifically for employment at the mine. Such a slight increase in population across the SESA would not likely cause an increase in crimes. County and municipal law enforcement agencies would likely be able to accommodate the slight population growth projected under the Proposed Action.

With a slight increase in ADT along the transportation routes, there may be a potential need for increased traffic enforcement; however, it is not likely that an increase in current staffing conditions would be necessary because an increase in traffic does not assume an increase in traffic violations. Furthermore, the LOS of C or better estimated to be maintained on all transportation routes would not require increases in law enforcement.

4.12.3.5.3 Wildland Fire Protection

The fire department in the Town of Alton, the nine fire departments in Kane County, and the efforts of the BLM would provide adequate fire fighting capabilities on the tract as a result of coal mining operations. Given the relatively small amount of acres impacted in the SESA (1,993 – 2,395 acres) and increase in ADT, it is assumed that aforementioned agencies could accommodate any increase in fires resulting from mining operations.

4.12.3.5.4 Health Care and Ambulance

The hospitals in the SESA would be able to handle the slight population growth and potential for acute traumas. As stated in Section 3.12.3.4, each county has a hospital that provides 24-hour emergency care. Air transport through Air-Med or Life Flight would provide emergency service to out-of-area hospitals.

4.12.3.5.5 Explosives

Under the Proposed Action, there could be a potential need for the use of explosives in the tract. Blasting activities could have adverse impacts on existing structures in the town of Alton. The potential damage to buildings would depend on the location of the explosive use and the condition of the structures in the town. However, a blasting plan would not be completed until the successful bidder has been awarded the contract; until then, detailed impacts from the use of explosives are unknown.

4.12.3.5.6 Underground Coal Fires

Under the Proposed Action, there is a potential risk for underground coal fires. In the event of an underground coal fire, potential impacts could include an increase in health and safety issues from toxic fumes, surface fires, subsidence, and damage to infrastructure such as roads, power lines, and buildings. Section 4.6.3.4, Geology, describes the risk of underground fires for the Alton Coal Tract.

4.12.3.6 ENVIRONMENTAL JUSTICE

The American Indian and Alaskan Native (American Indian) population in Iron County is 1.75 times greater than the reference population (State of Utah). Because the American Indian and Alaskan Native population exceeds the reference population threshold by 0.25%, the proceeding analysis examines the potential disproportionate adverse impacts to the American Indian.

Potential adverse impacts to the health, safety, and welfare of a potential environmental justice population are first examined by looking for adverse impacts to resources that affect health and welfare. Under the Proposed Action, resources whose impacts could directly or indirectly affect the health and welfare of American Indian populations in Iron County are air quality, noise, water quality, and transportation.

As stated in Section 4.3, adverse air quality impacts would likely occur in Kane County in the town of Alton. There are no potential environmental justice populations in Kane County. No adverse air quality impacts would be anticipated in Iron County; therefore, American Indian populations in Iron County would not be disproportionately impacted.

According to the noise analysis in Section 4.2, there would be a 2% increase in heavy truck traffic on SR-56 in Iron County through Cedar City. The increases in ambient noise levels from the 2% increase in truck traffic could result in increased annoyance but would not increase the risk for measurable hearing loss. Although American Indians living along SR-56 in Iron County may be annoyed by increases in noise from truck traffic, they would not experience a disproportionate increase in ambient noise levels when compared to nonminority populations living along the route.

The water quality analysis in Section 4.16 indicates that there would be no adverse impacts to the drinking water supply in the SESA; therefore, there would be no potential for disproportionate impacts to the American Indian population in Iron County. The potable water supplied to Iron County residents is not gathered from groundwater or surface-water sources near the proposed tract; therefore, any potential contamination of drinking water as a result of the Proposed Action would be negligible.

The impacts to general public health and safety (transportation, law enforcement, health care, etc.) for all individuals in the SESA would be negligible under the Proposed Action. Therefore, adverse impacts to American Indians in Iron County would also be negligible.

In summary, the percentage of American Indians in Iron County exceeds the reference population (i.e., State of Utah). Consequently, an examination of the potential impacts to resources that could impair the health, safety, and welfare of the American Indian population was completed. The analysis found that none of the impacts to resources (air, noise, transportation, water and public health and safety) as a result of the Proposed Action would disproportionately impact the American Indian population in Iron County.

4.12.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Under Alternative C, approximately 38.1–41.4 million tons of coal would be mined over a 21-year period. As under the Proposed Action, 1.8–1.9 million tons of coal would be mined annually, and 160 employees would be required to complete mining operations. Alternative C would also require an identical amount of truck round-trips to move coal from the tract to the reasonably foreseeable coal loadout location west of Cedar City. The tract, as modified under Alternative C, would encompass approximately 3,178 acres consisting of 2,280 acres of BLM-administered land (federal surface and subsurface and 893 acres of private land (private surface and federal subsurface. The life of the mine under Alternative C would be 21 years, four years less than under the Proposed Action. When compared to the No Action Alternative, Alternative C would result in an increase in employment, personal income, and government revenues. A slight increase in population is anticipated, but would not lead to an increased need for public services. Under the No Action Alternative, no mining would occur and therefore an increase in local employment, income, and government revenues as a result of mining would not occur. Under Alternative C, a slight decrease in grazing revenues would be lost as a result of a decrease in AUMs and any recreation-related economic contributions from individuals who choose to recreate on the tract would be foregone under Alternative C.

4.12.4.1 EMPLOYMENT AND INCOME

Employment requirements (for direct and indirect jobs) under Alternative C would be identical to the Proposed Action, though employment at the mine would be required for 21 years under Alternative C. The annual total wages generated (from direct and indirect jobs) would be the same under Alternative C as under the Proposed Action.

4.12.4.2 GOVERNMENT AND PUBLIC FINANCE

Under Alternative C, an estimated 1.8–1.9 million tons of coal would be mined each year. Over the 21-year mine life, approximately 38.1–41.4 million tons of recoverable coal would be mined. Using the same spot price as under the Proposed Action (11,700 BTU per pound of coal and $33.00 per short ton), the annual recovery value would be identical to the Proposed Action at approximately $59.4 to $62.7 million (1.8 million tons of coal × 33.00 and 1.9 million tons of coal × 33.00). Over the 21-year mine life, recovery values would be approximately $1.25 to $1.32 billion (1.8 million tons × 33.00 × 25 and 1.9 million tons × 33.00 × 21 years). This is a 16% decrease in potential recovery value compared to the Proposed Action.

4.12.4.2.1 Federal Royalties

Under Alternative C, annual royalties paid to the federal government would be similar to those paid under the Proposed Action because the amount of coal mined each year would be similar. However, royalty revenues would be generated for 21 years, four years less than the Proposed Action. When compared to the Proposed Action, Alternative C would produce 16% less royalty revenue. Assuming the annual recovery value for the coal produced under the Proposed Action would be $59.4 to $62.7 million per year, $7.46 to $7.89 million in royalties would be paid to ONRR ($59,400,000 × 0.125) and the State of Utah

would receive approximately $3.73 to $3.94 million ([$62,700,000 × 0.125]/2) per year. Under the Proposed Action, $103.44 to $111.43 million in royalties would be paid to ONRR and $78.38 to $82.11 million would be disbursed to the State of Utah over a 21-year period (see Table 4.26)

Under Alternative C, 118 AUMs allocated to livestock grazing would be lost. This loss of AUMs would total 2,852 over the life of the mine. The 2009 value of an AUM, according to the BLM is $1.35. Thus, over the 21-year mine life, this would result in a $4,938.30 (or $159.30 annually) decrease in contributions to the BLM. Should livestock permittees need to decrease livestock numbers as a result of the decrease in AUMs, this could result in lost revenue for permittees and a potential decrease in the workforce required to manage the livestock. However, with annual rotations in the tract over the life of the mine, adverse impacts to permittees would be minimized.

4.12.4.2.2 Additional Taxes and Fees

Under Alternative C, approximately 16% fewer coal mine-related taxes and fees would be generated. Contributions to the Black Lung Excise Tax would be between $20.8 and $21.0 million over the 21-year mine life, and Abandoned mine land fees would be between $5.7 and $5.9 million. Ad valorem taxes generated over the life of the mine would be 16% less than the Proposed Action. The sales and use tax generation on goods and services associated with the mine would taper off four years earlier under Alternative C.

Bonus bid payments: Approximately $24.0 to $26.1 million would be paid in bonus bid payments under Alternative C, given that 38.1–41.4 million tons of coal are expected to be mined over a 21-year period. Of the total bonus bid payment, 50% ($12.0 to $13.1 million) would be disbursed to the State of Utah.

4.12.4.3 POPULATION AND HOUSING

Impacts to population and housing under Alternative C would be nearly identical to impacts under the Proposed Action. However, because the duration of the mining activities would be 21 years under Alternative C, the 10% of the 160 employees (16 individuals) that would relocate to the tract for mine employment may choose to move away from the area once the mining operations are complete. Thus, the results would be a negligible decrease in population and an increase in housing availability.

Potential impacts to property values would be similar to the Proposed Action. However, given that the life of the mine would be four years shorter under Alternative C, reclamation would begin earlier, and adverse impacts to property values would be mitigated sooner than under the Proposed Action.

4.12.4.4 RECREATION AND TOURISM

Both action alternatives would result in the same types of impacts to recreational resources. However, Alternative C would result in fewer acres of recreation-related impact based on the smaller acreage of the tract and fewer years of impact based on the shortened life of the mine. Big game hunting areas in the PPMA would be reduced by 0.3%. OHV users would not be able to access 13 miles of designated routes on the tract. It is unlikely that these slight reductions in availability would deter these types of recreationists to the area. Economic contributions from these user groups would likely remain similar to current conditions given the amount of nearby lands available for big game hunting and OHV use.

Impacts to tourists and tourism-related businesses under Alternative C would be similar to the Proposed Action. Under Alternative C, the alteration of the existing rural, quiet nature of the town of Alton and surrounding areas due to truck traffic, noise, and artificial lighting would occur at the same level as the Proposed Action, but would end four years earlier.

4.12.4.5 PUBLIC HEALTH AND SAFETY

Under Alternative C, impacts to public health and safety would be identical to the Proposed Action. However, the duration of impacts and need for services would be four years less.

4.12.4.6 ENVIRONMENTAL JUSTICE

Similar to the Proposed Action, there would be no disproportionate impacts to the American Indian population in Iron County because mine-related activities would be the same as under Alternative C.

4.12.5 Potential Mitigation Measures

No potential mitigation measures have been identified for socioeconomic resources.

4.12.6 Unavoidable Adverse Impacts

Given that natural resource development is finite and based on demand, the SESA is susceptible to a boom-and-bust cycle. Although the proposed development would temporarily have positive impacts on the local economy with regard to revenue generation, the depletion of the resource would result in a long-term adverse impact to the economy. Those who had been dependent on the jobs and revenue provided by the mining operation would be adversely impacted as a result of job and revenue loss following resource depletion.

4.12.7 Short-term Uses versus Long-term Productivity

Increases in the workforce would contribute to temporary increases in income, housing, and service requirements. The increase in employment and revenues resulting from the mining operation would have short-term benefits for the local communities. However, once mining is complete, local revenues would be reduced and jobs would be eliminated or redirected. Once the tract has been rehabilitated, AUMs could return to current levels and recreation opportunities could be restored. The revenues and employment from those land uses would be realized indefinitely, or as long as the land uses were permitted to exist.

4.12.8 Irreversible and Irretrievable Commitments of Resources

The extraction of coal would result in a permanent (irreversible) loss of a portion of our natural resources. The irreversible loss of the resource would preclude future potential revenues for local, state, and federal governments and the local communities.

Implementation of the Proposed Action or Alternative C could reduce recreational tourism and livestock grazing and associated revenues. Social well-being and feelings of community satisfaction could also be disrupted during the life of the mine. However, studies in natural resource communities have observed that disruptive social effects do not last once the mining operations have ceased and the stability of the community has been reestablished (BLM 2008g).

4.13 Soils

4.13.1 Regulatory Framework

Numerous federal and state regulations shape the management of soils as a natural resource. Regulations that pertain to soils and potential impacts from mining and other land uses include, but are not limited to the following:

- The Taylor Grazing Act of 1934, as amended, provides for continued study of erosion and flood control, and provides for any work that may be necessary to protect and rehabilitate public lands to prevent soil deterioration.
- The Federal Land Policy and Management Act of 1976 requires that public lands be managed in a manner that will protect scientific, environmental, air and atmospheric, and water resource values. It also requires land-use plans to comply with applicable pollution control laws, including state and federal air, water, and other pollution standards.
- The Utah Coal Mine Permitting Requirements for soils (Utah Administrative Code [UAC] R645-301-200) include, but are not limited to, the following:
- Development of an operation plan for removing, storing, and reclaiming soils
- Development of a reclamation plan for redistributing and reclaiming of soils
- Protection and stabilization of all exposed surface areas to control erosion and air pollution (fugitive dust)
- Salvage of soils suitable to support plant growth for use in reclamation
- Protection of soil stockpiles from contaminants, disturbance, compaction, and erosion

In addition to the aforementioned regulations, the BLM uses trends or changes in vascular plants (NRCS ecological sites) and soils conditions (rangeland health) to guide the management of biological soil crusts.

In addition to promoting ecosystem health, BLM's Rangeland Health: Fundamentals and Standards (43 CFR 4180.1) specifically require that "soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform" and "upland soils exhibit permeability and infiltration rates that sustain or improve site productivity".

Management actions adopted in the KFO RMP would also be incorporated into the lease as required actions in the event of a lease sale for the tract. The KFO RMP lists the following management actions applicable to soils:

- Implement BMPs designed to minimize impacts on soils from ground-disturbing activities, as appropriate.
- Reduce soil loss on watersheds by performing appropriate land treatments.
- Initiate reclamation of surface disturbances, where appropriate, during or upon completion of the authorized project.
- Identify areas of "fragile soils" during preparation of project-level plans, as well as necessary mitigation measures to minimize risks and degradation.
- Develop and implement site-specific restrictions and/or mitigations for activities proposed in fragile soil areas on a case-by-case basis. Surface-disturbing activities must be approved by the BLM before construction and maintenance is authorized.

- Incorporate BMPs and soil protection measures into developments on sensitive soils. Measures to stabilize soils and minimize surface-water runoff would be required for slopes greater than 15%, both during tract activities and following tract completion.
- When feasible, identify and salvage biological crusts prior to disturbance; use salvaged soil crusts to inoculate reclaimed soils.

4.13.2 Alternative A: No Action

Under the No Action Alternative, no impacts to soils would occur as a result of mining activities. Some soil impacts associated with current surface uses, including livestock grazing, vegetation treatments, and OHV use, would continue. These impacts would generally be relatively minor in both extent and severity in comparison to the disturbances associated with surface mining under the action alternatives. These impacts would include erosion (related soil exposure) and compaction due to existing land uses. Under current uses, soil disturbance is generally limited to surface uses by livestock and light-duty vehicles, and heavy machinery is not a typical use. In addition, uses are generally limited to designated routes or grazing areas, rather than large swatches of major disturbance, as would occur under the action alternatives. Thus, in comparison to the action alternatives, impacts would be of lesser aerial extent and far lesser magnitude and severity. Impacts to sensitive soils would occur proportionally to the prevalence of the soils on the tract, as described in Chapter 3. However, these impacts would generally be minor and limited to surface disturbance and compaction by livestock and light-duty vehicles, and thus would not result in the need for major reclamation projects. Therefore, sensitive soils would unlikely limit reclamation success.

4.13.3 Alternative B: Proposed Action

4.13.3.1 TYPES AND NATURE OF IMPACTS TO SOILS

Under the Proposed Action, 1,993–2,395 acres of soils would be directly disturbed by surface mining and by the construction of related facilities and roads. Of this total, 1,750–2,152 acres of soil resources would be disturbed by surface mining, and 243 acres would be disturbed by other related activities, including the construction of centralized and dispersed facilities, the relocation and construction of roads, and the grading of road ROWs. Impacts under the Proposed Action would be considerably greater than under the No Action Alternative due to the large-scale removal and replacement of soils that would occur during proposed surface-mining operations (which would not occur under the No Action Alternative). Impacts to soils from current land uses on the tract from vegetation treatments, livestock grazing, and recreation would be discontinued under the Proposed Action. They would resume 35 years after mining commences (25 years for the life of the mine and 10 years for reclamation and rehabilitation).

Surface-mining activities under the Proposed Action would drastically disturb soil texture, structure, and porosity through the large-scale removal, stockpiling, and replacement of soils during surface mining. A total of 1,750–2,152 acres of soils would be removed to their full depth where surface mining takes place, and topsoil and suitable subsoil would be stockpiled for reclamation. Following the completion of mining, mined areas would be backfilled and regraded, then topped with the stockpiled soils. This would result in reclaimed soils with different long-term physical, structural, biological, and chemical properties than those present prior to surface mining. Post-mining soils would be more uniform in thickness, structure, type, texture, nutrient availability, and chemistry. The existing soil structure would largely be eliminated by the removal and replacement of soils in areas that are surface mined. In addition, changes in bulk density would occur due to mixing, aeration, and compaction. The bulk density of the entire soil profile would likely be reduced, as demonstrated by evidence that replaced soils in surface mines typically expand by approximately 15%–35% (Pfleider 1968). However, grading and compaction of topsoil would

likely increase the bulk density of near-surface soils. Surface-mining impacts are referred to as "pit" impacts in this section's tables.

Surface-mining activities would directly remove and stockpile up to 120 acres of soil per year. Topsoil would be stockpiled only until the overburden is moved to the next pit. Each of these up to 120-acre blocks would be replaced within a year, and the loss of soil productivity and increased potential for erosion related to soil removal and replacement would be short term. However, the drastic disturbance (impact) caused by removing and replacing soils, as described above, would be long term. Revegetation and natural weathering would eventually reform new soil structures with the reclaimed soils, although this would be a long-term process (hundreds of years) in the arid environment present in the tract. Per State of Utah and OSM regulation, reclaimed surface soils would be free of acid-forming soils, sodic zones, or toxic materials. They would also have a rooting zone sufficient to establish an effective and permanent vegetative cover. Thus, the long-term fertility of the soils would not be affected.

Impacts to soil resources within the 243 acres of other related activities would generally be less drastic than in areas that are surface mined. The construction of roads and facilities in these areas would result in soils being covered by infrastructure, graded or mixed, moved, compacted, or otherwise disturbed. These soils would generally not be disturbed to as great a depth, would retain more of their original qualities, and would be less uniform following reclamation. However, most of these impacts (caused by facilities, some roads, etc.) would be long-term impacts, persisting for the life of the tract.

Where the near-surface soil is compacted during disturbance and/or reclamation, its infiltration capacity would be temporarily decreased, resulting in a greater potential for runoff and erosion. However, soils and vegetation would also be more uniform, and overall erosion rates following successful reclamation could therefore be lower than pre-disturbance rates (OSM 2006). Numerous erosion-control measures and reclamation measures would be employed per state and federal regulation, as detailed in Chapter 2. Specifically, reclaimed areas would be required (UAC R645-301-200) to use best available technology to prevent sedimentation. They would also be required to stabilize all exposed surfaces to effectively control erosion, and stabilize rilled (or eroded) areas where post-mining land use, vegetation, or water quality would be threatened. Because temporary erosion controls specified on unreclaimed areas often prevent erosion from traveling long distances rather than completely preventing erosion (e.g., silt fencing, retention basins, etc.), there would likely be some mass transfer of eroded materials downslope early in the reclamation process. This erosion would be reduced as vegetation is established, and eroded materials would generally be prevented from impairing other resources by the required controls.

The reclamation and restoration of soil structure and functioning is determined by physical, chemical, and biological factors. As described in the above paragraphs, both disturbance and reclamation alter soil structure through compaction and the resulting loss of porosity and biological activity. These structural changes can potentially diminish the movement of water into and through the soil (Stolt et al. 2001), reduce seed and spore viability, and prevent the establishment and growth of vegetation and biological soil crusts and associated soil microbes (Scoles-Sciulla and DeFalco 2009).

Successful reclamation of soil structure and ecological function is assumed, provided that the management practices prescribed per UAC R645-301-200 are successfully implemented. However, ecological factors outside of human control, such as drought and other short-term climatic variations, can limit the effectiveness of soil reclamation efforts. There is limited information on reclamation success for arid west soils, but published studies clearly indicate that below-average precipitation during the restoration period can impede or delay the successful restoration of soils and associated vegetation (Romney et al. 1987; Bainbridge 1990; Bainbridge et al. 1995; Bainbridge and Lovich 1999).

4.13.3.2 IMPACTS TO SENSITIVE SOILS

4.13.3.2.1 Water-erosive Soils

Under the Proposed Action, 332–463 acres of highly erosive soils, and an additional 1,362–1,730 acres of moderately erosive soils, would be disturbed. Together, 77%–92% of all soil disturbances under this alternative would take place in highly or moderately erosive soils (Table 4.28). Most of this disturbance would occur in areas that are surface mined. The disturbances under this alternative would likely result in substantial erosion, particularly during the period following mining but prior to reclamation. Required erosion-control measures would effectively mitigate the impacts of erosion on water bodies and other resources, but would likely not prevent short-term erosion over short distances. This could result in some rilling (formation of shallow linear erosional features on the soil surface by water) and varied soil depths in areas where erosion would occur, contributing to limited reclamation success by limiting the soil depth available to vegetation in some areas, and impacting other vegetation through sedimentation. In addition, accelerated erosion could contribute to excess sedimentation in streams (e.g., Kanab Creek or Robinson Creek), and stock ponds, and could affect the stability of slopes that are planted for reclamation purposes.

4.13.3.2.2 Drought-intolerant Soils

A total of 300–335 acres of highly drought-intolerant soils would be disturbed under the Proposed Action (Table 4.29). An additional 10–83 acres of moderately intolerant soils would be disturbed. Of the 309–418 acres of total disturbance in these soils, 295–357 acres would be disturbed in the surface mine pit. Overall, 17%–18% of all soil disturbance under the Proposed Action would occur in highly or moderately drought-intolerant soils, and 15%–16% of all disturbance would be associated with surface-mining removal and replacement of these soils. Any disturbance of drought-intolerant soils would require the reclamation of those areas, which would be at an increased risk of poor reclamation success due to low available water capacity. In addition, the need to reclaim areas with droughty soils that are disturbed would likely prolong the reclamation period.

Table 4.28. Acres of Highly and Moderately Water-erosive Soils Impacted under each Alternative (and percentage of the total disturbance under each alternative)

Disturbance Type	Alternative A[1] (No Action)	Alternative B (Proposed Action)*	Alternative C**
Highly Erosive			
Pit disturbance	0	322.3–417.2 (18.1%–17.4%)	315.8–410.7 (20.7%–19.9%)
Other[2] disturbance	0	46.1 (1.9%–2.3%)	41.4 (2.0%–2.5%)
Total disturbance	**0**	**331.5–463.3 (18.1%–19.3%)**	**325.0–452.2 (21.3%–21.9%)**
Moderately Erosive			
Pit disturbance	0	1,288.6–1,535.5 (70.3%–64.1%)	1,124.1–1,371 (73.6%–66.4%)
Other disturbance	0	194.1 (8.1%–9.7%)	166 (8.0%–10.0%)
Total disturbance	**0**	**1,362.3–1,729.6 (74.3%–72.2%)**	**1,187.4–1,537 (77.8%–74.5%)**
Sum of Highly and Moderately Erosive			
Pit disturbance	0	1,610.9–1,953 (87.9%–81.5%)	1,439.9–1,782 (94.3%–86.4)
Other disturbance	0	240 (10.0%–12.0%)	207 (10.0%–12.5%)
Total disturbance	**0**	**1,693.8–2,193 (92.4%–91.6%)**	**1,512.4–1,989 (99.1%–96.4%)**

* 1,933–2,395 acres total soil disturbance.

**1,662–2,064 acres total soil disturbance.

[1] Although there would be no impact to soils related to mining under the No Action Alternative, impacts to soils due to other current land uses (grazing and vegetation treatments) would continue.

[2] "Other" disturbances include centralized and dispersed facilities and roads wi h their adjoining ROWs. Sensitive soil impacts would be identical for "other" disturbances because the no-coal zone would remain the same. However, the proportional impact of that disturbance would vary with the difference in acres of surface disturbance between the 200- and 300-foot overburden removal scenarios.

Table 4.29. Acres of Highly and Moderately Drought-intolerant Soils Impacted under each Alternative (and percentage of the total disturbance under each alternative)

Disturbance Type	Alternative A[1] (No Action)	Alternative B (Proposed Action)*	Alternative C**
Highly Droughty			
Pit disturbance	0	291.0–296.1 (15.9%–12.4%)	111.7–296.1 (7.3%–14.3%)
Other[2] disturbance	0	39.1 (1.6%–2.0%)	36.8 (1.8%–2.2%)
Total disturbance	**0**	**299.6–335.2 (16.3%–14.0%)**	**120.3–332.8 (7.9%–16.1%)**
Moderately Droughty			
Pit disturbance	0	3.8–61.1 (0.2%–2.6%)	57.3–61.1 (3.8%–3.0%)
Other disturbance	0	22.1 (0.9%–1.1%)	18.3 (0.9%–1.1%)
Total Disturbance	**0**	**9.7–83.2 (0.5%–3.5%)**	**60.5–79.4 (4.0%–3.8%)**
Sum of Highly and Moderately Droughty			
Pit disturbance	0	294.8–357.0 (16.1%–14.9%)	169.0–357.0 (11.1%–17.3%)
Other disturbance	0	61.0 (2.5%–3.1%)	55.0 (2.7%–3.3%)
Total disturbance	**0**	**309.3–418.0 (16.9%–17.5%)**	**180.8–412.0 (11.8%–20.0%)**

* 1,933–2,395 acres total soil disturbance.

**1,662–2,064 acres total soil disturbance.

[1] Although there would be no impact to soils related to mining under the No Action Alternative, impacts to soils due to other current land uses would continue.

[2] "Other" disturbances include centralized and dispersed facilities and roads with their adjoining ROWs. Sensitive soil impacts would be identical for "other" disturbances because the no-coal zone would remain he same. However, the propor ional impact of hat disturbance would vary with the difference in acres of surface disturbance between the 200- and 300-foot overburden removal scenarios.

4.13.3.2.3 Saline Soils

No highly or moderately saline soils would be disturbed under any of the alternatives. Therefore, there would be a relatively low risk of poor reclamation success due to excess salinity in the soils, or due to increases in salinity in downstream waters as a result of soil disturbance.

4.13.3.2.4 Sodic Soils

A total of 1.4–4.1 acres of highly sodic soils would be disturbed under the Proposed Action (Table 4.30). This disturbance would take place exclusively in the surface-mining pit, and would represent approximately less than 0.001%–0.2% of the total soil disturbance under this alternative. Because OSM rules restrict the use of sodic soils for reclamation, the disturbed areas would be reclaimed with less sodic soils, which would likely improve growing conditions for most vegetation. High sodium levels in soils affect reclamation potential by inhibiting the establishment of vegetation in disturbed areas. Thus, where sodic soils are used, reclamation success would have an increased risk of failure or delayed success of vegetation establishment. Areas with sodic soils that are reclaimed could also require different seed mixes and species in order to be successfully

reclaimed. Therefore, the disturbance of sodic soils would result in either an increased risk of impeded reclamation or would require their burial, which would in turn reduce the depth of topsoil for use elsewhere for reclamation (as discussed under Shallow Soils, below).

Table 4.30. Acres of Highly and Moderately Sodic Soils Impacted Under Each Alternative (and percentage of the total disturbance under each alternative)

Disturbance Type	Alternative A[1] (No Action)	Alternative B (Proposed Action)*	Alternative C**
Highly Sodic			
Pit Disturbance	0	1.4–4.1 (<0.001%–0.2%)	1.4–4.1 (<0.001%–0.2%)
Other[2] Disturbance	0	0 (0%)	0 (0%)
Total Disturbance	**0**	**1.4–4.1 (<0.001%–0.2%)**	**1.4–4.1 (<0.001%–0.2%)**
Moderately Sodic			
Pit Disturbance	0	0 (0%)	0 (0%)
Other Disturbance	0	0 (0%)	0 (0%)
Total Disturbance	**0**	**0 (0%)**	**0 (0%)**
Sum of Highly and Moderately Sodic			
Pit Disturbance	0	1.4–4.1 (<0.001%–0.2%)	1.4–4.1 (<0.001%–0.2%)
Other Disturbance	0	0 (0%)	0 (0%)
Total Disturbance	**0**	**1.4–4.1 (<0.001%–0.2%)**	**1.4–4.1 (<0.001%–0.2%)**

* 1,933–2,395 acres total soil disturbance.

**1,662–2,064 acres total soil disturbance.

[1] Although there would be no impact to soils related to mining under the No Action Alternative, impacts to soils due to o her current land uses would continue.

[2] "Other" disturbances include centralized and dispersed facilities and roads with their adjoining ROWs. Sensitive soil impacts would be identical for "other" disturbances because the no-coal zone would remain the same. However, the proportional impact of that disturbance would vary with the difference in acres of surface disturbance between the 200- and 300-foot overburden removal scenarios.

4.13.3.2.5 Shallow Soils

All of the soil disturbance under the Proposed Action would occur in areas where the soil's A horizon is less than 20 inches deep, or where the soil is at a high or moderate risk of limited reclamation due to its shallow depth (Table 4.31). Approximately 74%–76% of all disturbance would occur in areas with less than a 10-inch-deep A horizon. The considerable disturbance of shallow soils under this alternative would limit the depth of topsoil that could be used for reclamation, and would increase the reliance on subsoils in the rooting zone during reclamation. The use of shallow topsoil and subsoil during reclamation would increase the risk of inhibited restoration potential due to limited water holding capacity and nutrient availability during plant establishment.

Table 4.31. Acres of Highly and Moderately Shallow Soils Impacted Under Each Alternative (and percentage of the total disturbance under each alternative)

Disturbance Type	Alternative A[1] (No Action)	Alternative B (Proposed Action)*	Alternative C**
Highly Shallow			
Pit Disturbance	0	1,285.9–1,617.3 (70.2%–67.5%)	1,177.8–1,509.3 (77.2%–73.1%)
Other[2] Disturbance	0	213.4 (8.9%–10.7%)	184.4 (8.9%–11.1%)
Total Disturbance	**0**	**1,362.5–1,830.8 (74.3%–76.4%)**	**1,246.2–1,693.7 (81.6–82.1%)**
Moderately Shallow			
Pit Disturbance	0	452.0– 522.4 (24.7%–21.8%)	276.3–346.6 (18.1%–16.8%)
Other Disturbance	0	29.5 (1.2%–1.5%)	23 (1.1%–1.3%)
Total Disturbance	**0**	**458.3– 551.9 (25.0%–23.0%)**	**280.4–369.6 (18.4%–17.9%)**
Sum of Highly and Moderately Shallow			
Pit Disturbance	0	1,737.9–2,140 (94.8%–89.3%)	1,454.1–1,856 (95.3%–89.9%)
Other Disturbance	0	243 (10.1%–12.2%)	207 (10.0%–12.5%)
Total Disturbance	**0**	**1,820.8–2,383 (99.3%–99.5%)**	**1,526.6–2,063 (100%–100%)**

* 1,933–2,395 acres total soil disturbance.

**1,662–2,064 acres total soil disturbance.

[1] Although there would be no impact to soils related to mining under the No Action Alternative, impacts to soils due to other current land uses would continue.

[2] "Other" disturbances include centralized and dispersed facilities and roads with their adjoining ROWs. Sensitive soil impacts would be identical for "other" disturbances because the no-coal zone would remain the same. However, the proportional impact of that disturbance would vary with the difference in acres of surface disturbance between the 200- and 300-foot overburden removal scenarios.

4.13.3.2.6 Alkaline Soils

No highly alkaline soils would be disturbed under any alternative. Under the Proposed Action, 302–327 acres of moderately alkaline soils would be disturbed, primarily in the surface-mining pit (Table 4.32). Alkaline soils limit plant establishment during reclamation, and their disturbance under this alternative would result in either an increased risk of impeded reclamation or would require their burial, which would in turn reduce the depth of topsoil for use elsewhere for reclamation (as discussed under Shallow Soils, above).

Table 4.32. Acres of Highly and Moderately Alkaline Soils Impacted Under Each Alternative (and percentage of the total disturbance under each alternative)

Disturbance Type	Alternative A[1] (No Action)	Alternative B (Proposed Action)*	Alternative C**
Moderately Alkaline			
Pit Disturbance	0	295.4–305.8 (16.1–12.8%)	228.7–239.1 (15.0–11.6%)
Other[2] Disturbance	0	20.9 (0.9%–1.0%)	17.6 (0.9%–1.1)
Total Disturbance	**0**	**301.6– 326.7 (16.5–13.6%)**	**232.8–256.7 (15.3–12.4%)**

* 1,933–2,395 acres total soil disturbance.

**1,662–2,064 acres total soil disturbance.

[1] Although there would be no impact to soils related to mining under the No Action Alternative, impacts to soils due to other current land uses would continue.

[2] "Other" disturbances include centralized and dispersed facilities and roads wi h their adjoining ROWs. Sensitive soil impacts would be identical for "other" disturbances because the no-coal zone would remain the same. However, the proportional impact of that disturbance would vary with the difference in acres of surface disturbance between the 200- and 300-foot overburden removal scenarios.

4.13.3.2.7 Biological Soil Crusts

Biological soils crusts are found on various soil surfaces throughout the analysis area; although, no data on the prevalence of biological soil crust are available for the tract. Because the amount of biological soil crusts cannot be quantified, impacts are discussed qualitatively.

Total crust cover is usually inversely related to vascular plant cover, because less plant cover results in more surfaces available for colonization and growth of crustal organisms (Belnap et al. 2001). Biological soil crusts in the analysis area are mostly cyanobacteria (Microcoleus) and nitrogen-fixing lichens (Collema). These cyanobacteria and nitrogen-fixing lichens are limited and sparse in the analysis area due to relatively high average elevations (5,000–7,000 feet) and relatively dense vascular plant cover.

Within the 1,933–2,395 acres of predicted surface disturbance where biological soils are not identified beforehand, existing soils crusts would be adversely impacted by surface-disturbing activities. The crusts could be removed entirely and buried or disrupted to the point of nonfunctionality. Burial generally results in a greatly simplified crustal community, and disturbance flattens pinnacled and rolling crusts, thus decreasing water infiltration and increasing runoff (Belnap et al. 2001).

