

Chapter 2

PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

Chapter 2 describes in detail the proposed withdrawal (Proposed Action) and alternatives to the Proposed Action. Section 2.2 explains how the issues identified during scoping were used to develop alternatives. Section 2.3 describes the alternatives that were considered but eliminated from detailed analysis. In Section 2.4, each alternative is presented in detail in three segments: 1) an explanation of what lands would be withdrawn from location under the Mining Law, 2) the operating requirements for locatable mineral exploration and development, and 3) the level of reasonably foreseeable future locatable mineral operations that could occur under that alternative based on the reasonably foreseeable development (RFD) scenarios (see Appendix B). Section 2.5 describes past, present, and reasonably foreseeable future actions that may contribute to cumulative impacts. The identification of a preferred alternative is discussed in Section 2.6. Comparison tables are presented in Sections 2.7 and 2.8 to summarize and contrast the major provisions and impacts of each alternative.

NEPA and its implementing regulations promulgated by the CEQ require that an agency rigorously explore and objectively evaluate all reasonable alternatives. Reasonable alternatives are those that meet the purpose of and need for action and that are feasible to implement, taking into consideration regulatory, technical, economic, environmental, and other factors. In addition to reasonable alternatives, the EIS must also analyze the No Action Alternative, which provides a baseline against which to compare the potential environmental impacts for the action alternatives.

Alternatives are the heart of the EIS, as they present other possible courses of action that could achieve the underlying purpose of and need for action to which the agency is responding. In this case, as described in Chapter 1, the underlying purpose of and need for action is to protect the natural, cultural, and social resources in the Grand Canyon watershed from the possible adverse effects of locatable mineral exploration and development that could occur in the area.

In response to the above-stated purpose and need, approximately 1 million acres have been proposed for up to a 20-year withdrawal in order to prevent the location and development of new mining claims. This chapter of the EIS explores other options to the Proposed Action in the form of alternatives that could be used to address the purpose and need, as well as the No Action Alternative. How the Proposed Action and alternatives achieve the underlying purpose of and need for action is assessed by the decision-maker based in part on the environmental effects of each alternative, which are described in detail in Chapter 4 and summarized in Table 2.8-1. This comparative analysis of alternatives is done to provide the decision-maker, as well as the public, with a clear picture of the distinctions between the alternatives from the standpoint of environmental effects, which contributes to providing a clear basis for making an informed choice between alternatives.

2.2 DEVELOPMENT OF ALTERNATIVES

As detailed in Section 1.5, two public meetings were held to identify issues and assist with alternatives development. The formal public scoping process began on August 26, 2009, with the *Federal Register* publication of an NOI to prepare an EIS for a proposed withdrawal. By the end of the formal scoping period, the BLM had received a total of 83,525 comment submittals.

The alternative development process began with evaluating the public input collected during scoping and continued with extensive discussion between the BLM, as the lead agency, and the cooperating agencies, including the Forest Service, NPS, USFWS, and USGS; tribal governments; and state and local governments; recommendations were also sought from the Resource Advisory Council. The main issues identified during scoping were in the categories of Air Quality, Cultural Resources, Public Health and Safety, Recreation and Visuals, Socioeconomics, Soil and Water Resources, Special Status Species, Transportation, and Wildlife. These preliminary concerns were grouped into five categories in order to seek specific input from agency resource specialists: Biological Resources (vegetation, wildlife), Cultural Resources, Hydrologic Resources (including groundwater, surface water, and soils/erosion potential), Recreation/Visuals, and Socioeconomics. Alternatives were developed by superimposing the above categories of resource values on a single map in order to identify where such resource values were concentrated and hence outline the areas that were most sensitive to surface disturbance activities such as might occur during locatable mineral exploration and development.

In formulating alternatives to the proposed withdrawal, the BLM and cooperating agency managers and scientists—as a group and as separate resource-specific teams—initially decided on several general parameters that could be changed in order to develop a range of reasonable alternatives that would meet the purpose of and need for action, minimize impacts to resources, and address the key concerns identified in scoping. The parameters initially used were as follows:

- The proposed withdrawal area boundaries could be reduced to focus on those areas with a high concentration of sensitive resources or areas with limited data on sensitive resources.
- The proposed withdrawal area boundaries could be changed based on the uranium potential within the parcels, i.e., to include or exclude high-potential lands.
- The environmental protection requirements and other management programs in the proposed withdrawal area could be changed, possibly eliminating the need for the proposed withdrawal.
- The time frame of the proposed withdrawal could be decreased; for example, the withdrawal could be limited to 10 years instead of 20 years.

In addition, the necessity that all alternatives must be reasonable and meet the purpose of and need for action as defined in Chapter 1 (Section 1.3) was emphasized to all personnel involved in the alternative development process.

The initial suggestions for alternatives were subjected to a formal screening process to determine which were or were not viable, that is, which types of alternatives would meet the purpose of and need for action, would eliminate or minimize potential impacts, and would be distinct enough from other alternatives to provide a range of reasonable alternatives for the decision-maker. Suggestions such as phasing mining, limiting the number of mines that could operate at any given time, changing the Mining Law, and others, were screened out as parameters. The alternatives screened out and the rationale for not considering them are included in Section 2.3, Alternatives Considered but Not Analyzed in Detail.

As a result of this process, four alternatives have been developed for detailed analysis to address the significant relevant issues identified during scoping. Note that the preferred alternative to be identified in the Final EIS could be any one of the alternatives presented in the Draft EIS, or some combination or minor variation of the alternatives presented (see Section 2.6).

- **Alternative A**, the No Action Alternative: the proposed withdrawal would not be implemented and the proposed withdrawal area would remain open to location and entry under the Mining Law. New mining claims could be located and exploration and development activities would continue to be processed by the BLM or the Forest Service.
- **Alternative B**, the Proposed Action: the proposed withdrawal would be implemented and the entire 1,010,776 acres of federal locatable mineral estate within the three parcels would be

withdrawn for 20 years from operation of the Mining Law, subject to valid existing rights. On mining claims where valid existing rights determined to exist, drilling and mining activities would continue to be processed by the BLM or the Forest Service.

- **Alternative C**, Partial Withdrawal: 652,986 acres of federal locatable mineral estate within the three parcels would be withdrawn for 20 years from operation of the Mining Law, subject to valid existing rights. This alternative would withdraw the largest contiguous area identified on the resource overlays with concentrations of cultural, hydrologic, recreational, visual, and biological resources that could be adversely affected by locatable mineral exploration and development (see also Figures 2.4-2 through 2.4-4 in Section 2.4.4). Alternative C would leave the remaining portion of the proposed withdrawal area with isolated or low concentrations of these resources open to operation of the Mining Law. The mitigation of potential effects from exploration or development would continue under the applicable surface managing agency regulations.
- **Alternative D**, Partial Withdrawal: 300,681 acres of federal locatable mineral estate within the three parcels would be withdrawn for 20 years from operation of the Mining Law, subject to valid existing rights. This alternative would withdraw the contiguous area identified on the resources overlays where there is a high concentration of cultural, hydrologic, recreational, visual, and biological resources that could be adversely affected by locatable mineral exploration and development (see also Figures 2.4-5 through 2.4-7 in Section 2.4.5). Alternative D would leave the remaining portion of the proposed withdrawal area with isolated or low concentrations of these resources open to operation of the Mining Law. The mitigation of potential effects from exploration or development would continue under the applicable surface managing agency regulations.

One of the purposes of alternatives is to address relevant significant issues identified scoping. Each of the above alternatives was prepared to address certain issues raised during scoping or to meet requirements for alternatives analysis contained in regulation and policy, as explained below.

Alternative A is the No Action Alternative as required by NEPA [40 CFR 1502.14(d)]. The No Action Alternative “provides a benchmark, enabling decision makers to compare the magnitude of environmental effects of the action alternatives” (CEQ 1981:Question 3). Alternative A provides the environmental baseline against which the other alternatives are compared.

Alternative A would continue to rely upon the existing requirements and programs to protect the resources in the Grand Canyon watershed without the proposed withdrawal. It addresses the comments and concerns raised during scoping that the existing regulations applicable to exploration and development may not be adequate to protect the resources in the Grand Canyon watershed and that the withdrawal would unnecessarily restrict mining and result in economic impacts to local communities that are counting on mining to support their economies. Alternative A addresses the identified concern that uranium production needs to be maintained or allowed to expand as a low-carbon energy source to meet the nation’s clean energy needs.

Alternative B, the Proposed Action, is the Secretary’s proposal to withdraw 1,010,776 acres of federal locatable mineral estate, subject to valid existing rights. As the Proposed Action, it is the major federal action requiring preparation of the EIS. This alternative addresses the issues and concerns raised during scoping over the natural resource and human health and safety impacts that could be associated with increased uranium mining in the Grand Canyon watershed and the potential impacts of mining on tourism, recreational uses, American Indian tribes, and cultural resource values.

Alternatives C and D are partial withdrawal alternatives designed as geospatial approaches to balance the socioeconomic impacts of a complete withdrawal (particularly the potential loss of economic benefits associated with uranium exploration and development in the area) and the protection of the areas that

contain concentrations of biological, cultural, ethnographic, hydrologic, recreational, and visual resources. These alternatives focus the withdrawal preventing the location of new mining claims on areas with concentrations of nonmineral natural resources yet leave some high-potential uranium lands available for development.

To arrive at the partial withdrawal areas shown for Alternatives C and D, resource specialists and scientists from the federal agencies attended several alternatives discussion and development workshops. During the workshops, resource specialists considered the purpose of and need for action, to protect the natural, cultural, and social resources in the Grand Canyon watershed in order to identify the geographic areas of highest resource occurrence. The geographic areas from each group of resource specialists were then superimposed to determine the areas where such resources were concentrated in order to formulate the withdrawal boundaries of Alternatives C and D.

Representatives from the state, tribal, and county cooperating agencies were consulted during the development of the alternatives and invited to provide input. In addition, the Resource Advisory Council was asked to provide recommendations on issues and alternatives to be considered.

More detailed descriptions of Alternatives A through D are provided in Section 2.4, below. Section 2.7, Comparison of Alternatives, includes summary tables that identify key components, acreages, and reasonably foreseeable future mining-related activities by alternative for each parcel.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Sometimes, alternatives are suggested or proposed that on closer examination do not adequately respond to the purpose of and need for action, are technically or economically infeasible, are not ripe for consideration because they are remote or speculative, are substantially similar in design to an existing alternative, or would have substantially similar effects as an existing alternative. In such cases, the alternatives are usually eliminated from detailed analysis. Alternatives to the proposed withdrawal that were considered and eliminated from detailed analysis are described below, along with the rationale for their elimination.

2.3.1 Change in Duration of Withdrawal

An alternative was initially considered to change the time frame of the proposed withdrawal from 20 years to 10 years, or even to 5 years. However, it was determined a shorter term withdrawal does not warrant evaluation as a separate alternative because withdrawals can be renewed by the Secretary of the Interior, provided that the underlying reason for the withdrawal is still valid. Since protection of the Grand Canyon watershed is a long-term need and mining interest is foreseeable in the long term, it is quite possible that a shorter term withdrawal would simply be renewed, resulting in no meaningful difference between a 10-year and a 20-year withdrawal. Therefore, an alternative that consisted solely of changing the duration of the proposed withdrawal was eliminated from further detailed analysis.

2.3.2 Withdraw Only Lands with Low Mineral Potential

It was suggested early in scoping that a partial withdrawal of only the lands with low mineral resource potential be considered for withdrawal. Such an alternative was suggested as a possible means to leave the high-potential lands available for mineral development, with a withdrawal to remove other lands with high nonmineral natural resource values from location and entry under the Mining Law.

This alternative was eliminated from detailed analysis for several reasons. All the lands in the proposed withdrawal area are rated as having a high potential for uranium resources, lying within what USGS terms Favorable Area A (USGS 2010b). While certain specific areas within the proposed withdrawal area have attracted greater industry interest than others (the North and South parcels in particular), all of the lands involved in the proposed withdrawal are considered to be lands with some of the highest uranium potential in the country. Another factor affecting the feasibility of this alternative is that much of the uranium exploration and development activity to date tends to coincide with many of the areas that have the highest concentration of nonmineral resource values. This is evident when comparing the active and existing mines shown on the figures in this chapter with the areas depicted as having high concentrations of nonmineral resources. This coincidence suggests that mineral potential, or mineral development interest, would not be a useful discriminating factor in designing a partial withdrawal alternative that would meet the purpose of and need for action.