Soil crusts are thought to improve the moisture capacity of soils, stabilize them against erosion, enhance soil nutrients, and discourage the growth of some types of annual weeds. Thus, their disturbance would reduce the moisture capacity, nutrient availability, and erosion resistance of the disturbed areas' soils. This would therefore reduce the soils' productivity, fertility for vascular plants, and reduce reclamation success. At this time, the success of reclamation measures is poorly understood for the tract; therefore, the impacts would result from the disturbance of soil crust and would persist as long-term impacts. However, when feasible, crusts would be identified and preserved, and efforts would be made to inoculate newly replaced topsoil with biological soil crust spores.

4.13.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

4.13.4.1 TYPES AND NATURE OF IMPACTS TO SOILS

Under Alternative C, 1,662–2,064 acres of soils would be disturbed by surface mining and the construction of related facilities and roads. Of this total, 1,454–1,856 acres of soil resources would be disturbed by surface mining, and 208 acres would be disturbed by other related activities, including the construction of centralized and dispersed facilities, the relocation and construction of roads, and the grading of road ROWs. Impacts under Alternative C would be of the same type in nature as under Proposed Action, and they would (similarly) be considerably greater than under the No Action Alternative. Impacts to soils from current land uses on the tract from vegetation treatments, livestock grazing, and recreation would be discontinued under the Proposed Action and resume 31 years after mine-related activities begin (21 years for the life of the mine and 10 years for reclamation and rehabilitation).

4.13.4.2 IMPACTS TO SENSITIVE SOILS

4.13.4.2.1 Water-erosive Soils

Under Alternative C, 325–452 acres of highly erosive soils and an additional 1,187–1,537 acres of moderately erosive soils would be disturbed. Together, 99%–96% of all soil disturbances under this alternative would take place in highly or moderately erosive soils (see Table 4.28). This is slightly less disturbance of erosive soils than would take place under the Proposed Action. Impacts would be of the same nature as described for the Proposed Action in all other respects.

4.13.4.2.2 Drought-intolerant Soils

A total of 120–333 acres of highly drought-intolerant soils would be disturbed under Alternative C (see Table 4.29). An additional 61–79 acres of moderately drought-intolerant soils would be disturbed. Of the 412 acres of total disturbance in these soils, 357 acres would be disturbed in the surface-mining pit. Overall, 12%–20% of all soil disturbance under Alternative C would occur in highly or moderately drought-intolerant soils; 11%–17% of all disturbance would be associated with surface-mining removal and replacement of these soils (slightly less than under the Proposed Action). Impacts would be of the same nature as described for the Proposed Action in all other respects.

4.13.4.2.3 Saline Soils

No highly or moderately saline soils would be disturbed under any of the alternatives. Therefore, there would be a relatively low risk of poor reclamation success due to excess salinity in the soils, or to increases in salinity in downstream waters as a result of soil disturbance.

4.13.4.2.4 Sodic Soils

Impacts under Alternative C would be the same as described for the Proposed Action.

4.13.4.2.5 Shallow Soils

All of the soil disturbance under Alternative C would occur in areas where the soil's A horizon is less than 20 inches deep, or where the soil is at a high or moderate risk of limited reclamation due to its shallow depth (see Table 4.31). Under Alternative C, approximately 82% of all disturbance would occur in areas with less than a 10-inch-deep A horizon (slightly less than under the Proposed Action). Impacts would be of the same nature as described for Proposed Action in all other respects.

4.13.4.2.6 Alkaline Soils

No highly alkaline soils would be disturbed under any alternative. Under Alternative C, 233–257 acres of moderately alkaline soils would be disturbed, primarily in the surface-mining pit (slightly less than under the Proposed Action; see Table 4.32). Impacts would be of the same nature as described for Proposed Action in all other respects.

4.13.4.2.7 Biological Soil Crusts

Impacts would be of the same nature as described for Proposed Action, except that 306–332 fewer acres of predicted surface disturbance would occur under Alternative C.

4.13.5 Potential Mitigation Measures

Potential mitigation measures to reduce impacts to soil resources could include the following:

- Whenever feasible, direct haul topsoil to areas currently being reclaimed to retain viable biological components of the soil (seeds, root fragments and rhizomes, soil microbes).
- Identify and map rocky outcrops prior to disturbance; replace rocky outcrops with rock or rocky subsoil rather than topsoil to increase habitat diversity and increase the depth of topsoil available for reclamation elsewhere.

4.13.6 Unavoidable Adverse Impacts

Under the Proposed Action and Alternative C, the physical, structural, biological, and chemical properties of soils disturbed by surface mining would be unavoidably impacted. Post-mining soils would be far more uniform in thickness, structure, type, texture, nutrient availability, and chemistry. The existing soil structure would largely be eliminated by the removal and replacement of soils in areas that are surface mined. In addition, changes in bulk density would occur due to mixing, aeration, and compaction. In areas where sensitive soils are disturbed, their use in reclamation would limit the success of reclamation due to increased erosion, limited water hold capacity, high Ph, or high sodium content. These soil attributes would limit the establishment of vegetation relative to areas without sensitive soils.

Successful reclamation of soil structure and ecological function is assumed provided that reclamation practices are successfully implemented. Nevertheless, drought and other ecological factors outside of human control can limit the effectiveness of soil reclamation efforts by limiting soil productivity or increasing the time required for soil recovery.

4.13.7 Short-term Uses versus Long-term Productivity

The short-term removal and replacement of soils in areas that are surface mined would result in long-term changes in the productivity of soils under the Proposed Action and Alternative C. Soil productivity following mining and reclamation would be far less diverse and far more uniform. Soils capable of limiting productivity (i.e., sodic, acid-producing, droughty) that are currently present on the tract would be buried or mixed into other soils. Therefore, post-mining productivity may be slightly higher, but would also reduce the productivity of highly productive areas and reduce the prevalence of less productive areas. Some productivity would be lost due to the removal of soil structure and changes in soil properties. Despite the slight loss in productivity, the soil would still be able to support rangeland plants (native and suitable non-native species). The productivity of soils impacted by other mine-related activities (dispersed and centralized facilities, roads, and ROWs) would be eliminated or reduced during the life of the mine (25 years and 21 years under the Proposed Action and Alternative C, respectively). Soil productivity in areas that are only disturbed at their surface, or that are covered by facilities (that are eventually removed), would largely be restored once those facilities were removed because the severity of impact would be minor relative to areas that are surface mined.

4.13.8 Irreversible and Irretrievable Commitments of Resources

Under the Proposed Action and Alternative C, the physical, structural, biological, and chemical properties of soils that are removed for surface mining would be irreversibly altered (because it may take hundreds of years to reform). The productivity of soils impacted by other mine-related activities (dispersed and centralized facilities, roads, and ROWs) would be irretrievably removed or reduced until reclamation is completed at the tract's termination.

4.14 Transportation

The analysis of impacts to transportation near the tract is an assessment of the changes in LOS caused by the Proposed Action and alternatives. LOS is a measure of the quality of service on transportation infrastructure and generally indicates the level of traffic congestion. LOS on two-lane highways is a reflection of traffic flow conditions, average speed, and time spent following other vehicles. Three different alternatives are analyzed in this section. Each alternative considers different tract sizes and duration of operations. LOS is rated on a scale of A (the best) to F (the worst). Table 4.33 provides a description of LOS A–F (Fehr and Peers 2008).

Table 4.33. Intersection Level of Service Descriptions

Level of Service	Description of Traffic Conditions
A	Free Flow/Insignificant Delay Extremely favorable progression. Individual users are virtually unaffected by others in the traffic stream.
B	Stable Operations/Minimum Delays Good progression. The presence of other users in the traffic stream becomes noticeable.
C	Stable Operations/Acceptable Delays Fair progression. The operation of individual users is affected by interactions with others in the traffic stream.
D	Approaching Unstable Flows/Tolerable Delays Marginal progression. Operating conditions are noticeably more constrained.
E	Unstable Operations/Significant Delays Can Occur Poor progression. Operating conditions are at or near capacity.
F	Forced Flows/Unpredictable Flows/Excessive Delays Unacceptable progression with forced or breakdown of operating conditions.

Source: Fehr and Peers 2008.

4.14.1 Regulatory Framework

Coal haul trucks operating in the tract would be within the weight and size limitations established by the UDOT's Motor Carrier Division. There are also no regulations concerning the volume of coal haul trucks allowed on tract-associated roadways. Therefore, the weight and size of trucks as well as truck volume are not components of the analysis.

4.14.2 Alternative A: No Action

Under the No Action Alternative, ACD's application to lease the coal included in the Alton Coal Tract would not be approved, and the coal included in the tract would not be mined. Roads along the coal haul transportation route would continue to operate under their current LOS. Peak-hour LOS projected for 2020 under the No Action Alternative would continue to have low delays per vehicle and little to no congestion (Fehr and Peers 2008). Changes to LOS would not reach a level of significance. Under the No Action Alternative, coal haul trucks would use the coal haul transportation route to deliver coal from the Coal Hollow Mine (private mining area) to the rail loadout at Iron Springs. This activity would occur for the life of the Coal Hollow Mine (approximately 2–3 years).

Continued increases in population in Iron County, largely in and near the Cedar City area (as indicated in Section 3.12) could increase LOS on certain roads over time, regardless of mining activity.

4.14.3 Alternative B: Proposed Action

Under the Proposed Action, workers would commute from their homes to the tract according to the normal operating hours. Service operations would include delivery of diesel fuel and machine and equipment parts (daily or weekly), servicing of portable toilets (weekly or biweekly), servicing of permanent toilet facilities (monthly or bimonthly), removal of waste oil (weekly or biweekly), and incidental trips such as delivery of office supplies (bi-weekly or monthly), as necessary. Up to 100 workers would be employed at the tract. Although the traffic study completed by Fehr and Peers (2008) does not include projections of mine employee traffic, it is assumed that these employees would commute individually to the mine from communities within a one-hour to two-hour radius of the tract, resulting in an estimated 100 round-trips per day to and from the tract. Because of the proximity of the communities of Panguitch and Hatch to the tract, it is assumed that most of the commuter traffic would occur on US-89. The additional commuter traffic along US-89 would represent a 2% increase in ADT. Based on service and operations needs, it is estimated that no more than 20 service trips per week or an average of four round-trips per day to the tract would occur. This would be a 0.1% increase in ADT along US-89. Commuter traffic and service trips would represent a minimal contribution to traffic levels and would not result in any changes to LOS.

The following actions under the Proposed Action would result in impacts to LOS.

- An estimated 153 truck round-trips per day would occur to and from the tract and along the reasonably foreseeable loadout location.
- Mine operations would occur 24 hours a day, six days a week for the 25-year life of the mine.

The coal haul transportation route ADT on US-89 through Hatch and Panguitch is currently 3,600–4,100. The additional coal truck traffic would represent a 4% increase in ADT through Hatch and Panguitch when compared to the No Action Alternative. The ADT on SR-56 through Cedar City is 8,600 (Fehr and Peers 2008). The additional coal truck traffic would represent a 2% increase in ADT through Cedar City when compared to the No Action Alternative. Under the Proposed Action, traffic conditions at intersections and along road segments of the coal haul transportation route would continue to operate at their current, acceptable LOS-C or better. A traffic study conducted demonstrates that LOS-C or better would be maintained on all road segments and intersections of the coal haul transportation route (Fehr and Peers 2008). Capacity for additional traffic would remain, and increased traffic volume would not result in reductions in LOS or reach a level of significance.

4.14.4 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Impacts to transportation would be the same as those described under the Proposed Action but would occur over a 21-year period.

4.14.5 Potential Mitigation Measures

No transportation mitigation measures have been identified.

4.14.6 Unavoidable Adverse Impacts

Increase in vehicle traffic of no more than 4% in the tract and on the coal haul transportation route would occur over time under both action alternatives; however, no unavoidable adverse impacts to LOS would result from those increases.

4.14.7 Short-term Uses versus Long-term Productivity

Because there would be an increase in vehicle traffic of no more than 4%, surface mining and infrastructure development and use during the life of the mine would not impact the short-term use or the long-term productivity of local transportation.

4.14.8 Irreversible and Irretrievable Commitments of Resources

Under both action alternatives, there would be no irreversible impacts to transportation, because transportation resources would not be permanently altered as a result of mining operations on the tract. The increase in vehicle traffic that would occur during the life of the mine would be an irretrievable impact that would dissipate once mining operations ceased.

4.15 Vegetation

This section discusses the impacts of the Proposed Action and alternatives, as described in Chapter 2, on upland, wetland, and riparian vegetation. Upland vegetation communities in the tract are pinyon-juniper woodland, mountain brush, annual and perennial grasses, rabbitbrush, sagebrush/grassland, and sagebrush/grassland (treated) communities (Section 3.15). The meadow communities in the tract are considered potential wetlands for the purpose of this analysis due to the presence of predominately hydrophytic vegetation (Section 3.15.2.4). Impacts to riparian vegetation are analyzed separately.

4.15.1 Impact Indicators, Thresholds, and Analysis Assumptions

Acres of surface disturbance in the vegetation communities are used as the primary indicator of impacts to the vegetation resource by implementation of the alternatives. This disturbance would mainly be incurred by minerals development and construction activities as planned under both action alternatives.

Acres of increased susceptibility to noxious or weedy plant species invasion are also used as an indicator of impacts to this resource. Gelbard and Belnap (2003) found that weed densities were highest in vegetation up to 14 m (average) away from paved roads, although weeds were also found in areas farther away from the roads (up to 50 m, the extent of the survey area). This is mainly due to 1) weed seed transport during road construction, and subsequent vehicle traffic on roads; 2) ground disturbance during construction that creates bare soil, deeper soil, or soil with greater nutrient availability; and 3) soil compaction by construction and travel that creates conditions that favor invasive species (Gelbard and Belnap 2003). These factors are also similar to those that occur in other types of facilities construction and as a result of mining activities; therefore, a buffer would also be used around these areas for the purpose of this analysis. Increased susceptibility would be calculated by creating a GIS buffer of 30 m around roads, pipelines, construction areas, and surface-mined areas that would demark acres of land with an increased susceptibility to weed invasion. The 30-m buffer was chosen as a safe estimate for the likely spread of weed species; this is meant to represent 14 m with high weed occurrence (Gelbard and Belnap 2003) with an additional 16 m of lower weed occurrence. This model is not meant to predict the actual spread of weeds in the tract following mining operations, but illustrates that the potential for weed invasion is likely to increase in undisturbed lands adjacent to disturbance areas. Use of a buffered area around construction and mining areas would also allow for a more quantitative comparison between action alternatives. To simplify these calculations, environmental variables such as soil depth, vegetation community structure, slope, ecosystem health, and moisture availability in the surrounding areas would not be taken into consideration even though these factors do contribute to the ability of vegetation communities to withstand invasion. Data on these parameters in the tract are not currently available and an accurate model for invasion is not feasible at this time.

A site-specific, detailed mining and reclamation plan would be created by the lessee in consultation with DOGM. The operation portion of the plan requires the operator to promptly establish and maintain an interim vegetative cover on disturbed areas that would not be immediately redisturbed. The reclamation portion of this plan would include specifications for grading the surface to an acceptable PMT, replacement of salvaged topsoil to an acceptable depth over suitable overburden, and reestablishment of vegetation for the determined post-mining land use. Reestablishment of vegetation would serve to mitigate some of the negative effects of surface disturbance on vegetation communities. This is discussed in the Regulatory Framework and Lease Stipulations section of this chapter, as well as in the alternatives analyses. Revegetation would also increase the quality of vegetation communities over current conditions due to agency objectives for reclamation.

Consequences of increased dust due to area travel and construction is also analyzed for both action alternatives.

4.15.2 Regulatory Framework

There are numerous federal and state regulations that shape the management of vegetation resources. Regulations that pertain to vegetation and potential impacts from mining and other land uses include but are not limited to the following:

- The Taylor Grazing Act of 1934, as amended, provides for continued study of erosion and flood control, and provides for any work that may be necessary to protect and rehabilitate public lands to prevent soil deterioration.

- The ESA of 1973 protects endangered species and their habitat. This act is also used as a basis for eradicating non-native invasive species that threaten endangered species.
- The Federal CWA, with amendments in 1972 and 1977, has the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The CWA of 1987 provides additional authorizations.
- Section 404 of the Federal CWA requires the identification of all wetlands and waters under the jurisdiction of USACE, replacement of all jurisdictional and functional wetlands, and monitoring of reclaimed wetlands that may be impacted by proposed activities.
- The Federal Noxious Weed Act of 1974 authorizes measures to eradicate or control the spread of noxious weeds.
- The Federal Land Policy and Management Act of 1976 directs managers to determine areas suitable for livestock grazing under the multiple-use, sustained-yield mandate.
- The Public Rangelands Improvement Act of 1978 provides policy to manage, maintain, and improve public rangelands to increase productivity while remaining consistent with management objectives.
- The Plant Protection Act of 2000 consolidates and modernizes all major statutes pertaining to plant protection and quarantine (e.g., the Federal Noxious Weed Act, the Plant Quarantine Act).
- The Utah Seed Act (Utah Code, Title 4, Chapter 16) provides guidelines for the labeling and distribution of seeds, in conjunction with the Seed Law (Rule R68-8), which prohibits the sale and distribution of noxious weed seeds.
- The Utah Noxious Weed Act, as amended (Utah Code, Title 3 Chapter 17), authorizes measures to eradicate or control the spread of noxious weeds.
- The Utah Noxious Weed Act (Rule R68-9) designates State of Utah noxious weeds and sources capable of weed dissemination.

Utah coal mine permitting requirements for vegetation (Utah Administrative Code R645-301.300) include but are not limited to the following:

- Description of the vegetative resources of the tract and potential impacts to vegetation resources adequate to predict the potential for reestablishing vegetation.
- Description of the productivity of the land before mining in the tract.
- Reclamation designed to restore and enhance vegetation resources to a condition suitable for designated post-mining land uses. Control of erosion on reclaimed lands prior to seeding with final seed mixture using mulching, cover crops, or other approved measures.
- Monitoring of revegetation growth and diversity until release of final reclamation bond (after a minimum of 10 years).

Monitoring of erosion to identify any need for corrective action during the establishment of vegetation.

The KFO RMP and other BLM documents such as the Standards for Rangeland Health and Guidelines for Livestock Management have provided the framework for other required mitigation measures. The following standards would be applicable to vegetation resources and special status plant species:

- Using grazing exclosures and monitoring vegetation during revegetation to determine suitability for post-mining land uses.
- Controlling weed infestation chemically and mechanically.
- Directly hauling topsoil.

- Selectively planting shrubs in riparian areas.
- Planting sagebrush seedlings in addition to seeding the area with sagebrush.
- Creating depressions and rock piles.
- Using special planting procedures around rock piles.
- Promptly establishing interim vegetative cover in disturbed areas that would not be immediately redisturbed.

4.15.3 Actions that Would Cause Change to the Existing Vegetation Resource

4.15.3.1 ALTERNATIVE A: NO ACTION

Under the No Action Alternative, ACD's application to lease the coal included in the Alton Coal Tract would not be approved, the tract would not be offered for competitive lease sale, and the coal included in the tract would not be mined.

No coal mining activities or infrastructure development would occur under the No Action Alternative, and therefore no acres of vegetation communities would be disturbed. Likewise, no acres in the tract would be at an increased susceptibility to weed invasion due to actions associated with mining activities or infrastructure development.

Management of vegetation on BLM-administered lands in the tract would continue at the discretion of the BLM under the KFO RMP (2008a). Specifically, this would mean managing vegetation in the tract to improve wildlife habitat, increasing forage production for livestock grazing, providing watershed protection, and reducing soil loss. In addition to vegetation treatments and livestock grazing, other land uses such as OHV use would continue similar to current levels.

The use of vegetation management is emphasized under the KFO RMP. The management process restores sagebrush grasslands that have been invaded by pinyon-juniper woodlands for ecosystem restoration and watershed health. In the short term, vegetation treatments would increase the risk of invasion by noxious weeds and invasive species by vegetation removal and ground disturbance. Areas where vegetation treatments were not successful could be invaded by weed species and/or become infested with other undesired vegetation, which could also reduce the health of the upland communities over the long term. Implementing general treatment stipulations such as prescribed burning in lieu of mechanical treatment when suitable, evaluating treatment sites for soil suitability and stability prior to manipulation, and excluding livestock from all treatment areas until seedlings are established, would help facilitate reestablishment of the desired vegetation communities. Using desired species of grasses, forbs, and browse in the rehabilitation and reseeding of treated areas would facilitate vegetation reestablishment and avoid creating single-species communities.

Vegetation treatments, if successful, would have long-term benefits to the area by removing undesired species, increasing species diversity and age class of certain communities, improving vegetation composition and structure, and increasing overall vegetation cover. This would result in healthier woodlands, upland communities, and riparian areas that are more capable of retaining moisture and nutrients and resisting disease, invasive species, drought, and other natural disturbances and/or stressors.

Vegetation treatments could also improve watershed health, reduce soil loss, and enhance forage vegetation conditions. Implementing erosion-control measures in fragile watershed areas would help reduce short-term impacts such as soil erosion, surface runoff, and sedimentation of water sources. These vegetation treatments would help to reestablish upland communities, maintain or improve the health of riparian/wetland communities, reestablish seedlings and understory vegetation, and retain soil moisture and nutrients in forests and woodlands (2008b).

4.15.3.2 ALTERNATIVE B: PROPOSED ACTION

Under the Proposed Action, the Alton Coal Tract would be offered for lease at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the tract. The boundaries of the tract would be reasonably consistent with the tract reconfiguration completed by the BLM after ACD's original LBA submittal (see Map 1.2). A total of 1,993–2,395 acres of surface disturbance (surface mining and infrastructure development) would occur in the Alton Coal Tract under the Proposed Action. Underground mining would occur on 717 to 412 acres of land in the tract (depending on the extent of surface mining). Though subsidence related to underground mining is not expected to impact the overlying vegetation, any adverse effects would be repaired in accordance with DOGM rules and regulations (Utah Administrative Code 40-10). In Utah, the effects of subsidence usually consist of surface cracks, general ground lowering, and cliff fracture or failure (Personal Communication, Smith 2008).

4.15.3.2.1 Effects of Surface-mining Activities on Vegetation

Of the total 1,993–2,395 acres of surface disturbance that would occur in the Alton Coal Tract under the Proposed Action, 1,750–2,152 acres would be the direct result of surface-mining operations (pit disturbance). Of this total, approximately 17 acres would occur on existing roads and the remaining 1,733–2,135 acres would occur in the vegetation communities.

4.15.3.2.1.1 Upland Areas

Of the 3,437 acres of vegetated land in the tract to be impacted by surface mining, approximately 1,677–2,075 (49%–60%) would occur in upland areas. Of this total, 609–883 acres would be in pinyon-juniper communities, 315–383 acres would be in the sagebrush/grassland community, 472 acres would be in the sagebrush/grassland (treated) community, 259–280 acres would be in the annual and perennial grassland community, and 22–57 acres would be in the mountain brush community. This information is shown in Table 4.34.

Table 4.34. Acres of Upland Vegetation Communities Directly Disturbed by Surface Mining under the Proposed Action

Upland Vegetation Community	Acres Disturbed	Total Upland Acres in Tract	Percentage Disturbed by Surface Mining
Pinyon-juniper woodlands*	609.0–883.1	1,430.0	42.6%–61.8%
Sagebrush/grassland	314.9–383.1	860.2	36.6%–44.5%
Sagebrush/grassland (treated)	471.5	749.1	62.9%
Annual and perennial grasses	259.3–280.4	324.1	80.0%–86.5%
Mountain brush	22.0–57.1	62.8	35.0%–90.8%
Rabbitbrush	0.0	10.7	0.0%
Surface mining total	**1,676.7–2,075.2**	**3,436.9**	**48.8%–60.4%**

*This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Surface mining would result in the removal of 49%–60% of 3,437 acres of upland vegetation in the tract. These vegetation communities require long periods of time and the relative absence of invasive annual plant species (such as cheatgrass) in order to reestablish naturally. Active restoration would be needed after mining operations are complete and the land has been regraded. The reestablishment of vegetation is based on the ability of reclaimed soils to support new native and suitable non-native vegetation. See the Soils section of Chapter 4 for soils analysis.

Some vegetation communities, such as the mountain brush community (35%–91% reduction) would be very impacted by this disturbance. Likewise, 37%–45% of sagebrush/grassland acres, 63% of sagebrush/grassland (treated) communities, and 43%–62% of pinyon-juniper woodlands in the tract would also be eliminated due to surface-mining activities. Revegetation efforts would focus on restoring these areas to sagebrush and grassland ecosystems to benefit watershed health, wildlife, and livestock. Because of this, a total elimination of pinyon-juniper and mountain brush community acreages in the mining footprint would be likely in the short and long term.

Because annual and perennial grasses are not considered a native vegetation community, a reduction of 87% is not necessarily considered a loss to the resource. This is especially true of annual and perennial grasses displaced by surface mining that are to be revegetated with native and non-native rangeland-suitable vegetation at the completion of mining activities.

4.15.3.2.1.2 Wetland Areas

Disturbance due to surface mining is expected to impact 52.5 acres of meadow vegetation. This is approximately 84% of the total 62.8 acres of meadow vegetation in the tract. A reconnaissance-level wetland survey of these areas was conducted in July 2008 (Appendix F). This survey concluded that approximately 37.4 acres of these areas may be jurisdictional wetlands. Official wetland delineations would need to be completed in these areas and approved by the USACE before the actual extent of wetlands in this vegetation type can be determined. Acres of potential disturbance in wetland areas would require avoidance, minimization, or compensatory mitigation measures as approved by the USACE in a Section 404 permit that would be granted upon review of the official wetland delineation.

Canada thistle, the only listed noxious weed currently identified in the tract, is found in the meadow community. Further disturbance in this community would lead to an increase in the spread of this species in the tract.

4.15.3.2.1.3 Riparian Areas

Disturbance due to surface mining is expected to impact 3.8–7.1 acres of riparian vegetation. This is approximately 7%–13% of the total 55.3 acres of riparian vegetation in the tract. Revegetation of this area at the completion of mining activities would be required, with the objective of restoring riparian communities to achieve rangeland health standards and proper functioning condition (PFC).

4.15.3.2.2 Effects of Facilities Construction Activities on Vegetation

Centralized facilities associated with mining activities on the Alton Coal Tract would be located on approximately 36 acres of BLM-administered land in the tract’s no-coal zone (see Map 2.1). Other dispersed facilities such as temporary light-use roads and haul roads, electrical poles and lines, various temporary ponds and water-control structures, temporary topsoil and overburden stockpiles, and temporary berms and screens would result in approximately 160 acres of vegetation removal, and would be sited to avoid disturbances to wetlands, floodplains, stream channels, and intact sagebrush stands wherever possible. Where it is not possible to avoid disturbances to these areas, the mitigation measures described in the Regulatory Framework section above would be prescribed.

Approximately 36 acres of vegetation would be removed as a result of construction of centralized facilities. Of this total, 34.3 acres (96%) would be in the sagebrush/grassland (treated) community, and 1.4 acres (4%) would be in pinyon-juniper communities. This information is shown in Table 4.35.

Table 4.35. Acres of Upland Vegetation Communities Directly Disturbed by Construction of Centralized Facilities under the Proposed Action

Upland Vegetation Community	Acres Disturbed	Percentage Total Area Disturbed by Centralized Facility Construction
Pinyon-juniper woodlands*	1.4	4%
Sagebrush/grassland (treated)	34.3	96%
Centralized facilities construction total	**35.7**	**100**%

* This associa ion includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Land disturbed by construction of centralized facilities would remove approximately 1% of the total 3,437 acres of upland vegetation in the tract. The 34.3 acres of disturbance in the sagebrush/grassland (treated) vegetation community is approximately 5% of its total 749 acres. The 1.4 acres of disturbance in pinyon-juniper woodlands is less than 0.001% of all the land occupied by these communities (1,430 acres). No acres of riparian or wetland vegetation would be removed by construction of centralized facilities.

A total of 160 acres would be disturbed by construction of other dispersed facilities; however, the locations of these facilities have yet to be determined. To estimate vegetation disturbance from dispersed facility construction, total potential acreage was identified by acres of no-coal zone for each vegetation community (Table 4.36). This acreage was capped, when applicable, to the total maximum extent of disturbance (160 acres) and provides the most conservative estimate of potential dispersed facility impacts to tract vegetation. It is assumed that only a portion of the maximum potential acreage would be disturbed for each vegetation community. Total acres of dispersed facility disturbance were apportioned across vegetation communities based on their percentage of land in the tract (See Section 3.15.2). Based on this approach, 64.3 acres (40%) would be in pinyon-juniper communities, 38.6 acres (24%) would be in sagebrush/grasslands, and 33.4 acres (21%) would be treated sagebrush/grasslands. Remaining acres of disturbance would be distributed across other vegetation communities in the tract.

Care would be taken to avoid wetland and riparian areas when selecting sites for these facilities. Assuming that all these facilities would be placed in upland areas, this would represent a loss of approximately 5% of the 3,437 acres of upland vegetation communities in the tract. No acres of riparian or wetland vegetation would be removed by construction of dispersed facilities.

Table 4.36. Acres of Vegetation Communities Potentially Disturbed by Construction of Dispersed Facilities under the Proposed Action

Vegetation Community	Maximum Potential Acres Disturbed	Estimated Acres Disturbed
Pinyon-juniper woodlands*	160	64.3
Sagebrush/grassland	160	38.6
Sagebrush/grassland (treated)	160	33.4
Mountain brush	5.8	2.9
Annual and perennial grasses	39.1	14.6
Rabbitbrush	10.1	0.5
Riparian	47.6	2.4
Meadow	10.3	2.9

* This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

4.15.3.2.3 Effects of Road Relocation on Vegetation

Approximately 47 acres of vegetation in the tract would be removed due to surface disturbance (clearing) for the relocation of KFO Route 116 under the Proposed Action. Table 4.37 shows the acres of surface disturbance to each vegetation community that would occur due to the relocation of the actual road surface and due to the KFO Route 116 ROW.

Table 4.37. Acres of Vegetation Communities Directly Disturbed by Kanab Field Office Route 116 Relocation on BLM-administered Lands in the Tract under the Proposed Action

Vegetation Community	Acres Disturbed Road Surface	Acres Disturbed ROW	Total Acres in Tract	Percentage Disturbed by Road Relocation
Meadow	0.0	0.0	62.8	0%
Mountain brush	0.0	0.0	62.8	0%
Annual and perennial grasses	1.7	2.9	324.1	1.4%
Pinyon-juniper woodlands*	7.1	12.7	1,430.0	1.4%
Rabbitbrush	0.2	0.3	10.7	4.8%
Riparian	0.2	0.3	55.3	0.9%
Sagebrush/grassland	4.8	8.1	860.2	1.5%
Sagebrush/grassland (treated)	3.0	5.2	749.1	1.1%
Road relocation total	17.0	29.5	3,555.0	0.5%

* This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Road relocation by itself would not disturb large acreages of land in the tract. The greatest disturbance by percentage (4.8%) would occur in the sagebrush/grassland vegetation community. No disturbance due to road relocation would affect the meadow or mountain brush communities.

4.15.3.2.4 Increased Risk for Weed Invasion

Because of BMPs to be implemented during mining activities, it is assumed that no new weed species would be introduced to the tract. However, it is possible that weed species currently present in the tract could expand their ranges. This is especially likely for species such as cheatgrass that thrive in disturbance areas. Canada thistle, the only state-listed noxious weed in the tract, also tends to spread into disturbed areas (Morishita 1999). Soil and vegetation disturbance associated with mining are planned to occur in areas currently occupied by both these species under this alternative.

A 30-m buffer around all proposed roads, construction facilities, and surface mines was used to calculate the potential spread of weeds as a result of proposed activities under the Proposed Action. The results of these calculations are shown in Table 4.38.

Table 4.38. Acres of Land at Increased Risk for Weed Invasion under the Proposed Action

	Area (acres) or Length (miles)	Additional Area (acres) included in 30-m Buffer*	Total Acres at Increased Risk for Weed Invasion
Centralized facilities	35.8	9.5	45.3
Dispersed facilities	160.0	unknown	160.0 (plus unknown buffer)
KFO Route 116 relocation	12.9–16.9 (6.5 miles)	103.5–134.7	116.4–151.6
Surface mine	1,107.4–2,151.8	133.6–131.1	1,241.0–2,282.9
Total			**1,562.6–2,639.8**

* Some buffered areas extend outside the tract.

Mined areas, even though they are to be revegetated at the completion of activities, would still be susceptible to weed invasion. Disturbed soils are generally more susceptible to invasion (DiTomaso 2000); the soils in these areas would be repositioned and regraded and would otherwise be dissimilar to the native soils that existed pre-disturbance.

The construction and mining activities proposed under the Proposed Action would increase the acres of land susceptible to weed invasion by 1,563–2,640 acres over the No Action Alternative. This acreage includes the 30-m buffers as well as the mined and construction footprint areas.

4.15.3.2.5 Revegetation

Under the Proposed Action, recoverable portions of in-place coal reserves would be mined over approximately 25 years using surface and underground mining methods. Reclamation would be concurrent with mining over the course of the estimated 25-year mine life, and would be followed by a potential 10-year reclamation and revegetation monitoring period.

The entire 1,677–2,075 acres affected by surface mining under the Proposed Action would be revegetated. The 196 acres of vegetated land affected by centralized and dispersed facilities construction would also be revegetated as deconstruction occurs. Specific revegetation plans, including target communities for restoration, would be made by the lessee in accordance with guidance from the BLM and DOGM. Wetland revegetation plans would have to be made in accordance with USACE guidelines and mitigation requirements. General methods for revegetation are outlined in Chapter 2.

Revegetation in the mining and development footprint would change the distribution of vegetation communities. Reclamation measures proposed include an overall reduction in pinyon-juniper woodlands and an increase in sagebrush and grassland communities.

4.15.3.2.6 Other Actions

Increased traffic on highways and new roads, construction, and mining would lead to an increase in fugitive dust, which would create short-term direct negative impacts to vegetation in all the communities in the tract and the surrounding area. Dust on the surface of leaves inhibits stomatal function and photosynthesis (Hirano et al. 1995), and therefore impacts overall plant health. Dust would impact vegetation in the tract and surrounding area for the life of mining operations on the tract.

The effects of vegetation management would be the same as under Alternative A, outlined in the Impact Indicators, Thresholds, and Analysis Assumptions section above.

4.15.3.2.7 Summary of Effects of Management Actions on Vegetation under the Proposed Action

The acres of vegetation affected by each type of surface disturbance under the Proposed Action are shown in Table 4.39. Acres affected by underground mining are not shown because these would not result in direct removal of vegetation at the surface.

Table 4.39. Acres of Each Vegetation Community to be Removed Due to Surface-disturbing Activities in the Alton Coal Tract under the Proposed Action

Vegetation Community	Total Acres in Tract	Acres Disturbed by:				Total Acres Removed[1]	Percentage Total to be Disturbed
		Surface Mining	Centralized Facilities Construction	Dispersed Facilities Construction[2]	KFO Route 116 Relocation		
Pinyon-juniper woodlands[3]	1,430.0	609.0–883.1	1.4	64.3	19.8	694.4–968.5	48.6%–67.7%
Sagebrush/grassland	860.2	314.9–383.1	–	38.6	12.9	366.5–434.7	42.6%–50.5%
Sagebrush/grassland (treated)	749.1	471.5	34.3	33.4	8.2	547.5	73.1%
Annual and perennial grasses	324.1	259.3–280.4	–	14.6	4.6	278.4–299.6	85.9%–92.4%
Meadow	62.8	52.5	–	2.9	–	55.5	88.3%
Mountain brush	62.8	22.0–57.1	–	2.9	–	24.9–60.0	39.6%–95.5%
Riparian	55.3	3.8–7.1	–	2.4	0.5	6.7–10.0	12.1%–18.1%
Rabbitbrush	10.7	–	–	0.5	0.5	1.0–1.0	9.2%–9.2%
Total	**3,555.0**	**1,732.9–2,134.8**	**35.7**	**160**	**46.5**	**1,974.8–2,376.7**	**55.6%–66.9**

[1] In addition to dispersed facilities to be constructed.

[2] Specific placement of facilities is unknown at this time; however, acres of vegetation removal were estimated by apportioning total dispersed facility acres across vegetation communities based on their percentage of land in the tract. Additional information on this approach, as well as a more conservative estimate of total potential acreage, is discussed in Section 4.15.3.2.2.

[3] This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Within the total 3,555 acres of land in the tract currently occupied by vegetation, 1,815–2,217 acres, or 51%–62% of these, would be removed due to surface-mining and construction activities. Approximately 35%–91% of the vegetation in the mountain brush community would be removed, approximately 84% of the vegetation in the meadow community and 81%–88% in the annual and perennial grasses community would be removed, 44%–63% of the vegetation in the pinyon-juniper woodlands would be removed, 69% of the vegetation in the sagebrush/grassland (treated) community would be removed, and 38%–46% of the vegetation in the sagebrush/grassland community would be removed. Approximately 8%–14% of vegetation in the riparian community would also be removed.

Vegetation in the tract and surrounding areas would be negatively impacted by dust from increased travel and construction activities during the life of mining operations.

All areas affected by surface mining and facilities and road construction would be revegetated at the completion of the mine activities. However, it would be assumed that revegetated areas would still be susceptible to weed invasion due to the increased nutrient availability of disturbed soils that favors invasive species colonization (Lowe et al. 2003). A 30-m buffer around these areas (see rationale in this chapter's Introduction section) leads to 1,563–2,640 acres that would become more susceptible to invasion by noxious and invasive weeds because of mining and infrastructure development activities.

4.15.3.3 ALTERNATIVE C: REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS

Under Alternative C the tract would be modified to exclude Block NW (see Map 2.1). Further, certain mining activities in Block S would be subject to seasonal restrictions to reduce impacts to the local sage-grouse population. Under Alternative C, the modified tract would be offered for lease at a sealed-bid, competitive lease sale subject to standard and special lease stipulations developed for the tract. The boundaries of the modified tract would be reasonably consistent with the configuration shown in Map 2.1.

Consistent with the purpose and need for the action, the intent of Alternative C is to resolve in part or in full issues related to the local sage-grouse population, noise, and visual impacts to the town of Alton as well as issues related to conflicting land uses (agriculture versus surface mining). Alternative C may also reduce impacts to other resources such as AVF, springs and surface waters, wildlife, soils, public health and safety, paleontological resources, cultural resources, and vegetation. Potential impacts to vegetation would be the same as described under the Proposed Action (see Section 4.15.3.2)

4.15.3.3.1 Effects of Surface-mining Activities on Vegetation

Of the total 1,662–2,064 acres of surface disturbance that would occur in the Alton Coal Tract under Alternative C, 1,454–1,856 acres would be the direct result of surface-mining operations (pit disturbance). Of this total, 11 acres of disturbance would occur on existing roads, and the remaining 1,443–1,845 acres would occur in vegetation communities.

4.15.3.3.2 Upland Areas

Under Alternative C, approximately 1,439–1,838 (46%–59%) of the 3,107 acres of vegetated uplands in the tract would be disturbed by surface mining (Table 4.40). Of this total, 22–57 acres would be in mountain brush, 182–203 acres would be in annual and perennial grasses, 602–876 acres would be in pinyon-juniper communities, 162–230 acres would be in the sagebrush/grassland community, and 472 acres would be in the sagebrush/grassland (treated) community. Active restoration would be needed after mining operations are complete and the land has been regraded.

Table 4.40. Acres of Upland Vegetation Communities Directly Disturbed by Surface Mining under Alternative C

Upland Vegetation Community	Acres Disturbed	Total Acres in Tract	Percentage Disturbed by Surface Mining
Pinyon-juniper woodlands*	601.7–875.7	1,409.7	42.7%–62.1%
Sagebrush/grassland (treated)	471.5	749.1	62.9%
Sagebrush/grassland	161.7–229.9	627.8	25.8%–36.6%
Annual and perennial grasses	182.2–203.4	247.0	73.8%–82.3%
Mountain brush	22.0–57.1	62.8	35.0%–90.9%
Rabbitbrush	0.0	10.7	0.0%
Surface Mining Total	**1,439.1–1,837.6**	**3,107.1**	**46.3%–59.1%**

* This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Some vegetation communities such as the mountain brush community (35%–91% reduction) would be very impacted by this disturbance. Likewise, approximately 26%–37% of sagebrush/grassland acres, 63% of sagebrush/grassland (treated) communities, and 43%–62% of pinyon-juniper woodlands in the tract would also be eliminated due to surface-mining activities. Revegetation efforts would focus on restoring these areas to sagebrush and grassland ecosystems in order to benefit the watershed, wildlife, and livestock; and as such, a total elimination of pinyon-juniper and mountain brush community acreages in the mining footprint would be likely in the short and long term.

Because annual and perennial grasses are not considered a native vegetation community, a reduction of 74%–82% is not considered a loss to the native vegetation resource. Impacts to annual and perennial grasses removed during surface mining and associated activities would be mitigated by reclamation and revegetation with native and non-native rangeland-suitable plants upon completion of mining activities.

4.15.3.3.2.1 Wetland Areas

Disturbance due to surface mining would not impact the meadow vegetation community because the area containing the meadow vegetation community would not be included in the tract under this alternative.

4.15.3.3.2.2 Riparian Areas

Disturbance due to surface mining is expected to remove 3.7–7.0 acres of riparian vegetation. This is approximately 8%–14% of the total 54 acres of riparian vegetation in the tract. Revegetation of this area at the completion of mining activities would be required, and would lead to an increase in vegetation quality due to the requirements of rangeland health standards and agency objectives for reclamation.

4.15.3.3.3 Effects of Facilities Construction Activities on Vegetation

Centralized facilities associated with mining activities on the Alton Coal Tract would be located on approximately 36 acres of BLM-administered land in the tract's no-coal zone (see Map 2.1). This is the same as under the Proposed Action.

Dispersed facilities would occupy 135 acres of land in the tract. The placement of these facilities would be the same as under the Proposed Action. although the maximum potential and estimated vegetation disturbance by vegetation community would be less due to the smaller size of the tract under this alternative (Table 4.41).

Table 4.41. Acres of Vegetation Communities Potentially Disturbed by Construction of Dispersed Facilities under Alternative C

Vegetation Community	Maximum Potential Acres Disturbed	Estimated Acres Disturbed
Pinyon-juniper woodlands*	135	60.2
Sagebrush/grassland	135	26.8
Sagebrush/grassland (treated)	135	32.0
Mountain brush	5.8	2.7
Annual and perennial grasses	39.9	10.5
Rabbitbrush	10.2	0.5
Riparian	46.5	2.3

* This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Avoidance criteria would also be the same as under the Proposed Action. Assuming construction of dispersed facilities takes place in upland areas, this would be a loss of an additional 135 acres of upland vegetation, or 4% of the total 3,107 upland acres in the tract.

4.15.3.3.4 Effects of Road Relocation on Vegetation

Approximately 36 acres of vegetation on BLM-administered land in the tract would be removed due to the relocation of KFO Route 116 under Alternative C (Table 4.42).

Table 4.42. Acres of Vegetation Communities Directly Disturbed by Kanab Field Office Route 116 Relocation on BLM-administered Lands in the Tract under Alternative C

Upland Vegetation Community	Acres Disturbed Road Surface	Acres Disturbed ROW	Total Acres in Tract	Percentage Disturbed by Road Relocation
Pinyon-juniper woodlands*	5.9	10.4	1,409.7	1.2%
Sagebrush/grassland (treated)	3.0	5.2	749.1	1.1%
Sagebrush/grassland	2.6	4.6	627.8	1.1%
Annual and perennial grasses	1.4	2.4	247.0	1.5%
Mountain brush	0.0	0.0	62.8	0.0%
Riparian	0.1	0.2	54.0	0.6%
Rabbitbrush	0.2	0.3	10.7	4.7%
Meadow	0.0	0.0	0.0	0.0%
Road relocation total	**13.2**	**23.1**	**3,161.1**	**11.5%**

*This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Road relocation alone would not disturb large acreages of land in the tract. The greatest disturbance by percentage (4.7%) would occur in the rabbitbrush vegetation community. No disturbance due to road relocation would affect meadow or mountain brush communities. These acreages are similar to those under the Proposed Action.

4.15.3.3.5 Increased Risk for Weed Invasion

Because BMPs would be implemented during mining activities, it is assumed that no new weed species would be introduced to the tract. However, it is possible that weed species currently present in the tract could expand their ranges. Canada thistle, the only state-listed noxious weed in the tract, also tends to spread into disturbed areas (Morishita 1999). Soil and vegetation disturbance associated with mining are planned to occur in areas currently occupied by both these species under this alternative.

A 30-m buffer around all proposed roads, construction facilities, and surface mines was used to calculate the potential for spread of weeds as a result of proposed activities under Alternative C. The results of these calculations are shown in Table 4.43.

Table 4.43. Acres of Land at Increased Risk for Weed Invasion under Alternative C

	Area (acres) or Length (miles)	Additional Area included in 30-m Buffer*	Total Acres at Increased Risk for Weed Invasion
Centralized Facilities	35.7	9.5	45.2
Dispersed Facilities	135.0	unknown	135.0 (plus unknown buffer)
KFO Route 116 Relocation	13.2–16.9 (4.6 miles)	105.5–134.7	118.7–151.6
Surface Mine	1,454.0–2,151.8	122.1–131.1	1,576.1–2,282.9
Total			**1,875.0–2,614.7**

*Some buffered areas extend into the surrounding nontract area.

The construction and mining activities proposed under Alternative C would increase the acres of surface disturbance and land susceptible to weed invasion by 1,875–2,615 acres over the No Action Alternative. This includes the mining and construction footprint areas, as well as the 30-m buffers around these disturbances. Mined areas, even though they are to be revegetated at the completion of activities, would still be susceptible to weed invasion. Disturbed soils are generally more susceptible to invasion (DiTomaso 2000); the soils in these areas would be repositioned and alcinat and would otherwise be dissimilar to the native soils that existed pre-disturbance.

4.15.3.3.6 Revegetation

Under Alternative C, recoverable portions of in-place coal reserves would be mined over approximately 21 years using surface and underground mining methods. Reclamation would be concurrent with mining over the course of the estimated 21-year mine life and would be followed by a minimum 10-year reclamation and revegetation monitoring period.

The entire 1,443–1,845 acres affected by surface mining under Alternative C would be revegetated. The 171 acres affected by centralized and dispersed facilities construction would also be revegetated as deconstruction occurs. Specific revegetation plans, including target communities for restoration, would be

implemented by the lessee in accordance with guidance from the BLM and the DOGM. Wetland revegetation plans would have to be made in accordance with USACE guidelines and mitigation requirements. General methods for revegetation are outlined in Chapter 2.

Revegetation in the mining and development footprint would most likely change the distribution of vegetation communities; mainly as a reduction in pinyon-juniper woodlands and an increase in sagebrush and grassland communities.

4.15.3.3.7 Other Actions

Increased traffic on highways and new roads, construction, and mining would lead to an increase in fugitive dust, which would create short-term direct negative impacts to vegetation in all the communities in the tract and the surrounding area. Dust on leaf surfaces inhibits stomatal function and photosynthesis (Hirano et al. 1995) and reduces overall plant health. This effect is likely to be felt by vegetation in the tract and surrounding area for the life of the tract.

The effects of vegetation management would be the same as described under Alternative A.

4.15.3.3.8 Summary of Effects of Management Actions on Vegetation under Alternative C

The acres of vegetation affected by each type of surface disturbance are shown in Table 4.44. Acres affected by underground mining are not shown because they would not result in direct removal of vegetation at the surface.

Table 4.44. Acres of Each Vegetation Community to be Removed Due to Surface-disturbing Activities in the Alton Coal Tract under Alternative C

Vegetation Community	Total Acres in Tract	Acres Disturbed by:				Total Acres Removed[1]	Percentage Total to be Disturbed
		Surface Mining	Centralized Facilities Construction	Dispersed Facilities Construction[2]	KFO Route 116 Relocation		
Meadow	0.0	–	–	0	–	0.0	0%
Mountain brush	62.8	22.0–57.1	–	2.7	–	24.7–59.8	39.3%–95.2%
Annual and perennial grasses	247.0	182.2–203.4	–	10.5	3.8	196.5–217.6	79.6%–88.1%
Pinyon-juniper woodlands[3]	1,409.7	601.7–875.7	1.4	60.2	16.3	679.5–953.5	48.2%–67.6%
Rabbitbrush	10.7	–	–	0.5	0.5	0.9	8.0%
Riparian	54.0	3.7–7.0	–	2.3	0.3	6.3–9.6	11.7%–18.0%
Sagebrush/grassland	627.8	161.7–229.9	–	26.8	7.2	195.7–263.9	31.2%–42.0%
Sagebrush/grassland (treated)	749.1	471.5	34.3	32	8.2	546.1	72.9%
Total	**3,161.1**	**1,442.8–1,844.6**	**35.7**	**135**	**36.3**	**1,649.7–2,051.4**	**52.2–64.9**

[1] In addition to dispersed facilities to be constructed.

[2] Specific placement of facilities is unknown at this time; however, acres of vegetation removal were estimated by apportioning total dispersed facility acres across vegetation communities based on their percentage of land in the tract. Additional information on this approach, as well as a more conservative estimate of total potential acreage, is discussed in Section 4.15.3.3.3.

[3] This association includes areas of pinyon-juniper/mountain brush, pinyon-juniper/sagebrush, and pinyon-juniper/sagebrush/mountain brush communities.

Within the total 3,161 acres of land in the tract currently occupied by vegetation, 1,650–2,052 acres (52%–65%) would be removed due to surface-mining and construction activities (including 135 acres for dispersed facilities). Thirty-five percent to 90% of the vegetation in the mountain brush community would be removed, approximately 75%–83% of the vegetation in the annual and perennial grasses community would be removed, 44%–63% of the vegetation in the pinyon-juniper woodlands would be removed, 69% of the vegetation in the sagebrush/grassland (treated) community would be removed, and 27%–38% of the vegetation in the sagebrush/grassland community would be removed. Approximately 8%–14% of vegetation in the riparian community would also be removed and no acres of the meadow community would be removed.

All areas affected by surface mining and facilities and road construction would be revegetated at the completion of mine activities. However, it is assumed that revegetated areas would still be susceptible to weed invasion due to the increased nutrient availability of disturbed soils that favors invasive species colonization (Lowe et al. 2003). A 30-m buffer out from these areas (see rationale in this chapter's Introduction section) leads to 1,875.0–2,614.7 acres that would become more susceptible to invasion by noxious and invasive weeds because of soil and vegetation disturbance resulting from mining and infrastructure development activities.

Vegetation in the tract and surrounding areas would be negatively impacted by dust from increased travel and construction activities during the life of mining operations.

4.15.4 Potential Mitigation Measures

The protective measures for vegetation described above and in the Management and Considerations Common to Each Action Alternative section of Chapter 2 would mitigate and/or minimize impacts to vegetation resources in the tract. These mitigation measures would help to reduce the amount and severity of weed infestations and would help to restore native vegetation communities. No potential mitigation measures are recommended.

4.15.5 Unavoidable Adverse Impacts

Unavoidable adverse impacts would occur where vegetation resources are removed during mining pit disturbance, soil stockpiling, road and infrastructure development, and other mine operations. These impacts would be mitigated by site reclamation and revegetation concurrent with mining that would minimize soil loss or weed invasion in disturbed sites. Unavoidable loss would occur where special status plant species are not detected or identified during surveys and are subsequently lost. Implementation of mitigation and monitoring plans would reduce the risk of loss or destruction of special status plant species. Unavoidable loss of special status plant species due to nondetection or loss of function in native vegetation communities from inadvertent adverse impacts would also occur.

4.15.6 Short-term Uses versus Long-term Productivity

Surface mining and infrastructure development and use during the life of the mine would negatively impact the short-term productivity of vegetation communities. The vegetation communities present in the tract are typically slow to recover from disturbance. Productivity would be limited during reclamation and restoration activities for the time period required for plants to grow to mature size and for the development of functioning vegetation communities. Long-term productivity would be reduced because vegetation communities are unlikely to be fully developed immediately following mining and restoration activities. Until vegetation communities are fully developed, these habitats would be less diverse (Belnap et al. 2001) and less productive (Garcia-Pichel and Belnap 1996) where ecologically important habitat components such as biological soil crusts have been lost. Effective implementation of the regulatory compliance and mitigation measures outlined in Chapter 2 and enumerated above would minimize impacts to the long-term productivity of vegetation communities.

4.15.7 Irreversible and Irretrievable Commitments of Resources

The protective measures detailed in Chapter 2 and enumerated above require the reclamation of disturbed areas following completion of the management action. Because vegetation resources would be restored or rehabilitated after proposed disturbance and/or development, there would be no anticipated irreversible impacts on vegetation resources associated with the management decisions proposed for the tract. However, there would be irretrievable impacts associated with surface-disturbing activities proposed throughout the tract. The vegetation that would be removed or disturbed to facilitate mining would be irretrievably lost until successful restoration took place.

4.16 Water Resources

This section addresses potential impacts on surface water, groundwater, wetlands and riparian areas, floodplains, and AVFs due to the removal of coal from the Alton Coal Tract using primarily surface-mining methods. Direct and indirect effects would consist of 1) surface-water depletions, 2) potential degradation of surface-water quality from increased sediment delivery and subsequent changes in turbidity, dissolved solids, or temperature, 3) groundwater depletions, 4) potential degradation of groundwater quality from increased TDS, 5) disturbance to wetland and riparian areas and floodplains, and 6) indirect impacts to AVFs that may exist adjacent to areas where surface mining would occur (in a reconnaissance-level survey there were no probable AVFs identified in areas that would be surface mined). Impacts to the quality of deep groundwater are not discussed in the alternatives analysis because no impacts are expected to deep groundwater resources (as described in Section 3.16.2.) under any alternative. Under any action alternative the successful bidder would be required to comply with state and federal mining regulations intended to reduce or eliminate impacts to surface and groundwater resources (see Table 2.3 and Section 4.16.1). Hazardous materials contained and used in the tract represent a risk of contamination to near-surface groundwater and surface-water resources from spills. Spills would be contained and mitigated in accordance with applicable state and federal regulations dealing with hazardous materials (see Table 2.3 and Section 4.7.1). Transportation of coal by truck from the tract to a rail loadout near Cedar City, Utah, represents a risk to surface-water resources near the coal haul transportation route due to coal dust and potential accidents. Potential subsidence in the portion of the tract that would be underground mined could result in changes to surface draining and deterioration of surface water quality and changes to groundwater levels, flow, and quality.

4.16.1 Regulatory Framework

Numerous federal and state regulations shape the management of water resources. Regulations that pertain to water resources and potential impacts from mining and other land uses include but are not limited to the following:

- The Fish and Wildlife Coordination Act (1934), as amended, provides the basic authority for USFWS's involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. The Water Resources Act of 1954, as amended, permits the Secretary of the Interior to give grants to and cooperate with federal, state, and local agencies to undertake research into any water problems related to the DOI’s mission.
- The Water Resources Planning Act of 1965, as amended, established the Water Resources Council, which is directed to maintain studies of water supplies and water programs. The chairman of any river basin commission can request from an agency, and that agency is authorized to furnish, such information as is necessary to carry out its function.

- The Federal CWA (1977) – The Federal Pollution Control Act, with amendments 1972 and 1977, has the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The CWA of 1987 provides additional authorizations.
- The Federal Land Policy and Management Act of 1976 requires that public lands be managed in a manner that will protect scientific, environmental, air and atmospheric, and water resource values. It also requires land-use plans to be in compliance with applicable pollution control laws, including state and federal air, water, and other pollution standards.
- SMRCA requires federal agencies to gather hydrologic data to ascertain the suitability for mining.
- The Safe Drinking Water Act of 1977 protects all public water systems from pollutants or contaminants that would endanger public health and welfare. Activities on public lands in these watersheds must not cause contaminant levels to exceed promulgated standards.

The KFO RMP, other BLM, and state regulations have provided the framework for other required mitigation measures. The following standards would be applicable to water resources and compel mitigation for impacts to water resources related to mining the tract:

- UPDES permitting process administered by the Utah Division of Water Quality requires that a water quality discharge permit be obtained for construction and coal mining operations. UPDES storm water permits require BMPs to mitigate storm water discharge. After August 1, the successful bidder would be required to monitor turbidity in storm water to assure compliance with Effluent Limit Guidelines 280 Nephelometer Turbidity Units (40 CFR Part 450).
- The Division of Water Rights may require issuance of a permit for the diversion and/or evaporation of water associated with retention ponds.
- Spill Prevention, Control, and Countermeasure (SPCC) regulations apply to any operation with greater than 1,320 gallons of oil storage capacity on-site. Regulated facilities also include those that could reasonably be expected to discharge oil in harmful quantities into the navigable waters of the U.S. or adjoining shorelines.
- The DOGM permitting process has multiple provisions for the mitigation of potential impacts to water resources.
- Build and maintain sediment control ponds or other devices during mining.
- Monitor storage capacity in sediment ponds.
- Monitor quality of discharges through the UPDES permit.
- Restore approximate original drainage patterns during reclamation.
- Monitor streamflow and water quality and selected springs in and adjacent to the tract.
- Restore stock ponds and playas during reclamation.
- Identify all wetlands that would be affected by mining.
- Identify jurisdictional wetlands as required by USACE and replace any that would be disturbed by mining.
- Replace functional wetlands as required by surface managing agency, surface landowner, and/or DOGM.
- Monitor reclaimed wetlands using the same procedures used to identify pre-mining jurisdictional wetlands.
- Repair subsidence-related disturbances in accordance with Utah Administrative Code 40-10.

4.16.2 Impact Indicators, Thresholds, Area of Analysis, and Assumptions

4.16.2.1 SURFACE WATER

The analysis area for direct and indirect impacts to the Proper Functioning Condition of streams is the Alton Coal Tract. Impacts to stream channel condition are assessed according to the length of stream altered or realigned and the number of stream crossings required for mining operations. It is assumed that a portion of Robinson Creek would be realigned to allow surface mining to occur. In addition, one or two stream crossings of Kanab Creek would be required.

The tract is located in parts of three sub-drainages (HUC 12) of Kanab Creek. These sub-drainages are Reservoir Canyon, Lower Robinson Creek, and Sink Valley Wash. The analysis area for direct and indirect impacts on surface water is the area (40,040 acres) of these three sub-drainages (Map 3.16).

Impacts to surface-water hydrology in this section are assessed by estimating the total annual runoff from the tract that would be collected in ponds. Water collected in ponds would be subject to increased evaporation and infiltration, which would constitute a loss of runoff to surface waters.

Impacts to surface-water quality are primarily assessed by qualitatively describing the risk of impairment of surface waters, as indicated by state water quality standards, which serve as threshold indicators for surface-water quality impacts. The criteria used for all surface waters are those listed by the State of Utah for Kanab Creek; the creek's most stringent criteria are for the beneficial use as a warm water fishery (3B). Risk of impact measurements under each alternative included the area of each surface use or disturbance, such as roads, graded ROWs, facilities, soil stockpiles, and mine pits. Impacts to surface-water quality along the coal haul transportation route are assessed in terms of tons of coal dust and fugitive dust deposited on surface waters. The miles of stream within 100 feet of the coal haul transportation route and the number of times the coal haul route crosses streams are used to assess impacts from dust deposition as well as risk of spills associated with the transportation of hazardous materials.

In addition, impacts to surface-water quality are assessed through the linear feet of creek realigned (to indicate the relative magnitude of thermal impacts and increases in dissolved solids and other constituents).

In the analysis it is assumed that surface runoff from all pit disturbances and centralized facilities would be captured in sediment retention ponds. The area draining to the ponds is assumed to be the total projected surface disturbance from pits and centralized facilities (1,786–2,188 acres under the Proposed Action, and 1,490–1,892 acres under Alternative C). Water would not be released from these ponds; therefore it is assumed that the ponds would be 100% effective at controlling sediment. Water would be lost only to evaporation or infiltration. Water loss from the ponds is estimated using local evaporation rates on a per-unit area basis. It is assumed that there would be minor recharge to shallow groundwater systems from pond infiltration due to the low permeability of these aquifers. In either case, the retention ponds represent a 100% loss of surface water from the tract for immediate use by irrigators downstream. Sediment runoff would not be captured in retention ponds from dispersed facilities and the relocation of KFO Route 116. It is assumed that sediment from these areas would be controlled using BMPs such as silt fencing, straw wattles, matting, etc, as required by UPDES storm water permitting.

Because underground mining activities produce unique risks to surface-water systems, a separate qualitative summary of potential subsidence and hydrologic changes from underground mining is also provided. Additional discussion of subsidence impacts is provided in Section 4.6, Geology and Minerals. The acreage subject to subsidence-related impacts is the same under both action alternatives.

4.16.2.2 GROUNDWATER

The analysis area for direct and indirect impacts on groundwater quality is the area that would be disturbed as a result of surface mining (1,750–2,152 acres under the Proposed Action and 1,454–1,856 acres under Alternative C). Impacts to groundwater hydrology are assessed according to groundwater losses due to reduced recharge, consumptive use for coal mining activities, loss of coal moisture, and evaporation of groundwater exposed in pits.

Impacts to groundwater quality are assessed by qualitatively describing the risk of impairment of shallow groundwater, as indicated by state surface-water quality standards, for typical underground water uses in the area as identified in the Utah Division of Water Rights database (i.e., irrigation and stock watering). The principal parameter of concern for these groundwater uses is TDS. The Utah TDS standard for irrigation is less than 1,200 mg/L, and for stock watering the TDS standard is less than 2,000 mg/L.

The moisture content of coal in the Smirl Coal Zone is 13% and includes moisture that is bound in the organic matter and/or hydrated clays found in the coal zone. It represents an additional groundwater resource separate from mined groundwater that could be lost due to removal of 2 million tons of coal per year under both the Proposed Action and Alternative C.

As with surface-water resources, underground mining impacts to groundwater from subsidence and hydrology changes are discussed qualitatively as a separate analysis. Additional discussion of subsidence impacts is provided in Section 4.6, Geology and Minerals. The acreage subject to subsidence-related impacts is the same under both action alternatives.

4.16.2.3 WETLANDS, RIPARIAN AREAS, FLOODPLAINS, AND ALLUVIAL VALLEY FLOORS

The area of analysis for wetlands, riparian areas, floodplains, and AVFs is the tract and its immediate surroundings. The impact indicator for these areas is acres of disturbance in each zone based on GIS analysis of the tract and surrounding areas.

For purposes of analysis, and based on existing GIS data, approximately 62.8 acres of private surface in Block NW is assumed to be jurisdictional wetlands. A preliminary field assessment of this area was also conducted. According to this assessment, approximately 37.5 acres of this area exhibit wetland characteristics including dominant presence of hydrophytic vegetation and hydric soils. Data on wetland hydrology were not collected as part of the preliminary field assessment. Because the preliminary field assessment was conducted on a reconnaissance level the larger acreage figure is used in the analysis. A complete wetland delineation would be required under Section 404 of the CWA during the DOGM-permitting process.

With respect to floodplains it is assumed that any in the tract would be subject to protections and regulations detailed in EO 11988. Areas identified as probable AVFs during a reconnaissance-level survey (see Appendix E) are assumed to be AVFs in the analysis. During the permitting process, a more extensive study to determine the presence of AVFs would be required. For the purposes of this analysis, it is further assumed that floodplains are included in the AVF determination (Petersen Hydrologic 2008).

4.16.3 Alternative A: No Action

Under the No Action Alternative, ACD's application to lease the coal included in the Alton Coal Tract under the Proposed Action or Alternative C would not be approved, the tract would not be offered for competitive lease sale, and the coal in the tract would not be mined.

No coal-mining activities or infrastructure development would occur under the No Action Alternative, and therefore no surface disturbance would occur in the tract as a function of mining operations (Table 4.45). However, existing land uses would continue, including livestock grazing, recreation, and vegetation treatments for wildlife habitat and watershed health.

Table 4.45. Surface Disturbance (acres) and Creek Realignment (miles) under all Alternatives

Disturbance Type	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Pit disturbance	0	1,750–2,152	1,454–1,856
Centralized facilities	0	36	36
Dispersed facilities	0	160	135
Road relocation	0	47 (17 actual road and 30 ROW)	37 (13 actual road and 24 ROW)
Total Surface-disturbing Activities	**0**	**1,993–2,395**	**1,662–2,064**
Underground mining	0	717–412	717–412
Robinson Creek realigned (miles)	0	0.49–0.81	0.49–0.81

4.16.3.1 SURFACE WATER

No impacts to surface-water quantity or quality would result under the No Action Alternative beyond those that may result from ongoing land uses such as livestock grazing, vegetation treatments, and recreation. These ongoing impacts may include active erosion along stream channels in the tract (Petersen Hydrologic 2007) and continued background erosion of sediments from the tract surface. Because no mining, construction, or additional surface disturbance would occur under the No Action Alternative, there would be no additional impacts to surface-water quality or quantity.

Reportedly a result of land management practices in the late 1800s or early 1900s, the creeks in the tract have limited riparian vegetation, in many locations are not stable in their current configurations, are actively eroding their channels during precipitation events, and are deeply incised (Petersen Hydrologic 2007). Based on a November 2010 field assessment of creeks in and around the tract, as defined by the BLM's Proper Functioning Condition Assessment protocol (BLM 1998). Robinson Creek is rated as "Functional – At Risk" and the functional rating for Upper Kanab Creek is "Proper Functioning Condition." Under the No Action Alternative the creeks' channels would remain incised and would continue to contribute sediment to the creek during relatively infrequent high flow periods.

4.16.3.2 GROUNDWATER

No impacts to groundwater quantity or quality would result under the No Action Alternative beyond those minor impacts from ongoing land uses. Because no mining, construction, or additional surface disturbance would occur under the No Action Alternative, there would be no additional impacts to groundwater quality or quantity.

4.16.3.3 WETLANDS, RIPARIAN AREAS, FLOODPLAINS, AND ALLUVIAL VALLEY FLOORS

Under the No Action Alternative, the wetlands (62.8 acres) assumed to be present in Block NW would not be disturbed as a function of mining the tract and, therefore, no impacts are anticipated under this alternative. Under the No Action Alternative, no disturbance to riparian areas (54 acres), floodplains (57 acres), or AVFs (57 acres) would occur either.

4.16.4 Alternative B: Proposed Action

Under the Proposed Action, the Alton Coal Tract would be offered for lease at a sealed-bid competitive lease sale, subject to standard and special lease stipulations developed for the tract. The tract boundaries would be reasonably consistent with the tract reconfiguration completed by the BLM after ACD's original lease application submittal (see Map 1.2). Depending on the extent of surface mining (200 feet to 300 feet of overburden removal) approximately 1,993–2,395 acres of surface disturbance would occur in the Alton Coal Tract under the Proposed Action, (see Table 4.45). Similarly, underground mining would occur on 717 to 412 acres of land in the tract. Surface-mining methods involving up to 200 feet of overburden removal would result in a lesser quantity of disturbed acres, meaning a lesser impact on water resources, than surface-mining methods involving up to 300 feet of overburden removal. The first number provided in the acreage ranges detailed in the following sections (and previously in Table 4.45) relates to surface mining up to approximately 200-foot of overburden removal whereas the second number provided relates to surface mining up to approximately 300-foot of overburden removal.

4.16.4.1 SURFACE WATER

4.16.4.1.1 Stream Proper Functioning Condition

Under the Proposed Action, approximately 0.49–0.81 mile of Robinson Creek would be relocated from the tract and diverted into a new manmade channel hardened with riprap (see Table 4.45). Ordinarily, the rerouting of a creek would have direct and indirect impacts to stream function and water quality. However, because Robinson Creek is currently ranked as "Functional – At Risk," if the stream is rerouted through a properly sized and designed channel, relocation could result in a more stable channel in many areas and therefore less sediment transport during high flows. Nonetheless, where streamside vegetation is removed or where the new channel has less shading, increases in water temperature would occur. This impact is limited to the lower section of Robinson Creek, because the upper sections of Robinson Creek (above the seepage area) is dry most of the time (Petersen Hydrologic 2007). This impact would be minimal during high flow periods due to the relatively low residence time of the swiftly moving water. The thermal impact could be mitigated through planting riparian vegetation and the use of materials that mimic a natural stream channel on the rerouted channel. If there is removal of vegetation this would also reduce stream stability locally because there would no longer be root material to hold streambanks in place.