2.3.3 No Withdrawal—Phased Mine Development

This alternative was considered as a way to limit the level of exploration and development activity in place of a withdrawal. Under this alternative, potential impacts to resources in the Grand Canyon watershed would be protected by limiting mineral development to certain areas at certain times, with a limited amount of mineral exploration and development activity occurring at any one time. This “phased development” alternative was eliminated from detailed analysis because it does not address the relevant aspect of the mining issue—the location of the activity—and the effects from specific individual mines on area resources. The RFD scenarios described in Appendix B do not indicate the likelihood of multiple mines’ overlapping in time or location and creating such extensive cumulative impacts that phased development would be a particularly useful mitigation approach.

Alternatives that better address the issue of impacts from the development of multiple mines either prohibit mining in areas with sensitive resources under one of the withdrawal alternatives or include careful screening for cumulative impacts under the existing regulations. Therefore, the phased mine development alternative, as a separate alternative, was eliminated from further analysis.

2.3.4 Permanent Withdrawal

During scoping, it was suggested that a permanent withdrawal be implemented instead of the proposed withdrawal for 20 years. The rationale for this is that if Grand Canyon resources require protection from the potential adverse effects of mining, that protection should be for longer than 20 years.

This alternative was considered but eliminated from detailed analysis for several reasons. A permanent withdrawal would require congressional action because the Secretary does not have the ability to implement a withdrawal for more than 20 years for areas aggregating more than 5,000 acres [FLPMA Section 204(c)]. In addition, Congress is already considering just such a proposal under the legislative process [HR 644], which is the appropriate venue for such an action. Furthermore, it is unclear whether there would be much difference between how a permanent withdrawal addresses the relevant significant issue of effects from uranium mining in the Grand Canyon watershed, compared with the proposed 20-year withdrawal. Withdrawals made by the Secretary under the authority of FLPMA are renewable as long as the underlying reason for the withdrawal is still valid. Hence, the environmental consequences of a permanent withdrawal and a 20-year withdrawal with respect to uranium mining could be difficult to distinguish in a separate alternative.

2.3.5 Change the Mining Law

Many comments received in response to the Notice of Proposed Withdrawal and during scoping suggested that reforming or changing the Mining Law would address potential environmental impacts to the Grand Canyon watershed. While the Mining Law is fundamentally a law for acquiring property rights, rather than an environmental law, presumably the comments were directed at eliminating the ability to establish property rights and increasing agency discretion to prevent mining. This alternative was eliminated from consideration for several reasons.

Making or amending law is an explicit function of the Congress, and proposals to change the Mining Law are currently under consideration before Congress. Even if such a change in law could be structured that responded to the purpose of and need for action with respect to mining in the Grand Canyon watershed, it is unlikely to be implemented in time to have any effect before the segregation expires and new mining claims can be located. Because an alternative to amend the Mining Law is too speculative, may not address the purpose and need, and is not within the ability of the Secretary to implement, it has been eliminated from detailed analysis.

2.3.6 New Mining Requirements

During scoping, it was suggested by members of the public and the Resource Advisory Council that instead of the withdrawal, the BLM and Forest Service should consider new locatable mineral exploration and development requirements, along with certain program initiatives, to protect the resources in the Grand Canyon watershed from the potential adverse effects of uranium exploration and development. During alternative formulation, the interagency team identified a number of potential new requirements for uranium exploration and development within the area proposed for withdrawal. Such requirements included processing and review requirements specific to notices and plans of operation, as well as regional monitoring programs, remediation efforts, targeted research initiatives, and coordinated interagency oversight, including the following:

- The BLM and Forest Service would require a plan of operations for all activity exceeding casual use in the area. Surface disturbance exceeding casual use, including exploratory drilling, could not be conducted under a notice but would require a plan of operations and be subject to NEPA analysis and the opportunity for public comment.
- The BLM and Forest Service would not approve a plan of operations in which the environmental analysis determines that substantial irreparable harm would occur to significant natural or cultural resources in the Grand Canyon watershed that could not be effectively mitigated. This requirement would be used where the plan of operations was considered unreasonable because it posed a substantial risk of causing impacts that would result in the permanent loss of significant values and irreplaceable resources that could not be mitigated using available technology.
- Before approving a plan of operations, the BLM or Forest Service would consult with the NPS on the operating and reclamation standards needed to prevent the impairment of Grand Canyon National Park System resources. Such measures would be incorporated into the BLM or Forest Service decision as conditions of approval when determined necessary to protect National Park System resources.
- The BLM and Forest Service would assess civil penalties, when necessary, in order to enforce their respective operating requirements.
- A compensatory off-site mitigation program would be established that could be used for regional mitigation at legacy uranium mine sites that require cleanup, or for responding to unanticipated

events or conditions at mine operations that are found to be adversely affecting natural, cultural, or social resources in the Grand Canyon watershed.

- A cost recovery program would be used to fund federal agency monitoring and compliance activities determined necessary to oversee individual mining operations.
- The BLM and Forest Service would undertake an initiative, in conjunction with other federal and state agencies, to establish regional programs to monitor wildlife indicator species for effects resulting from uranium mining.
- The BLM and Forest Service would undertake an initiative, in conjunction with other federal and state agencies, to establish regional programs to identify, characterize, and monitor area groundwater and spring conditions for effects associated with uranium mining.
- The BLM and Forest Service would undertake an initiative, in conjunction with other federal agencies and tribal governments, to establish regional programs to identify and monitor other natural and cultural resources for effects associated with uranium mining.
- The BLM and Forest Service would establish a standing regional interagency workgroup to advise the federal land managing agencies on monitoring, research needs, and operating and reclamation performance standards.

Most of the requirements described above would require changing the BLM and Forest Service surface management regulations at 43 CFR 3809 and 36 CFR 228A, respectively, in order to be implemented. The rulemaking process for amending regulations can take years, and the final outcome is not certain until a final rule is published. Furthermore, changing the regulatory requirements could be proposed as a subsequent action in conjunction with any of the withdrawal alternatives, including the No Action Alternative. The other program requirements or initiatives listed above could be implemented under any alternative independent of a withdrawal action or a regulation change. Because a New Mining Requirements Alternative would depend on the outcome of some future regulatory process yet to be initiated, its ability to be implemented is speculative, and a separate alternative considering such measures and their effectiveness has been eliminated from detailed analysis.

2.4 DESCRIPTION OF THE ALTERNATIVES

This section describes the elements of each alternative in sufficient detail to understand what would be involved in its implementation. The individual alternative description is divided into three components: 1) a description of the area that would be withdrawn from location and entry under the Mining Law with accompanying maps as appropriate; 2) a narrative that describes the operating requirements for locatable mineral exploration and development activities; and 3) the reasonably foreseeable future activity or actions that could occur based on the RFD scenario developed for each alternative, as detailed in Appendix B.

The first component, the description of area to be withdrawn, focuses on Alternatives B, C, and D. There is no withdrawal associated with Alternative A, since Alternative A is the No Action Alternative. The second component, the narrative describing the operating requirements for locatable mineral exploration and development activities, is essentially the same for Alternatives A through D. Requirements for mining companies to comply with environmental regulations administered by other federal and state agencies would also apply to all alternatives. Many of these compliance requirements are expressed as project design features intended to reduce or minimize environmental impacts. Some aspects of the requirements, such as the procedures for determining valid existing rights, are especially relevant to the alternatives that include a withdrawal since new activity would be limited to those claims with valid existing rights as of the date of the segregation, July 21, 2009.

The reasonably foreseeable future activity, the final component described under each alternative, focuses on key outputs from Appendix B, Locatable Mineral Resources—Reasonably Foreseeable Development Scenarios. The RFD scenarios were prepared in order to provide a broad overview of the types and amount of reasonably foreseeable future locatable mineral exploration and development. As an overview, the RFD scenarios do not replace the detailed review required at the project level, nor are they substitutes for the validity examinations required to assess valid existing rights under the Mining Law. Instead, the RFD scenarios provide a consistent set of assumptions regarding anticipated exploration or development that could occur under each alternative and serve as the basis for assessing the environmental effects in Chapter 4.

Predictions of reasonably foreseeable future locatable mineral exploration, development, and mining activities are presented for each alternative and include estimates of the following:

- Number of mines,
- Amount of exploration activity,
- Miles of new mine access roads,
- Miles of power lines,
- Number of ore haul trips,
- Acreage of surface disturbance, and
- Water use.

These numbers from the RFD scenarios should not be regarded as absolute, meaning they are only estimates of what could occur under each alternative using a consistent set of assumptions. Their main utility is for comparing the alternatives. The RFD numbers do not constitute a limit or minimum on the level of future locatable mineral operations.

The acreages of areas withdrawn, operating requirements, and RFD projections for each alternative are summarized at the end of this chapter in Tables 2.7-1 through 2.7-3, respectively.

2.4.1 Past Withdrawals

Discrete areas in the region have already been withdrawn, or made unavailable, to entry and location under the Mining Law. These previously withdrawn lands, illustrated in Figure 2.4-1 and listed in Table 2.4-1, would remain withdrawn under all of the alternatives. In addition, several tribes in the region, including the Havasupai Tribe, Hualapai Tribe, Navajo Nation, Hopi Tribe, and Kaibab Band of Paiute Indians, have declared a uranium mining moratorium for their tribal lands.

Table 2.4-1. Lands in the Vicinity of the Proposed Withdrawal Area Previously Withdrawn from Mining Activity

Withdrawn Land Designation	Surface Area (square miles)	Acres
Grand Canyon National Park	1,904	1,218,375
Grand Canyon–Parashant National Monument	1,638	1,048,316
Grand Canyon Game Preserve	997	638,080
Vermilion Cliffs National Monument	459	294,000
Total for Withdrawn Areas	4,998	3,198,771

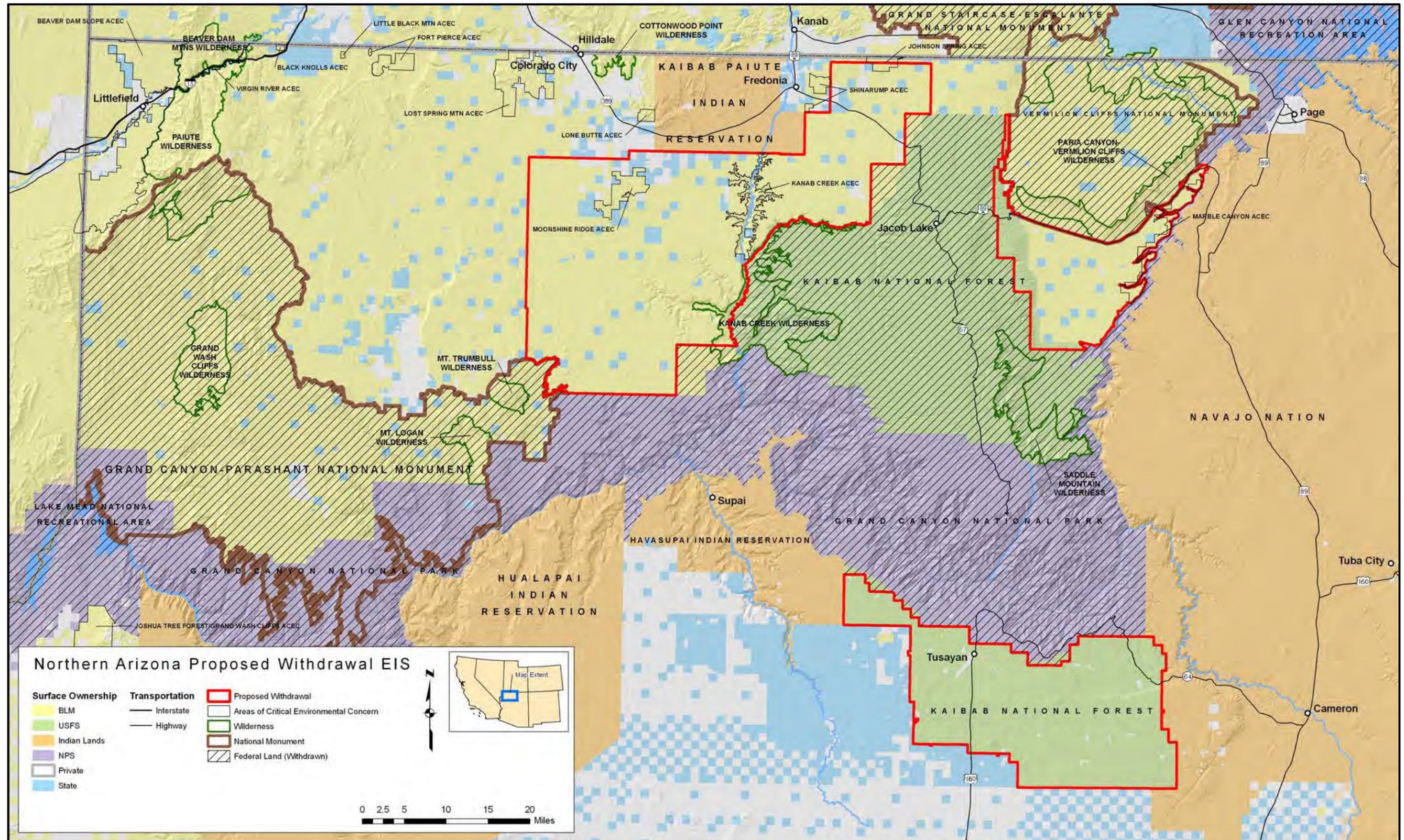


Figure 2.4-1. Previously withdrawn lands in the proposed withdrawal region.

2.4.2 Alternative A: No Action Alternative

Alternative A—Area Withdrawn

Under the No Action Alternative, the Secretary would not withdraw any of the lands identified in the Notice of Proposed Withdrawal from location and entry under the Mining Law. The proposed withdrawal area (see Figures 1.1-1 and 2.4-1) would remain open to location and entry under the Mining Law. New mining claims could be located. The BLM and Forest Service would continue to oversee locatable mineral exploration and development in accordance with their existing programs, policies, and regulations.

Alternative A—Locatable Mineral Operating Requirements

Locatable mineral exploration and development on BLM land is subject to the surface management regulations at 43 CFR 3715 and 3809. Locatable mineral operations on National Forest land are regulated under 36 CFR 228A. The following is a brief description of the each agency's existing requirements.

On BLM land, locatable mineral operations beyond “casual use” require that a detailed plan of operations be submitted to the BLM for review and approval. Casual use is generally defined as “activities ordinarily resulting in no or negligible disturbance of the public lands or resources” (43 CFR 3809.5). Exploration activities exceeding casual use can submit what is called a *notice* rather than a *plan of operations*, provided that the surface disturbance is less than 5 acres and does not occur in what are called special-category lands [43 CFR 3809.11(c)]. These special-category lands include ACECs, Wild and Scenic Rivers, National Monuments, National Conservation Areas, designated wilderness areas, OHV closed areas, and threatened and endangered species critical habitat. Areas disturbed must be reclaimed upon completion of operations. The operator is required to provide the BLM with an approved financial guarantee that is adequate to cover the estimated cost to complete the reclamation plan before beginning activities under either a notice or plan of operations. In addition, under the regulations at 3715, the BLM must make a formal decision of concurrence before a proposed occupancy of a mining claim or millsite can occur. This is usually done in conjunction with the review of a notice or approval of a plan of operations.

On National Forest System lands, for most locatable mineral operations, “a notice of intent to operate is required from any person proposing to conduct operations which might cause significant disturbance of surface resources” [36 CFR 228.4(a)]. The requirement is further defined and clarified in the regulations. If the operation is likely to cause significant disturbance of surface resources, a plan of operations must be submitted in lieu of the notice of intent. The determination of the significance of surface disturbance is made by the District Ranger, in accordance with Forest Service Manual 2810, Section 2817.11. In either case, “if the District Ranger determines that any operation is causing or will likely cause significant disturbance of surface resources, the District Ranger shall notify the operator that the operator must submit a proposed plan of operations for approval and that the operations cannot be conducted until a plan of operations is approved” [36 CFR 228.4(a)(4)].

The review and approval of a plan of operations by the BLM or Forest Service involve the following basic steps: 1) review of the proposed plan of operations to determine whether the operator has submitted complete operating, reclamation, monitoring, and interim management plans; 2) NEPA analysis, including the opportunity for public comment; 3) development of mitigating measures as conditions of approval required to meet the requirements of the regulations; 4) determination of the reclamation cost and financial guarantee amount; and 5) approval of the plan of operations and financial guarantee instrument. The approved plan of operations is subject to compliance monitoring by the BLM or Forest Service to ensure that the operator is following the approved plan.

Operations conducted under a *notice*, *notice of intent*, or an approved *plan of operations* must comply with all applicable state and federal laws and regulations related to environmental protection.

A more detailed description of the operating requirements of each agency is in Table 2.7-2 and in Appendix B.

Alternative A—Reasonably Foreseeable Future Activity

Uranium is the primary locatable mineral commodity of interest in the proposed withdrawal area. In this region uranium deposits of economic interest occur within geological structures termed breccia pipes. There are 45 confirmed breccia pipes within the proposed withdrawal area. Twenty-six of these confirmed breccia pipes are known to have some level of mineralization that may be economic to develop. Based on confirmed breccia pipe occurrence, as well as uranium resource estimates made by the USGS for the proposed withdrawal area, the RFD scenario estimates that 30 underground uranium mines could be developed within the proposed withdrawal area over the next 20 years. An approved plan of operations would be required for each new mine and would include detailed project planning and NEPA review, as described above.

In the North Parcel, the BLM believes that 18 new mines can be reasonably foreseen to come into production over the next 20 years in addition to the three that existed prior to the Proposed Withdrawal—Pinenut, Arizona 1, and Kanab North. The Arizona 1 Mine is in active production, while the Pinenut and Kanab North Mines are operating under interim management as approved in their plans of operation. The total estimated surface disturbance is estimated to be 945 acres from exploration and development in the North Parcel over 20 years. It is estimated that 208,385 ore haul trips would be associated with this level of mining activity.

Each mine would likely require a deep production well for operational water during the average 5-year life span of the mine, with most water usage occurring during the anticipated 3-year ore production phase. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 221 million gallons (mgal) of water could be required for mine operations in the North Parcel over 20 years.

A breakdown by the type of activity that could occur in the North Parcel is shown below in Table 2.4-2. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would be present at the same time.

Table 2.4-2. Reasonably Foreseeable Future Activity, Alternative A, North Parcel

Alternative A (No Action)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	504	25 projects/year
Acres disturbed for exploration (1.1 acres/project)	554	28 acres/year
Predicted mining projects (3 existing + 18 new)	21	1 mine/year
Acres new disturbance for mining (20 acres/mine)	360	18 acres/year
Number of ore haul trips (25 tons ore/trip)	208,385	10,420 trips/year
Miles of new power lines (parallel to access roads)	16.4	0.8 mile/year
Miles of new roads for new mine access	16.4	0.8 mile/year
Total acres disturbed for exploration and development	945	47 acres/year
Water usage (10.5 mgal/mine)	221	11 mgal/year

In the East Parcel, there are no existing mines, although two new mines are possible over the next 20 years, based on the RFD scenario. The total estimated surface disturbance is 107 acres from exploration and development in the East Parcel over 20 years. It is estimated that 22,240 ore haul trips would occur from mining in the East Parcel.

Each new mine would likely require a deep production well for operational water during the average 5-year life span of the mine. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 21 mgal of water would be required for mine operations in the East Parcel over 20 years.

A breakdown by the type of activity that could occur in the East Parcel is shown below in Table 2.4-3. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would occur at the same time.

Table 2.4-3. Reasonably Foreseeable Future Activity, Alternative A, East Parcel

Alternative A (No Action)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	56	3 projects/year
Acres disturbed for exploration (1.1 acres/project)	62	3 acres/year
Predicted mining projects (2 new)	2	–
Acres disturbed for new mining (20 acres/mine)	40	–
Number of ore haul trips required (25 tons ore/trip)	22,240	3,707 trips/year/mine
Miles of new power lines (parallel to access roads)	2.4	–
Miles of new roads for new mine access	2.4	–
Total acres disturbed for exploration and development	107	5 acres/year
Water usage (10.5 mgal/mine)	21	1 mgal/year

In the South Parcel, there is one existing uranium mine, the Canyon Mine, where the shaft has been partially developed, with an additional six new uranium mines likely to occur over the next 20 years, based on the RFD scenario. The total estimated surface disturbance is 312 acres in the South Parcel over 20 years from exploration and development. It is estimated that 69,540 ore haul trips could occur from mines in the South Parcel. It is assumed that trucks hauling ore would not be able to transit Grand Canyon National Park.

Each new mine would likely require a deep production well for operational water during the average 5-year life span of the mine, with most water being used during ore production. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 74 mgal of water could be required for mine operations in the South Parcel over 20 years.

A breakdown by the type of activity that could occur in the South Parcel is shown below in Table 2.4-4. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would occur at the same time.

The RFD scenario in Appendix B explains in detail how the above estimates of reasonably foreseeable future activity were determined. Table 2.7-3, at the end of this chapter, compares the amount of activity predicted by the RFD scenario for each alternative.

Table 2.4-4. Reasonably Foreseeable Future Activity, Alternative A, South Parcel

Alternative A (No Action)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	168	8 projects/year
Acres disturbed for exploration (1.1 acres/project)	185	9 acres/year
Predicted mining projects (1 existing + 6 new)	7	<1 mine/year
Acres new disturbance for mining (20 acres/mine)	120	6 acres/year
Number of ore haul trips (25 tons ore/trip)	69,540	3,477 trips/year
Miles of new power lines (parallel to access roads)	3.6	–
Miles of new roads for new mine access	3.6	–
Total acres disturbed for exploration and development	312	16 acres/year
Water usage (10.5 mgal/mine)	74	4 mgal/year

2.4.3 Alternative B: Proposed Action (20-Year Withdrawal)

Alternative B—Area Withdrawn

Alternative B is the proposed withdrawal from location and entry under the Mining Law of the federal locatable mineral estate underlying approximately 626,354 acres of BLM land, 360,349 acres of National Forest land, 4,284 acres of state lands, and 19,789 acres of private lands in the North, East, and South parcels, subject to valid existing rights. These lands are identified by legal description in the July 21, 2009, *Federal Register* Notice of Proposed Withdrawal and Opportunity for Public Meeting (see Appendix A) and shown in Figures 1.1-1 and 2.4-1. The private and state lands within the parcel boundaries with non-federal mineral estate would not be subject to the proposed withdrawal. However, if these lands were ever acquired by the federal government through means such as sale or exchange, they would be subject to the withdrawal and closed to locatable mineral exploration and development.

The proposed withdrawal would prohibit the location of new mining claims. Exploration or development operations on BLM and National Forest System lands on existing mining claims under notices or plans of operation submitted after the effective date of the withdrawal would not be able to proceed unless the subject mining claim were determined to be valid under the Mining Law as of the date of the segregation, July 21, 2009.

Alternative B—Locatable Mineral Operating Requirements

Locatable mineral operations would continue to be managed under the operating requirements described above for Alternative A. Locatable mineral operations on BLM land are subject to the surface management regulations at 43 CFR 3809. Locatable mineral operations on National Forest System land are regulated under 36 CFR 228A. A key difference under Alternative B is that the BLM and Forest Service would only process new notices and plans of operation on mining claims located prior to July 21, 2009, and where it was determined that the mining claim was valid before the withdrawal and remains valid.

On BLM land, existing mining claims in the withdrawn area would be subject to provisions of 43 CFR 3809.100(a), which states, “After the date on which the lands are withdrawn from appropriation under the mining laws, BLM will not approve a plan of operations or allow notice-level operations to proceed until BLM has prepared a mineral examination report to determine whether the mining claim was valid before the withdrawal, and whether it remains valid.” During the preparation of a mineral examination, activities

would be limited to sampling and testing in order to verify the presence of a discovery or to perform required annual assessment work. The time frame listed in the regulations for responding to a notice or plan of operations would be suspended pending the results of the mineral examination.