The relocation of the channel would require a State of Utah Stream Alteration Permit and a CWA Section 404 Permit administered by the Department of the Army. Compensatory mitigation for loss of waters of the U.S., sediment controls, and other mitigation would likely be required under these permits. Any loss of channel function remaining after this mitigation would be long term. However, due to the assumed nonfunctional status of the stream channel, function could be improved during temporary relocation or reclamation, particularly with respect to erosion and downstream sedimentation.

4.16.4.1.2 Surface-water Hydrology

Under the Proposed Action, adverse short-term impacts to surface-water quantity would occur from the implementation of sediment- and erosion-management BMPs. Under this alternative, 1,993–2,395 acres of the tract would be disturbed by open pit mining, the construction of centralized and dispersed facilities, and road relocation, which is 1,993–2,395 acres more than would be disturbed under the No Action Alternative. Runoff from 1,750–2,152 acres would be diverted and captured in storm-water retention ponds to reduce the amount of eroded sediments that are discharged to downstream water bodies such as Kanab Creek and Robinson Creek. Areas where runoff is not captured, such as dispersed facilities and the road relocation right of way, would be treated through the use of silt fencing, check dams (e.g. straw bales), or other BMPs that slow runoff and allow sediments to settle. Because water that is permanently retained in ponds or temporarily slowed or detained is subject to additional infiltration and evaporation, loss of surface water would result.

Under the Proposed Action, approximately 29–35 acre-feet of water would be captured annually from pits and centralized facilities (Table 4.46). These values are estimated as a portion of the flow (equal to the proportion of the tract relative to the watershed area) associated with runoff from precipitation events at the USGS gauge on Kanab Creek downstream of the tract. Storm and snowmelt peaks were identified on the gauge using a simple hydrograph line method (Chow et al. 1988) and checked against climate data for the area (precipitation, snowfall, and temperature) (NCDC Station 420086; NCDC 2010). Ten years of precipitation data from the Alton NCDC climate station were used in this calculation. Pit disturbance and centralized facilities make up 1.4%–1.7% of the total drainage area upstream of the USGS gauge. It was assumed that the same percentage of flow at the gauge was generated on those areas of the tract. Because this water would be captured in retention ponds that would not discharge to downstream water bodies, the full volume of runoff captured from the tract would be lost to increased evaporation or infiltration into the ground. Maximum annual evaporation from standing water in the tract is approximately 35 inches per year. Evaporated water would be lost as a surface-water resource; however, infiltrated water could be lost, or could be lost temporarily if it eventually rejoined the surface-water system (if discharged at a spring, for instance). However, because groundwater and surface water in the tract are in general disconnected, no impacts to surface-water resources would be expected due to reduced or increased groundwater recharge. In addition, because any new seeps would frequently discharge to a dry channel, seep discharge may subsequently be lost to evaporation.

Table 4.46. Water Resource Impacts under all Alternatives

Disturbance Type	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Surface Water			
Acre-feet of surface-water runoff from pit disturbance and dispersed facilities (annual)	0	29–35	24–30
Acre-feet of water loss from streams (annual)	0	29–35	23–35
Total miles of streams within 100 feet of transportation route	0	48–49	48–49
Total miles of perennial streams within 100 feet of transportation route	0	8.4	8.4
Number of stream crossings	0	135	135

Table 4.46. Water Resource Impacts under all Alternatives

Disturbance Type	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Groundwater			
Acre-feet of groundwater lost for dust suppression (life of the mine)	0	625	525
Acre-feet of groundwater lost to evaporation (life of the mine)	0	2,900	4,893
Acre-feet of coal moisture lost (life of the mine)	0	4,701–7,326	3,989–6,312
Wetlands, Riparian Areas, Floodplains, and Alluvial Valley Floors			
Acres of wetland removal	0	52.5	0
Acres of riparian disturbance	0	6.7–10.0	6.3–9.6
Acres of floodplain/AVF disturbance	0	8	7.2
Acres Subject to Potential Subsidence	0	513–211 (+166–109 outside the tract)	513–211 (+166–109 outside the tract)

Because most of the surface flows from the tract in Kanab and Robinson Creeks are impounded in irrigation ponds or lost to stream channel infiltration downstream (Petersen Hydrologic 2007), indirect impacts resulting from any loss of surface waters would primarily affect downstream irrigators rather than in-stream flows. However, these ponds may be bypassed during infrequent high discharges, and any depletion would somewhat decrease peak flows downstream in Kanab Creek.

4.16.4.1.3 Surface-water Quality

Under the Proposed Action, no direct adverse impacts to surface-water quality are likely. Runoff from disturbed areas on the tract would be captured in retention ponds, which do not release water into downstream receiving waters. Erosion of sediment from dispersed facilities and the relocation of KFO Route 116 would be controlled with silt fences and other sediment-control BMPs. These BMPs are more than 90% effective in capturing sediment when installed and maintained properly (Robichaud et al.). Therefore, most of the sediment and associated contaminants found in surface runoff from the tract would be contained, and would not pose any direct threat to surface waters.

Indirect effects on water quality from the Proposed Action would result from the loss of 29–35 acre-feet of water to streams associated with diversion of surface-water runoff on the tract into retention ponds (see Table 4.46). This loss of water to the surface-water system would reduce flows in Robinson Creek and Kanab Creek, and thereby reduce the dilution of any pollutant (total phosphorus, suspended solids, nitrogen, or dissolved solids) downstream of the tract. This could increase the pollutant's concentration in the surface-water system. However, reduced flow would also reduce in-stream erosion, and therefore could reduce sediment concentrations in the stream. The primary pollutant that could pose a concern to Kanab Creek is TDS, because current concentrations of TDS in surface water in and around the tract already exceed the standard of 1,200 mg/L identified by the State of Utah as protective of irrigation water. Water quality data in and around the tract indicate that TDS concentrations are highest under low flow conditions. Mean TDS concentrations in groundwater in Sink Valley Wash are 378 mg/L (maximum 623 mg/L); therefore the use of groundwater for dust suppression would not lead to an increase in TDS concentrations in future surface runoff from the tract. Use of groundwater from wells in Lower Robinson Creek in which mean TDS is 1,172 mg/L (maximum 3,197 mg/L) for dust suppression could lead to an increase in TDS concentrations in future surface runoff from the tract. In this case, salt-tolerant plants could be used for revegetation.

Adverse impacts to surface water as a result of accidental spills of hazardous materials along the coal haul transportation route or at the tract are also unlikely because of spill prevention, control, and countermeasure (SPCC) plan regulations associated with the transportation and storage of bulk oil products (see the Hazardous Materials section of this chapter). However, there would be a small increased risk of surface-water contamination. Deposition of coal dust and fugitive dust along the coal haul transportation route would lead to a small increase in fine particles (suspended solids) in streams because fugitive dust and coal dust are themselves fine particles. Under the Proposed Action, there are 48–49 miles of stream within 100 feet of the coal haul transportation route, of which 8.4 miles are perennial. The route crosses many different streams 135 times (see Table 4.46).

4.16.4.2 GROUNDWATER

4.16.4.2.1 Groundwater Hydrology

Under the Proposed Action, adverse short-term impacts to groundwater hydrology would occur as a result of groundwater pumping for dust suppression. Groundwater pooled in mining pits could also be used for dust suppression. Water supplies needed for dust suppression are assumed to originate as groundwater. Assuming all the water used for dust suppression is lost to evaporation, the loss of groundwater would be 25 acre-feet per year. Over the approximate 25 year projected life of the mine under this alternative, 625 acre-feet of groundwater would be lost (625 acre-feet more than would be lost under the No Action Alternative) (see Table 4.46). Assuming no groundwater recharge this equates to approximately 6% of the estimated groundwater resources available (10,000 acre-feet) in the zone from which groundwater resources would be extracted (Personal Communication, Petersen 2010).

The tract is located at the base of a valley, along the north-south axis of Kanab Creek, where shallow aquifers could support stream flows during periods of peak runoff. During these periods, areas along Kanab Creek could be considered groundwater discharge zones. The principal recharge areas to the shallow aquifers are located outside the tract on the Paunsaugunt Plateau. Groundwater in the bedrock stratigraphic sequence of the Paunsaugunt Plateau east of the tract is located large distances laterally and topographically up-gradient of the tract. Therefore, there is no reasonably plausible mechanism whereby groundwater systems in these formations could be impacted by mining activities (Petersen Hydrologic 2007). Local recharge to shallow aquifers occurs as diffuse infiltration through the unsaturated zone during precipitation events. Because the principal recharge areas are located outside and up-gradient of the tract and could not be impacted by mining activities (Petersen Hydrologic 2007), no adverse impacts to groundwater quantity would occur as a result of reduced recharge associated with the Proposed Action.

Adverse long-term impacts to groundwater could also result from the permanent removal of moisture in the mined coal. The coal is assumed to have a moisture content of 13% (2004) and a bulk density of 40–57 pounds per cubic foot (The Engineering Toolbox 2005). With an average projected annual coal production of 2 million tons, the loss of moisture from coal would be 209–298 acre-feet per year. Under this alternative, 4,701–7,326 acre-feet of moisture would be lost (4,701–7,326 acre-feet more than would be lost under the No Action Alternative) over the life of the mine (see Table 4.46). However, this moisture is largely unavailable in the groundwater and surface-water systems in the area, and its loss would not result in impacts to other groundwater resources.

A portion of groundwater pooled in mining pits that is not removed for dust suppression would be lost to evaporation and represents a groundwater loss. Under the Proposed Action, up to 40 acres of groundwater would be exposed to evaporation at any one time. The average annual evaporation from standing water in the tract is approximately 35 inches (based on evaporation data available for Bryce Canyon National Park from 1971 – 1978). Therefore, the loss of groundwater from mining pits due to evaporation would be up to 116 acre-feet per year. Under this alternative, over the life of the mine the total loss of groundwater due

to evaporation from mining pits would be up to 2,900 acre-feet (2,900 acre-feet more than under the No Action Alternative) (see Table 4.46). This estimate assumes that there would be one open pit (approximately 40 total acres) for the life of the mine. However, there would be one open pit only for the surface mining portion of the total mine life. For the underground mining portion of the mine life there would not be any open pits and therefore no exposed groundwater as a result of mining. However, some groundwater would still be lost as a result of groundwater evaporation through underground mine openings.

4.16.4.2.2 Groundwater Quality

Due to the poor groundwater-transmitting properties of the Dakota Formation it is assumed that no degradation to deeper aquifers would occur, and therefore there would be no impact to municipal water supplies.

Based on laboratory analysis of samples collected in the Alton Area but not directly in the tract, it is apparent that acid-forming and toxic-forming materials that could result in the contamination of groundwater supplies in the tract are generally not present (Petersen Hydrologic 2007). As part of the permitting process, the DOGM requires permittees to pre-sample overburden for acid-forming and toxic-forming substances. In the event that either of these is discovered, the permittee would be required to develop a plan to treat these substances to minimize or eliminate impacts to groundwater quality.

4.16.4.3 WETLANDS, RIPARIAN AREAS, FLOODPLAINS, AND ALLUVIAL VALLEY FLOORS

Under the Proposed Action, approximately 52.5 acres of wetlands in Block NW would be removed as a result of surface-mining operations, compared to none under the No Action Alternative (see Table 4.46). This is approximately 84% of the total 62.8 acres of wetlands in the tract. In the short term, the functions performed by these wetlands would be lost with the removal of the wetland areas. Reclamation would partially or fully restore the wetland functions lost; however, the precise pre-mining structure, extent, and character of the wetlands would be permanently altered. Assuming these wetlands are jurisdictional, the successful bidder would be required to mitigate wetland impacts in accordance with guidance and directives provided by USACE during the CWA Section 404 permitting process.

Under the Proposed Action, total disturbance to riparian areas would be 6.7–10.0 acres (see Table 4.46). Of this total, 3.8–7.1 acres would be disturbance as a result of surface mining. Direct impacts from the relocation of KFO Route 116 would be from the removal of 0.5 acres of riparian area. Assuming that impacts from dispersed facilities (160 acres) are proportional to the acreage of riparian areas present in the no coal zone (where all dispersed facilities are assumed to be located), then approximately 2.4 acres of riparian area would be lost as a result of construction of these facilities. This is 2.4 acres more disturbance of riparian areas than under the No Action Alternative. The impacts due to disturbance or removal of riparian areas would depend on the quality of the existing habitat and the reclamation that followed the disturbance. Impacts could include loss of native vegetation, loss of wildlife habitat, and destabilization of the associated streambanks.

Under the Proposed Action, all floodplains (57 acres), and probable AVFs (57 acres) that are present on the tract occur in the no-coal zone. Therefore, this acreage would not be directly impacted from pit disturbance. Direct impacts would be the result of construction of dispersed facilities and relocation of KFO Route 116. The floodplains/AVFs make up approximately 5.0% of the total no-coal zone area available for dispersed facilities (1,131 acres) under the Proposed Action. Assuming that impacts from dispersed facilities (160 acres) are proportional to the acreage of floodplains/AVFs present in the no coal zone, then approximately 8.0 acres of floodplains/AVFs would be impacted under the Proposed Action (8.0 acres more disturbance of floodplains/AVFs areas than under the No Action Alternative) (see Table 4.46). The requirements to protect AVFs refer to protecting the essential hydrologic function of AVFs as they relate to the ability to conduct

farming at the AVF. In the six areas delineated as probable AVFs (including the 8 acres that would be impacted under the Proposed Action), the essential hydrologic function is related to the ability of the land to be irrigated using surface water in either Kanab Creek or Sink Valley Wash. Groundwater is not thought to be a significant factor in the essential hydrologic functions of any these probable AVFs. Accordingly, the only reasonably plausible way that the essential hydrologic functions of these AVFs could be impacted would be if impacts to water quantity or water quality in Kanab Creek or lower Sink Valley Wash were to occur (these are discussed above). Because the probable AVFs are located in no-coal areas, and thus would not be mined, the physical capability of the land to be irrigated would not be impacted outside of the construction of dispersed facilities and relocation of KFO Route 116 in these areas (approximately 207 acres, and no more than 57 acres, which is the total area of probable AVFs in the tract). Development of floodplains would result in the loss of their functions and values in these areas (approximately 8 acres) (see Table 4.46). Floodplain functions that could be lost include flood storage and attenuation, riparian habitat (described above), groundwater recharge, water filtration, and erosion prevention.

4.16.4.4 SUBSIDENCE

Coal removal by underground mining methods and the withdrawal of water to facilitate mining would result in subsidence as overlying strata settle into mining-produced voids. Subsidence is a natural consequence of underground mining; although, the magnitude and extent vary based on a range of mining and geologic factors, such as surface topography, depth of mining, near surface geology, and mining method (Society for Mining, Metallurgy, & Exploration 1992). In the tract, 513 to 211 acres would be affected by subsidence through underground mining. An additional 166 to 109 acres outside of the tract would be disturbed through ground movement associated with coal removal.

Subsidence-related surface-water impacts would include potential changes to surface drainage and deterioration of surface-water quality. Additionally, subsidence could cause fissures and pits or open cracks, which, if connected to aboveground streams, could lead to partial or complete loss of surface water. As discussed in the previous sections, aquifer pumping for underground mining could also interrupt groundwater flow to surface waters, leading to reduced stream flows.

Groundwater could be affected by mine-generated subsidence through changes to groundwater levels, flow, and quality. Because mining produces voids in the strata, these voids induce groundwater movement from the surrounding saturated rock, leading to nearby rock dewatering while water accumulation occurs in the voids. This water movement is often accompanied by rock fracturing or movement, which can change how water moves through the rock, leading to changes in groundwater level, storage capacity, flow direction, and chemistry (Society for Mining, Metallurgy & Exploration 1992). Other potential hydrological impacts from underground mining include changes to the permeability of rock units, creation of fresh rock surfaces, and water flow between previously unconnected units or between surface and groundwater, leading to decreased evapotranspiration in those areas (Marcus 1997).

4.16.5 Alternative C: Reduced Tract Acreage and Seasonal Restrictions

Under Alternative C, the tract would be modified to exclude Block NW (see Map 2.1). Further, certain mining activities in the tract's southern portion (Block S) would be subject to seasonal restrictions to reduce impacts to the local sage-grouse population. Under Alternative C, the modified tract would be offered for lease at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the tract. The boundaries of the modified tract would be reasonably consistent with the configuration shown in Map 2.1.

Approximately 1,662–2,064 acres of surface disturbance would occur in the Alton Coal Tract under Alternative C, depending on the extent of surface mining (see Table 4.45). As under the Proposed Action, underground mining would occur on 717 to 412 acres of land in the tract under Alternative C.

4.16.5.1 SURFACE WATER

4.16.5.1.1 Stream Proper Functioning Condition

Under Alternative C, approximately 0.49–0.81 mile of Robinson Creek would be relocated from the area that would be surface mined into a new manmade channel hardened with rip-rap (see Table 4.45). This is the same length as would be relocated under the Proposed Action. Thus, Alternative C would have the same direct and indirect impacts to stream proper functioning condition and water quality as described under the Proposed Action. No stream relocation would be conducted under the No Action Alternative.

4.16.5.1.2 Surface-water Hydrology

Impacts to surface-water quantity under Alternative C would be of the same nature as those under the Proposed Action, but would be of lesser magnitude. Under this alternative, 1,490–1,892 acres of the tract would be disturbed by surface mining and the construction of centralized facilities (1,490–1,892 acres more than would be disturbed under the No Action Alternative). Runoff from 1,490 to 1,892 acres (1.3% –1.7% of the area draining to the USGS gauge) would be diverted and captured in storm water retention ponds to reduce the amount of eroded sediments that are discharged to downstream water bodies such as Kanab Creek and Robinson Creek. Under Alternative C, approximately 24–30 acre-feet of water would be captured from disturbed areas (24–30 more acre-feet than under the No Action Alternative) (see Table 4.46). Areas where runoff would not be captured (the road relocation ROW and dispersed facilities), would be treated through the use of silt fencing, check dams (e.g., straw bales), or other BMPs that slow runoff and allow sediments to settle. As discussed for the Proposed Action, this water would be removed from the surface-water system due to infiltration and evaporation.

4.16.5.1.3 Surface-water Quality

Impacts to surface-water quality under Alternative C would be of the same nature as those under the Proposed Action, but would be of a lesser magnitude. Under Alternative C, approximately 23–35 acre-feet of water would be captured from disturbed areas (see Table 4.46). This quantity of water would no longer reach receiving waters downstream resulting in reduced dilution and therefore a potential increase in the concentration of pollutants in associated surface waters compared to the No Action Alternative.

Adverse impacts along the coal haul transportation route would be the same as those described under the Proposed Action, but would occur for approximately 21 years rather than approximately 25 years.

4.16.5.2 GROUNDWATER

4.16.5.2.1 Groundwater Hydrology

Impacts to groundwater hydrology under Alternative C would be of the same nature as those under the Proposed Action, but would be of a lesser magnitude. Over the approximate 21 year life of the mine under Alternative C groundwater losses for dust suppression would be approximately 525 acre-feet (525 more acre-feet than under the No Action Alternative) (see Table 4.46). Assuming no groundwater recharge this equates to approximately 5% of the estimated groundwater resources available (10,000 acre-feet) in the zone from which groundwater resources would be extracted (Personal Communication, Petersen 2010).

Groundwater losses due to the removal of coal moisture would also occur under Alternative C, with 3,989–6,312 acre-feet of moisture lost (3,989–6,312 acre-feet more than would occur under the No Action Alternative) over the life of the mine (see Table 4.46).

Groundwater pooled in mining pits that is not removed for dust suppression would be lost to evaporation and represents a groundwater loss. Under Alternative C, up to 80 acres of groundwater would be exposed to evaporation at any one time. The maximum annual evaporation from standing water in the tract is approximately 35 inches per year. Therefore, the loss of groundwater from mining pits due to evaporation would be up to 233 acre-feet per year. Under this alternative, over the life of the mine the total loss of groundwater due to evaporation from mining pits would be up to 4,893 acre-feet (4,893acre-feet more than under the No Action Alternative) (see Table 4.46). This estimate assumes that there would be two open pits (approximately 80 total acres) for the life of the mine. However, there would be two open pits only for a portion of the total mine life to comply with the timing restrictions of this alternative. Following this time frame, up to 40 acres of groundwater would be exposed as a result of pooling in mining pits (one open pit). Further, for the underground mining portion of the mine life there would not be any open pits and therefore no exposed groundwater as a result of mining. However, some groundwater would still be lost as a result of groundwater evaporation through underground mine openings.

4.16.5.2.2 Groundwater Quality

Potential degradation to deeper aquifers (and therefore impacts to municipal water supplies) and potential impacts to groundwater resources as a result of acid-forming and toxic-forming materials would be the same under Alternative C as under the Proposed Action.

4.16.5.3 WETLANDS, RIPARIAN AREAS, FLOODPLAINS, AND ALLUVIAL VALLEY FLOORS

Under Alternative C, the wetlands (62.8 acres) assumed to be present in Block NW would not be disturbed as a function of mining because this portion of the tract would not be included in a lease sale under this alternative (see Table 4.46). As under the No Action Alternative, no impacts are anticipated to wetlands under Alternative C.

Under the Alternative C, total disturbance to riparian areas would be 6.3–9.6 acres (see Table 4.46). Of this total, 3.7–7.0 acres would be disturbance as a result of surface mining. Direct impacts from the relocation of KFO Route 116 would be from the removal of 0.3 acres of riparian area. Assuming that impacts from dispersed facilities (160 acres) are proportional to the acreage of riparian areas present in the no coal zone (where all dispersed facilities are assumed to be located), then approximately 2.3 acres of riparian area would be disturbed as a result of construction of these facilities. Under Alternative C, the total disturbance to riparian areas of 6.3–9.6 acres would be 6.3–9.6 acres more disturbance than under the No Action Alternative. As under the Proposed Action, the impacts due to disturbance or removal of riparian areas would depend on the quality of the existing habitat and the reclamation that followed the disturbance. Impacts would include loss of native vegetation, loss of wildlife habitat, and destabilization of the associated streambanks.

Under Alternative C, all floodplains (56.6 acres) and probable AVFs (56.6) that are present on the tract occur in the no-coal zone. Therefore, this acreage would not be directly impacted from pit disturbance. Direct impacts would be the result of construction of dispersed facilities and relocation of KFO Route 116. The nature of these impacts is the same under Alternative C as under the Proposed Action. The floodplains/AVFs make up 5.3% of the total no-coal zone area available for dispersed facilities (1,063 acres). Assuming that impacts from dispersed facilities (135 acres) would be proportional to the acreage of floodplains/AVFs present in the no coal zone, approximately 7.2 acres of floodplain/AVF area would receive surface disturbance under Alternative C (7.2 acres more disturbance of floodplain/AVF area than under the No Action Alternative) (see Table 4.46).

4.16.5.4 SUBSIDENCE

Subsidence-related water resources impacts from underground mining under Alternative C would be of the same nature and magnitude as those under the Proposed Action, because the area that would be underground mined under Alternative C would also be underground mined under the Proposed Action.

4.16.6 Potential Mitigation Measures

The following measures could be applied to both action alternatives, in addition to required measures, to further reduce or eliminate impacts to water resources identified in the analysis above:

- Water detention ponds (rather than retention) could be used to decrease the amount of water lost to evaporation following its interception and collection.
- Temporarily (life of mine) relocated segments of Robinson Creek could be planted with native vegetation to shade the creek (reducing thermal pollution) and stabilize its banks (reducing sediment pollution).
- Any flow in Robinson Creek could be diverted around the construction area to reduce sediment discharges during construction; construction could take place during a period of zero or low flow.
- Temporarily (life of mine) relocated segments of Robinson Creek could be properly designed to function as a stable, functional channel with 1) a floodplain connected to the stream, 2) the proper width, velocity, and gradient to replace all lost habitat, and 3) the proper form to convey sediment without eroding or aggrading.
- Temporarily (for life of mine) relocated segments of Robinson Creek may avoid capturing groundwater, which could increase the concentration of TDS in the creek. In addition, the bed and banks could be constructed to avoid use of or contact with the Tropic Shale.
- Construction of dispersed facilities in riparian areas and floodplains/AVFs could be avoided to the maximum extent possible.

4.16.7 Unavoidable Adverse Impacts

The Proposed Action and Alternative C would result in unavoidable adverse impacts to water resources even following implementation of protective measures and following the above potential mitigation measures. Approximately 0.49–0.81 mile of Robinson Creek would be unavoidably relocated under the action alternatives, including the removal of its streamside and riparian vegetation. Surface water on the tract would be lost due to evaporation from ponds and infiltration. Loss of surface-water volume would reduce downstream dilution, and could therefore alter water quality. Some sediment runoff from dispersed facilities and road relocation ROWs would be unavoidable because BMPs are less than 100% effective. The risk of spills or water contamination would be small, but would be unavoidably increased under the action alternatives. Groundwater would also be consumed (depleted) under the action alternatives. Approximately 25 acre-feet per year of groundwater would be lost due to evaporation from pits and dust suppression. A total of 200 to 300 acre-feet of coal moisture would be removed per year as well. The loss of wetland acreage and function on the tract could not be avoided.

4.16.8 Short-term Uses versus Long-term Productivity

No impacts to the long-term productivity of water quantity are expected as a result of the short-term use of the land for coal extraction. Once mining ceased and reclamation was complete, mine-related water use and increased evaporation would cease. The short-term use of the land for coal extraction would result in long-term alteration of wetland and riparian area functions and productivity. Similarly, the short-term use of areas occupied by Robinson Creek would result in the long-term alteration of Robinson Creek.

4.16.9 Irreversible and Irretrievable Commitments of Resources

The removal of approximately 4,701–7,326 acre-feet (Proposed Action) or 3,989–6,312 acre-feet (Alternative C) of water from the tract as coal moisture would be an irreversible impact under the action alternatives. The following commitments of water resources would be irretrievable until successful reclamation was completed under the action alternatives.

- Loss of Robinson Creek's channel function and riparian vegetation;
- Changes to Robinson Creek's discharge volume and water quality resulting from its realignment;
- Loss of wetland area and function due to its removal and reconstruction;
- Loss of riparian area and function due to its removal along Robinson Creek; and
- Surface disturbance to floodplains and probable AVFs as a result of the construction of dispersed facilities and relocation of KFO Route 116.

4.17 Wildlife and Special Status Species

This section assesses the environmental consequences of Alternative A (No Action), Alternative B (Proposed Action), and Alternative C on one federally threatened species, 25 State of Utah/BLM Sensitive species, and wildlife, raptors, and migratory birds with potential to occur on the proposed Alton Coal Tract and coal haul transportation route. Special status species have limited distributions or numbers, and they generally have specific habitat requirements. If these species are lost, displaced, or if their habitat is altered, there is limited potential for relocation or reestablishment elsewhere. As a result, impacts to special status species must be assessed according to factors that are most important for their maintenance or recovery, or to prevent their listing as threatened or endangered. Impacts to wildlife special status species would be avoided to some degree through conservation and/or mitigation measures. However, both direct and indirect impacts to wildlife and special status species are expected to result from minerals development and construction activities in the tract, as proposed under the action alternatives, and from traffic changes on the coal haul transportation route, both of which could affect individuals, populations, or habitat conditions.

4.17.1 Regulatory Framework and Lease Stipulations

4.17.1.1 REGULATORY FRAMEWORK

Numerous federal and state regulations shape the management of wildlife and special status species. Regulations that pertain to wildlife and special status species and potential impacts from mining and other land uses include, but are not limited to, the following:

- The Migratory Bird Treaty Act of 1929, as amended, establishes federal responsibility to protect international migratory birds and authorizes the Secretary of the Interior, through the USFWS, to regulate hunting of migratory birds. The North American Waterfowl Management Plan, signed in 1986 between Canada and the United States, further sets population goals and how to achieve them.
- The Taylor Grazing Act of 1934, as amended, requires cooperation with states and other groups interested in conservation and propagation of wildlife in established grazing districts. It provides for fishing and hunting in those districts in accordance with applicable laws.
- The Bald Eagle Protection Act of 1940, as amended, establishes penalties for taking, possessing, selling, purchasing, or bartering bald and golden eagles. It also provides for cancellation of the lease, license, or other federal land use authorization for anyone convicted of violating the act or any of its implementing regulations or permits.
- The Fish and Wildlife Coordination Act of 1958 mandates equal consideration of wildlife conservation with other features of water resource development programs. It requires that damage to fish and wildlife resources be prevented and that these resources be developed and improved.
- The Clean Air Act of 1970 establishes the mechanism for control of air pollution for public health and welfare, recognizing wildlife as one aspect of public welfare.
- The ESA of 1973, as amended, requires the BLM to ensure that proposed actions do not jeopardize the continued existence of a threatened or endangered species and do not cause its critical habitat to be modified or destroyed.
- Federal Land Policy and Management Act of 1976 recognizes wildlife as a principal land use, requires consideration of wildlife objectives in commodity-oriented programs, and authorizes use of range-betterment funds for enhancement of habitat for fish and wildlife.
- The objective of the Federal Water Pollution Control Act (CWA) of 1977 is the restoration and maintenance of the chemical, biological, and physical integrity of the nation's waters at a quality sufficient to protect fish and wildlife and sufficient for recreational use.
- The Fish and Wildlife Improvement Act of 1978 authorizes the Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations.
- The Public Rangelands Improvement Act of 1978 directs that the condition of the public rangelands be improved so that they become as productive as feasible for wildlife habitat and other rangeland values. The act provides for on-the-ground funding of wildlife habitat protection, improvements, and maintenance projects.
- The North American Wetlands Conservation Act of 1989 is the first act to make federal funds available annually for wetland restoration in the United States, Canada, and Mexico. The act is intended to generate as much as $30 million a year toward the North American Waterfowl Management Plan.

Other federal laws that could occasionally affect wildlife habitat management actions in the tract are the MLA, the Water Resources Planning Act, the Water Pollution Act, the Water Resources Development Act, the Federal Grants and Cooperative Agreements Act, the Safe Drinking Water Act, the Fish and Wildlife Act, and the Soils and Water Resources Conservation Act.

4.17.1.2 LEASE STIPULATIONS

The KFO RMP and other BLM and state documents provided the framework for the tract's lease stipulations. The following standards would be applicable to wildlife and would compel mitigation for impacts to wildlife related to mining the tract.

- Survey for threatened, endangered, proposed, and candidate species and their habitats.
- Avoid disturbance to individuals, populations, and habitats of threatened, endangered, proposed, and candidate species.
- Restore habitat for threatened, endangered, proposed, and candidate species in areas disturbed by mining.
- Conduct baseline and annual wildlife monitoring surveys.
- Follow approved raptor mitigation plans such as USFWS Utah Field Office Guidelines for Raptor Protection from Human and Land-use Disturbances (Romin and Muck 1999).
- Monitor for migratory bird species of management concern in Utah.
- Restore pre-mining topography to the maximum extent possible.
- Plant a diverse mixture of grasses, forbs, and shrubs in configurations beneficial to wildlife.
- Design fences to permit wildlife passage.
- Follow power transmission pole guidance from Avian Power Line Interaction Committee (Avian Power Line Interaction Committee/USFWS 2005).
- Increase habitat diversity by creating rock clusters and shallow depressions on reclaimed land.
- Use appropriate plantings along reclaimed drainages.
- Replace drainages, wetlands, and AVFs disturbed by mining.
- Enforce appropriate vehicle speed limits to minimize potential for wildlife mortality.
- Instruct employees not to harass or disturb wildlife.
- Conduct annual post-reclamation surveys for undesirable invasive plant species.
- Monitor restored vegetation during the growing season following fall seeding and planting to assess reclamation success.
- Monitor reclamation sites to assess habitat reclamation success.

In addition to the above, the following regulatory measures would apply to Greater Sage-grouse:

- Create or enhance nesting and brooding habitat on public lands in the tract in the no-coal zone (habitat creation/enhancement area identified as Block Sa in Map 1.1) and on Block S.

On Block S (and other locations in the tract as appropriate), the following short- and long-term habitat reclamation measures would apply to enhance habitat for Greater Sage-grouse:

- Reclaim to AOC and seed with similar plant species and composition to approximate pre-mining, original community.
- Following mining, graze livestock in the same areas as pre-mining to maintain approximate pre-mining or desirable vegetation conditions.
- Where practicable, avoid storing mining-generated spoil and topsoil stockpiles on intact sagebrush stands.
- Locate operations to create the least possible disturbance to sage-grouse and sage-grouse habitat.
- Clear young juniper from intact sagebrush stands.
- Cut back juniper woodlands surrounding intact sagebrush stands.

On Block S (and other locations in the tract as appropriate), the following long-term habitat reclamation measures would apply to enhance habitat for Greater Sage-grouse:

- Reclaim to create range sites based on approved ecological site descriptions (conditions for the growth of grasses, forbs, and sagebrush).
- Plant bare root or potted sagebrush and bitterbrush in identified sites to accelerate shrub reestablishment.
- Seed and plant in the fall.
- Remove juniper and pinyon seedlings found in reclaimed areas until full release of the reclamation bond.

These stipulations would help reduce the severity of impacts to wildlife and special status species by enhancing and restoring native and suitable non-native vegetation communities in the short term and long term.

4.17.2 Impact Indicators and Thresholds

In this analysis, acres of surface disturbance in or adjacent to wildlife and special status species habitats are used as the primary indicator of impacts in the tract. Potential impacts to wildlife and special status species, such as changes in habitat quality or quantity, reduced population size, or increased mortality, are also used as impact indicators. Surface disturbance from minerals development and construction activities would occur in the tract as planned under the action alternatives. On the coal haul transportation route, impacts to the Utah prairie dog and its habitats adjacent to the route are analyzed as acres within a 350-foot buffer on both sides of the route. Impacts to wildlife and special status species associated with riparian habitats adjacent to the coal haul transportation route are analyzed as acres within a 100-foot buffer on both sides of the route. Impacts to all other wildlife and special status species and their habitats on the coal haul transportation route are analyzed using miles of habitat adjacent to the route. Impacts to wildlife and special status species on the coal haul transportation route are analyzed separately from impacts associated with the tract (see Section 4.17.4).

As indicated in Section 3.17, wildlife and special status species habitat acreages are based on detailed vegetation community surveys in the tract (SWCA 2007b), and on southwest regional land-cover data (SWReGAP 2004) along the coal haul transportation route (see Section 3.15 for a detailed description of the vegetation communities present in the tract). The habitat types discussed for the tract and coal haul transportation route differ because of differences between the field surveys and SWReGAP datasets, and because different land-cover types occur in these areas. Because impacts to the tract and coal haul transportation route are analyzed separately, land-cover types are not directly compared, and differences in cover types are not a limiting factor in the analysis.

Three general categories of impacts are anticipated to be the most influential on wildlife and special status species and their habitats: 1) habitat fragmentation and alteration, 2) habitat loss and displacement, and 3) habitat enhancement. Habitat fragmentation occurs when a contiguous habitat is broken up or fragmented by surface-disturbing activities causing a reduction in usable ranges and a disruption of movement among habitat areas. In addition, habitat fragmentation causes the isolation of less mobile species, a decline in habitat specialists, and facilitates invasion by generalist species (Marvier et al. 2004). Habitat alteration occurs when surface-disturbing activities directly or indirectly change the composition, structure, or functioning of the habitat. Habitat loss is caused by surface-disturbing activities or other activities that degrade or remove habitat. Habitat displacement occurs when land-use activities force wildlife or special status species to move into other habitats, thereby increasing stress on individual animals and increasing competition for habitat resources. Any surface-disturbing actions could lead to habitat alteration, fragmentation, displacement, or loss; limit the amount of usable habitat for special status species and wildlife; and restrict movement among habitat areas. Habitat enhancement results from maintenance,

reclamation, revegetation, or other management actions that increase the quantity and/or quality of habitat conditions, or is otherwise beneficial to one or more wildlife or special status species.

4.17.3 Analysis Assumptions

The locations and habitats of some species in the tract and coal haul transportation route are known; however, the data are neither complete nor comprehensive for all wildlife and special status species occurrences or for all potential habitats that might exist. Both known and potential special status species and habitat locations are considered in the analysis. The species and potential habitats that could be affected by various actions are assumed to be directly correlated with the degree, nature, and quantity of surface disturbance and other activities. Impacts are quantified wherever possible. In the absence of quantitative data, best professional judgment is used to analyze impacts. This analysis was prepared using the following assumptions:

- Local populations are naturally affected by nonhuman causal factors such as climate, natural predation, disease, natural fire regimes, and competition with other native species for available habitat.
- Impacts to wildlife and special status species depend on the location, extent, timing, and intensity of the disturbance.
- Impacts to special status species and certain wildlife species are likely greater than impacts to nonspecial status species due to the limited distribution of individuals and habitats and/or a low tolerance for disturbance.
- Ground-disturbing activities could lead to the fragmentation, alteration (positive or negative), loss, or displacement (short-term or long-term) of wildlife and special status species habitats and/or loss or gain of individuals or populations.
- Disturbance occurring adjacent to wildlife and special status species habitat would contribute to habitat fragmentation, alteration, and displacement due to reduced habitat quality or accessibility.
- Changes in air, water, and habitat quality may cause direct and indirect impacts to wildlife and special status species and habitats, and may also have cumulative impacts on species survival.
- Mitigation, habitat maintenance, or habitat enhancement actions could maintain or improve the condition of vegetation, soils, and other habitat conditions through vegetation treatments, restrictions on surface-disturbing activities, and site reclamation and restoration.

In addition to the assumptions listed above, to analyze and disclose the effects of coal mining on wildlife and special status species associated with the Proposed Action and Alternative C, it is assumed that 1) mining would occur and that there would be an exemption, waiver, or modification of surface stipulations for Greater Sage-grouse (BLM 2008a: Appendix 3), and that 2) surface disturbance would be allowed within a 0.5-mile radius of a Greater Sage-grouse lek and within a 2.0-mile radius of a Greater Sage-grouse lek in brood-rearing habitat from March 15 to July 15. Without an exemption, waiver, or modification to surface stipulations, mining would not be permitted on most of the tract.

Impacts to stream and riparian habitats associated with the coal haul transportation route are based on the assumption that the likelihood of a coal spill along the route would be proportional to the occurrence of one accident per year anywhere along the entire reasonably foreseeable route. It is not possible to predict future conditions that could contribute to an accident; nevertheless, the chance of an accident occurring near stream or riparian habitats, which make up a very small portion of the route, would be extremely low.

In addition to conservation and lease notices, the following would apply: species-specific recovery plans and conservation documents that include management plans and strategies to protect wildlife and special status species. Applicable documents to the tract and coal haul transportation route include, but are not limited to, the Bald and Golden Eagle Protection Act of 1940, *the American Peregrine Falcon Recovery Plan* (1984), *the Utah Prairie Dog Recovery Plan* (1991), *the Utah Prairie Dog Interim Conservation Strategy* (1997), *the Northern Goshawk Conservation Agreement* (1998), *Strategic Management for Sage-Grouse* (UDWR 2002), *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Romin and Muck 2002), and *Best Management Practices for Raptors and Their Associated Habitats* (BLM 2008a). In addition, most native bird species are protected under the Migratory Bird Treaty Act of 1918, which prohibits direct take and destruction of occupied nests, whereby clearing of vegetation during the breeding season could result in loss of eggs or young and would be a violation of the Act.

4.17.4 Regional Greater Sage-grouse Status Summary

Greater Sage-grouse numbers have declined throughout its range due to habitat loss, habitat fragmentation, and reduced habitat quality from urban expansion, conversion of habitats to agriculture, and pinyon-juniper encroachment (UDWR 2002; Bosworth 2003; UDWR 2005). In Utah, Greater Sage-grouse occupies approximately 40% of its historic range (Beck et al. 2003). The Alton–Sink Valley sage-grouse lek is the southern-most active Greater Sage-grouse lek in North America (Curtis and Frey 2007)(; (BLM 2008b). The Alton sage-grouse population is currently estimated at 30–40 birds, and has remained static for the approximately ten years (Personal Communication, Frey 2009). There are three inactive Greater Sage-grouse leks approximately 15 miles south of Alton, which indicates that Alton–Sink Valley is not the southern limit of the species' range. However, the closest active lek, with approximately 120 sage-grouse, is at Heut's Ranch approximately 6 miles north of Alton (Personal Communication, Frey 2009). Sage-grouse move from the Heut's Ranch lek to the Alton–Sink Valley lek, but there is no other known source of genetic exchange with the Alton sage-grouse population. Because of its small size, the Alton–Sink Valley population is highly susceptible to extirpation due to environmental or demographic stochastic events, such as severe drought or disease outbreak, respectively (Personal Communication, Frey 2009). Specific threats to the Alton sage-grouse population include habitat loss, West Nile virus, increased predation, severe drought, or a combination of these events. Fences and other structures are also potential threats to sage-grouse because they function as vertical barriers, collision risks, and raptor perches (Curtis and Frey 2007). The Alton sage-grouse population has experienced high mortality from predation, with a relatively large number of sage-grouse known to have been killed by predators since 2005 (Curtis and Frey 2007). Increasing predation by non-native predators (domestic pets, red foxes, raccoons) and native ravens is of concern (Frey et al. 2006).

4.17.5 Greater Sage-grouse Conservation Issues

Greater sage-grouse is a sagebrush obligate species that requires contiguous sagebrush-dominated habitats (Connelly et al. 2004). In Utah, nesting sage-grouse prefer mature, well-developed sagebrush communities (Connelly et al. 2004). Range-wide, sage-grouse use other sagebrush-dominated habitats and forage in riparian, wet meadow, and agricultural habitat types during the summer nesting and brood-rearing seasons, and they are dependent on mature sagebrush stands for both forage and shelter in the winter (Connelly et al. 2004).

The Alton sage-grouse population uses sagebrush-steppe, agricultural, pinyon-juniper woodland, and riparian habitats in the Alton–Sink Valley area. Alton sage-grouse appear to nest exclusively in sagebrush habitats adjacent to the Alton–Sink Valley lek (Personal Communication, Frey 2009).Nesting sage-grouse habitats on the tract include sagebrush/grassland and sagebrush/grassland (treated) habitats in Block S. Summer brooding habitats on the tract include sagebrush/grassland, sagebrush/grassland (treated), and annual and perennial grasses in Block S, and grassland and meadow habitats in the northern portion of the tract (Map 4.2). During

summer brooding season, approximately one-third of nesting females move their chicks from nesting habitats in Block S to horse pastures and wetlands north of the tract (Curtis and Frey 2007).Wintering habitats include all habitat types in the tract.

In the Alton area, fragmentation and loss of sagebrush stands has occurred due to pinyon-juniper woodland encroachment (BLM 2008a: Appendix 3) and may have contributed to the isolation of the sage-grouse population due to loss of habitat connectivity (Petersen 2006). Changes in habitat quality and availability both locally and throughout the region have limited sage-grouse migration and isolated populations, thereby potentially restricting gene flow and reducing the fitness of local populations. However, beginning in fall 2005, Alton sage-grouse have responded favorably to the removal of pinyon-juniper trees and seeding with forbs and grasses on 1,700 acres in Alton–Sink Valley (Frey et al. 2006). Nine hundred acres in the tract have been treated for pinyon-juniper removal. The treatments resulted in increased forb and grass cover and increased use of treated areas by sage-grouse in summer and fall (Curtis and Frey 2007; Frey 2008).

Because sage-grouse migrate between habitats several times during the year, and because of the small size and isolation of the Alton sage-grouse population, habitat connectivity is important for facilitating genetic exchange with other populations, and in determining the availability and quality of sage-grouse habitats. Off-site mitigation and conservation activities are neither enforceable nor required by BLM, but could include habitat enhancement and the development of migration corridors between habitat areas. Conservation measures to increase connectivity between the Heut's Ranch lek (north of Alton) and Alton–Sink Valley sage-grouse habitats have been planned. These would be implemented prior to any mining activity in the tract. Voluntary mitigation measures which would be provided by the proponent have also been proposed to increase connectivity between Alton–Sink Valley sage-grouse habitats and the historic leks at Johnson Canyon (Skutumpah leks) and Ford Pasture (south of the Alton–Sink Valley lek). These measures could provide Alton sage-grouse with wintering habitat refugia during mining activities by increasing the quality and connectivity of sagebrush habitats between the Alton-Sink Valley sage-grouse population and other sage-grouse populations and habitats. However, the success of these conservation measures is contingent on the Alton–Sink Valley sage-grouse population actually using available habitats.

The habitat reclamation and restoration activities that would follow mining disturbance would be designed to create habitat for the Greater Sage-grouse. In the short term (life of the mine), habitat enhancement in Block S would improve conditions for sage-grouse by removing pinyon and juniper, and by establishing sagebrush and native and desirable non-native grasses and forbs. This would improve the structural and compositional diversity of sage-grouse habitat compared to current conditions (BLM 2008b: Appendix 3). Reclamation and restoration actions that would take place concurrently with mining would also be designed to improve habitat conditions for sage-grouse. However, retention of the Alton sage-grouse population would require that year-round, suitable habitats are continuously available to provide refugia for the sage-grouse population while removal and restoration of other habitat areas is taking place. This would require the avoidance of 1) intact sagebrush stands and other seasonal sage-grouse habitats, such as the agricultural and wet meadow habitats in Block NW that are used as summer brood-rearing habitats, and 2) sagebrush nesting, brood-rearing, and wintering habitats in Block S.

The Alton sage-grouse population is unusually tolerant of human disturbance (Curtis and Frey 2007; Personal Communication, Frey 2009), which suggests that the population may tolerate indirect disturbance associated with mining and reclamation. Nevertheless, successful restoration would require that restored sagebrush communities achieve maturity and the structural diversity required to support the Greater Sage-grouse. Development of a mature sagebrush community requires approximately 15–30 years following fire (Miller and Rose 1999). In the tract, sagebrush communities would presumably require a similar time period to recover on reclaimed soils. Recovery time would depend on numerous ecological variables such as local topography, soil reclamation success, soil type, variations in local and regional climate, colonization of the site by soil-building fungi and bacteria, and other site features that cannot be predicted or easily quantified. The restoration plan to

plant sagebrush seedlings would be designed to accelerate sagebrush reestablishment and to accelerate the successional development of mature sagebrush communities. The recovery time for sagebrush reestablishment would likely be reduced but cannot be quantified because of the variables involved in plant establishment and growth.

The northern and southern blocks of the tract would not be mined at the same time, with mining likely beginning in Block S. This could allow the Block NW to serve as one of the sage-grouse refugia during Block S mining operations. Avoidance of intact and restored sagebrush habitats would be required to provide adequate refugia throughout the life of the mine. Over the long term, reclamation of disturbed areas and successful restoration of diverse sagebrush habitat in the tract would contribute to the creation of contiguous sagebrush vegetation necessary for the long-term persistence of the Alton sage-grouse population. The analysis presented here assumes that habitat avoidance, enhancement, reclamation, and restoration actions would be successful, and that these actions would lead to the establishment of self-sustaining and self-propagating mature sagebrush communities.

4.17.6 Impacts Occurring in the Tract Analysis Area

4.17.6.1 ALTERNATIVE A: NO ACTION

Under the No Action Alternative, the tract would not be mined, and no coal mining or related activities, infrastructure development, or relocation of KFO Route 116 would occur. Therefore, no acres of wildlife habitat would be disturbed by these activities. However, management under the No Action Alternative would not restrict permitted mining activities on private lands adjacent to the tract. Mine-related activities would occur to a lesser degree than under the Proposed Action or Alternative C because the total acreage of mining activities and the total duration of mining activities would be considerably less than under either of these alternatives.

Management of wildlife and special status species habitats on BLM-administered lands in the tract would be conducted as directed under the KFO-RMP (BLM 2008a). Under the No Action Alternative, prescribed management on BLM-administered lands would include watershed protections and improvements to wildlife and special status species habitats. Vegetation management to restore sagebrush grasslands that have been invaded by pinyon-juniper woodlands would improve ecosystem functioning and watershed health. Vegetation management would have long-term, beneficial effects for upland animal species by removing undesirable vegetation, increasing species and structural diversity, and improving overall habitat quality. Pinyon-juniper tree removal would reduce the amount of foraging, roosting, and nesting habitats available to raptors, bats, and migratory birds. Vegetation treatments that would help reduce soil loss and improve water quality would likely improve aquatic and riparian habitats and benefit the wildlife and special status species that rely directly or indirectly on these habitats. Erosion-control measures would reduce sedimentation of water sources and associated impacts to special status amphibian and fish species. Vegetation and soil treatments would help to reestablish upland communities, maintain or improve the health of riparian/wetland communities, reestablish seedlings and understory vegetation, and retain soil moisture and nutrients (BLM 2008a).

The invasion of pinyon pine and Utah juniper into sagebrush habitats, and the lack of contiguous sagebrush habitats for nesting, brood-rearing, and wintering sage-grouse have been limiting factors in the size and distribution of the Alton sage-grouse population. Tree removal and seeding to restore sagebrush habitats on 1,700 acres in Alton–Sink Valley by BLM in 2005 has resulting in increased forb and grass cover and increased use of the treated areas by sage-grouse (Curtis and Frey 2007). Ongoing management to improve the distribution, abundance, and connectivity of suitable habitats would have beneficial impacts on the species.

Table 4.47 lists the habitat types present in the tract, the wildlife and special status species associated with each habitat type, and the acres of disturbance that would occur to each habitat type under the No Action Alternative, Proposed Action, and Alternative C.

Table 4.47. Acreages and Direct Disturbance in the Alton Coal Tract by Habitat Type and Associated Wildlife and Special Status Species Under the No Action and Action Alternatives

Habitat Type	Associated Wildlife and Special Status Species[12]	Alternative A (No Action)	Alternative B: (Proposed Action)			Alternative C		
		Acres Disturbed	Acres in Tract	Acres Disturbed	Percentage Disturbed	Acres in Tract	Acres Disturbed	Percentage Disturbed
Pinyon-Juniper Woodland	Allen's big-eared bat, Arizona toad, e k, Ferruginous Hawk, Lewis' Woodpecker, Townsend's big-eared bat	0.0	1,430.0	694.4–968.5	48.6%–67.7%	1,409.7	679.5–953.5	48.2%–67.6%
Sagebrush/ Grassland	Burrowing Owl, elk, Ferruginous Hawk, fringed myotis, Golden Eagle, Greater Sage-grouse, kit fox, Long-billed Curlew, mule deer, pygmy rabbit, Short-eared Owl, spotted bat, Townsend's big-eared bat	0.0	860.2	366.5–434.7	42.6%–50.5%	627.8	195.7–263.9	31.2%–42.0%
Sagebrush/ Grassland (treated)	Burrowing Owl, elk, Ferruginous Hawk, fringed myotis, Golden Eagle, Greater Sage-grouse, kit fox, Long-billed Curlew, mule deer, pygmy rabbit, Short-eared Owl, spotted bat, Townsend's big-eared bat	0.0	749.1	547.5	73.1%	749.1	546.1	72.9%
Annual and perennial grasses	Elk, Ferruginous Hawk, Long-billed Curlew, mule deer, Short-eared Owl	0.0	324.1	278.4–299.6	85.9%–92.4%	247.0	196.5–217.6	79.6%–88.1%
Mountain Brush	Elk, Ferruginous Hawk, Lewis's Woodpecker	0.0	62.8	24.9–60.0	39.6%–95.5%	62.8	24.7–59.8	39.3%–95.2%
Wetland (meadow)	Elk, mule deer, western toad	0.0	62.8	55.5	88.3%–88.3%	0.0	0.0	0%
Riparian	Allen's big-eared bat, Arizona toad, Bald Eagle, big free-tailed bat, Lewis's Woodpecker, Northern Goshawk, western toad	0.0	55.3	6.7–10.0	12.1%–18.1%	54.0	6.3–9.6	11.7%–18.0%
Rabbitbrush	Burrowing Owl, elk, Ferruginous Hawk, Golden Eagle, Greater Sage-grouse, kit fox, pygmy rabbit, Short-eared Owl, spotted bat	0.0	10.7	1.0	9.2%	10.7	0.9	8.0%
Bedrock, Cliff, and Canyon	Allen's big-eared bat, Black Swift, big free-tailed bat, fringed myotis, Golden Eagle, spotted bat, Townsend's big-eared bat	0.0	0.0	0.0	0%	0.0	0.0	0%
Open water	Black Swift, Bonneville cutthroat trout, desert sucker, leatherside chub, virgin spinedace	0.0	4.1	0.0	0%	0.0	0.0	0%
Habitat Total		**0.0**	**3,559.1**	**1,974.8–2,376.7**	**55.5%–66.9%**	**3,161.1**	**1,649.7–2,051.4**	**52.2%–64.9%**

[12] Scientific names for all wildlife and special status species can be found in Chapter 3.

4.17.6.2 IMPACTS COMMON TO THE ACTION ALTERNATIVES

Under the Proposed Action and Alternative C, there would be a short-term loss of all habitat types from the clearing of vegetation during the life of the mine and from the construction of centralized and dispersed facilities. Vegetation and soil would be removed from active mining areas and stockpiled, with reclamation and revegetation taking place concurrently with mining. Long-term fragmentation, alteration, loss, or displacement of wildlife and special status species habitats would occur during mining and restoration activities, because some or all reclaimed habitats would not have developed to a mature, structurally and compositionally diverse condition. Sagebrush takes approximately five years to reestablish following a fire; however, the successional development of a mature sagebrush community takes from 15 to 30 years (Miller and Rose 1999). Because restoration plans include planting sagebrush seedlings, the recovery period for sagebrush would be reduced to some degree. Successional development of a mature sagebrush community would require up to 30 years, depending on site conditions. During this recovery period, restored sites may have lower habitat quality than fully developed vegetation communities, and would therefore be of less value to wildlife and special status species, particularly those that require mature sagebrush habitats such as Greater Sage-grouse.

On federal lands, reclamation would involve the reestablishment of native and suitable non-native vegetation communities. On private lands, revegetation would involve the reestablishment of pre-mining agricultural vegetation. Impacts would be partially mitigated by revegetation and habitat enhancement plans. There would be displacement of wildlife and interference with movement patterns during periods of active mining and construction. Injury or potential for mortality of smaller and less mobile animals (e.g., rodents, reptiles, and amphibians) could result from individuals being crushed on the ground or in burrows, buried in spoil areas, or trapped in excavated areas and buried. Small animals in mined and developed areas would likely be displaced, injured, or have potential for mortality.

Disruption of breeding or loss of nests or young could take place if mining and construction occurs during the nesting season for raptors and other migratory and nonmigratory birds. These impacts would be avoided by restricting clearing of vegetation to nonbreeding seasons, or by conducting nest surveys and protecting individual nests during breeding periods. Of the habitats in the tract, pinyon-juniper woodlands would likely have the highest diversity of breeding migratory birds, and would be similarly affected under both action alternatives. Disturbance to native habitats could also cause degradation of wildlife and special status species habitats due to an increased risk of noxious weeds invasion and associated alteration of habitat composition and structure.

Under the action alternatives, approximately 8.12 million gallons (25 acre-feet) of water per year would be used for dust suppression and equipment washing. Modifications to Robinson Creek and Kanab Creek in the tract would have negligible impacts on potential habitats for fish and amphibian species due to limited surface water. Nevertheless, relocation of Robinson Creek would reduce or eliminate any existing flows and connectivity, remove structural habitat features, reduce or eliminate prey species, and increase erosion and sedimentation of connected surface waters. Relocation of existing streams would require surface impacts during dredging of a new stream channel and filling of the existing channel, as well as surface disturbance from construction equipment. Aquatic and riparian habitats would be displaced from both the original creek bed and replacement creek bed until restoration is completed. Impacts from stream crossing developments on Kanab Creek would be minimal due to limited surface-water flows and associated fish and amphibian habitats.

Under the action alternatives, portions of KFO Route 116 in the tract would be relocated to allow for mine-related disturbance within 100 feet of the road. KFO Route 116 would be sited to avoid disturbances to wetlands, floodplains, stream channels, and intact sagebrush stands wherever possible. Where it is not

possible to avoid disturbances to these areas, mitigation measures would be prescribed. Relocation of KFO Route 116 would be temporary, and the road would be reestablished in the approximate, original roadbed following mining. Two-track roads on private and BLM-administered lands in the tract would be closed during mining operations and replaced following completion of mining and reclamation activities. Temporary two-track roads may be constructed and reclaimed following mining. Surface disturbance from road relocation would impact wildlife and special status species by removing and fragmenting existing habitats, and by reducing habitat quality in adjacent habitats due to noise and disturbance associated with road construction and use. There would be an increased likelihood of mortality of individuals from collisions with mine-related vehicles on KFO Route 116.

Under both action alternatives, mining activities would be ongoing 24 hours a day, six days a week. Noise and ground vibration would occur from blasting, the use of electrical power generators, and coal processing, loading, and transport from centralized facilities. Approximately 153 truck round-trips per day, and worker and service traffic to and from the tract would occur for the duration of the mining operation. Impacts to wildlife and special status species from coal truck and other vehicle traffic in the tract would vary according to the size, mobility, and movements of each species. The use of narrow, unpaved roads in the tract would increase the likelihood of mortality of smaller, less mobile animals (e.g., small mammals, ground birds, reptiles, and amphibians) from collisions with mine-related vehicles. Vehicle-related mortality of raptors and other special status bird species could also occur from birds scavenging roadkill, and would be proportional to the amount of roadkill that occurs.

Disturbance to or displacement of wildlife and special status species would likely occur due to lighting during nighttime operations. Artificial night lighting affects animal foraging behavior, reproduction, movement, and species interactions (such as predator-prey and pollinator-plant relationships) (Longcore and Rich 2004, 2005). Bats and other nocturnal mammals respond to increased nighttime light by reducing or shifting their periods of activity, traveling shorter distances, and consuming less food (Longcore and Rich 2005). Diurnal (day-active) and nocturnal wildlife and special status species could be displaced from, or attracted to, habitats affected by night lighting. Bat species are likely to be attracted to insect activity around lights and could benefit from concentrated prey. However, night lighting increases the risk of predation for small, nocturnal mammals and decreases food consumption when animals reduce foraging activities to remain concealed in an artificially lit environment (Beier 2005). Night lighting may also increase the risk of animal mortality from vehicle collisions (Longcore and Rich 2005).

Subsidence from underground mining operations and from the removal of coal would be expected to cause surface cracks, lower the ground surface, and cause the fracture or failure of cliffs (Personal Communication, Smith 2008). Several small areas of bedrock, cliff, and canyon habitat occur adjacent to the eastern boundary of the proposed tract, but none of this habitat type occurs on or adjacent to the NE corner of the tract (Block C) where underground mining is expected to occur. Subsidence would be expected to occur within one year of mining operations and would permanently impact the topography, physiography, and stratigraphy of the area. If subsidence were to occur, direct or indirect impacts to wildlife and special status species and their habitats would occur from collapse of surface topography, such as rock walls or cliffs, and any resulting loss of nesting or roosting habitat.

The KFO-RMP (BLM 2008a) includes habitat maintenance, enhancement, and species-specific management (particularly for Greater Sage-grouse). A detailed, site-specific mining and reclamation plan would be applied for reclamation and reestablishment of vegetation with planned mitigation required before coal mining and coal mine-related activities could occur. Under the *Alton Sage-grouse Habitat Assessment and Mitigation Plan* (ACD 2008: Appendix 3), nearby grasslands and shrublands would be protected to provide alternate breeding and nesting sites, intact sagebrush stands in the tract would be avoided, and pinyon-juniper woodlands would be removed with subsequent restoration of the sagebrush community. In addition to habitat reclamation and restoration of disturbed areas, the successful bidder

would be required to enhance sage-grouse habitat in Block Sa concurrent with mining (see Map 1.2 and Map 2.1). Irrigated alfalfa fields would also be created in Swapp Valley to provide sage-grouse brood-rearing habitat away from mining disturbance and residential areas (ACD 2008: Appendix 3). Nevertheless, wildlife and special status species habitats would be fragmented, altered, or lost in the short term due to surface disturbance from coal mining and construction, and associated impacts such as increased susceptibility of disturbed sites to weed invasion, reduced species diversity, and altered habitat structure.

Over the long-term, mining reclamation and sagebrush restoration activities are expected to improve crucial big game and special status species habitats, restore ecological functioning, and increase forage production. Habitat reclamation and revegetation actions would enhance habitat for some wildlife and special status species. Reestablishment of vegetation would serve to mitigate the short-term, negative impacts of surface disturbance on vegetation communities by restoring native and desirable non-native species. Immediate site reclamation and restoration of the native vegetation community would reduce the duration of habitat loss and the impacts to wildlife and special status species from habitat fragmentation and loss. Habitat restoration actions would be expected to enhance habitat quality over the long-term by creating structurally and compositionally diverse vegetation communities.

The regulatory framework and required mitigation measures are described under the action alternatives and in Section 4.17.1.

Direct adverse effects under the action alternatives would include

- direct mortality of individuals due to trampling, crushing, or burial during mining operations;
- alteration or loss of suitable and/or potential habitats due to surface disturbance, noise, ground vibration, or night lighting;
- disruption of breeding, nesting, or roosting activities due to surface disturbance, human presence, increased levels or duration of noise, and night lighting during 24-hour operations;
- disruption of bird migration and habitat use due to mining and associated disturbance and human presence;
- alteration of hydrologic or geologic conditions in or adjacent to the tract due to surface disturbance or subsidence during underground mining; and
- mortality, stress, or effective loss of habitat due to increased vehicle and coal truck traffic.

Indirect adverse impacts would include

- habitat fragmentation and subsequent displacement of individuals or populations due to surface disturbance and development;
- dust impacts to habitat quality from increased travel and construction activities during the life of mining operations;
- increased susceptibility of disturbed areas to weed invasion and associated alteration of vegetation communities and habitat structure from surface disturbance; and
- increased mosquito-borne disease transmission to special status species populations due to the presence of standing water in holding ponds or excavated areas.

4.17.6.3 ALTERNATIVE B: PROPOSED ACTION

Under the Proposed Action, the tract would encompass approximately 3,576 acres. Approximately 1,993–2,395 acres of surface disturbance from surface mining and infrastructure development would occur in the tract over approximately 25 years. There would be a single open pit (approximately 120 acres), and at any

one time, there would be approximately 120 acres of open surface mining pit disturbance and an additional 120 or more acres in some stage of reclamation. Reclamation would be concurrent with mining over the course of the estimated 25-year mine life and would be followed by a minimum of 10 years of reclamation and revegetation monitoring. Impacts are reported in terms of total acres of disturbance over the life of the mine; however, this disturbance would not all occur at one time.

Under the Proposed Action, approximately 1,975–2,377 acres of disturbance would occur in vegetated areas (see Table 4.47).Of this total, dispersed facilities would be sited to avoid disturbances to wetlands, floodplains, stream channels, and intact sagebrush stands wherever possible, with mitigation measures prescribed where it is not possible to avoid disturbances. Underground mining would not directly impact overlying vegetation; however, impacts associated with underground mining could include hydrological changes and subsidence. Surface disturbance, consisting of the road and ROW, would occur for the reroute of KFO Route 116 in and outside the tract. Although the entire ROW would not be directly disturbed, for purposes of analysis, we assume that these areas would be nonfunctional as habitat for wildlife and special status species for the life of the mine. Following mining of the original roadbed, KFO Route 116 would be returned to its original route and the temporary ROW would be reclaimed and restored. Under the Proposed Action, approximately 56%–67% of the wildlife and special status species habitats in the tract would be removed by surface mining and associated disturbance.

Water use for dust suppression and the washing of equipment would occur over the 25-year mine life. Water sources would consist of groundwater accumulated in open pits and water pumped from existing wells or from wells established near the mine for coal mining purposes. Direct and indirect impacts to wildlife and special status species could result from surface-water depletions or from degradation of surface-water quality due to increased sediment loads from mining operations or spills of petroleum products and other hazardous materials. Direct impacts to wildlife and special status species that occupy wetlands or riparian habitats (see Table 4.47) would consist of habitat removal during mining and related disturbances. Indirect impacts would consist of loss of habitat and/or reduced habitat functioning (i.e., reduced water quality, reduced prey availability) as a result of water depletions or sedimentation of surface waters. See Section 4.16, Water Resources, for more detailed discussion of water use under the Proposed Action.

4.17.6.3.1 Impacts on Wildlife Occurring in the Tract Analysis Area

The tract is located entirely in crucial summer habitat for mule deer and in crucial summer and year-long substantial value habitats for elk. These big game species are likely to be displaced from crucial and substantial-value habitats on the tract during mining operations and development. Direct impacts would consist of habitat loss, alteration, and fragmentation due to surface disturbance. Other impacts would consist of disruption of movement and habitat use due to noise, night lighting, and increased human presence. Disturbed habitat would have reduced forage and cover value until reclamation and restoration actions are complete (approximately 10 years post-mining activity). Reclaimed sites may have limited habitat value in early stages of succession, and may never fully return to their original habitat function in late successional stages. Under the Proposed Action, surface-disturbing activities would remove 67%–73% of crucial summer mule deer habitat, 66%–72% of crucial summer elk habitat, and 40% of year-long substantial value elk habitat in the tract (Table 4.48). No designated pronghorn habitats occur in the proposed tract.

Table 4.48. Direct Impacts to Mule Deer and Elk Habitats in the Alton Coal Tract under the No Action and Action Alternatives

	Alternative A (No Action)	Alternative B (Proposed Action)			Alternative C		
	Acres Disturbed	Acres in Tract	Acres Disturbed	Percentage Disturbed	Acres in Tract	Acres Disturbed	Percentage Disturbed
Mule Deer Crucial Summer	0	3,576.6	2,394.0–2,605.1	66.9%–72.8%	3,172.7	2062.8–2273.9	65.0%–71.7%
Elk Crucial Summer	0	3,576.6	2,369.3–2,580.3	66.2%–72.1%	3,101.6	2035.0–2246.1	65.6%–72.4%
Elk Year-long Substantial Value	0	71.1	28	39.4%	71.1	27.8	39.1%

Source: Utah Division of Wildlife Resources GIS data updated May 2006.

Under the Proposed Action, an additional 0.8 acre of mule deer crucial summer, 0.2 acre of elk crucial summer, and 0.6 acre of elk year-long substantial value habitats on BLM-administered land adjacent to the tract would be disturbed to reroute KFO Route 116. Impacts to big game species along the coal haul transportation route are discussed in Section 4.17.7.2.1. Direct impacts to mule deer and elk habitats in the tract would be considerably greater under the Proposed Action compared to the No Action Alternative. Implementation of the Proposed Action would result in the disturbance of 2,394–2,605 more acres of crucial summer mule deer habitat, 2,369–2,580 more acres of crucial summer elk habitat, and 28 more acres of year-long substantial elk habitat than would occur under the No Action Alternative.

4.17.6.3.2 Impacts on Special Status Species Occurring in the Tract Analysis Area

4.17.6.3.2.1 Greater Sage-grouse

The Alton sage-grouse population is isolated by its distribution at the southern portion of the species' range and the limited distribution of nesting, brood-rearing, and wintering habitats in the area. Under the Proposed Action, the Alton sage-grouse population would be adversely affected in the short term where surface disturbance associated with coal mining and construction activities occur in the species' habitats. As described in Section 4.17.1.2, short-term, medium-term, and long-term habitat reclamation measures would be required to enhance Greater Sage-grouse nesting and brooding habitats. Accelerated reclamation actions in Block Sa (planting of grass, forb, and sagebrush seedlings) would also be required to minimize loss of existing sagebrush habitat and to create restored sagebrush habitats within approximately 10 years. However, the restoration and successional development of a mature sagebrush community would be expected to require 15–30 years or longer depending on site conditions (see Section 4.17.3). In the long term, reclamation and restoration actions throughout the tract would create sagebrush stands of varying ages and structure, and would increase the overall quality and quantity of habitats available to the Alton population.

Although the location of the tract's coal resources do not coincide with the lek used by the local population, the development of the coal mine would eliminate brood-rearing and wintering habitat and habitat resources adjacent to the lek during the life of the mine and during subsequent restoration and

recovery period. Fragmentation, alteration, degradation, and loss of Greater Sage-grouse habitats would likely occur as a result of mining activity and associated noise and human presence. Development of the coal mine, removal of overburden, and surface mining operations would result in the short-term loss of habitat resources and displacement or loss of individual birds. The reclamation and restoration plan would be designed to enhance the long-term survivability of the Alton sage-grouse population. However, although mitigation and reclamation actions are expected to reduce impacts to sagebrush habitats in the short term and increase the quality and quantity of sagebrush habitats over the long-term, development of the coal mine could result in the short-term or long-term displacement or loss of the local population.