If the mineral examination determines that the mining claims involved in the notice or plan of operations are valid, i.e., held by a discovery of a valuable mineral deposit under the Mining Law, then the notice or plan of operations would continue to be processed in accordance with the regulations at 43 CFR 3809. If the mineral examination determined that the mining claims were not valid, then the BLM would not approve the plan of operations or allow notice-level activities to proceed and would institute contest proceedings against the subject mining claims.

On National Forest System lands, the Forest Service would follow essentially the same procedure as explained above for BLM lands. Although there are no specific regulations, the Forest Service would not accept a notice of intent nor approve a plan of operations unless and until the subject mining claims were examined and determined to be valid under the Mining Law as of July 21, 2009, and remain valid.

Alternative B—Reasonably Foreseeable Future Activity

Reasonably foreseeable locatable mineral exploration and development operations under Alternative B are expected to be considerably more limited than under Alternative A because the area would be closed to new mining claim location. The only activity, in addition to the current approved operations, would be on existing mining claims determined valid as of July 21, 2009. Based on the number of confirmed breccia pipes within the proposed withdrawal area, it is estimated that in addition to the four existing uranium mines, seven more uranium mines could be developed.

In the North Parcel, there are three mines under plans of operation approved before the Notice of Proposed Withdrawal segregated the area—Arizona 1, Kanab North, and Pinenut—and seven mineralized breccia pipes with estimated uranium resources that are currently held under mining claims and would be likely to be developed into production. Ten mines could therefore operate during the 20-year time frame.

The total estimated surface disturbance from these mines, 10 additional drilling projects (incidental to existing claims), 6.4 miles of new power lines, and 6.4 miles of new roads is 163 acres in the North Parcel over 20 years. It is estimated that 86,065 ore haul trips could occur as a result of mining in the North Parcel.

It is estimated that a total of 105 mgal of water could be required over 20 years to support mine operations. A breakdown by the type of activity that could occur in the North Parcel is shown below in Table 2.4-5. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would occur at the same time.

In the East Parcel, there are no existing mines, and there is only one breccia pipe confirmed through drilling. No mineral exploration or development is anticipated in this parcel under Alternative B, as it is unlikely any of the approximately two dozen mining claims had identified a valuable mineral deposit prior to July 21, 2009.

In the South Parcel, there is one partially developed mine, the Canyon Mine, but there are no other breccia pipes with estimated uranium resources. Therefore, it is likely that only the Canyon Mine would operate over the next 20 years. Total estimated surface disturbance from this mine is the 20 acres of existing disturbance and 1 acre related to drilling. It is estimated that 2,820 ore haul trips from mining in the South Parcel could occur based on the resources assumed to be present at the Canyon Mine. It is assumed that trucks hauling ore would not be able to transit Grand Canyon National Park.

Table 2.4-5. Reasonably Foreseeable Future Activity, Alternative B, North Parcel

Alternative B (Proposed Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	10	<1 project/year
Acres disturbed for exploration (1.1 acres/project)	11	<1 acres/year
Predicted mining projects (3 existing + 7 new)	10	<1 mine/year
Acres new disturbance for mining (20 acres/mine)	140	7 acres/year
Number of ore haul trips (25 tons ore/trip)	86,065	4,303 trips/year
Miles of new power lines (parallel to access roads)	6.4	0.3 mile/year
Miles of new roads for new mine access	6.4	0.3 mile/year
Total acres disturbed for exploration and development	163	8 acres/year
Water usage (10.5 mgal/mine)	105	5 mgal/year

It is estimated that a total of 11 mgal of water could be required to support the Canyon Mine operations. A breakdown by the type of activity that could occur in the South Parcel is shown below in Table 2.4-6. Because of the low level of activity, essentially one mine, it is likely that the drilling or mine disturbance would occur within a 4- to 5-year time frame, rather than being spread out evenly over 20 years.

Table 2.4-6. Reasonably Foreseeable Future Activity, Alternative B, South Parcel

Alternative B (Proposed Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	1	–
Acres disturbed for exploration (1.1 acres/project)	1	–
Predicted mining projects (1 existing)	1	–
Acres new disturbance for mining (20 acres/mine)	0	–
Number of ore haul trips (25 tons ore/trip)	2,820	564 trips/year/mine
Miles of new power lines (parallel to access roads)	0	0 new
Miles of new roads for new mine access	0	0 new
Total acres disturbed for exploration and development	1	–
Water usage (10.5 mgal/mine)	11	~2 mgal/year/mine

The RFD scenario in Appendix B explains in detail how the above estimates of reasonably foreseeable future activity were determined. Table 2.7-3 at the end of this chapter compares the amount of activity predicted by the RFD scenario for each alternative.

2.4.4 Alternative C: Partial Withdrawal

Alternative C—Area Withdrawn

Alternative C is the withdrawal from location and entry under the Mining Law of the federal locatable mineral estate underlying approximately 399,849 acres of BLM land, 237,894 acres of National Forest System land, 4,284 acres of state lands, and 10,959 acres of private lands in the North, East, and South parcels subject to valid existing rights. This is only a portion of the area proposed to be withdrawn under Alternative A, the Proposed Action. The private and state lands within the Alternative C withdrawal area with non-federal mineral estate would not be subject to the withdrawal. However, if these lands were ever

acquired by the federal government through means such as sale or exchange, they would be subject to the withdrawal and closed to locatable mineral exploration and development.

The location of new mining claims would be prohibited within the Alternative C withdrawal area. Exploration or development operations on BLM and National Forest System land on existing mining claims under notices or plans of operation submitted after the effective date of the withdrawal would not be able to proceed unless the involved mining claim were determined to be valid under the Mining Law as of the date of the segregation, July 21, 2009.

This alternative would withdraw those contiguous areas with a high concentration of natural resources. The remaining areas would stay open to locatable mineral exploration and development. Under Alternative C, the withdrawal of 652,986 acres amounts to approximately 65% of the total area being proposed for withdrawal under Alternative B (64% of the North Parcel, 67% of the East Parcel, and 64% of the South Parcel).

In the North Parcel, the 356,096 acres that would be withdrawn under this alternative include all or part of three ACECs—Johnson Spring, Kanab Creek, and Moonshine Ridge—as well as other lands known to contain cultural, biological, recreational, visual, and hydrologic resources. The Alternative C withdrawal boundaries and the identified areas of resource occurrence within the North Parcel are shown in Figure 2.4-2.

In the East Parcel, the 90,233 acres that would be withdrawn under this alternative includes the contiguous area with a high concentration of cultural, biological, recreational, visual, and hydrologic resources. This includes the lands along the southern boundary of Vermilion Cliffs National Monument and land adjacent to Marble Canyon. The Alternative C withdrawal boundaries and the identified areas of resource occurrence within the East Parcel are shown in Figure 2.4-3.

In the South Parcel, the 206,657 acres that would be withdrawn under this alternative form a contiguous area with a high concentration of cultural, biological, recreational, visual, and hydrologic resources. The proposed withdrawal includes Red Butte, regarded by American Indian tribes as a sacred site, and the Coconino Rim area, which is also important to area tribes. The Alternative C withdrawal area includes the Grand Canyon Railroad route and the area east and west of State Route (SR) 64, the entrance corridor to Grand Canyon National Park. The Alternative C withdrawal boundaries and areas of resource occurrence within the South Parcel are shown in Figure 2.4-4.

Alternative C—Locatable Mineral Operating Requirements

Locatable mineral operations would continue to be managed under the operating requirements described above for Alternative A. A key difference under Alternative C is that within the Alternative C withdrawal area, the BLM and Forest Service would only process new notices and plans of operation on mining claims located prior to July 21, 2009, and where it was determined that the mining claim was valid before the withdrawal and remains valid.

On BLM land, existing mining claims in the withdrawn area would be subject to provisions of 43 CFR 3809.100(a), which states, “After the date on which the lands are withdrawn from appropriation under the mining laws, BLM will not approve a plan of operations or allow notice-level operations to proceed until BLM has prepared a mineral examination report to determine whether the mining claim was valid before the withdrawal, and whether it remains valid.” During the preparation of a mineral examination, activities would be limited to sampling and testing in order to verify the presence of a discovery or to perform required annual assessment work. The time frames in the regulations for responding to a notice or plan of operations would be suspended pending the results of the mineral examination.

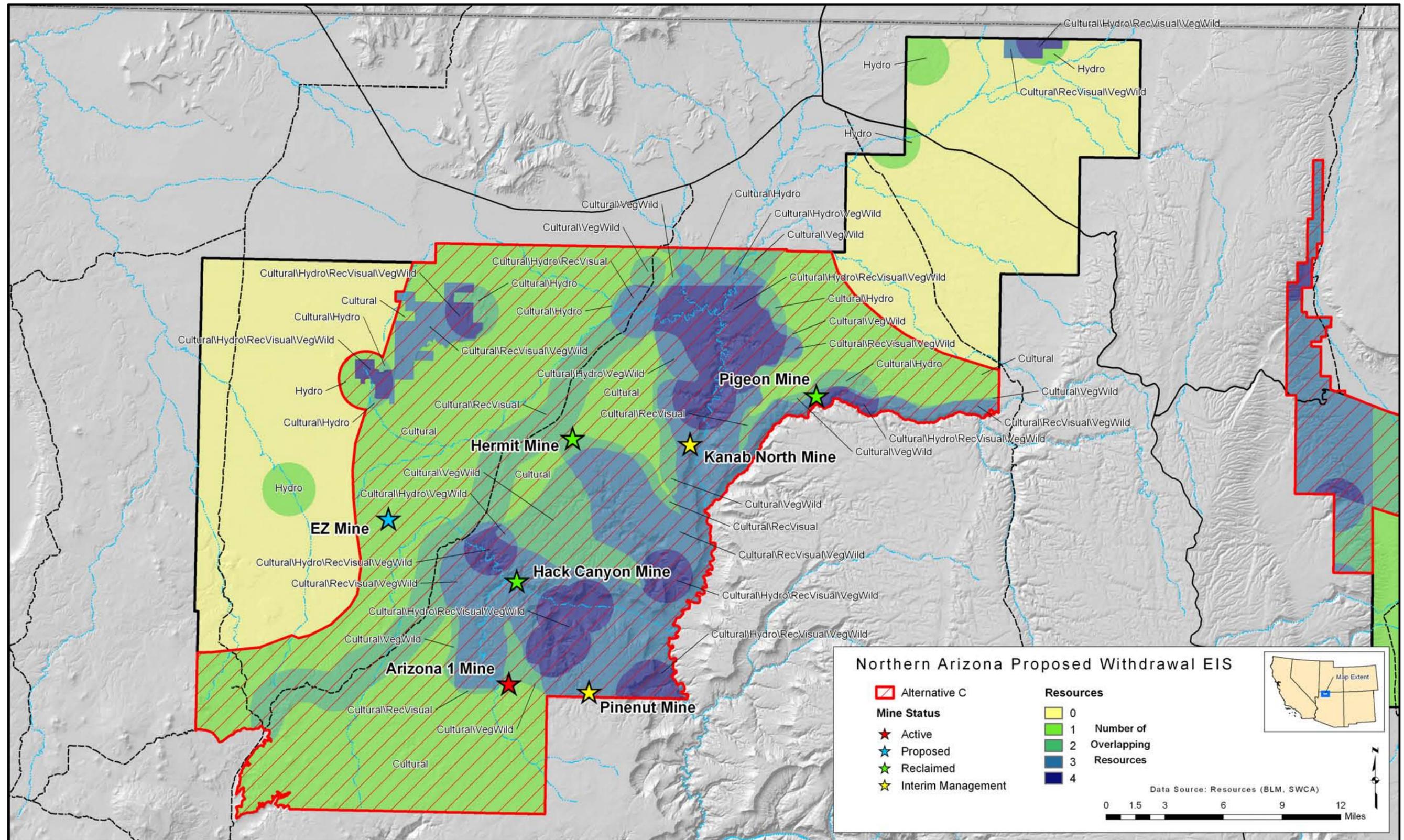


Figure 2.4-2. Alternative C partial withdrawal boundary: North Parcel.

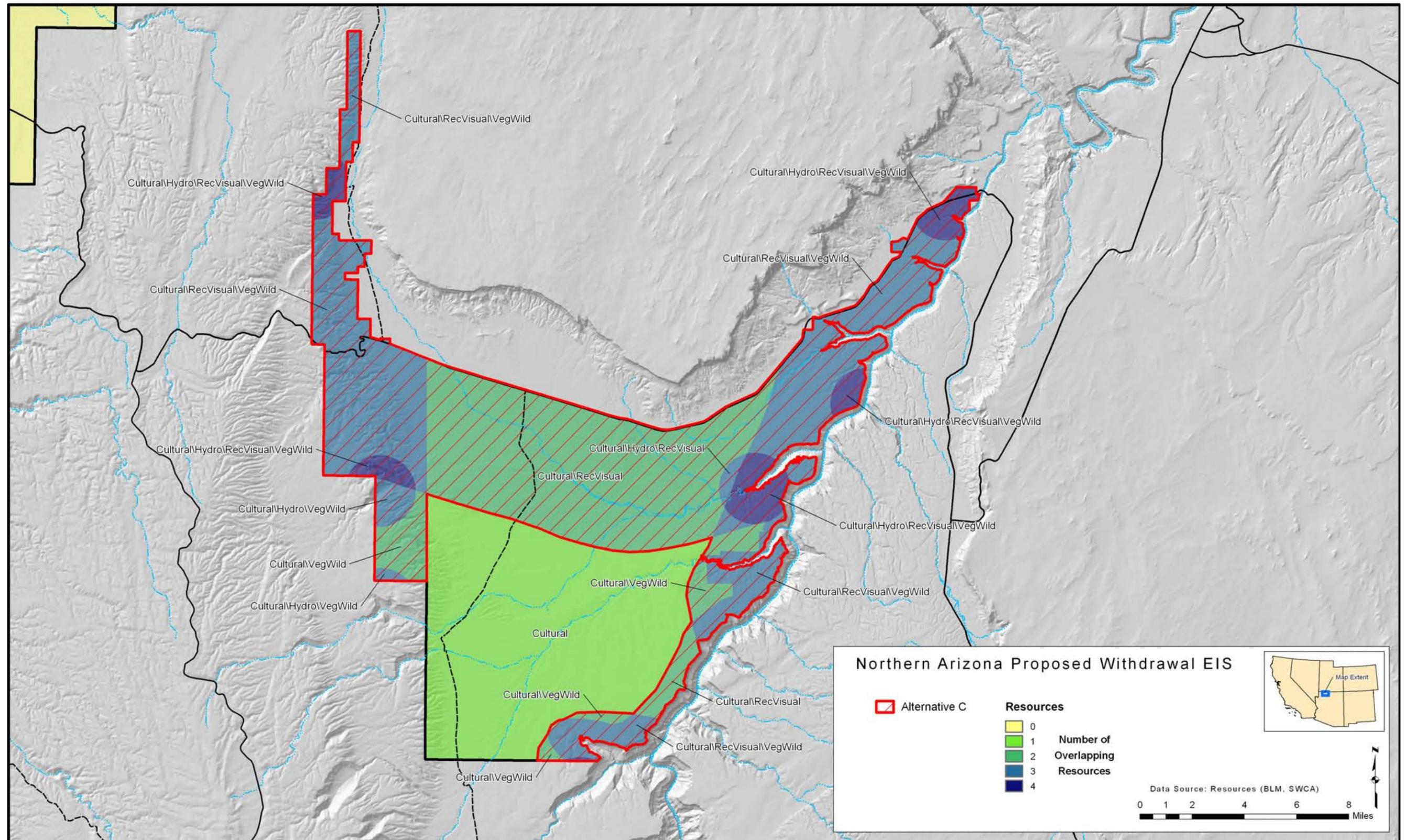


Figure 2.4-3. Alternative C partial withdrawal boundary: East Parcel.

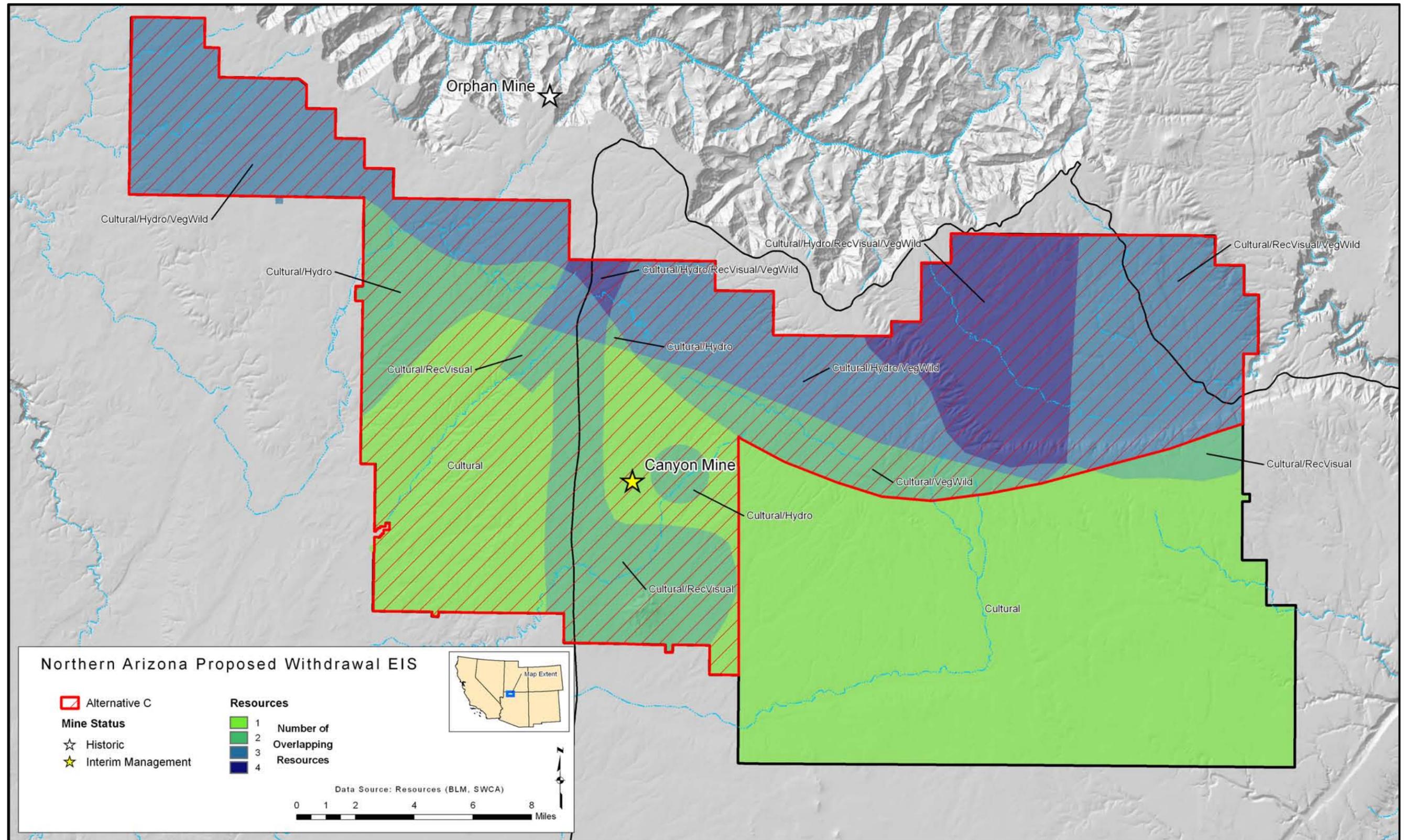


Figure 2.4-4. Alternative C partial withdrawal boundary: South Parcel.

If the mineral examination determines that the mining claims involved in the notice or plan of operations are valid, i.e., held by a discovery of a valuable mineral deposit under the Mining Law, then the notice or plan of operations would continue to be processed in accordance with the regulations at 43 CFR 3809. If the mineral examination determined that the mining claims were not valid, then the BLM would not approve the plan of operations or allow notice-level activities to proceed and would institute contest proceedings against the subject mining claims.

On National Forest System lands, the Forest Service would follow essentially the same procedure as explained above for BLM lands. Although there are no specific regulations, the Forest Service would not accept a notice of intent nor approve a plan of operations unless and until the subject mining claims were examined and determined to be valid under the Mining Law as of July 21, 2009, and remain valid.

Alternative C—Reasonably Foreseeable Future Activity

Reasonably foreseeable mineral exploration and development operations under Alternative C are expected to be considerably more limited than under Alternative A since more than two-thirds of the area would be withdrawn. On lands included in the Alternative C withdrawal, the only development in addition to the currently approved operations within the withdrawn area would be on existing mining claims determined to be valid as of July 21, 2009. Outside the area that would be withdrawn in this alternative, new mining claims could be located and exploration and development could proceed the same as on any BLM or National Forest System land open to operation of the Mining Law.

Based on confirmed breccia pipe occurrence, as well as uranium resource estimates made by the USGS for the area, the RFD scenario estimates that 18 underground uranium mines could be developed within the area over the next 20 years. This includes both the area that would be withdrawn under this alternative and the portion of the segregation area that would not be withdrawn under this alternative as shown in Figures 2.4-2 through 2.4-4. An approved plan of operations would be required for each new mine that would include detailed project planning and NEPA review, as described above.

In the North Parcel, there are three existing uranium mines—Pinenut, Arizona 1, and Kanab North—with an additional 10 new uranium mines that could be developed over the next 20 years. The total estimated surface disturbance as a result of exploration and development is 320 acres in the North Parcel over 20 years. It is estimated that 119,425 ore haul trips could occur as a result of mining in the North Parcel.

Each new mine would likely require a deep production well for operational water during the average 5-year life span of the mine. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 137 mgal of water could be required for all the mine operations in the North Parcel over 20 years.

A breakdown by the type of activity that could occur in the North Parcel is shown below in Table 2.4-7. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would occur at the same time.

In the East Parcel, there are no existing mines, although one new mine is predicted over the next 20 years, based on the RFD scenario. The total estimated surface disturbance is 54 acres from exploration and development over 20 years. It is estimated that 11,120 ore haul trips could occur as a result of mining in the East Parcel.

The new mine would likely require a deep production well for operational water during the average 5-year life span of the mine. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 11 mgal of water would be required for mine operations in the East Parcel.

Table 2.4-7. Reasonably Foreseeable Future Activity, Alternative C, North Parcel

Alternative C (Partial Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	94	5 projects/year
Acres disturbed for exploration (1.1 acres/project)	103	5 acres/year
Predicted mining projects (3 existing + 10 new)	13	<1 mine/year
Acres new disturbance for mining (20 acres/mine)	200	10 acres/year
Number of ore haul trips (25 tons ore/trip)	119,425	5,971 trips/year
Miles of new power lines (parallel to access roads)	9.1	0.5 mile/year
Miles of new roads for new mine access	9.1	0.5 mile/year
Total acres disturbed for exploration and development	320	16 acres/year
Water usage (10.5 mgal/mine)	137	7 mgal/year

A breakdown by the type of activity that could occur in the East Parcel is shown below in Table 2.4-8. Because of the low level of activity (essentially one mine), it is likely that the mining disturbance would occur within a 4- to 5-year time frame, rather than being spread out over 20 years.

Table 2.4-8. Reasonably Foreseeable Future Activity, Alternative C, East Parcel

Alternative C (Partial Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	28	1 project/year
Acres disturbed for exploration (1.1 acres/project)	31	2 acres/year
Predicted mining projects (1 new)	1	—
Acres new disturbance for mining (20 acres/mine)	20	—
Number of ore haul trips (25 tons ore/trip)	11,120	2,240 trips/year/mine
Miles of new power lines (parallel to access roads)	1.2	—
Miles of new roads for new mine access	1.2	—
Total acres disturbed for exploration and development	54	—
Water usage (10.5 mgal/mine)	11	~2 mgal/year/mine

In the South Parcel, there is one existing mine, the Canyon Mine, which is operating under interim management approved as a part of their plan of operation. An additional three new mines are likely to occur somewhere in that portion of the parcel that would not be withdrawn under this alternative over the next 20 years, based on the RFD scenario. The total estimated surface disturbance from exploration and development is 158 acres in the South Parcel over 20 years. It is estimated that 36,180 ore haul trips could occur as a result of mining in the South Parcel. It is assumed that trucks hauling ore would not be able to transit Grand Canyon National Park.