Infrastructure associated with mining activities could also facilitate increased predation by raptors and *Corvus* species (crows and ravens) because it would increase availability of perching sites. Mining activities and associated surface disturbance and road development could also facilitate invasion by weed species (Bergquist et al. 2007). In addition, the creation of holding ponds could increase mosquito abundance and transmission of West Nile Virus to the local sage-grouse population (Naugle et al. 2004). This disease is a considerable threat to the species (Naugle et al. 2004), and this population would be adversely impacted by the loss of individual birds due to its relative isolation and limited numbers. Mosquito abatement in holding ponds and standing water would reduce the potential for transmission of West Nile Virus to the sage-grouse population.

Construction activities near active leks during the breeding season would have direct adverse impacts to sage-grouse by disrupting courtship behaviors and increasing the risk of mortality of adult sage-grouse, fledglings, and nestlings from collisions with, or crushing by vehicles and construction equipment. Recent studies indicate that sage-grouse lekking and brooding habitat is devalued within 1,300 feet of roads and other surface disturbances, which causes avoidance and displacement to other habitat areas (Connelly et al. 2000; UDWR 2002; Crawford et al. 2004). Noise associated with human presence, mining, and associated facilities (i.e., power generators) in the tract, and coal truck traffic to and from the tract, would reduce breeding success by reducing lek use and nest initiation in and adjacent to brooding habitats. Because 70%–80% of sage-grouse hens nest and rear their young within 1.75–2.50 miles of the lek where they breed (Rowland 2004), ongoing surface disturbance and associated noise could cause the displacement of sage-grouse from crucial brooding habitats in the tract. Under the Proposed Action, 1,290–1,403 acres (62%–68%) of crucial brooding habitat (see Map 4.2) would be impacted through direct surface disturbance (Table 4.49).

Table 4.49. Direct Impacts to Greater Sage-grouse Habitats in the Tract Under the No Action and Action Alternatives

	Alternative A (No Action)	Alternative B (Proposed Action)			Alternative C		
	Acres Disturbed	Acres in Tract	Acres Disturbed	Percentage Disturbed	Acres in Tract	Acres Disturbed	Percentage Disturbed
Crucial Brooding Habitat	0	2,067.5	1,290.4–1,402.8	62.4%–67.9%	1,833.4	1,056.4–1,168.8	57.6%–63.8%

Source: Utah Division of Wildlife Resources GIS data updated May 2006.

The Proposed Action would result in more direct adverse impacts to the Alton sage-grouse population and its habitat than would occur under the No Action Alternative. Implementation of the Proposed Action would result in the disturbance of 1,290–1,403 more acres of crucial sage-grouse brooding habitat than would occur under the No Action Alternative. Restoration actions would include seeding sagebrush and planting seedlings to accelerate the successional development of suitable sage-grouse habitat. Over the long-term, these restoration measures would improve the overall quantity and quality of habitats,

provided that sufficient refugia are available in habitats adjacent to the tract to retain the Alton sage-grouse population and to provide lekking and brood-rearing sites throughout the period of disturbance. Because this population is small and isolated, and individuals have been found to complete their life cycles in the Alton and Sink Valley areas, and sage-grouse in general exhibit high fidelity to nesting and lek sites, the extent of available, suitable habitats may not be adequate to prevent the loss or displacement of the existing population.

4.17.6.3.2.2 Pygmy Rabbit

Threats to the pygmy rabbit are primarily from habitat loss across its limited range in the Intermountain West (Bosworth 2003). In Utah, the pygmy rabbit occurs in the western half of the state, primarily in the Bonneville Basin (Bosworth 2003). Like the Greater Sage-grouse, this species is largely dependent on sagebrush for both food and cover. Approximately 914–982 acres (57%–61%) of the pygmy rabbit's sagebrush/grassland and sagebrush/grassland (treated) habitats would be removed under the Proposed Action (see Table 4.47). In addition to direct impacts to individuals that may occur during surface disturbance and mining, pygmy rabbit would be displaced from these habitat resources until reclamation and successful restoration have been completed. The Proposed Action would result in greater short-term direct adverse impacts to pygmy rabbit and its habitats than would occur under the No Action Alternative.

4.17.6.3.2.3 Kit Fox

The kit fox is widely distributed in Utah, but may be declining (UDWR 2005). Its distribution in the tract analysis area is not known. Habitat loss, displacement by competitors, and indiscriminant predator poisoning are the primary threats to the species (Bosworth 2003). Indirect impacts can result from reduced abundance of small mammal prey due to habitat alteration. Approximately 914–982 acres (57%–61%) of kit fox sagebrush/grassland and sagebrush/grassland (treated) habitats would be removed under the Proposed Action (see Table 4.47). In addition to direct impacts to individuals that may occur during surface disturbance and mining, kit fox would be displaced due to the removal of its habitat until reclamation and successful restoration have been completed. Because a large portion of the tract would be disturbed during surface mining and associated activities, the Proposed Action would result in greater short-term direct adverse impacts to kit fox and its habitats than would occur under the No Action Alternative.

4.17.6.3.2.4 Bat Species

Most of the habitat types in the tract are used as foraging habitat by one or more special status bat species (see Table 4.47). Potential bat roosting habitats occur adjacent to the tract. Adverse impacts to Allen's big-eared bat, big free-tailed bat, fringed myotis, spotted bat, and Townsend's big-eared bat would include the direct loss of foraging habitat in the tract; potential displacement from roosting and foraging habitats adjacent to the tract due to increased noise, human presence, and surface-disturbing activities; and habitat fragmentation and alteration. Decreased productivity of individuals or populations could result from the loss of, or displacement from, foraging habitats in or adjacent to the tract. Night lighting could disrupt roost emergence timing, predator avoidance, and foraging behaviors (Briggs 2004; Navarra and Nelson 2007). No bedrock, cliff, or canyon habitat occurs in the tract, but several small habitat areas are adjacent to the tract's eastern boundary. However, indirect impacts to these habitat areas from subsidence would be unlikely because underground mining operations would only occur in the northeast corner of the tract. Because a large portion of the tract would be disturbed during surface mining and associated activities, the Proposed Action would result in greater short-term adverse impacts to bat species and their habitats than would occur under the No Action Alternative.

4.17.6.3.2.5 Raptor Species

The Proposed Action would result in direct adverse impacts to Bald Eagle, Burrowing Owl, Ferruginous Hawk, Golden Eagle, Northern Goshawk, and Short-eared Owl foraging and wintering habitats, and active and inactive nest sites. Raptor species are sensitive to human disturbance (Romin and Muck 1999). Disturbance from mining activities or human presence near an active nest during breeding season could result in nest abandonment and/or mortality of young from increased vulnerability to predators, temperature extremes, or reduced food intake due to avoidance of the nest site by adult raptors. Raptor species would be directly impacted by habitat loss from pit disturbance and construction activities, and by the long-term loss of wooded foraging habitats (e.g., riparian, pinyon-juniper woodland, and mountain brush habitats). Construction of roadways and mine-related traffic could result in increased mortality from vehicle strikes. There is an increased risk of direct mortality of ground-nesting raptor species, particularly the Burrowing Owl, from pit development and construction equipment, which could crush or bury adults, nestlings, or eggs in burrows. Impacts to active nesting sites would be mitigated by raptor nest surveys and avoidance measures. The loss of foraging habitats due to direct disturbance or removal would result in the displacement of raptors from these areas until habitats have been successfully restored. Raptor nesting sites would likely be reduced by the removal of 694–969 acres of pinyon-juniper woodland. No bedrock, cliff, or canyon roosting and nesting habitat occurs in the tract, but several small habitat areas are adjacent to the tract's eastern boundary. However, indirect impacts to these habitat areas from subsidence would be unlikely because underground mining operations would occur in the northeast corner of the tract. Because a large portion of the tract would be disturbed during surface mining and associated activities, the Proposed Action would result in greater short-term adverse impacts to raptor species and their habitats than would occur under the No Action Alternative. In the long term, the Proposed Action would result in greater beneficial impacts to raptor species associated with sagebrush habitat compared to the No Action Alternative by increasing the quality and quantity of foraging habitats through sagebrush habitat restoration. Special lease stipulations and BMPs would minimize adverse impacts to raptor species, especially during the breeding season, by providing spatial and seasonal buffers of both occupied and unoccupied nests.

4.17.6.3.2.6 Other Bird Species

The Proposed Action would result in direct adverse impacts to the Black Swift, Lewis' Woodpecker, Long-billed Curlew, and Three-toed Woodpecker breeding, nesting, and wintering habitats. Loss of habitat due to removal of vegetation and surface disturbance and associated activities would reduce foraging and nesting habitats, cover, and roosting and nesting sites. Most surface disturbance under the Proposed Action would occur in sagebrush/grassland and sagebrush/grassland (treated) (914–982 acres) and pinyon-juniper woodland habitats (694–969 acres). Therefore, the Long-billed Curlew and Lewis's Woodpecker, respectively associated with these habitat types, would be most greatly affected. Habitat fragmentation, alteration, displacement, and loss for ground-nesting species would result from pit disturbance and construction activities. These species would be at increased risk of direct mortality from excavation and construction due to potential for crushing or burial of adults, nestlings, and eggs on the ground. Increased mine-related traffic could also result in increased mortality from vehicle strikes. Impacts to active nesting sites would be mitigated by nest surveys and avoidance measures.

The loss of foraging habitats due to direct disturbance or removal would result in the displacement of special status bird species from these areas until habitats have been successfully restored. Woodpecker nesting habitat in the tract would be reduced by the removal of 49%–68% of pinyon-juniper woodland habitats in the tract. Because of the large portion of the tract that would be disturbed during surface mining and associated activities, the Proposed Action would result in greater short-term adverse impacts to special status bird species and their habitats than would occur under the No Action Alternative. In the long term, the Proposed Action would result in greater beneficial impacts to Long-billed Curlew

compared to the No Action Alternative by increasing the quality and quantity of sagebrush-grassland foraging and nesting habitats. Special lease stipulations and BMPs would minimize adverse impacts, especially during the breeding season, by requiring surveys for and avoidance of nest sites.

4.17.6.3.2.7 Migratory Bird Species

Under the Proposed Action, direct adverse impacts to migratory birds would occur from the direct removal, alteration, or fragmentation of habitat during surface mining and associated activities. Loss of habitat would reduce forage, cover, perches, and nesting areas for migratory birds. Most surface disturbance under the Proposed Action would occur in sagebrush/grassland and sagebrush/grassland (treated) (914–982 acres) and pinyon-juniper woodland habitats (694–969 acres) (Table 4.50). Therefore migratory bird species associated with these habitat types would be most greatly affected. In addition, 278–300 acres (86%–92%) of annual and perennial grasses habitat would be directly disturbed and effectively lost for migratory bird species associated with this habitat type. Under the Proposed Action, approximately 1,975–2,377 acres (56%–67%) of migratory bird habitat would be disturbed by surface mining over the life of the mine. Because a large portion of the tract would be disturbed during surface mining and associated activities, the Proposed Action would result in greater short-term adverse impacts to migratory bird species and their habitats than would occur under the No Action Alternative. In the long term, the Proposed Action would result in greater beneficial impacts to migratory birds associated with sagebrush habitat compared to the No Action Alternative by increasing the quality and quantity of foraging and nesting habitats through sagebrush habitat restoration.

Table 4.50. Acreages and Direct Disturbance in the Alton Coal Tract by Habitat Type and Associated Migratory Bird Species Under the Action Alternatives

Habitat Type	Associated Wildlife and Special Status Species	Alternative B (Proposed Action)			Alternative C		
		Acres in Tract	Acres Disturbed	Percentage Disturbed	Acres in Tract	Acres Disturbed	Percentage Disturbed
Pinyon-Juniper Woodlands	Black-throated Gray Warbler, Gray Vireo, Loggerhead Shr ke, Virginia's Warbler	1,430.0	694.4–968.5	48.6%–67.7%	1,409.7	679.5–953.5	48.2%–67.6%
Sagebrush/ Grassland	Brewer's Sparrow, Sage Sparrow	860.2	366.5–434.7	42.6%–50.5%	627.8	195.7–263.9	31.2%–42.0%
Sagebrush/ Grassland (treated)	Brewer's Sparrow, Sage Sparrow	749.1	547.5	73.1%	749.1	546.1	72.9%
Annual and perennial grasses	Peregrine Falcon, Prairie Falcon, Swainson's Hawk	324.1	278.4–299.6	85.9%–92.4%	247.0	196.5–217.6	76.6%–88.1%
Mountain Brush	Black-throated Gray Warbler, Gray Vireo, Virginia's Warbler	62.8	24.9–60.0	39.6%–95.5%	62.8	24.7-59.8	39.3%–95.2%
Wetland (meadow)	Northern Harrier	62.8	55.5	88.3%	0.0	0.0	0%
Riparian	Broad-tailed Hummingbird, Gambel's Quail, Lucy's Warbler, Peregrine Falcon	55.3	6.7–10.0	12.1%–18.1%	54.0	6.3–9.6	11.7%–18.0%
Rabbitbrush	Brewer's Sparrow, Sage Sparrow	10.7	1.0	9.2%	10.7	0.9	8.0%
Habitat Total		**3,555.0**	**1,974.8–2,376.7**	**55.5%–66.9%**	**3,161.1**	**1,649.7–2,051.4**	**52.2%–64.9%**

4.17.6.3.2.8 Amphibian Species

Impacts to amphibian species from mining activities include habitat fragmentation and loss, displacement to lower quality habitats, increased exposure to predators from cover removal, crushing and burial of adults and young, and attraction to ecological 'traps' such as water holding ponds. Potential habitats for the Arizona toad in pinyon-juniper woodlands near water comprise up to 1,430 acres of the tract. Under the Proposed Action, 44%–63% (694–969 acres) of pinyon-juniper woodland would be directly disturbed by mining and associated activities (see Table 4.47). Potential habitats for the western toad in wetland (meadow) and riparian habitats comprise approximately 118 acres (3%) of the tract. Under the Proposed Action, approximately 53%–55% (62–66 acres) of wetland and riparian habitats would be removed by mining and associated activities (see Table 4.47). Because a large portion of the tract would be disturbed during surface mining and associated activities, the Proposed Action would result in greater short-term adverse impacts to amphibian habitats than would occur under the No Action Alternative.

4.17.6.3.2.9 Fish Species

No special status fish species are known to occur on the tract or in adjacent waterways. Surface water on the track is limited, and impacts to fish species in the tract are unlikely to occur. Any impacts that would occur would be indirect adverse affects to local waterways from reduction in surface or groundwater or from degradation of surface-water quality from mining and mine-related activities. See Section 4.16 for more detail on impacts to surface water and groundwater.

4.17.6.4 ALTERNATIVE C: REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS

Under Alternative C, the nature of impacts would be the same as under the Proposed Action, but would differ in the acres of disturbance and timing of mine-related activities. Timing restrictions would be in place for Block S to reduce impacts to the Alton sage-grouse population (see Section 2.4.2.3 Sage-grouse Timing Restrictions). The tract would encompass approximately 3,173 acres due to the exclusion of Block NW. Under the Alternative C, approximately 1,650–2,052 acres of disturbance would occur in vegetated areas over approximately 21 years (see Table 4.47). Dispersed facilities would be sited to avoid disturbances to wetlands, floodplains, stream channels, and intact sagebrush stands wherever possible, with mitigation measures prescribed where it is not possible. Relocation of KFO Route 116 would not be required in Block NW under this alternative because this portion of the tract would not be included (see Map 2.1). Relocation of KFO Route 116 elsewhere in the tract would require approximately 36 acres of surface disturbance, with an additional 0.6 acre of disturbance outside of the tract. As described for the Proposed Action, for purposes of analysis, the entire 36.6 acres is assumed to be nonfunctional as habitat for wildlife and special status species for the life of the mine. The reroute would be cited to avoid disturbances to wetlands, floodplains, stream channels, and intact sagebrush stands wherever possible. Under Alternative C, approximately 52%–65% of wildlife and special status species habitats in the tract would be directly impacted by surface disturbance.

Timing restrictions designed to reduce impacts to Greater Sage-grouse in Block S would be implemented to reduce impacts to the local lek and sage-grouse population that occupies portions of the tract during the nesting and brooding periods. Under this alternative, no surface-disturbing activities would be allowed within 0.5 mile of the lek during the lekking period (February 15–March 15) or in Block S (see Map 2.1) during the nesting and brooding period (March 15–July 15). These timing restrictions would alter the timing and distribution of mining activities, and would reduce impacts to Greater Sage-grouse as well as to surface waters, soils, vegetation, and other wildlife and special status species.

Alternative C would require that two pits (approximately 240 acres) are open simultaneously, and would require the use of additional heavy equipment. In addition, a stockpiling area for approximately 40–60 acres of overburden would be required for two simultaneously open pits. At any one time, there would be approximately 240 acres of open surface mining pits and an additional 240 or more acres in some stage of reclamation. Reclamation would be concurrent with mining over the course of the estimated 21-year mine life and would be followed by an up to 10-year reclamation and revegetation monitoring period, with reclamation activities potentially extended for some pits due to timing restrictions for sage-grouse. Impacts are reported in terms of total acres of disturbance over the life of the mine, but note that this disturbance would not all occur at one time.

Water use for dust suppression and the washing of equipment would occur over the 21-year mine life. Water sources would consist of groundwater accumulated in open pits and water pumped from existing wells or wells established near the mine for coal mining purposes. Impacts to wildlife and special status species would be the same as would occur under the Proposed Action. See Section 4.16 for more detailed discussion of water use.

4.17.6.4.1 Impacts on Wildlife Occurring in the Tract Analysis Area

Under Alternative C, the nature of impacts to wildlife occurring in the tract analysis area would be the same as described for the Proposed Action and in the Impacts Common to the Action Alternatives section. Surface-disturbing activities would impact 2,063–2,274 acres (65%–72%) of crucial summer mule deer habitat, 2,035–2,246 acres (66%–72%) of crucial summer elk habitat, and 27.8 acres (39%) of year-long substantial value elk habitat (see Table 4.48). An additional 0.6 acre of mule deer crucial summer and 0.6 acre of elk year-long substantial value habitats on BLM-administered land adjacent to the tract would be disturbed for the reroute of KFO Route 116. Direct impacts to mule deer and elk habitats in the tract would be greater under Alternative C compared to the No Action Alternative. No designated pronghorn habitats occur on or adjacent to the tract under Alternative C.

4.17.6.4.2 Impacts on Special Status Species Occurring in the Tract Analysis Area

Under Alternative C, the nature of impacts to special status species occurring in the tract analysis area would be the same as described for the Proposed Action and under the Impacts Common to the Action Alternatives section.

4.17.6.4.2.1 Greater Sage-grouse

Under Alternative C, mining would not occur in the Block NW. Timing restrictions would be placed on mining activities in Block S, and habitat enhancement would be implemented in Block Sa to minimize impacts to the Greater Sage-grouse population in the tract. The sage-grouse population and its habitats would be adversely affected in both the short term and long term due to surface coal mining activities on and adjacent to the tract, but to a lesser degree than would occur under the Proposed Action. Data show that a lek site occurs on adjacent private property and that birds from the Alton sage-grouse population use Block S during the nesting and brooding period. As would occur under the Proposed Action, mining activities in the tract would not directly disturb the sage-grouse lek, but there is potential for indirect impacts to the lek from human presence, noise, and night-lighting associated with mining activities. As previously mentioned, under Alternative C, no surface-disturbing activities would be allowed within 0.5 mile of the lek during the lekking period or in Block S during the nesting and brooding period; however, outside of these time periods, surface disturbance would occur and would adversely impact habitat known to be used by the local sage-grouse population. There would be potential for direct and indirect impacts associated with human presence, noise, and night lighting within the 0.5-mile lek buffer and in adjacent habitats.

Fragmentation, alteration, degradation, and loss of Greater Sage-grouse habitats are likely to occur as a result of mining activity and associated noise and human presence. Due to timing stipulations, there would be a greater area of open pits during active mining under this alternative than would occur under the Proposed Action. Development of the coal mine, removal of overburden, and surface mining operations would result in the short-term loss of habitat resources and displacement or loss of individual birds. The reclamation and restoration plan would be designed to enhance the long-term survivability of the Alton sage-grouse population. However, although mitigation and reclamation actions are expected to reduce impacts to sagebrush habitats in the short term and increase the quality and quantity of sagebrush habitats over the long-term, habitat loss and disturbance associated with the coal mine could result in the short-term displacement or loss of the local population.

Under Alternative C, 1,056–1,169 acres (58%–64%) of crucial brooding habitat in the tract would be impacted through direct surface disturbance (see Table 4.49). Alternative C would result in more direct adverse impacts to the Alton sage-grouse population and its habitat than would occur under the No Action Alternative. Over the long-term, habitat restoration measures would result in improvements to the overall quantity and quality of habitats, provided that sufficient refugia are available in habitats on or adjacent to the tract to retain the Alton sage-grouse population and provide lekking and brood-rearing sites throughout the period of disturbance. Because this population is small and isolated, and individuals have been found to complete their life cycles in the Alton and Sink Valley areas, the extent of available, suitable habitats may not be adequate to prevent the loss or displacement of the existing population. Long-term, beneficial impacts to the local sage-grouse population from habitat improvements are contingent upon the population having persistent and sufficient habitat quantity and quality on or adjacent to the tract while removal, reclamation, and restoration of habitats are occurring. Improvements to habitat would not be beneficial to the Alton sage-grouse population if it is displaced or lost from the area as a result of mining activity.

4.17.6.4.2.2 Pygmy Rabbit

Approximately 742–810 acres (54%–59%) of the pygmy rabbit's sagebrush/grassland and sagebrush/grassland (treated) habitats in the tract would be removed under Alternative C (see Table 4.47). In addition to direct impacts that may occur during surface disturbance and mining, the pygmy rabbit would be displaced from these habitat resources until reclamation and successful restoration have been completed. Alternative C would result in greater short-term adverse impacts to the pygmy rabbit and its habitat than would occur under the No Action Alternative. In the long term, Alternative C would beneficially impact the pygmy rabbit by increasing the quality and quantity of sagebrush habitats in the tract.

4.17.6.4.2.3 Kit Fox

Approximately 742–810 acres (54%–59%) of the kit fox's sagebrush/grassland and sagebrush/grassland (treated) pinyon-juniper habitats would be removed under Alternative C (see Table 4.47). In addition to direct impacts that may occur during surface disturbance and mining, the kit fox would be displaced from these habitat resources until reclamation and successful restoration have been completed. Because a large portion of the tract would be disturbed during surface mining and associated activities, Alternative C would result in greater short-term adverse impacts to the kit fox and its habitats than would occur under the No Action Alternative. In the long term, Alternative C would result in greater beneficial impacts to the kit fox compared to the No Action Alternative by increasing the quality and quantity of the species' habitats and habitat conditions for its prey through sagebrush restoration.

4.17.6.4.2.4 Bat Species

Under Alternative C, impacts to Allen's big-eared bat, big free-tailed bat, fringed myotis, spotted bat, and Townsend's big-eared bat would include the loss of roosting and foraging habitat; displacement from habitat due to increased noise, human presence, and surface-disturbing activities; and habitat

fragmentation and alteration (see Table 4.47). Impacts due to night lighting and 24-hour mine operations would be reduced by timing restrictions on mining in Block S. No bedrock, cliff, or canyon roosting habitat occurs in the tract, but several small habitat areas are adjacent to the tract's eastern boundary. However, indirect impacts to these habitat areas from subsidence would be unlikely because underground mining operations would only occur in the northeast corner of the tract. Because a large portion of the tract would be disturbed during surface mining and associated activities, Alternative C would result in greater short-term adverse impacts to bat species and their habitats than would occur under the No Action Alternative. In the long term, Alternative C would result in greater beneficial impacts to bat species compared to the No Action Alternative by increasing the quality and quantity of foraging habitats through sagebrush habitat restoration.

4.17.6.4.2.5 Raptor Species

Under Alternative C, Bald Eagle, Burrowing Owl, Ferruginous Hawk, Golden Eagle, Northern Goshawk, and Short-eared Owl would be directly impacted by habitat loss from pit disturbance and construction activities, and by the long-term loss of wooded foraging habitats (e.g., riparian, pinyon-juniper woodland, and mountain brush habitats). The nature of impacts to raptor species would be the same as described for the Proposed Action. The increased risk of direct mortality of ground-nesting raptor species from pit development and construction equipment would be reduced by the elimination of the Block NW and by timing stipulations in Block S. Raptor nesting sites would likely be reduced by the removal of 680–954 acres of pinyon-juniper woodland. Because a large portion of the tract would be disturbed during surface mining and associated activities, Alternative C would result in greater short-term adverse impacts to raptor species and their habitats than would occur under No Action. In the long term, Alternative C would result in greater beneficial impacts to raptor species associated with sagebrush habitat compared to the No Action Alternative by increasing the quality and quantity of foraging habitats through sagebrush habitat restoration. As under the Proposed Action, special lease stipulations and BMPs would minimize adverse impacts to raptor species, especially during the breeding season, by providing spatial and seasonal buffers of both occupied and unoccupied nests.

4.17.6.4.2.6 Other Bird Species

Under Alternative C, Black Swift, Lewis' Woodpecker, Long-billed Curlew, and Three-toed Woodpecker foraging and nesting habitats, cover, and roosting and nesting sites would be directly impacted by surface disturbance and associated activities. The nature of impacts to these bird species would be the same as described for the Proposed Action. Most surface disturbance under Alternative C would occur in sagebrush/grassland and sagebrush/grassland (treated) (742–810 acres) and pinyon-juniper woodland habitats (680–954 acres). Long-billed Curlew and Lewis's Woodpecker, respectively associated with these habitat types, would be most greatly affected. Ground-nesting and foraging species would be directly impacted by pit disturbance and construction activities, and would be at increased risk of direct mortality from excavation and construction due to potential for crushing or burial of adults, nestlings, and eggs on the ground. Increased mine-related traffic could result in increased mortality from vehicle strikes. Impacts to active nesting sites would be mitigated by nest surveys and avoidance measures. The loss of foraging habitats due to direct disturbance or removal would result in the displacement of special status bird species from these areas until habitats have been successfully restored. Woodpecker nesting habitat would be reduced by the removal of 680–954 acres of pinyon-juniper woodland. Because of the large portion of the tract that would be disturbed during surface mining and associated activities, Alternative C would result in greater short-term adverse impacts to special status bird species and their habitats than would occur under the No Action Alternative. In the long term, Alternative C would result in greater beneficial impacts to Long-billed Curlew compared to the No Action Alternative by increasing the quality and quantity of foraging and nesting habitats through sagebrush habitat restoration. Special lease stipulations and BMPs would minimize adverse impacts, especially during the breeding season, by requiring surveys for and avoidance of nesting sites.

4.17.6.4.2.7 Migratory Bird Species

Under Alternative C, direct adverse impacts to migratory birds would occur from the direct removal, alteration, or fragmentation of habitat during surface mining and associated activities. The nature of impacts to migratory bird species would be the same as described for the Proposed Action. Most surface disturbance under Alternative C would occur in sagebrush/grassland and sagebrush/grassland (treated) (742–810 acres) and pinyon-juniper woodland habitats (680–954 acres) (see Table 4.50). Therefore, migratory bird species associated with these habitat types would be most greatly affected. In addition, 197–218 acres (77%–88%) of annual and perennial grasses would be directly disturbed and effectively lost for migratory bird species associated with this habitat type. Under Alternative C, approximately 1,650–2,052 acres (52%–65%) of migratory bird habitat in the tract would be disturbed by surface mining over the 21-year life of the mine (see Table 4.50). Because a large portion of the tract would be disturbed during surface mining and associated activities, Alternative C would result in greater short-term adverse impacts to migratory bird species and their habitats than would occur under the No Action Alternative. In the long term, Alternative C would result in greater beneficial impacts to migratory birds associated with sagebrush habitat compared to the No Action Alternative by increasing the quality and quantity of foraging and nesting habitats through sagebrush habitat restoration.

4.17.6.4.2.8 Amphibian Species

Impacts to amphibian species from mining activities include habitat fragmentation and loss, displacement to lower quality habitats, increased exposure to predators from cover removal, crushing and burial of adults and young, and attraction to ecological ‘traps’ such as water holding ponds. The nature of impacts to amphibian species would be the same as described for the Proposed Action. The Arizona toad’s pinyon-juniper woodland habitats make up 1,410 acres in the tract under Alternative C. Under this alternative, 48%–68% (680–954 acres) of pinyon-juniper woodland would be directly disturbed by mining and associated activities (see Table 4.47). None of the western toad’s wetland (meadow) habitats would be directly disturbed under Alternative C. However, approximately 6.3–9.6 acres of the western toad’s riparian habitats would be disturbed under this alternative. Because a large portion of the tract would be disturbed during surface mining and associated activities, Alternative C would result in greater short-term adverse impacts to amphibian species’ habitats than would occur under the No Action Alternative.

4.17.6.4.2.9 Fish Species

The nature and degree of impacts to fish species would be the same as described for the Proposed Action.

4.17.7 Impacts Occurring in the Coal Haul Transportation Route Analysis Area

Wildlife mortality along highways and roads is facilitated by the presence of open foraging areas along the roadside, and by the need for road crossings during daily or seasonal movements (U.S. Department of Transportation 1975; BLM 1995). Wildlife mortalities along highways and roads is most likely to occur from dusk to dawn, when wildlife may be more active and motorist visibility is reduced, and during seasonal migrations when wildlife are more likely to cross roads. Impacts from coal truck traffic on wildlife and special status species would vary according to the individual’s size, mobility, and movements; large, nocturnal species and migratory species such as mule deer, elk, and pronghorn would be at the greatest risk. An increase in vehicle collision mortality of raptors and other special status bird species could also occur due to birds scavenging roadkill, and would be proportional to the volume of other animal mortalities. The attraction of raptors to any increase in roadkill could also result in an increase in raptor predation of sage-grouse and small animal species in habitats adjacent to the coal haul transportation route.

4.17.7.1 ALTERNATIVE A: NO ACTION

Wildlife mortalities along US-89, SR-20, I-15, and SR-56 are likely to increase due to additions of mine-related traffic from existing fee coal mine areas adjacent to the tract that would use existing routes (see Section 4.18). A large portion of the coal haul transportation route would be adjacent to wildlife and special status species habitats (Table 4.51). From 2003 to 2005, wildlife-related single-vehicle crashes made up 51.1% of crashes on US-89, 17.7% of crashes on US-20, 11.4% of crashes on I-15, and 40.5% of crashes on SR-56 (Fehr and Peers 2008). Wildlife mortality and associated disruptions in habitat use and migration routes would be expected to occur under both the No Action Alternative and the action alternatives. However, mine-related traffic and associated wildlife impacts would be minimized under the No Action Alternative due to the expected lower volume of truck traffic.

Table 4.51. Land-cover Miles* Adjacent to the Coal Haul Transportation Route and Associated Wildlife and Special Status Animal Species Under the No Action and Action Alternatives**

Cover Type	Associated Wildlife and Special Status Animal Species	Miles	Percentage of Route
Sagebrush	Burrowing Owl, elk, Ferruginous Hawk, fringed myotis, Golden Eagle, Greater Sage-grouse, kit fox, mule deer, pronghorn, pygmy rabbit, Short-eared Owl, spotted bat, Townsend's big-eared bat, Utah prairie-dog	43.0	39.0%
Developed	None	42.6	38.7%
Pinyon-juniper woodland	Allen's big-eared bat, Arizona toad, e k, Ferruginous Hawk, Lewis's Woodpecker, spotted bat, Townsend's big-eared bat	9.9	9.0%
Agriculture	E k, Ferruginous Hawk, Long-billed Curlew, mule deer, pronghorn, Short-eared Owl	7.3	6.6%
Shrub steppe	Burrowing Owl, elk, Ferruginous Hawk, Golden Eagle, Greater Sage-grouse, kit fox, Long-billed Curlew, pronghorn, Pygmy Rabbit, Short-eared Owl, spotted bat, Townsend's big-eared bat, Utah prairie dog	3.5	3.2%
Woodland-shrubland	Black Swift, elk, Ferruginous Hawk, Lewis's Woodpecker, Three-toed Woodpecker	2.2	2.0%
Bedrock, Cliff and Canyon	Allen's big-eared bat, Black Swift, big free-tailed bat, fringed myotis, spotted bat, Townsend's big-eared bat	1.0	0.9%
Grassland (native and invasive grasses/forbs)	Burrowing Owl, elk, Ferruginous Hawk, fringed myotis, Long-billed Curlew, mule deer, pronghorn, Short-eared Owl, Utah prairie-dog	0.1	0.1%
Open water	Black Swift, Bonneville cutthroat trout, desert sucker, leatherside chub, virgin spinedace	0.1	<0.001%
Salt desert scrub	Big free-tailed bat, Burrowing Owl, Ferruginous Hawk, Golden Eagle, kit fox, Long-billed Curlew, pronghorn, Short-eared Owl, spotted bat	0.1	<0.001%
Riparian	Allen's big-eared bat, Arizona toad, Bald Eagle, big free-tailed bat, Lewis's Woodpecker, Lucy's Warbler, Northern Goshawk, Northern Harrier, Peregrine Falcon, Short-eared Owl, western toad	0.1 38.3 acres†	<0.001%
Total		**109.8 miles**	**100.0%**

Note: Scientific nomenclature for all wildlife species in this EIS is introduced in Chapter 3.

* Acres of riparian habitat within 100-feet of the coal haul transportation route are also included to assess potential impacts in the unlikely event of a coal truck accident in close proximity to this cover type.

** Land-cover miles are he same for all three alternatives because the coal haul transportation route is the same for all alternatives.

† The analysis area for riparian also includes acres of habitat within a 100-foot buffer of the coal haul transporta ion route.