Each new mine would likely require a deep production well for operational water during the average 5-year life span of the mine. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 42 mgal of water could be required for mine operations in the South Parcel over 20 years.

A breakdown by the type of activity that could occur in the South Parcel is shown below in Table 2.4-9. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would occur at the same time.

Table 2.4-9. Reasonably Foreseeable Future Activity, Alternative C, South Parcel

Alternative C (Partial Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	85	4 projects/year
Acres disturbed for exploration (1.1 acres/project)	94	5 acres/year
Predicted mining projects (1 existing + 3 new)	4	–
Acres new disturbance for mining (20 acres/mine)	60	3 acres/year
Number of ore haul trips (25 tons ore/trip)	36,180	1,809 trips/year
Miles of new power lines (parallel to access roads)	1.8	–
Miles of new roads for new mine access	1.8	–
Total acres disturbed for exploration and development	158	8 acres/year
Water usage (10.5 mgal/mine)	42	2 mgal/year

The RFD scenario in Appendix B explains in detail how the above estimates of reasonably foreseeable future activity were determined. Table 2.7-3 at the end of this chapter compares the amount of activity predicted by the RFD scenario for each alternative.

2.4.5 Alternative D: Partial Withdrawal

Alternative D—Area Withdrawn

Alternative D is the withdrawal from location and entry under the Mining Law of the federal locatable mineral estate underlying approximately 133,241 acres of BLM land, 165,042 acres of National Forest land, 881 acres of state lands, and 1,517 acres of private lands in the North, East, and South parcels, subject to valid existing rights. This is only a portion of the area proposed to be withdrawn under Alternative A, the Proposed Action, and a smaller area than what would be withdrawn under Alternative C, another partial withdrawal alternative. The private and state lands within the Alternative D withdrawal area with non-federal mineral estate would not be subject to the proposed withdrawal. However, if these lands were ever acquired by the federal government through means such as sale or exchange, they would be subject to the withdrawal and closed to locatable mineral exploration and development.

The location of new mining claims would be prohibited within the Alternative D withdrawal area. Exploration or development operations on BLM and National Forest System land on existing mining claims under notices or plans of operation submitted after the effective date of the withdrawal would not be able to proceed unless the involved mining claim were determined to be valid under the Mining Law as of the date of the segregation, July 21, 2009.

This alternative would withdraw only those contiguous areas with the highest concentration of natural resources. The remaining areas would stay open to locatable mineral exploration and development. Under Alternative D, the withdrawal of 300,681 acres amounts to approximately 30% of the total area being proposed for withdrawal under Alternative B (20% of the North Parcel, 42% of the East Parcel, and 41% of the South Parcel).

In the North Parcel, a total of 111,198 acres would be withdrawn under this alternative, including the Kanab Creek ACEC. The areas with the concentrations of cultural, biological, recreational, visual, and hydrologic resources to be withdrawn would include the area immediately adjacent to Kanab Creek, Grama Canyon, Hack Canyon, and Snake Gulch. The Alternative D withdrawal boundaries and identified areas of resource occurrence within the North Parcel are shown in Figure 2.4-5.

In the East Parcel, the 56,232 acres that would be withdrawn under this alternative include the areas with concentrations of cultural, biological, recreational, visual, and hydrologic resources. The area that would be withdrawn under this alternative is adjacent to Marble Canyon and the interface area between the Kaibab National Forest and Vermilion Cliffs National Monument. The Alternative D withdrawal boundaries and the identified areas of resource occurrence within the East Parcel are shown in Figure 2.4-6.

In the South Parcel, the 133,251 acres that would be withdrawn under this alternative include the contiguous area with the highest concentrations of cultural, biological, recreational, visual, and hydrologic resources. The area that would be withdrawn encompasses the northern portion of the Tusayan Ranger District north of the groundwater divide, including the Coconino Rim. The Alternative D withdrawal boundaries and areas of resource occurrence within the South Parcel are shown in Figure 2.4-7.

Alternative D—Locatable Mineral Operating Requirements

Locatable mineral operations would continue to be managed under the operating requirements described above for Alternative A. A key difference under Alternative D is that, within the Alternative D withdrawal area, the BLM and Forest Service would only process new notices and plans of operation on mining claims located prior to July 21, 2009, and where it was determined that the mining claim was valid before the withdrawal and remains valid.

On BLM land, existing mining claims in the withdrawn area would be subject to provisions of 43 CFR 3809.100(a), which states, “After the date on which the lands are withdrawn from appropriation under the mining laws, BLM will not approve a plan of operations or allow notice-level operations to proceed until BLM has prepared a mineral examination report to determine whether the mining claim was valid before the withdrawal, and whether it remains valid.” During the preparation of a mineral examination, activities would be limited to sampling and testing in order to verify the presence of a discovery or to perform required annual assessment work. The time frame listed in the regulations for responding to a notice or plan of operations would be suspended pending the results of the mineral examination.

If the mineral examination determines that the mining claims involved in the notice or plan of operations are valid, i.e., held by a discovery of a valuable mineral deposit under the Mining Law, then the notice or plan of operations would continue to be processed in accordance with the regulations at 43 CFR 3809. If the mineral examination determined that the mining claims were not valid, then the BLM would not approve the plan of operations or allow notice-level activities to proceed and would institute contest proceedings against the subject mining claims.

On National Forest System lands, the Forest Service would follow essentially the same procedure as explained above for BLM lands. Although there are no specific regulations, the Forest Service would not accept a notice of intent nor approve a plan of operations unless and until the subject mining claims were examined and determined to be valid under the Mining Law as of July 21, 2009.

Alternative D—Reasonably Foreseeable Future Activity

Reasonably foreseeable mineral exploration and development operations under Alternative D are limited, compared with those described under Alternative A, since about one-third of the area would be withdrawn. On lands included in the Alternative D withdrawal, the only development in addition to the currently approved operations within the withdrawn area would be on existing mining claims determined valid as of July 21, 2009. Outside the area that would be withdrawn in this alternative, new mining claims could be located and exploration and development could proceed the same as on any BLM or National Forest System land open to operation of the Mining Law.

Based on confirmed breccia pipe occurrence, as well as uranium resource estimates made by the USGS for the area, the RFD scenario estimates that 26 underground uranium mines could be developed within the area over the next 20 years. This includes both the area that would be withdrawn under this alternative and the portion of the withdrawal area in the Proposed Action that would not be withdrawn under this alternative, as shown in Figures 2.4-5 through 2.4-7. An approved plan of operations would be required for each new mine and would include detailed project planning and NEPA review, as described above.

In the North Parcel, there are three existing uranium mines—Pinenut, Arizona 1, and Kanab North—with an additional 17 new uranium mines that could be developed over the next 20 years. The total estimated surface disturbance from exploration and development is 688 acres in the North Parcel over 20 years. It is estimated that 197,265 ore haul trips could occur as a result of mining in the North Parcel.

Each new mine would likely require a deep production well for operational water during the average 5-year life span of the mine. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 210 mgal of water could be required for mine operations in the North Parcel over 20 years.

A breakdown by the type of activity that could occur in the North Parcel is shown below in Table 2.4-10. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would occur at the same time.

In the East Parcel, there are no existing mines, although one new mine is possible over the next 20 years, based on the RFD scenario. The total estimated surface disturbance from exploration and development is 54 acres in the East Parcel over 20 years. It is estimated that 11,120 ore haul trips could occur as a result of mining in the East Parcel.

The new mine would likely require a deep production well for operational water during the average 5-year life span of the mine. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 11 mgal of water would be required for mine operations in the East Parcel.

A breakdown by the type of activity that could occur in the East Parcel is shown below in Table 2.4-11. Because of the low level of activity, essentially one mine, it is likely the mining disturbance would occur within a 4- to 5-year time frame, rather than being spread out over 20 years.

In the South Parcel, there is one existing mine, the Canyon Mine, which has been partially developed and is operating under interim management approved as a part of their plan of operation, with an additional four new uranium mines likely to occur somewhere in the portion of the parcel that would not be withdrawn under this alternative over the next 20 years, based on the RFD scenario. The total estimated surface disturbance from exploration and development is 209 acres in the South Parcel over 20 years. It is estimated that 47,300 ore haul trips could occur as a result of mining in the South Parcel. It is assumed that trucks hauling ore would not be able to transit Grand Canyon National Park.

Each new mine would likely require a deep production well for operational water during the average 5-year life span of the mine. Water would be drawn from the Redwall-Muav aquifer. It is estimated that a total of 53 mgal of water could be required for mine operations in the South Parcel over 20 years.

A breakdown by the type of activity that could occur in the South Parcel is shown below in Table 2.4-12. Because reclamation occurs once exploration or development is concluded, not all the disturbance shown below would occur at the same time.

The RFD scenario in Appendix B explains in detail how the above estimates of reasonably foreseeable future activity were determined. Table 2.7-3 at the end of this chapter compares the amount of activity predicted by the RFD scenario for each alternative.

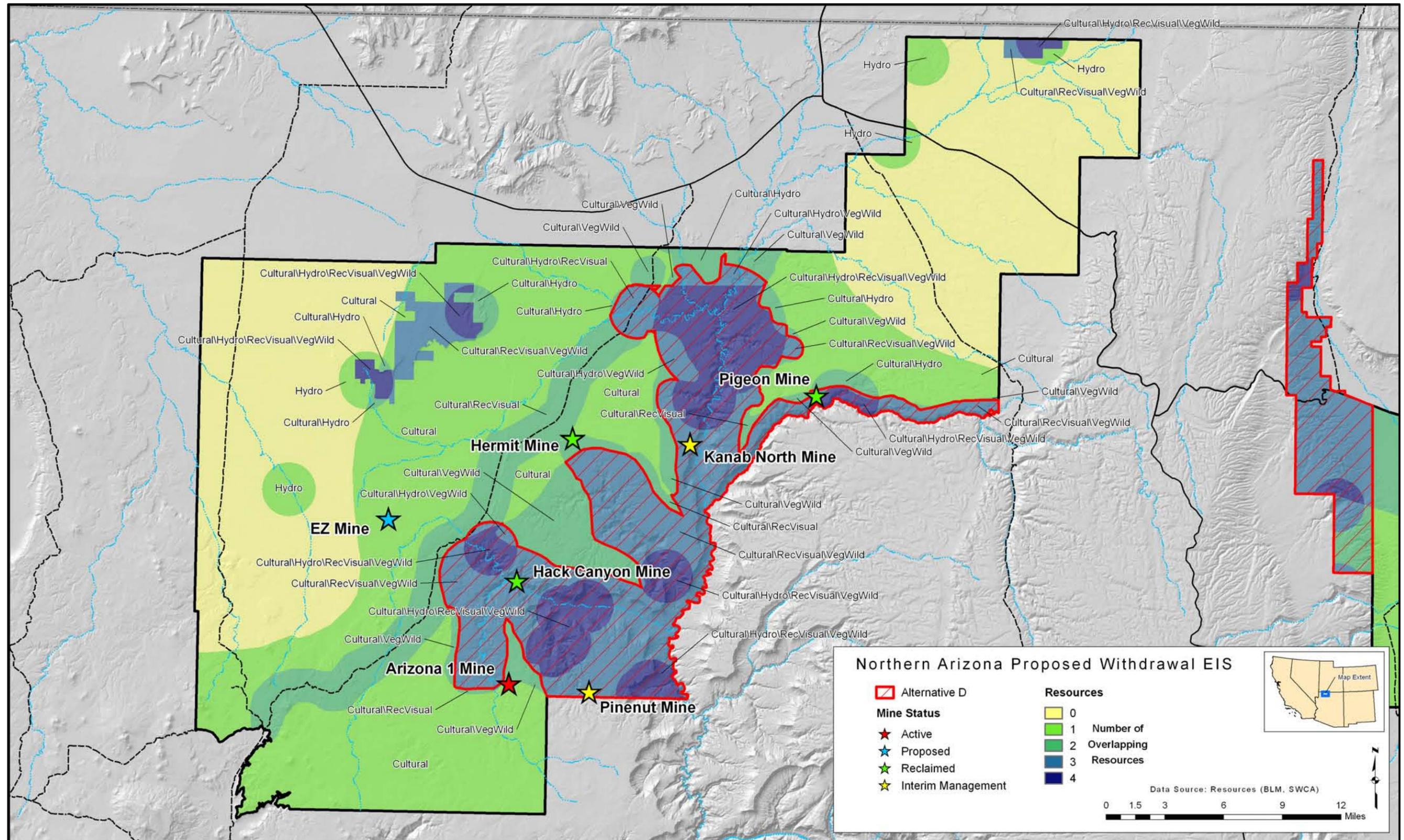


Figure 2.4-5. Alternative D partial withdrawal boundary: North Parcel.