4.17.7.2 ALTERNATIVE B (PROPOSED ACTION) AND ALTERNATIVE C (REDUCED TRACT ACREAGE AND SEASONAL RESTRICTIONS)

Under both the Proposed Action and Alternative C, the addition of coal trucks and other mine-related traffic is expected to generate an additional 160 employee round-trips per day on existing roadways, and 153 truck round-trips over each 24-hour period, or six trucks each way per hour, along the reasonably foreseeable transportation route (approximately 110 miles from Alton via US-89 to US-20 to I-15 to SR-56 to Iron Springs). Coal trucks are expected to leave the mine at nine- to 10-minute intervals, with a truck passing any given point along the route approximately every five minutes. The increase in ADT from employee and service round-trips and coal trucks is estimated at 4% on US-89 and 2% on SR-56 compared to the No Action Alternative (see Section 4.14.3). Coal truck traffic would increase average, daily, heavy truck volume of 28%–43% along US-89 and US-20 (Fehr and Peers 2008). There would be an increased risk of wildlife and special status species mortality from vehicle collisions along the coal haul transportation route, particularly due to the relative increase in nighttime truck traffic. Wildlife and special status species would also be impacted by disruption of diurnal or nocturnal activities from traffic-related noise. Because wildlife and special status species habitats occur adjacent to a large portion of the coal haul transportation route (see Table 4.51), there would be an increased risk of mortality from vehicle collisions and greater impacts from traffic-related noise due to an increase in coal truck traffic. There would also be an increased risk of sedimentation or contamination of the Sevier River drainage system from accidental spillage of coal associated with increased coal truck traffic.

Any increase in roadkill could increase raptor activity along the coal haul transportation route, which could result in increased predation on sage-grouse, pygmy rabbit, or other special status animals occupying habitats adjacent to the route. The increase in truck traffic at night would be considerably higher than daily traffic volume increases (BLM 1995) (see Section 4.14). Coal truck traffic would not be reduced by timing restrictions on Block S under Alternative C, because of the operation of a second pit that would allow mining at all times. Direct and indirect impacts to wildlife and special status species would be greater under both the Proposed Action and Alternative C compared to the No Action Alternative.

4.17.7.2.1 Impacts to Wildlife Occurring in the Coal Haul Transportation Route Analysis Area

Mule deer are the primary big game animal affected by highway traffic in the United States, with an estimated 1 million deer-vehicle collisions annually (Conover et al. 1995). As discussed for Alternative A, wildlife accounted for a considerable portion of the vehicle accidents that occurred on the proposed coal haul transportation route from 2003 to 2005 (Fehr and Peers 2008). The factors contributing to deer-vehicle collisions are traffic volume, deer density, and higher vehicle speeds (Sullivan and Messmer 2003). As a result, vehicle-related mortality of mule deer along the coal haul transportation route would be proportional to mule deer density and the speed and volume of traffic relative to deer movements and concentrations. Traffic timing is also a factor; the greatest potential for mule deer fatalities from truck traffic most likely to occur during spring and fall migrations and at night, when deer are most active. Traffic impacts to elk and pronghorn would also be proportional to the density of animals, and the timing, speed, and volume of traffic relative to their movements. Under the No Action Alternative, coal transport from the tract along US-89, SR-20, I-15, and SR-56 would not occur as a function of mining because the tract would not be offered for lease sale. Under the Proposed Action and Alternative C, a large portion of the coal haul transportation route would be adjacent to crucial winter mule deer habitat (81%), crucial winter elk habitat (49%), and crucial year-long pronghorn habitat (49%) (Table 4.52), with impacts to wildlife in these habitats expected to be proportional to the volume and timing of coal truck traffic along the route. Although the estimated increase in ADT is estimated to be from 2% to 4% along the route, there would be a proportionally greater increase in nighttime traffic due to the 24-hour coal truck activity.

Table 4.52. Miles of Mule Deer, Elk, and Pronghorn Habitats Adjacent to the Coal Haul Transportation Route Under the No Action and Action Alternatives

	Miles	Percentage of Route
Mule Deer Habitats		
Crucial Winter	89.7	81.4%
Crucial Summer	28.5	25.9%
Substantial Value Year-long	14.5	13.2%
Substantial Value Winter	2.8	2.5%
Elk Habitats		
Crucial Winter	53.5	48.6%
Crucial Summer	11.5	10.5%
Pronghorn Habitats		
Crucial Winter	5.9	5.3%
Crucial Year-long	54.0	49.1%

Source: Utah Division of Wildlife Resources GIS data updated May 2006.

4.17.7.2.2 Impacts on Special Status Species Occurring in the Coal Haul Transportation Route Analysis Area

4.17.7.2.2.1 Greater sage-grouse

Occupied Greater Sage-grouse habitats occur adjacent to 44.5 miles of the route, consisting of brooding habitat adjacent to 43.8 miles of US-89 and SR-20, and wintering habitat adjacent to 0.7 mile of SR-20 (UDWR GIS data updated May 2006). Greater sage-grouse that occur along the coal haul transportation route are most likely distinct from the population that occurs in the tract due to the isolated distribution of that population.

Adverse impacts to the Greater Sage-grouse that occur along the coal haul transportation route are expected to be minimal; however, they could occur from an increase in collisions with truck and commuter traffic, increased noise, and increased predator activity along roadways. Greater traffic volume would increase the risk of mortality of adult sage-grouse, fledglings, and nestlings from vehicles. Noise and vibration near active leks during the breeding season could disrupt courtship behavior or prevent hens from locating lekking areas. Sage-grouse have been found to avoid lekking and brooding habitats within 1,300 feet of roads and other surface disturbances, which could cause displacement and increased competition for habitat resources (Connelly et al. 2000; Crawford et al. 2004). Under the Proposed Action and Alternative C, traffic and noise-related adverse impacts to the Greater Sage-grouse and its habitats along the coal haul transportation route would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.2 Pygmy Rabbit

Impacts to the pygmy rabbit along the coal haul transportation route would consist of increased loss of individuals from vehicle collisions and from increased predator abundance along roadways, which is a likely result of increased traffic-related roadkills. The Pygmy rabbit's sagebrush and shrub steppe habitats occur adjacent to approximately 47 miles (42%) of the coal haul transportation route (see Table 4.51). Under the Proposed Action and Alternative C, transportation-related adverse impacts to the pygmy rabbit and its habitats would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.3 Utah Prairie-dog

There is limited information on road-related impacts to the prairie-dog and other small mammals. Impacts associated with increased vehicle traffic likely include greater loss of individuals from vehicle collisions and from increased predator abundance along roadways, a likely result of increased traffic-related roadkills. It is not known if traffic noise interferes with predator warning calls or with other communication in prairie-dog colonies. Utah prairie-dog habitats occur adjacent to 28.3 miles (26%) of the coal haul transportation route (UDWR GIS data updated May 2006). The USFWS has established a 350-foot buffer as the range within which normal behavior of individual Utah prairie dogs may be disrupted by noise or human presence. Known Utah prairie dog colonies occur within 350 feet of the coal haul transportation route on 640 acres. These colonies are estimated to contain 309 prairie dogs, or 6.1% of the total estimated Utah prairie dog population in the West Desert and Paunsaugunt Recovery Units, which are the two units impacted by the tract (UDWR 2010). Under the Proposed Action and Alternative C, traffic and noise-related adverse impacts to the Utah prairie-dog and its habitats would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.4 Kit Fox

Impacts to the kit fox from increased vehicle traffic would likely include loss of individuals from vehicle collisions. Kit fox sagebrush, shrub steppe, and salt desert scrub habitats occur adjacent to approximately 47 miles (42%) of the coal haul transportation route (see Table 4.51). Impacts associated with an increase in vehicle traffic would likely include an increased loss of individuals from vehicle collisions, particularly due to increased nighttime traffic when the species is active. Under the Proposed Action and Alternative C, transportation-related adverse impacts to the kit fox and its habitats would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.5 Bat Species

Potential foraging and roosting bat habitats occur adjacent to the coal haul transportation route (see Table 4.51). Traffic-related impacts to Allen's big-eared bat, big free-tailed bat, fringed myotis, spotted bat, and Townsend's big-eared bat would likely consist of displacement from habitat due to 1) increased noise and 2) disruption of roosting or foraging behaviors in habitats adjacent to the route resulting from an increase in nighttime vehicle traffic. Special status bat habitats in sagebrush, pinyon-juniper woodland, shrub steppe, grassland, salt desert scrub, cliff and canyon, and riparian cover types occur adjacent to approximately 58 miles (52%) of the coal haul transportation route (see Table 4.51). Riparian habitats occur on 38.3 acres within a 100-foot buffer of the coal haul transportation route. Under the Proposed Action and Alternative C, transportation-related adverse impacts to bat species and their habitats would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.6 Raptor Species

Increased coal truck traffic would likely result in direct adverse impacts to bald eagle, burrowing owl, ferruginous hawk, golden eagle, northern goshawk, and short-eared owl from vehicle strikes. The increase in traffic volume would likely result in increased roadkills, which would attract raptor species to the coal haul transportation route and increase the likelihood of raptor mortality from vehicle collisions. Raptor foraging and nesting habitats in sagebrush, pinyon-juniper woodland, agriculture, shrub steppe, woodland-shrubland, grassland, salt desert scrub, and riparian cover types occur adjacent to approximately 66 miles (60%) of the coal haul transportation route (see Table 4.51). Potential habitats for the northern goshawk occur in 38.3 acres of riparian habitat within 100 feet of the coal haul transportation route. These riparian habitats contain two known occupied goshawk habitat areas (UDWR 2010). Under the Proposed Action and Alternative C, transportation-related adverse impacts to raptor species would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.7 Other Bird Species

Increased coal truck traffic would likely result in limited adverse impacts to the Black Swift, Lewis' Woodpecker, Long-billed Curlew, and Three-toed Woodpecker and their habitats. Nevertheless, increased traffic volume could result in increased mortality from vehicle strikes. Foraging and nesting habitats for special status bird species in agriculture, shrub steppe, woodland-shrubland, cliff and canyon, grassland and salt desert scrub cover types occur adjacent to approximately 14 miles (13%) of the coal haul transportation route (see Table 4.51). Under the Proposed Action and Alternative C, transportation-related adverse impacts to these bird species would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.8 Migratory Bird Species

Increased coal truck traffic would likely result in limited adverse impacts to migratory bird species adjacent to the coal haul transportation route. Nevertheless, increased traffic volume could result in increased mortality from vehicle strikes. Foraging and nesting habitats for migratory bird species in sagebrush, pinyon-juniper woodland, agriculture, shrub steppe, woodland-shrubland, grassland, and salt desert scrub cover types occur adjacent to approximately 66 miles (60%) of the coal haul transportation route (see Tables 4.50 and 4.51). Under the Proposed Action and Alternative C, transportation-related adverse impacts to migratory bird species would likely be greater than would occur under the No Action Alternative.

4.17.7.2.2.9 Amphibian Species

Increased coal truck traffic would likely result in limited adverse impacts to the Arizona toad and western toad along the coal haul transportation route. Nevertheless, increased traffic volume could result in increased mortality from vehicle strikes. Amphibian habitat in pinyon-juniper woodlands occur adjacent to approximately 10 miles (9%) of the coal haul transportation route (see Table 4.51). Under the Proposed Action and Alternative C, transportation-related adverse impacts to amphibians would likely be slightly greater than would occur under the No Action Alternative.

4.17.7.2.2.10 Fish Species

No special status fish species are known to occur in habitats adjacent to the coal haul transportation route. However, due to the expected increase in the volume of coal truck traffic associated with mining operations, there is increased potential for accidental coal spills to stream habitats along the coal haul transportation route. Approximately 0.1 miles (<0.001%) of the coal haul transportation route transects stream habitats where there is the potential for a coal truck spill into the waterway. Stream and riparian habitats occur on 38.3 acres of riparian habitat within 100 feet of the coal haul transportation route. Although the risk of a spill to this small portion of the route is negligible, the introduction of coal, petroleum products, or other hazardous materials

from a coal truck spill could directly or indirectly adversely impact fish species and their habitats by causing mortality of individual fish or prey species from poisoning, or from loss of habitat due to reduced water quality or other habitat features.

4.17.8 Potential Mitigation Measures

Protective measures for wildlife and special status animal species described above and in Management and Considerations Common to Each Action Alternative in Chapter 2 would mitigate and/or minimize impacts to wildlife resources and special status species in the tract. Potential mitigation measures for wildlife and special status animal species include the following:

- Install fencing and/or netting or other protective features around evaporation and production pits to reduce mortality of wildlife and special status species (e.g., Greater Sage-grouse, migratory birds, raptors, bats) due to drowning or entrapment.
- Monitor and treat water storage impoundments to prevent mosquito breeding and the associated spread of West Nile Virus to the Greater Sage-grouse population.
- Monitor the Alton sage-grouse population throughout the year to assess bird survival, nest site and nest success, brood-rearing sites, and key winter habitat areas.
- Install deer ‘whistles’ on coal haul trucks to reduce potential wildlife mortality.

4.17.9 Unavoidable Adverse Impacts

Unavoidable adverse impacts would occur where the loss of wildlife or special status species occurs during mining pit disturbance, soil stockpiling, road and infrastructure development, or regular mine operations. Unavoidable loss could occur where wildlife or special status species are not detected or identified during surveys. Unavoidable loss of wildlife and special status species due to nondetection or inadvertent adverse impacts would also occur. There would also be unavoidable, short-term loss of wildlife habitats as a result of mining operations.

4.17.10 Short-term Uses versus Long-term Productivity

The short-term use of the tract for coal extraction would result in reduced structural and compositional diversity and reduced long-term productivity of wildlife and special status species habitats. The habitats present in the proposed tract are typically slow to recover from disturbance and productivity would be limited during reclamation and restoration activities. Long-term productivity would be reduced because vegetation communities would not develop immediately following mining and restoration activities. Until they are fully developed, these habitats would be less diverse and less productive, particularly if critical habitat components such as biological soil crusts and other soil properties have been lost. Effective implementation of the mitigation measures outlined above would minimize impacts to the long-term productivity of these vegetation communities and the wildlife and special status species that rely on them.

4.17.11 Irreversible and Irretrievable Commitments of Resources

Under the Proposed Action and Alternative C, wildlife and special status species forage and cover removed for surface mining would be irretrievably altered during the life of the mine. Once impacted by surface mining, dispersed and centralized facilities, roads, and ROWs, the productivity of vegetation communities would be irretrievably removed or reduced until reclamation and restoration have been completed. The loss of wildlife and special status animal species from mining and associated activities and from coal truck strikes along the coal haul transportation route would constitute an irreversible commitment of the resource because these individuals would be permanently lost.

4.18 Cumulative Impacts

4.18.1 Introduction

Cumulative impacts are the environmental effects that result from the incremental impacts of an action, when added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions (40 CFR 1508.7). Past actions are those that have created the affected environment, as described in Chapter 3 of this EIS. Present actions are those that are occurring at the time of this evaluation. Future actions are those that are in planning stages and may reasonable occur in the next 20 years. Cumulative impacts can result from individually minor, but collectively substantial actions occurring over time. This section analyzes the cumulative impacts to specific resource values and uses that would occur from implementation of the Proposed Action and Alternative C, when added to other past, present, and reasonably foreseeable future actions that are not associated with this action.

In general the geographic scope of this analysis—the CIAA—is the BLM-KFO, approximately 2.85 million acres of lands in Kane and Garfield counties. This area was selected because BLM recently completed the KFO RMP and EIS, a large-scale, land-use planning effort, which included a cumulative impact assessment of this planning area. This analysis area provides good baseline information for comparison with the effects of potential mining operations on the tract. Overall, this CIAA provides a reasonable area for analysis of the cumulative impacts of mining the tract and other actions on the multiple resource values and uses of the CIAA because 1) there is a reasonable degree of data available to conduct the analysis, 2) it is large enough to account for resource impacts where impacts may be far-reaching (e.g., watersheds, wildlife), and 3) it is small enough that analyses do not become unreasonably cumbersome to complete with an acceptable degree of accuracy and precision. However, for certain resource values and uses, the CIAA may be slightly different than that described here. In these cases, the modified CIAA is described and explained. The timeframe for analysis of cumulative impacts is approximately 20 years.

The following list consists of land-use planning and environmental documents that were consulted to determine the existing and reasonable foreseeable future actions that are analyzed in this cumulative analysis.

- Coal Hollow Mine Permit C/025/005 (private fee coal area)
- BLM-KFO Proposed RMP and Final EIS, 2008.
- BLM, Coal Hollow Environmental Assessment (BLM 2009).
- BLM, West-Wide Energy Corridor Draft Programmatic EIS, October 2007

Although much of the cumulative impact analysis focuses on adverse cumulative effects, it should be noted that cumulative impacts may also be beneficial. For example, there would be beneficial economic effects as a result of coal mining, including additional employment, additional tax revenues to local governments, and additional royalties to the federal government.

Section 4.18.2 below identifies and summarizes the actions included in this cumulative impact analysis.

4.18.2 Reasonably Foreseeable Actions and Development

This section of the EIS incorporates into the analysis key projects for ongoing, proposed, and potential action in Kane and Garfield counties in the CIAA. For the purposes of analysis, the reasonably foreseeable actions come from the proposed actions and Records of Decision of the land-use planning and environmental documents identified in the list above. However, some of the documents identified above

are not yet complete. Use of draft land-use plans and environmental analyses does not imply that the actions are final decisions. Still, they represent "reasonably" foreseeable actions and development that can be used in this analysis. These projections are not to be considered part of the Proposed Action or Alternative C. Table 4.53 summarizes the reasonably foreseeable future actions and anticipated acres of disturbance. Table 4.54 summarizes disturbances as a result of mining the tract. The discussion that follows provides further explanation of the information in the tables.

Table 4.53. Reasonably Foreseeable Actions and Development in the Cumulative Impact Assessment Area, Next 20 years

Action	Anticipated Disturbance (acres)	Total Anticipated Disturbance (%)
Wildfire	3,476	4.52%
Wildfire use	390	0.51%
Prescr bed fire	800	1.04%
Vegetation treatments	60,000	78.07%
Alton Coal Mine, Coal Hollow Mine (Permit #C/025/005)	424	0.55%
Alton Coal Mine, northern private coal area (permit application not submitted)	378	0.49%
Alton Coal Mine Short Haul Route	19	0.02%
Oil and gas exploration, development, and production	2,070	2.69%
Seismic exploration	906	1.18%
Mining Alabaster and Septarian Nodules	20	0.03%
Sand and gravel production	625	0.81%
Building stone production	400	0.52%
Clay production	5	0.01%
Tropic to Hatch Transmission Line	379	0.49%
Cross-country OHV travel	1,000	1.30%
Lake Powell pipeline	5,745	7.48%
Jackson Flat Reservoir	200	0.26%
KFO Route 116	17	0.02%
West-wide Energy Corridor	0	0.00%
Wind energy development	0	0.00%
Total	**76,854**	**100.00%[1]**

[1]The total surface disturbance is less than 100% because surface disturbance resulting from the West-wide Energy Corridor and wind energy development is not known at this time.

Table 4.54. Additional Surface Disturbance as a Result of Mining the Alton Coal Tract

	Additional Surface Disturbance (acres) as a Result of Mining Operations on the Alton Coal Tract	Increase in Surface Disturbance in the CIAA over the next 20 years as a Result of Mining the Tract (%)
Proposed Action	1,993–2,395	2.59%–3.12%
Alternative C	1,662–2,064	2.16%–2.69%

Reasonably foreseeable development in the CIAA would impact 78,854 surface acres. Under the Proposed Action, the tract would directly impact 1,993–2,395 acres, which is a 2.59% to 3.12% increase in the total surface disturbance in the CIAA over the next 20 years. Alternative C would directly impact 1,662–2,064 acres, which is a 2.16%–2.69% increase in the total disturbance in the CIAA over the next 20 years.

4.18.2.1 MINERALS AND ENERGY EXPLORATION, DEVELOPMENT, AND PRODUCTION

4.18.2.1.1 Exploration, Development, and Production of Coal

In November 2010 the State of Utah approved a permit for the Coal Hollow Mine (Permit #C/025/005) on approximately 424 acres of private lands. The tract would be developed by surface mining methods. ACD is also pursuing development of an additional coal mine on 378 acres. Leases have not been finalized, and a PAP has not been submitted to mine this additional coal mine. These two private areas are associated with the tract and are adjacent to federally administered coal that BLM is considering for competitive leasing in this EIS.

4.18.2.1.2 Exploration, Development, and Production of Oil and Gas and Other Leasable Minerals, Salable Minerals, and Mining under the Mining Laws

A total of 90 oil and gas wells (70 exploration wells and 20 production wells) could be drilled on public lands managed by the BLM-KFO over the next 15–20 years. This exploration, development, and production could disturb 2,070 acres, and seismic operations could disturb an additional 906 acres. Of this total disturbance, 2,370 acres could be reclaimed.

Septarian and gypsum (alabaster) mining could disturb 1 acre per year, or 20 acres over the next 15–20 years.

Surface disturbance from salable mineral production (sand, gravel, building stone, and clay) could be 1,030 acres over the next 15–20 years. Of that total, sand and gravel operations could disturb 625 acres, building stone operations could disturb 400 acres, and clay production could disturb 5 acres.

4.18.2.2 WIND ENERGY DEVELOPMENT

Although the KFO-RMP does not allocate specific areas to wind energy development, it does provide for consideration of such proposals, except in designated wilderness, WSAs, areas of critical environmental concern, and suitable wild and scenic river corridors. The KFO-RMP also prescribes BMPs for wind energy development projects on the public lands.

4.18.2.3 UTILITY CORRIDORS AND TRANSMISSION LINES

4.18.2.3.1 West-wide Energy Corridor

The *West-Wide Energy Corridor Draft Programmatic EIS* (PEIS) analyzes the environmental impacts of designating more than 6,000 miles of energy corridors on federal land in 11 western states. One corridor would be designated by the KFO RMP in the CIAA.

4.18.2.3.2 Tropic to Hatch Transmission Line

Garkane Energy Cooperative proposes to construct and operate an electric transmission line in Garfield County, Utah. The tract would include the construction of a 138-Kv transmission line within a 100-foot ROW, associated substations, access roads, and the removal and reclamation of a portion of the existing 69-Kv transmission line west of Bryce Canyon National Park. The proposed line would cross approximately 15 miles of USFS land; 3.7 miles of the Grand Staircase-Escalante National Monument; 3.5 miles of public lands managed by BLM-KFO, 7.3 miles of State of Utah, and 1.8 miles of private lands. The existing line and alternatives under consideration cross Bryce Canyon National Park.

4.18.2.4 WATER PROJECTS

4.18.2.4.1 Lake Powell Pipeline

The State of Utah Board of Water Resources and Washington, Kane, and Iron counties are pursuing the construction of a pipeline that would run from Lake Powell to Sand Hollow Reservoir, approximately 10 miles east of St. George. The pipeline would consist of approximately 120 miles of 66-inch pipe and 38 miles of 30-inch pipe north from Sand Hollow to Cedar City. The corridor is anticipated to be 300 feet wide. As part of the initial feasibility studies, various alternative alignments are being investigated. The pipeline would bring 70,000 acre-feet of water to Washington County, 10,000 acre-feet to Kane County, and 20,000 acre-feet to Iron County. Construction of the pipeline is estimated to take three years.

4.18.2.4.2 Jackson Flat Reservoir

The Jackson Flat Reservoir is proposed by the Kane County Water Conservancy District for construction on approximately 200 acres of land within the Kanab city limits. The reservoir would store 3,900 acre-feet of water.

4.18.2.5 ROAD PROJECTS

4.18.2.5.1 U.S. Highway 89

US-89 is expected to be widened over the next 20 years. The widening of the highway would allow for an increase in traffic volume. In addition, portions of the highway would be developed into a four-lane divided highway.

4.18.2.5.2 Kanab Field Office Route 1116

There is a proposal to relocate KFO Route 116, west of its current location, to provide uninterrupted access around the proposed Alton Coal Mine. The proposed road relocation would be approximately 3.1 miles long, have a 24-foot running surface, and lie within a 66-foot-wide ROW. Total area of disturbance would be 16.9 acres.

4.18.2.6 VEGETATION TREATMENTS

Historically, the BLM has treated on average 3,000 acres of upland vegetation annually. Using this average, it is estimated that the BLM would treat 60,000 acres over the next 20 years (Personal Communication, Church 2010). These treatments are to enhance wildlife habitat, restore watershed condition, increase livestock forage, and reduce fuel loading. A full range of upland vegetation treatment methods would be used, including wild and prescribed fire; mechanical, chemical, and biological treatments; and woodland product removal. There are currently two approved burn plans in the KFO totaling 800 acres (BLM 2001b, 2002). According to the KFO RMP, wildfire use disturbance over the next 20 years would total 390 acres (BLM 2008a).

4.18.2.7 WILDFIRE

A five year average for wildfires in the KFO totals approximately 869 acres (Personal Communication, Church 2010). Using these past numbers, it is estimated that wildfires would disturb 3,476 acres over the next 20 years.

4.18.2.8 LAND-USE PLANNING AND DEVELOPMENT

As communities in the CIAA continue to grow, agricultural lands are expected to be converted to residential and commercial uses. There is no specific projection as to the number of acres per year that would be converted, but for analysis purposes, growth (and thus, conversion of agricultural land) is expected to continue at a steady pace. Under the KFO-RMP, BLM has identified 6,000 acres potentially available for sale over the next 20 years. If disposed of, these lands would provide for the needs of the communities in the field office area. Assuming these lands would be developed for public purposes, 320 acres per year would convert to community purposes.

4.18.3 Cumulative Impacts Related to the Proposed Action and Alternatives

4.18.3.1 AESTHETIC RESOURCES

4.18.3.1.1 Cumulative Impact Analysis Area

The geographic extent of the CIAA for aesthetic resources consists of the BLM-KFO and the coal haul transportation route to the loadout west of Cedar City, Utah. It includes sensitive viewpoints and soundscapes in Bryce Canyon National Park to the east, Dixie National Forest to the east and west, and the communities along the coal haul transportation route. The area was selected to incorporate lands where aesthetic resources would be affected regardless of administrative jurisdiction. The area is primarily used for agriculture, travel, tourism, and recreational activities.

4.18.3.1.2 Soundscape

Past and present actions that have resulted in increased ambient noise levels in the characteristic soundscapes of the CIAA (as described in Section 4.18.3.1.1 above) include vehicle traffic on the coal haul transportation route, motorized recreation, mineral material mining, mechanical vegetation treatments, and wild and prescribed fire operations. Future actions include expansion of US-89; the realignment of KFO Route 116; construction of the Tropic to Hatch transmission line; coal mining near the Town of Alton (private coal); oil and gas exploration, development, and production; continued sand and gravel, building stone, and clay mining; additional vegetation treatments; continued wild and prescribed fire operations, construction of the Lake Powell pipeline; continued growth in OHV use and

back country driving; and construction of a utility corridor as part of the West-Wide Energy Corridor grid. All of the projected actions could disturb approximately 78,854 acres of lands. Mining operations on the Alton Coal Tract under the Proposed Action would disturb approximately 1,993–2,395 acres, a 2.59%–3.12% increase in the entire disturbance associated with the reasonably foreseeable future activity. Under Alternative C mining operations on the Alton Coal Tract would disturb approximately 1,662–2,064 acres, or a 2.16%–2.69% increase in the entire disturbance associated with the reasonably foreseeable future activity. Using the amount of surface disturbance as an indication of noise levels associated with this activity, coal mining on the tract would contribute less than 1% of future anticipated surface disturbance, and thus ambient noise to soundscapes.

Mitigation measures would be implemented with the Proposed Action or Alternative C to reduce the impacts of increased noise levels on noise-sensitive receptors. Additionally, noise from the Proposed Action or Alternative C would occur only for the duration of active mining. The analysis assumes that mitigation measures would be implemented with future projects to reduce increases in ambient noise levels at noise-sensitive receptors. Cumulatively, noise levels at noise-sensitive receptors would remain below EPA noise levels necessary to prevent measurable hearing loss over a lifetime (EPA 1974) in the CIAA.

4.18.3.1.3 Visual Resources

The area of analysis consists of the BLM's KFO, including the view shed surrounding the tract as well as portions of the Dixie National Forest and private lands. Past and present actions have contributed to modifications to the characteristic landscape in the area of analysis including mechanical vegetation treatments, transmission lines and other linear ROWs. Future actions that would contribute to cumulative impacts to the landscape (visual resources) consists of cross country OHV travel, additional vegetation treatments, coal mining private coal near the Town of Alton, oil and gas exploration and production, mining, sand and gravel and building stone production and development of pipelines and power lines (see Table 4.53).

Over the next 20 years, reasonably foreseeable future development would change the character of the existing landscape. Reasonable foreseeable actions would potentially remove vegetation by fire and land treatment methods, change landform by surface disturbance during mining and road building, and introduce linear structures to the landscape including power lines and pipelines. These developments would introduce moderate to noticeable changes to the characteristics landscape (visual resources) on as much as 78,854 acres.

The incremental impacts of mining coal on the Alton Coal Tract under the Proposed Action or Alternative C would add moderate to strong contrasts to the characteristic landscape on up to 1,993–2,395 or 1,662–2,064 acres, respectively, spread out over the active mining period and would result in cumulative impacts to the view shed. Over the next 20 years, coal mining on the Alton Coal Tract would increase disturbance by approximately 2.59%–3.12% under the Proposed Action and 2.16%–2.69% under Alternative C in the CIAA. Mitigation measures would be implemented to return the tract to a more natural landscape as pit activities are completed. The analysis assumes that mitigation measures for visual resources would be implemented with reasonably foreseeable future projects to reduce contrasts. Cumulatively, contrasts would remain consistent with BLM VRM Class IV objectives in the area of analysis.

4.18.3.1.4 Night Sky

The area of analysis consists of the lands surrounding the tract including portions of Bryce Canyon National Park, Dixie National Forest and private lands. Because of the nature of artificial light, the area of analysis must be larger than the tract's view shed. Past and present actions in the area of analysis that

have contributed to the existing night sky conditions include management of Bryce Canyon National Park, residential development and tourism facilities. Future actions include expansion of US-89, and development of the Tropic to Hatch transmission line. These future actions would increase the amount of light seen during construction, but would be temporary impacts.

The incremental impacts of the Proposed Action or Alternative C would add to the artificial sources of light pollution and would have a cumulative impact on the night sky conditions of the tract Bryce Canyon National Park and Dixie National Forest. The analysis assumes that mitigation measures for night sky conditions including directional lighting would be implemented with future projects to reduce those impacts. Cumulatively, light conditions would not exceed Bryce Canyon National Park night sky objectives in the area of analysis.

4.18.3.2 AIR QUALITY

4.18.3.3 CUMULATIVE EMISSION INVENTORY

The cumulative emission inventory is composed of 1) an inventory of emissions from the proposed coal haul transportation route, and 2) an inventory of proposed emission sources within a 300 × 300–km area. The cumulative inventory includes the identification and evaluation of permitted source changes (increases or decreases), RFFA, and RFD.

It was assumed that all existing permitted emission sources are included in the background concentrations estimates. The cumulative emission inventory was developed based on any Title V major modifications and new minor- or major-source permits that occurred after September 1, 2008. The data were obtained from the state air resources regulators (e.g., Utah, Nevada, and Arizona) in the emission inventory domain. RFFA and RFD sources are proposed sources and include new sources expected from BLM- and USFS-related activities, such as oil and gas development and mining. Oil and gas commissions in the various states and other state agencies also provided information on planned, new emission-producing sources. Due to the uncertainty in projected traffic increases on the existing road network, only mine-related transportation increases are considered in the analysis. RFFA and RFD sources evaluated in the modeling domain are listed in Table 4.55 and the emissions from these RFFA and RFD sources are presented in Table 4.56.

Table 4.55. Sources of Potential Reasonable Foreseeable Future Actions and Reasonable Foreseeable Developments in the Modeling Domain

NEPA Documents, Land-use Plans, and Personnel	Disposition
Oil and Gas Leasing on Lands Administered by the Dixie National Forest Draft EIS	Dixie and Fishlake national forests oil field development are included as point sources in cumulative modeling.
BLM-KFO RMP	90 new production wells over 20 years (4.5 wells per year); no production or drilling of coalbed CH_4 wells; no oil wells
BLM-KFO Mineral Potential Report	Uses highest projected pollutant emissions for oil and gas and area sources. Included lands and realty, livestock grazing, OHVs, resource roads, saleable minerals, and vegetation Eliminates coal mining (projected mine is the Alton Coal Tract) Eliminates prescribed burning as a cumulative source because it is intermittent and regulated such that it occurs during favorable weather conditions

Table 4.55. Sources of Potential Reasonable Foreseeable Future Actions and Reasonable Foreseeable Developments in the Modeling Domain

NEPA Documents, Land-use Plans, and Personnel	Disposition
BLM Richfield Field Office RMP	Oil well and non-oil well activities: 30 wells per year Uses highest projected pollutant emissions for oil and gas and area sources Included lands and realty, livestock grazing, OHVs, resource roads, saleable minerals, and vegetation Eliminates coal mining (outside domain)
BLM Cedar City Field Office Personnel	No sources to add
BLM St. George Field Office Personnel	No sources to add
BLM Ely Field Office	No sources to add
BLM Las Vegas Field Office	No sources to add
BLM Arizona Strip Field Office	No sources to add
UDAQ: Permit Actions	Two new gas turbines at St. George City Power
Arizona Department of Environmental Quality: Permit Actions	EPA PSD permit: Modification to Navajo Generating Station
Nevada Department of Environmental Quality: Permit Actions	No sources to add
UDOT	No sources to add

Table 4.56. Emissions (tons per year) from Potential Reasonable Foreseeable Future Actions and Reasonable Foreseeable Developments in the Modeling Domain

	PM_{10}	$PM_{2.5}$*	NO_x	SO_2	CO	VOC	HAPs
Dixie National Forest	84.0	36.8	529.8	28.6	–	–	–
Fishlake National Forest	30.9	21.1	364.9	17.7	–	–	–
BLM-KFO RMP	15	10	10	0	692	258	26
BLM Richfield Field Office RMP	58.0	18.0	230.5	3.8	558.0	177.1	17.7
Utah DEQ: St George City Power	–	–	33.3	–	34.4	–	–
Arizona DEQ: Navajo Generating Station Modifications *	–	–	-22,386	–	36,570	–	–
Total RFFA and RFD	**188**	**85**	**-21,217**	**50**	**37,855**	**435**	**44**

* Planned modifications at the Navajo Generating Station result in a net decrease of NO_x emissions.

4.18.3.4 CUMULATIVE IMPACTS RESULTS

An ambient, air resources impact assessment was performed to quantify cumulative impacts near the tract and in the far-field modeling domain. To demonstrate that air quality standards and air quality-related values (AQRV) are protected, the RFFA and RFD sources were modeled in conjunction with the tract sources. The KFO RMP sources are in the near-field modeling domain; the remaining RFFA and RFD sources are in the far-field modeling domain.

4.18.3.5 CUMULATIVE NATIONAL AMBIENT AIR QUALITY STANDARDS AND HAZARDOUS AIR POLLUTANTS RESULTS

The modeling results indicate that there is minimal interaction between the RFFA/RFD sources and the receptors exhibiting the highest concentrations in the tract only analysis. Therefore, the results and conclusions drawn for the PM_{10}, $PM_{2.5}$, NO_2, CO, SO_2, and HAPs are as presented in Tables 4.5 through 4.11 in Section 4.3.2.

4.18.3.6 CLASS I AND CLASS II INCREMENTS RESULTS

Under federal and state PSD regulations, increases in ambient air concentrations in Class I areas are limited by PSD Class I increments. Specifically, emissions associated with a particular development may increase ambient concentrations above baseline levels only within those specific increments developed for SO_2, PM_{10}, and NO_2. The modeling results for the maximum cumulative scenarios are presented in Table 4.57 for the near field Class I and II areas, and Table 4.58 for the far field Class I and II areas. Negative values indicate a net improvement due to cumulative sources showing a net reduction in emissions. The analysis did not follow the methodology for a regulatory PSD increment analysis, and the increment comparison is included to disclose maximum cumulative scenario impacts.

Table 4.57. Near Field (Bryce Canyon National Park, Grand Staircase-Escalante) Class I and Class II Results

Pollutant	Averaging Period	Class I Analysis Results		Class II Analysis Results	
		Cumulative Concentration	Class I Increment	Cumulative Concentration	Class II Increment
PM_{10}	Annual	0.01	4	0.42	17
	24-hour	0.42	8	3.16	30
SO_2	Annual	0.01	2	0.00	20
	24-hour	0.01	5	0.03	91
	3-hour	0.06	25	0.20	512
NO_x	Annual	0.04	2.5	1.73	25
$PM_{2.5}$	Annual	0.00	n/a	0.10	n/a
	24-hour	0.09	n/a	1.17	n/a
CO	8-hour	31	n/a	92	n/a
	1-hour	91	n/a	541	n/a

Table 4.58. Far Field (Zion, Grand Canyon, Capital Reef National Park) Class I and Class II Results

Pollutant	Averaging Period	Class I Analysis Results		Class II Analysis Results	
		Cumulative Concentration	Class I Increment	Cumulative Concentration	Class II Increment
PM_{10}	Annual	0.15	4	0.04	17
	24-hour	1.06	8	0.25	30
SO_2	Annual	0.00	2	0.001	20
	24-hour	0.02	5	0.01	91
	3-hour	0.06	25	0.07	512
NO_x	Annual	0.01	2.5	-0.01	25
$PM_{2.5}$	Annual	0.01	n/a	0.004	n/a
	24-hour	0.09	n/a	0.03	n/a
CO	8-hour	25	n/a	52	n/a
	1-hour	108	n/a	118	n/a

Because results show values far below the relevant increments, results are only presented for the cumulative sources with the tract maximum emission rate case (300-foot overburden removal, Alternative C) and are presented above. Impacts from the other scenarios would be less than presented here. The impacts are significantly below both the Class I and Class II increments. Even though there are no increments for $PM_{2.5}$ or CO, results are presented in Tables 4.57 and 4.58 to convey a general impression of impact levels.

4.18.3.7 VISIBILITY

Cumulative visibility results are presented in Table 4.59, using method 6. Only Capitol Reef National Park and Bryce Canyon National Park have visibility extinction changes that surpass 10%, with maximums of 10.7% and 21.7%, respectively. The Capitol Reef impact occurs on a single day, and is due to one of the regional sources because the tract impacts at Capitol Reef National Park were small (maximum change of 1.80%). Bryce Canyon had four days with impacts greater than 10%, all under the 300-foot Alternative C scenario.

Table 4.59. Cumulative Visibility Results, Alton Coal Tract

METHOD 6	200-foot Overburden, Proposed Action		300-foot Overburden, Alternative C	
Class I/Class II Area	**# Days > 10%**	**Max Change (%)**	**# Days > 10%**	**Max Change (%)**
Bryce Canyon National Park	0	9.6	4	21.7
Capitol Reef National Park	1	10.5	1	10.7
Grand Canyon National Park	0	2.9	0	5.5
Zion National Park	0	4.8	0	4.9
Grand Staircase-Escalante National Monument	0	5.0	0	5.0

4.18.3.8 DEPOSITION

Maximum predicted sulfur and nitrogen deposition impacts were estimated for the cumulative sources (Table 4.60).

Total deposition impacts from direct mine-related and regional sources were compared to green line values (Fox et al. 1989). All sulfur deposition impacts are below the green line values. All nitrogen deposition impacts are also considerably below the green line values. The improvements in the cumulative cases versus the Alton cases are due to the large NO_x emission decrease from the Navajo generating station. In fact, most of the nitrogen deposition values turned out to be 0, signifying that the Navajo emission decrease over the annual period exceeded the increased impacts from other sources.

Table 4.60. Cumulative Deposition Results

Location	Overburden Thickness (feet)	Alton Alternative	Cumulative Sources			
			Maximum Dry and Wet Annual Sulfur Deposition (kg/ha-yr)	>Green Line?	Maximum Dry and Wet Annual Nitrogen Deposition (kg/ha-yr)	>Green Line?
Bryce Canyon	200	B	0.0003	No	0.0000	No
	300	C	0.0003	No	0.0110	No
Capitol Reef	200	B	0.0007	No	0.0000	No
	300	C	0.0007	No	0.0000	No
Escalante	200	B	0.0010	No	0.0000	No
	300	C	0.0010	No	0.0000	No
Grand Canyon	200	B	0.0001	No	0.0000	No
	300	C	0.0001	No	0.0000	No
Zion	200	B	0.0001	No	0.0000	No
	300	C	0.0001	No	0.0000	No
Navajo Lake	300	C	–	–	–	–

4.18.3.9 CLIMATE CHANGE

The human and natural causes of climate change, and the impacts of climate change, are global. GHG emissions, which have been shown to contribute to climate change, do not remain localized, but become mixed with the general composition of the earth's atmosphere. Therefore, this analysis cannot separate the particular contribution of project GHG emissions to global climate change (and its regional implications) from the multitude of other past, present, and reasonably foreseeable projects that have produced or would produce or mitigate GHG emissions. Rather, this analysis focuses on the cumulative impacts of GHG emissions and climate change from a global perspective.

A worldwide environmental issue is the likelihood of changes in the global climate as a consequence of global warming from increasing atmospheric concentrations of GHGs (Intergovernmental Panel on Climate Change [IPCC] 2007a). The atmosphere allows a large percentage of incoming solar radiation to pass through to the earth's surface, where it is converted to heat energy (infrared radiation) that is more readily absorbed by GHGs such as CO_2 and water vapor than by incoming solar radiation. The heat energy absorbed near the earth's surface increases the temperature of air, soil, and water.

GHGs include water vapor, CO_2, CH_4, nitrous oxide, ozone, and several chlorofluorocarbons. GHGs constitute a small percentage of the earth's atmosphere, but are entirely responsible for its heat-trapping properties. Water vapor, a natural component of the atmosphere, is the most abundant GHG, but its atmospheric concentration is driven primarily by changes in the earth's temperature. As such, water vapor simply serves to amplify the effects of other GHGs such as CO_2. The second-most abundant GHG is CO_2, which remains in the atmosphere for long periods of time. Due to human activities, atmospheric CO_2 concentrations have increased by approximately 35% over preindustrial levels. Fossil fuel burning, specifically from power production and transportation, is the primary contributor to increasing concentrations of CO_2 (IPCC 2007a). In the United States, stationary CO_2 emission sources include energy facilities (such as coal and natural gas power plants) and industrial plants. Industrial processes that emit these gases include cement manufacture, limestone and dolomite calcinations, soda ash manufacture and consumption, CO_2 manufacture, and aluminum production (EIA 2009).

In the preindustrial era (before 1750 A.D.), the concentration of CO_2 in the atmosphere appears to have been 275–285 ppm (IPCC 2007a). In 1958, C.D. Keeling and others began measuring the concentration of atmospheric CO_2 at Mauna Loa in Hawaii (Keeling et al. 1976). The data collected by Keeling's team indicate that the amount of CO_2 in the atmosphere has been steadily increasing from approximately 316 ppm in 1959 to 386 ppm in 2008 (NOAA 2010). This increase in atmospheric CO_2 is attributed almost entirely to the anthropogenic (e.g., human) activities noted previously. In addition, industrial and agricultural activities release GHGs other than CO_2—notably CH_4, NO_x, ozone, and chlorofluorocarbons—to the atmosphere, where they can remain for long periods of time.

4.18.3.9.1 Impacts of Greenhouse Gases on Climate

Climate is usually defined as the average weather of a region, or more rigorously as the statistical description of a region's weather in terms of the means and variability of relevant parameters over time periods ranging from months to thousands of years. The relevant parameters include temperature, precipitation, wind, and dates of meteorological events such as first and last frosts, beginning and end of rainy seasons, and appearance and disappearance of pack ice. Because GHGs in the atmosphere absorb energy that would otherwise radiate into space, the possibility that human-caused emissions of these gases could result in warming that might eventually alter climate was recognized soon after the data from Mauna Loa and elsewhere confirmed that the atmosphere's content of CO_2 was steadily increasing (IPCC 2007a; NOAA 2010).

Changes in climate are difficult to detect because of the natural and complex variability in meteorological patterns over long periods of time and across broad geographical regions[13]. There is much uncertainty regarding the extent of global warming caused by human-caused GHGs, the climate changes this warming has or will produce, and the appropriate strategies for stabilizing the concentrations of GHGs in the atmosphere. The World Meteorological Organization and United Nations Environment Programme established the IPCC to provide an objective source of information about global warming and climate change, and IPCC's reports are generally considered to be an authoritative source of information on these issues.

According to the IPCC fourth assessment report, "[w]arming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level" (IPCC 2007b). The IPCC report finds that the global average surface temperature has increased by approximately 0.74°C in the last 100 years; global average sea level has risen approximately 150 millimeters over the same period; and cold days, cold nights, and frosts over most land areas have become less frequent during the past 50 years. The report concludes that most of the temperature increases since the middle of the twentieth century "is [are] very likely due to the observed increase in anthropogenic [GHG] concentrations."

The 2007 report estimates that, at present, CO_2 accounts for approximately 77% of the GWP attributable to human-caused releases of GHGs, with most (74%) of this CO_2 coming from the combustion of fossil fuels. Although the report considers a variety of future scenarios regarding GHG emissions, CO_2 would continue to contribute more than 70% of the total warming potential under all scenarios. IPCC therefore believes that further warming is inevitable, but that this warming and its effects on climate could be mitigated by stabilizing the atmosphere's concentration of CO_2 through the use of 1) "low-carbon technologies" for power production and industrial processes, 2) more efficient use of energy, and 3) management of terrestrial ecosystems to capture atmospheric CO_2 (IPCC 2007b).

4.18.3.9.2 Environmental Impacts of Climate Changes

IPCC and the U.S. Climate Change Science Program (CCSP) have examined the potential environmental impacts of climate change at global, national, and regional scales. The IPCC report states that, in addition to increases in global surface temperatures, the impacts of climate change on the global environment may include:

- more frequent heat waves, droughts, and fires;
- rising sea levels and coastal flooding;
- melting glaciers, ice caps, and polar ice sheets;
- more severe hurricane activity and increases in frequency and intensity of severe precipitation;
- spread of infectious diseases to new regions;
- loss of wildlife habitats; and
- heart and respiratory ailments from higher concentrations of ground-level ozone (IPCC 2007b).

On a national scale, average surface temperatures in the United States have increased, with the last decade being the warmest in more than a century of direct observations (U.S. Climate Change Science Program 2008). Impacts on the environment attributed to climate change that have been observed in North America include:

- extended periods of high fire risk and large increases in burned areas;

[13] Detection of these types of changes was also difficult because of the limited tools that were available for collecting data and for modeling climate systems. However, scientific advances over the last 20 years have vas ly improved the tools available for climatological research.

- increased intensity, duration, and frequency of heat waves;
- decreased snow pack, increased winter and early spring flooding potentials, and reduced summer stream flows in the western mountains; and
- increased stress on biological communities and habitat in coastal areas (IPCC 2007b).

On a regional scale, there is greater natural variability in climate parameters that makes it difficult to attribute particular environmental impacts to climate change (IPCC 2007b). However, based on observational evidence, there is likely to be an increasing degree of impacts such as coral reef bleaching, loss of specific wildlife habitats, reductions in the area of certain ecosystems, and smaller yields of major cereal crops in the tropics (IPCC 2007b). For the northern hemisphere, regional climate change could affect physical and biological systems, agriculture, forests, and amounts of allergenic pollens (IPCC 2007b)[14].

4.18.3.9.3 Production of Greenhouse Gases

Emissions of GHGs from the tract would increase the atmosphere's concentration of GHGs, and in combination with past and future emissions from all other sources, they would contribute incrementally to the global warming that produces the adverse effects of climate change described previously. At present, however, the climate change research community has not yet developed tools specifically intended for evaluating or quantifying end-point impacts attributable to the emissions of GHGs from a single source. The current tools for simulating climate change generally focus on global and regional-scale modeling. Global and regional-scale models lack the capability to represent many important small-scale processes. As a result, confidence in regional- and sub-regional-scale projections is lower than at the global scale. Therefore, there is no methodology that would allow the BLM to estimate the specific impacts (if any) that this increment of warming or climate change would produce in the proposed project area or elsewhere.

4.18.3.10 CULTURAL RESOURCES

The primary geographic area for analysis of cumulative impacts on archaeological resources consists of the Coal Hollow Mine and the potential fee coal mine located to the north of the Alton Coal Tract. Mining activity in these areas is a reasonably foreseeable future action that, in conjunction with the Proposed Action and Alternative C analyzed in this EIS, would lead to a broader pattern of impacts to cultural resources in the Alton Amphitheatre and Sink Valley area. There are no other reasonably foreseeable future actions identified in the BLM KFO Proposed RMP and Final EIS that have the potential to affect archaeological sites in this area. For the Panguitch Historic District and the Utah Heritage Highway 89/Mormon Pioneer Heritage Area, cumulative impacts analysis considers the anticipated expansion of US-89, the only reasonably foreseeable future action identified in the BLM KFO Proposed RMP and Final EIS that has the potential to affect these resources.

[14] The IPCC report provides more detailed information on the current and potential environmental impacts of climate change and on how climate may change in the future under various scenarios of GHG emissions.

Reasonably foreseeable future activities in the fee coal areas adjacent to the Alton Coal Tract include surface mining and the construction of facilities. Four archaeological sites that would not be affected by mining in the Alton Coal Tract have been identified in the portion of the Coal Hollow Mine area in which surface mining can be expected to occur (an additional six sites that have been identified in the potential surface mining area straddle the border between the Coal Hollow Mine and the Alton Coal Tract and are included in the analysis of impacts for the Proposed Action and Alternative C). Of these, two are NRHP-eligible prehistoric sites, one is an NRHP-eligible multicomponent site, and one is a prehistoric site that is not eligible for the NRHP. There is one archaeological site that has been identified in the potential fee coal area to the north of the tract that occurs in an area where surface mining may occur (this is in addition to two sites that straddle the border between the potential fee coal area and the tract that were considered in the analysis of impacts in the tract). This is a NRHP-eligible prehistoric site. Thus, surface mining in the fee coal areas may impact five sites, four of which are NRHP-eligible, in addition to those that would be affected by the Proposed Action. Impacts of surface mining in the fee coal areas can be expected to be similar to those of surface mining in the tract and would likely result in complete destruction of these sites.

Another three archaeological sites have been identified in the portion of the Coal Hollow Mine in which surface mining will not occur (in addition to two sites in the area where surface mining will not occur that straddle the border between the Coal Hollow Mine and the Alton Coal Tract and are included in the analysis of impacts in the tract). These are all NRHP-eligible prehistoric sites. These sites may be impacted by activities associated with mining, such as facilities construction.

Overall, reasonably foreseeable activities in the fee coal areas will incrementally add to the impacts to archaeological sites that would occur under either the Proposed Action or Alternative C for the Alton Coal Tract. It should be noted that that the cumulative nature of impacts on archaeological sites in the tract and the fee coal areas has been recognized and is the reason for the development of the CRMP that has been developed for the Alton Amphitheatre and Sink Valley area (Stavish 2008b).

Regarding the Panguitch Historic District and the Utah Heritage Highway 89/Mormon Pioneer Heritage Area, according to the BLM KFO Proposed RMP and Final EIS (BLM 2008a: 4-157), it is anticipated that US-89 will be widened over the next 20 years to allow for an increase in traffic volume. The increased truck traffic that would occur under either the Proposed Action or Alternative C for the life of the mining operation would contribute to the increased traffic volume that is already expected to occur on US-89. Overall, it can be expected that truck traffic associated with mining in the Alton Amphitheatre and Sink Valley area would contribute to a broader pattern of increased traffic volume along US-89 that will likely occur over the next two to three decades. To the extent that increased traffic has impacts on the integrity of setting, feeling and association of the Panguitch Historic District and the Utah Heritage Highway 89, coal truck traffic would contribute to an even broader pattern of such impacts. For a further discussion of cumulative impacts related to US-89 see the transportation section below (Section 4.18.3.14)

Finally, in the broader CIAA (the BLM-KFO) any increase in surface-disturbing activities would increase the potential to adversely impact known and currently unknown archaeological sites. With the implementation of the Proposed Action or Alternative C there would be a 2.59%–3.12% and a 2.16%–2.69% increase, respectively in surface disturbance in the entire CIAA over the next 20 years.

4.18.3.11 FIRE MANAGEMENT

As mineral development, recreational activities, and general use of the area increase, so would the number of potential ignition sources and consequently the probability of wildland fire occurrence. Activities associated with fire suppression, recreation, development, and general land use would cumulatively contribute to the modification of the composition and structure of vegetation communities and increase the spread of noxious and invasive weeds. Such effects would, in turn, alter the fire regime of the area, potentially increasing the frequency, size, and intensity of wildland fires. Developed areas and associated roads and ROW corridors could also provide increased accessibility to remote areas for fire suppression equipment and provide fuel breaks in the case of wildland fire events. The reasonably foreseeable development in the CIAA, of which fire management activities would be required, would impact 78,854 acres. The Proposed Action would increase surface disturbance, as well as potential fire management actions, by 2.59%–3.12% and Alternative C would increase the total disturbance by 2.16%–2.69% in the CIAA.

4.18.3.12 GEOLOGY AND MINERALS

Reasonably foreseeable development in the CIAA could impact up to 78,854 surface acres. Under the Proposed Action, the Alton Coal Tract would directly impact 1,993–2,395 acres which is a 2.59%–3.12% increase in the total surface disturbance in the CIAA over the next 20 years. Alternative C would directly impact 1,662–2,064 acres which is a 2.16%–2.69% increase in the total surface disturbance in the CIAA. Various forms of surface disturbance impact geological resources by potentially altering surface and subsurface features, modifying stratigraphic layers, resulting in potential geologic hazards, etc.

In addition to the Alton Coal Field there are two other major coal fields (Kaiparowits and Kolob) in the CIAA. No coal mining activities are currently occurring or reasonably foreseeable in these coal fields. However, in the Alton Coal Field two other mining operations, both on private lands for fee coal, would result in the extraction of approximately 13 million tons of coal from the Alton Coal Field (estimated tons assume that acre-for-acre coal tonnage is approximately the same on the private tracts as on the federal tract). Under the Proposed Action or Alternative C, 44.9–49.1 million tons or 38.1–42.3 million tons, respectively of coal would be permanently removed from the Alton Coal Field. This would be a 29%–26% or 34%–31% increase, respectively in the amount of coal removed from the coal field when considered with reasonably foreseeable coal mining activities.

Other reasonably foreseeable mineral development in the CIAA includes oil and gas development, locatable mineral development, and salable mineral development. The Alton Coal Tract lies in a high potential area for oil and gas. Assuming that coal mining on the tract would preclude all oil and gas development over the life of the mine the incremental impact of activities associated with the Alton Coal Tract under the Proposed Action or Alternative C would be to decrease impacts to oil and gas resources because their extraction would be postponed to allow for coal mining. On the other hand, impacts to locatable minerals (namely Septarian nodules) and salable minerals (largely burnt shale and gravel) would be incrementally increased as a result of coal mining activities under the Proposed Action or Alternative C depending on how their unearthing were dealt with during the mining process (i.e. if the gravel is separated from the overburden). If these materials were returned to mined-out pits along with the remainder of overburden they would remain in place following mining and no extraction related impact would occur. On the other hand, if these materials were to be set aside and sold the mining operation would result in increased impacts to these resources in the CIAA via extraction and sale.

4.18.3.13 HAZARDOUS MATERIALS AND HAZARDOUS AND SOLID WASTE

The State of Utah is considering an application to surface mine privately owned coal resources adjacent to the tract in Kane County. Resource decisions from this project could combine with other past, present, and reasonably foreseeable future actions to produce cumulative impacts from hazardous materials and solid waste in the CIAA. Additional opportunities for incidences related to hazardous materials in the CIAA include: oil and gas development and transport, prescribed fire treatments, and to a lesser extent the installation of transmission lines and pipelines. With adherence to SOPs cumulative impacts in the CIAA would be minimal.

4.18.3.14 LAND USE AND ACCESS

Land tenure on the tract would not change based on any known past, present, or reasonably foreseeable projects. The land status and prior rights currently held by parties would remain unchanged. However, the overall land use in the tract would be restricted to mining operations. The mine operator would lease private and federal surface estates and federal mineral estates from the BLM for the life of the mine and until the coal mine area has been reclaimed and released from bond.

Using surface disturbance acres as an indicator of land use in the CIAA mining operations on the Alton Coal Tract would increase the total acreage of land in the CIAA used for mineral extraction by 1,993–2,395 acres under the Proposed Action and 1,662–2,064 acres under Alternative C. Reasonably foreseeable future actions would result in the use of 4,826 acres of land for mineral extraction related activities. Coal mining activities on the tract under the Proposed Action or Alternative C would result in a 41%–50% or 34%–43% increase, respectively in the acreage of land in the CIAA used for mineral extraction. However, under the Proposed Action or Alternative C the amount of land used for mineral extraction across the CIAA (again using surface disturbance acres as an indicator) would still be relatively low at 3% and 2%–3%, respectively.

4.18.3.15 LIVESTOCK GRAZING

Potential, cumulative impacts on livestock grazing operations could occur from a combination of activities and land uses occurring in the CIAA. Vegetation treatments and range improvements on lands adjacent to the decision area (public and private) would increase available forage and water for a wide range of uses, including livestock grazing and rangeland health. Surface-disturbing activities, including coal development activities and related construction of roads and infrastructure, could be a primary cause of site-specific loss of forage and the spread of noxious weeds. The implementation of BLM's mitigation guidelines, restrictions on surface use, Standards for Rangeland Health, vegetation treatments, and monitoring efforts would all provide measures of protection for forage resources on federal lands, which would help to reduce overall effects on livestock grazing operations.

4.18.3.16 PALEONTOLOGY

It is likely that intense hobby fossil collecting and other nearby mining activities for burnt shale clinker and Septarian concretions would continue through the life of the mine under the Proposed Action or Alternative C. It is also expected that research activities in the Alton Amphitheatre would increase as knowledge of the nearby Kaiparowits Basin matures creating additional demands for undisturbed fossils and outcrops. The mining of burnt shale, Septarian concretions, or nearby coal resources would contribute to the total loss of fossil resources on federal lands, perhaps as much as an additional 40%.

Across the CIAA reasonably foreseeable future actions would result in approximately 78,854 acres of surface disturbance. Surface-disturbing activities have the potential to result in the destruction of fossils depending on the location of the surface-disturbing activity. On the other hand, surface-disturbing activities can also result in the unearthing of fossils and their inclusion in the paleontological scientific body of knowledge. Mining operations on the tract under the Proposed Action or Alternative C would result in a 2.59%–3.12% or 2.16%–2.69% increase, respectively in surface disturbance in the CIAA.

4.18.3.17 RECREATION

Cumulative effects to recreation resources would potentially occur from a combination of land uses and permitted actions. These include the conversion of agricultural lands to residential and commercial uses and known projects such as the West-Wide Energy Corridor Programmatic EIS, the Coal Hollow Environmental Assessment (which occurs on lands adjacent to and including the Alton Coal Tract), the Tropic to Hatch transmission line project, the Lake Powell water pipeline project, the Jackson Flat Reservoir project, and the US-89 Highway widening project.

For many of these projects and permitted actions, some recreation users would be temporarily or permanently displaced from the immediate area around the tract. The Proposed Action would cause a 2.59%–3.12% increase in overall surface disturbance in the CIAA. Alternative C would increase surface disturbance by 2.16%–2.69%. This disturbance would result in displacement of recreationists to other areas in the CIAA. Users would move onto adjacent public lands (BLM-administered lands and the Dixie National Forest) for hunting and other dispersed recreation opportunities (camping, hiking, sightseeing, etc.). The conversion of agricultural land to residential and commercial uses is likely the largest area of impact to recreation resources in the CIAA. As removal of minimally developed land available for hunting and dispersed recreation increases, the amount of land available for recreation in those types of settings decreases permanently. This increases crowding and decreases the recreational experiences of displaced and existing users in those remaining areas.

4.18.3.18 SOCIOECONOMICS

The CIAA for socioeconomics includes Kane, Garfield, and Iron counties. Thus, in addition to considering the past, present, and reasonably future impacts from the KFO (Kane and Garfield counties), the cumulative socioeconomic analysis considers management decisions related to the Cedar City Field Office (Iron County) as well. Most of the cumulative impacts to the social and economic conditions of the three-county area would be a result of mineral development. According to the Utah Geologic Survey, two coal fields do exist in Iron County (Harmony and Kolob) (UDNR 2006). However, development of these fields is not anticipated in the foreseeable future. Given that there is no current or reasonably foreseeable coal production or oil and gas development in Iron and Beaver counties, the Proposed Action or Alternative C would add a new revenue stream, via indirect expenditures, into the local economy. The Proposed Action or Alternative C could contribute to revenues from existing and future oil and gas development and exploration in the KFO. The KFO estimates that 90 oil and gas wells will be drilled over a 20-year period. An increased contribution of mineral-related royalties, taxes, and payments from the successful bidder to the federal, state, and local government would be beneficial to current economic conditions at all levels of government. As stated in the KFO RMP/Final EIS the Alton coal mine “would provide by far the largest new economic stimulus to the [Kane and Garfield counties].

Increasing natural resource development in the KFO and potentially in the Cedar City Field Office over the next 20 years would likely alter the social character in many of the small central and southern Utah communities. In addition to the truck traffic required to move mined coal to market, other production-related trucks would further degrade the rural, small-town nature of communities near mines, wells, and along transportation routes. The alteration of landscapes from semiprimitive/natural to ones characterized

by coal mining and oil and gas development would be experienced by local residents in the area who enjoy and/or depend on the naturalness of the area for their livelihood. Cumulatively, these changes could result in adverse impacts to recreationists who value primitive recreation and businesses dependant on tourism-related revenue.

4.18.3.19 SOILS

In addition to the 1,993– 2,395 to 1,662–2,064 acres of soil disturbance that would occur under the Proposed Action and Alternative C respectively, several other activities would impact soils in the CIAA. The reasonably foreseeable development in the CIAA would disturb 78,854 surface acres. The Proposed Action would increase surface disturbance, by 2.59%–3.12% and Alternative C would increase the total disturbance by 2.16%–2.69% in the CIAA.

Proposed coal mine development on private surface areas adjacent to the Alton Coal Tract would result in an additional 802 acres of surface disturbance to soils, potentially contributing to soil erosion and loss of soil productivity. Other activities could also contribute to cumulative impacts to soil in the CIAA, including OHV and vehicle use, rangeland use, oil and gas development, and other surface uses and activities. Under the KFO-RMP, the public lands in the CIAA limit OHV use to designated trails and roads, and the area is open to oil and gas leasing. All oil and gas development, mining, public lands grazing, and other uses of public lands would require permits that would comply with authorizing permit stipulations and apply BMPs that would minimize the overall erosion and loss of soil productivity resulting from incremental impacts. Thus, the mining of the Alton Coal Tract and adjacent private lands would be one of the dominant cumulative impacts to soils in the CIAA.

4.18.3.20 TRANSPORTATION

Past and present actions including improved recreational opportunities in the region have contributed to the existing LOS in the area of analysis. Future actions that would contribute to cumulative impacts to transportation include expanding US-89, oil and gas development, locatable mineral development, salable mineral development, energy corridor development, wind energy development, and water project. The Proposed Action or Alternative C would cause incremental increases in traffic density; however it would not result in substantial decreases to LOS. The expansion of US-89 is expected to improve LOS on portions of the coal haul transportation route and would mitigate the incremental increases in traffic density resulting from the Proposed Action or Alternative C.

4.18.3.21 VEGETATION

Resource decisions from mining activities on the tract under the Proposed Action or Alternative C would combine with other past, present, and reasonably foreseeable future actions to produce cumulative impacts to vegetation resources in the CIAA. The total amount of surface disturbance from reasonably foreseeable future actions across the CIAA is estimated at 78,854 acres. The Proposed Action would disturb 1,993–2,395 surface acres, a 2.59%–3.12% increase in surface disturbance in the CIAA. Alternative C would disturb 1,662–2,064 acres, a 2.16%–2.69% increase in total CIAA surface disturbance. Surface disturbance associated with consumptive uses such as oil, gas, and other minerals development, and forage use by livestock and wildlife species would result in cumulative effects over a larger landscape scale than analyzed in this document.

Minerals development has occurred across this region in the past and is projected to continue at an increasing rate into the future. Additionally, both copper and uranium mining have occurred and would continue to occur in and around the tract. The combined amount of surface disturbance of these past, present, and future actions would be detrimental to vegetation resources. The spatial layout of oil and gas

facilities and access roads disturbs a large proportion of vegetation when considered across the landscape. Each disturbed area increases the opportunity for weed invasions and disrupts the spatial continuity of vegetation communities.

The overall cumulative impact of activities proposed for all resource decisions on vegetation resources in the CIAA includes short-term detrimental impacts and long-term improvements. Major contributors to detrimental impacts include continuing or increasing OHV activities throughout most of the area, and degradation to vegetation and habitats from mineral development-related activities. However, of the estimated 78,854 acres of surface disturbance as a result of reasonably foreseeable future activities in the CIAA, approximately 60,000 acres (or 78% of the total 78,854 acres) are anticipated to be for vegetation treatments intended to create desired vegetation communities such as stable sagebrush stands. An additional 4,666 acres of disturbance would be a result of wildfire, wildfire use, and prescribed fire. Although impacts related to fire are adverse to vegetation in the short term, in the long term fire results in beneficial impacts to vegetation be culling out decadent and decaying plant material and returning vegetation communities to historical fire return intervals that promote vegetation community vigor. Though coal mining activities on the Alton Coal Tract would result in short-term adverse impacts to vegetation as described, in the long term reclamation activities would restore native and suitable non-native plants to the landscape in arrangements beneficial to the vegetation communities themselves and to the wildlife that depends on these communities for habitat. Under the Proposed Action or Alternative C reclamation operations on the tract would increase restoration (i.e., vegetation treatment related) activities by 31%– 37% or 26%–32%, respectively (percentage increase is based on 64,666 acres of surface disturbance combined for vegetation treatments, wildfire, wildfire use, and prescribed fire) in the CIAA.

4.18.3.22 WATER RESOURCES

Reasonably foreseeable development in the CIAA, which has the potential to impact water resources, would impact approximately 78,854 acres. The Proposed Action would increase surface disturbance, as well potentially adverse impacts to water quality and/or quantity, by 2.59%–3.12% whereas Alternative C would increase the total disturbance by 2.16%–2.69% in the CIAA. In the CIAA, coal mining related operations on the tract combined with future construction and development of the Lake Powell pipeline, development of the West-wide energy corridor, construction of the Jackson Flat Reservoir, and oil and gas development would increase the incremental impacts associated with localized erosion and sediment loading, which could degrade downstream water quality. However, projects occurring on BLM-administered land must comply with BLM-permitted activities and would comply with permit stipulations that would minimize soil erosion and degradation of water quality and quantity. These permitted activities are not expected to contribute to the overall cumulative effect to water quality and quantity from past, present, and reasonably foreseeable actions. Several actions identified by the BLM as reasonably foreseeable actions such as fire use and vegetation treatments would incrementally improve watershed health in the long term though short-term impacts on water quality as a result of these activities would be adverse.

4.18.3.23 WILDLIFE AND SPECIAL STATUS SPECIES

The overall cumulative impact of activities proposed for the Alton Coal Tract and surrounding planning areas on wildlife and special status animal species includes short-term detrimental impacts and long-term improvements to habitats. Surface disturbance associated with oil, gas and other minerals development, and forage use by livestock would result in cumulative effects over a larger area than is analyzed in this document. The combined surface disturbance of past, present, and future development would be detrimental to wildlife and special status animal species due to fragmentation and destruction of habitat. Detrimental impacts include ongoing or increasing OHV use, loss and degradation of habitat due to mineral development, and disruption of daily and seasonal animal movement and habitat use due to

increased human presence, increased traffic volume and speeds, and noise and light pollution. Each disturbed area increases habitat fragmentation, reduces the connectivity and integrity of habitats, and displaces wildlife and special status species over the short- and long-term. The reasonably foreseeable development in the CIAA, which has the potential to impact wildlife, would impact 78,854 acres. The Proposed Action would increase surface disturbance, as well potentially adverse impacts to wildlife, by 2.59%–3.12% and Alternative C would increase the total disturbance by 2.16%–2.69% in the CIAA.

The development of the Alton Coal Tract combined with mining operations on adjacent private lands could result in the long-term loss of local sage-grouse habitat and displacement of the southern-most lek of the greater sage-grouse. Although mitigation and reclamation could reduce these impacts in the long term (perhaps resulting in improved habitat for the population), development of the Alton Coal Tract could result in the displacement of the location population in the short term or the loss of the local population in the long term (BLM 2008b).

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