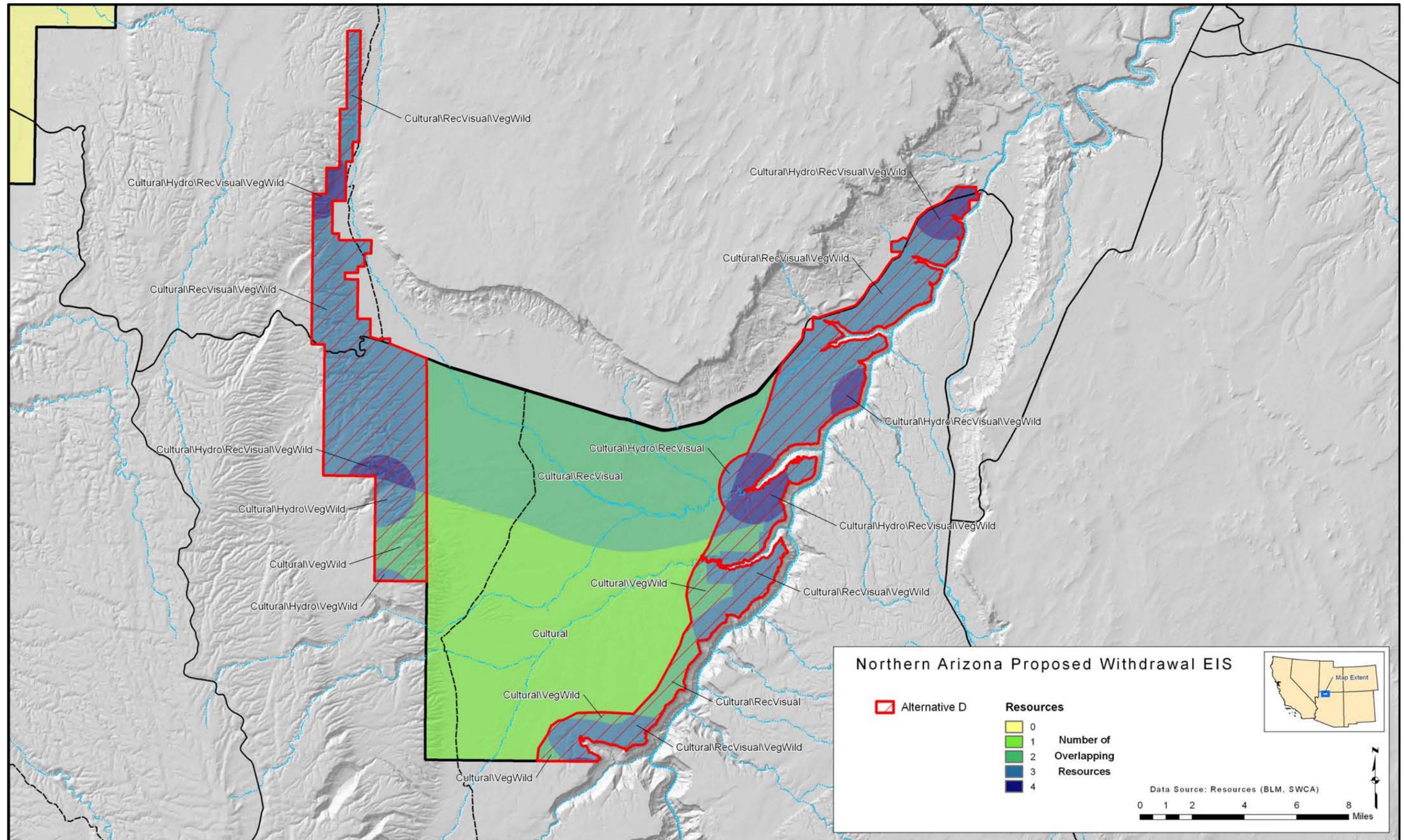


Figure 2.4-6. Alternative D partial withdrawal boundary: East Parcel.

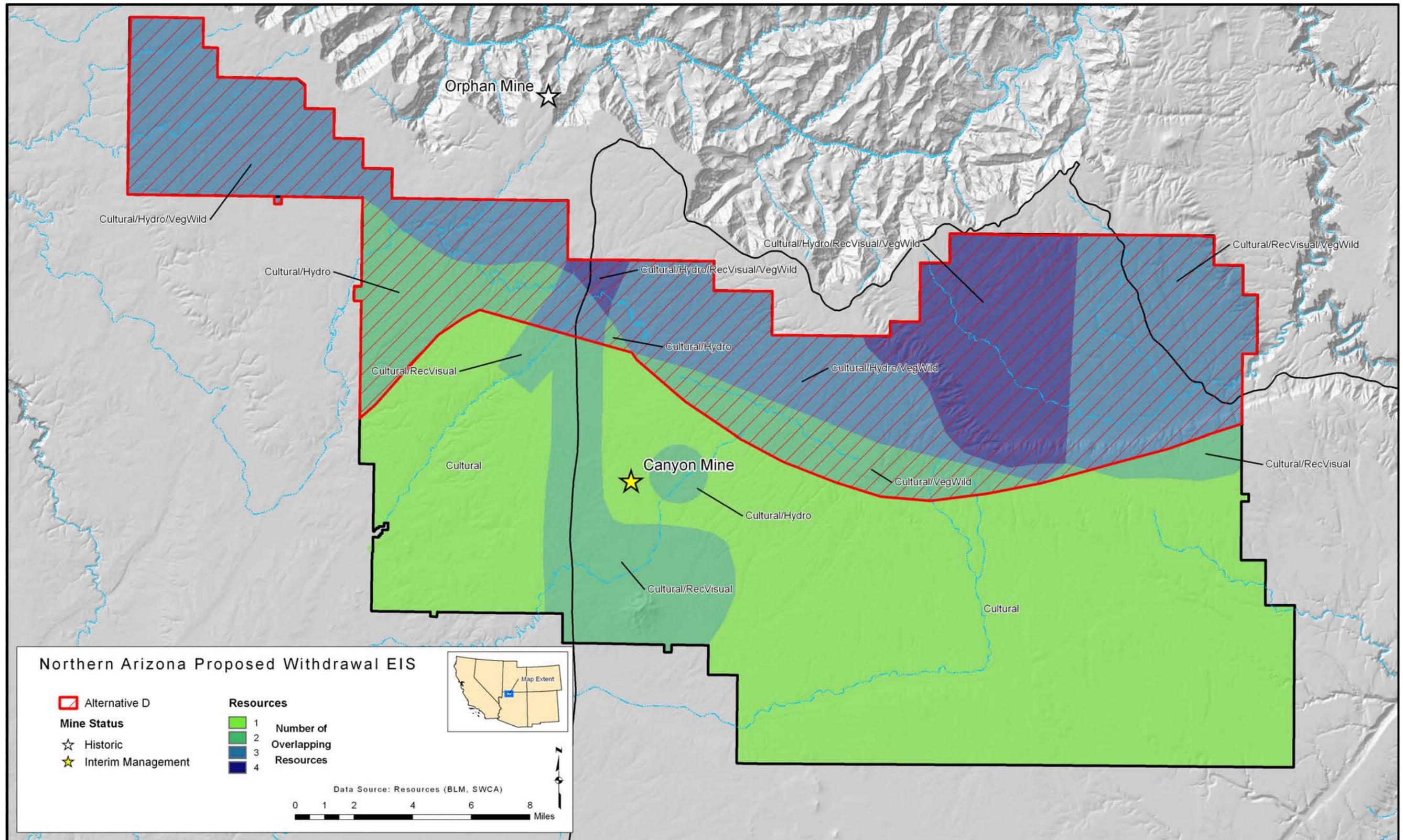


Figure 2.4-7. Alternative D partial withdrawal boundary: South Parcel.

Table 2.4-10. Reasonably Foreseeable Future Activity, Alternative D, North Parcel

Alternative D (Partial Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	290	15 projects/year
Acres disturbed for exploration (1.1 acres/project)	319	16 acres/year
Predicted mining projects (3 existing + 17 new)	20	1 mine/year
Acres new disturbance for mining (20 acres/mine)	340	17 acres/year
Number of ore haul trips (25 tons ore/trip)	197,265	9,863 trips/year
Miles of new power lines (parallel to access roads)	15.5	0.8 mile/year
Miles of new roads for new mine access	15.5	0.8 mile/year
Total acres disturbed for exploration and development	688	34 acres/year
Water usage (10.5 mgal/mine)	210	11 mgal/year

Table 2.4-11. Reasonably Foreseeable Future Activity, Alternative D, East Parcel

Alternative D (Partial Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	28	1 project/year
Acres disturbed for exploration (1.1 acres/project)	31	2 acres/year
Predicted mining projects (1 new)	1	–
Acres new disturbance for mining (20 acres/mine)	20	–
Number of ore haul trips (25 tons ore/trip)	11,120	2,240 trips/year/mine
Miles of new power lines (parallel to access roads)	1.2	–
Miles of new roads for new mine access	1.2	–
Total acres disturbed for exploration and development	54	–
Water usage (10.5 mgal/mine)	11	~2 mgal/year/mine

Table 2.4-12. Reasonably Foreseeable Future Activity, Alternative D, South Parcel

Alternative D (Partial Withdrawal)—Activity Levels	Over 20 Years	Average
Predicted exploration projects (~5 drill holes/project)	113	6 projects/year
Acres disturbed for exploration (1.1 acres/project)	124	6 acres/year
Predicted mining projects (1 existing + 4 new)	5	<1 mine/year
Acres new disturbance for mining (20 acres/mine)	80	4 acres/year
Number of ore haul trips (25 tons ore/trip)	47,300	2,365 trips/year
Miles of new power lines (parallel to access roads)	2.4	–
Miles of new roads for new mine access	2.4	–
Total acres disturbed for exploration and development	209	10 acres/year
Water usage (10.5 mgal/mine)	53	3 mgal/year

2.5 CUMULATIVE ACTIONS

All existing and anticipated exploration and development operations are included as part of the RFD scenarios used to predict reasonably foreseeable future actions and activities. The three mines within the area proposed for withdrawal (Canyon, Pinenut, and Kanab North) are under interim management, consistent with their approved plans of operation. Arizona 1 is the only uranium mining operation currently in production within the area proposed for withdrawal. All four of these mines are included in the RFD analysis (see Appendix B).

The BLM is currently reviewing a plan of operations for mining of the EZ-1, EZ-2, and What deposits in the North Parcel (Figure 2.4-5, labeled EZ MINE). These deposits are proximally located and are planned to be mined from a single mine location. Potential development of these deposits is included as part of the RFD scenarios (see Appendix B). Site-specific analysis, findings, and decisions regarding the EZ-1, EZ-2, and What plan of operations will be made by BLM after preparation of a separate, project-specific environmental analysis is completed. A site-specific analysis of that plan of operations is not within the scope of the current EIS.

On October 10, 2008, the Kaibab National Forest published a *Federal Register* NOI to prepare an EIS on the proposed exploration of 24 mining claims in the South Parcel held by VANE Minerals, Inc. (VANE). VANE must prove valid existing rights prior to the July 21, 2009, segregation in order to conduct exploration. However, VANE subsequently withdrew the plan of operations. The Forest Service is not currently reviewing any plans of operation within the area proposed for withdrawal. Potential exploration and possible mine development of these claims is included as part of the RFD scenarios (see Appendix B). A site-specific analysis of the VANE exploration plan of operations is not within the scope of the current EIS.

Other reasonably foreseeable, non-mineral-related actions that could contribute to cumulative impacts, such as recreational use, OHV use, and road construction, are presented and analyzed in the individual resource sections in Chapter 4, where the potential for a specific cumulative impact is identified.

2.6 PREFERRED ALTERNATIVE IDENTIFICATION

The CEQ regulations at 40 CFR 1502.14(e) and Department of Interior regulations at 43 CFR 46.425 direct that an EIS “identify the agency’s preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.” According to CEQ, the agency’s preferred alternative “is the alternative that the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors” (CEQ 1981:Question 4). BLM has not identified a preferred alternative in this DEIS and is soliciting public comments and input with respect to the identification of a preferred alternative. Based on a review of public comments, BLM will identify a preferred alternative in the Final EIS.

For actions presented in this EIS, the decision-maker is the Secretary of the Interior. The EIS is being prepared to objectively provide the decision-maker with a range of reasonable alternatives, each analyzed to a comparable level of detail. The preferred alternative could be any one of the alternatives presented in the Draft EIS, or some combination or minor variation of the alternatives presented. In accordance with NEPA [40 CFR 1502.9(1)], a preferred alternative within the spectrum of alternatives analyzed in the Draft EIS will not require supplementation (CEQ 1981:Question 29b).

2.7 COMPARISON OF ALTERNATIVES

Table 2.7-1 identifies the approximate number of acres of federal locatable mineral estate, by alternative and by proposed withdrawal parcel, that could be withdrawn for a period of 20 years from the location of new mining claims under the Mining Law. Table 2.7-2 identifies the locatable mineral exploration and development operating requirements by agency (i.e., BLM or Forest Service). Table 2.7-3 identifies the RFD-related activities that are anticipated under each alternative over 20 years.

2.8 IMPACT SUMMARY COMPARISON

Table 2.8-1 provides a comparison of the potential environmental effects of Alternatives A through D. A detailed description of the environmental effects is provided in Chapter 4.

Table 2.7-1. Federal Locatable Mineral Estate (Acres) Subject to Withdrawal by Alternative and by Parcel

Proposed Withdrawal Parcel	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn			
North	None	<u>Surface Ownership</u>		<u>Surface Ownership</u>			
		BLM	523,922	BLM	334,724	BLM	101,797
		FS*	7,919	FS	7,919	FS	7,919
		State	4,204	State	4,204	State	801
		Private	18,079	Private	9,249	Private	681
East	None	<u>Surface Ownership</u>		<u>Surface Ownership</u>			
		BLM	102,432	BLM	65,125	BLM	31,444
		FS	31,273	FS	24,359	FS	24,359
		State	0	State	0	State	0
		Private	749	Private	749	Private	429
South	None	<u>Surface Ownership</u>		<u>Surface Ownership</u>			
		BLM	0	BLM	0	BLM	0
		FS	321,157	FS	205,616	FS	132,764
		State	80	State	80	State	80
		Private	961	Private	961	Private	407
Total Acres of Federal Locatable Mineral Estate to Be Withdrawn:	None	<u>Surface Ownership</u>		<u>Surface Ownership</u>			
		BLM	626,354	BLM	399,849	BLM	133,241
		FS	360,349	FS	237,894	FS	165,042
		State	4,284	State	4,284	State	881
		Private	19,789	Private	10,959	Private	1,517
		Total:	1,010,776	Total:	652,986	Total:	300,681

Note: FS = Forest Service.

Table 2.7-2. Locatable Mineral Exploration and Mine Operating Requirements

Agency	Alternatives A through D
BLM	<p>Use and occupancy regulations at 43 CFR 3715; and surface management regulations at 43 CFR 3809. Major provisions include the following:</p> <ul style="list-style-type: none"> • Surface use must be reasonably incident to mining, prospecting, and milling operations. • If the area is withdrawn, the mining claims involved must have valid existing rights. • Exploration disturbing less than 5 acres can usually be conducted under a notice. • All mining requires an approved plan of operations involving NEPA analysis and public comment. • All activity must prevent unnecessary or undue degradation, which requires complying with applicable state and federal environmental protection laws; meeting the performance standards in the BLM regulations for the protection of air, cultural, water, and wildlife resources; and isolating and controlling toxic or deleterious materials. • Exploration- and development-related disturbance must be reclaimed in accordance with the reclamation plan. • All operators must provide the BLM with a financial guarantee covering the full cost of reclaiming the operation in accordance with the reclamation plan. • The BLM can inspect operations for compliance with the regulations and issue administrative enforcement orders in cases of noncompliance. <p>If a plan of operations meets the above requirements, it would be approved.</p>
Forest Service	<p>Surface management regulations at 36 CFR 228A. Major provisions include the following:</p> <ul style="list-style-type: none"> • Surface use must be reasonably incident to mining, prospecting, and milling operations. • If the area is withdrawn, the mining claims involved must have valid existing rights. • Operators proposing exploration or small-scale mining submit an NOI and may be allowed to conduct operations without a plan of operations if the proposed disturbance is not considered significant. • Mining operations entailing significant disturbance require an approved plan of operations involving NEPA analysis and public comment. • All activity must comply with applicable state and federal environmental protection laws; meeting the performance standards in the Forest Service regulations for the protection of air, cultural, water, and wildlife resources; and isolating and controlling toxic or deleterious materials. • Exploration- and development-related disturbance must be reclaimed in accordance with the reclamation plan. • All operators must provide the Forest Service with a reclamation bond covering the full cost of reclaiming the operation in accordance with the approved reclamation plan. • The Forest Service can inspect operations for compliance with the regulations and issue administrative enforcement orders in cases of noncompliance. <p>If a plan of operations meets the above requirements, it would be approved.</p>

Table 2.7-3. Reasonably Foreseeable Future Locatable Mineral Operations by Alternative (anticipated over 20 years)

Activity	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Predicted exploration projects				
North Parcel	504	10	94	290
East Parcel	56	0	28	28
South Parcel	168	1	85	113
<i>Subtotal</i>	<i>728</i>	<i>11</i>	<i>207</i>	<i>431</i>
Acres disturbed for exploration				
North Parcel	554	11	103	319
East Parcel	62	0	31	31
South Parcel	185	1	94	124
<i>Subtotal</i>	<i>801</i>	<i>12</i>	<i>228</i>	<i>474</i>

Table 2.7-3. Reasonably Foreseeable Future Locatable Mineral Operations by Alternative (anticipated over 20 years), Continued

Activity	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Predicted mining projects				
North Parcel	21	10	13	20
East Parcel	2	0	1	1
South Parcel	7	1	4	5
<i>Subtotal</i>	30	11	18	26
Acres disturbed for mining				
North Parcel	360	140	200	340
East Parcel	40	0	20	20
South Parcel	120	0	60	80
<i>Subtotal</i>	520	140	280	440
Number of ore haul trips required				
North Parcel	208,385	86,065	119,425	197,265
East Parcel	22,240	0	11,120	11,120
South Parcel	69,540	2,820	36,180	47,300
<i>Subtotal</i>	300,165	88,885	166,725	255,685
Miles of new power lines				
North Parcel	16.4	6.4	9.1	15.5
East Parcel	2.4	0	1.2	1.2
South Parcel	3.6	0	1.8	2.4
<i>Subtotal</i>	22.4	6.4	12.1	19.1
Miles of new roads for mine access				
North Parcel	16.4	6.4	9.1	15.5
East Parcel	2.4	0	1.2	1.2
South Parcel	3.6	0	1.8	2.4
<i>Subtotal</i>	22.4	6.4	12.1	19.1
Total acres disturbed for exploration and development over 20 years				
North Parcel	945	163	320	688
East Parcel	107	0	54	54
South Parcel	312	1	158	209
<i>Subtotal</i>	1,364	164	532	951
Water usage (mgal) over 20 years				
North Parcel	221	105	137	210
East Parcel	21	0	11	11
South Parcel	74	11	42	53
<i>Subtotal</i>	316	116	190	274

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Air Quality and Climate (4.2)				
Release of particulates	Over a 20-year period approximately 17,645 tons of PM ₁₀ and 2,532 tons of PM _{2.5} would be emitted to the atmosphere during mine operation activities. Emissions would be the greatest under this alternative.	Over a 20-year period approximately 6,786 tons of PM ₁₀ and 956 tons of PM _{2.5} would be emitted to the atmosphere. Emissions would be the least under this alternative.	Over a 20-year period approximately 10,160 tons of PM ₁₀ and 1,472 tons of PM _{2.5} would be emitted to the atmosphere.	Under Alternative D, over a 20-year period, approximately 15,514 tons of PM ₁₀ and 2,214 tons of PM _{2.5} would be emitted to the atmosphere.
Increase in regional haze	A more refined modeling analysis would be required to determine potential impacts on Grand Canyon National Park. Inconclusive	A more refined modeling analysis would be required to determine potential impacts on Grand Canyon National Park. Inconclusive	A more refined modeling analysis would be required to determine potential impacts on Grand Canyon National Park. Inconclusive	A more refined modeling analysis would be required to determine potential impacts on Grand Canyon National Park. Inconclusive
Geology and Mineral Resources (4.3)				
Change in underground geological conditions	Number of ore deposits mined: 30. <i>Underground geological impacts and associated effects on groundwater are not able to be determined without site-specific studies.</i> Potential for subsidence and alteration of geology or topography: <i>no change.</i>	Number of ore deposits mined: 11. <i>Underground geological impacts and associated effects on groundwater are not able to be determined without site-specific studies.</i> Potential for subsidence and alteration of geology or topography: <i>no change.</i>	Number of ore deposits mined: 18. <i>Underground geological impacts and associated effects on groundwater are not able to be determined without site-specific studies.</i> Potential for subsidence and alteration of geology or topography: <i>no change.</i>	Number of ore deposits mined: 26. <i>Underground geological impacts and associated effects on groundwater are not able to be determined without site-specific studies.</i> Potential for subsidence and alteration of geology or topography: <i>no change</i>
Availability of mineral resources	Approximately 33,155 tons U ₃ O ₈ mined over a 20-year time frame.	Approximately 4,147 tons U ₃ O ₈ mined over a 20-year time frame.	Approximately 14,647 tons U ₃ O ₈ mined over a 20-year time frame.	Approximately 26,647 tons U ₃ O ₈ mined over a 20-year time frame.
Water Resources (4.4)				
Perched aquifer springs quantity and quality of water	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Probability of impact: 13.2%.</i> <i>Potential impact: 5% to 20% estimated probability that a perched aquifer spring would have a mine located within its groundwater drainage area. This range of values generally indicates more than an 80% probability that any spring would not be impacted.</i> East Parcel: <i>Probability of impact: 1.3%.</i> <i>Potential impact: Between 0% and 5% estimated probability that a perched aquifer spring would have a mine located within its groundwater drainage area. This range of values indicates more than a 95% probability that any spring would not be impacted</i> South Parcel: <i>Probability of impact: 0.2 %.</i> <i>Potential impact: Between 0% and 5% estimated probability that a perched aquifer spring would have a mine located within its groundwater drainage area. This range of values indicates more than a 95% probability that any spring would not be impacted</i>	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Probability of impact: 5.4 %.</i> <i>Potential impact: 5% to 20% estimated probability that a perched aquifer spring would have a mine located within its groundwater drainage area. This range of values generally indicates more than an 80% probability that any spring would not be impacted.</i> East Parcel: <i>Probability of impact: 0%.</i> <i>Potential impact: No new mines would be located within the groundwater drainage areas that support perched aquifer springs and wells.</i> South Parcel: <i>Probability of impact: 0 %.</i> <i>Potential impact: No new mines would be located within the groundwater drainage areas that support perched aquifer springs and wells.</i>	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Probability of impact: 6.6%.</i> <i>Potential impact: 5% to 20% estimated probability that a perched aquifer spring would have a mine located within its groundwater drainage area. This range of values generally indicates more than an 80% probability that any spring would not be impacted.</i> East Parcel: <i>Probability of impact: 0%.</i> <i>Potential impact: No new mines would be located within the groundwater drainage areas that support perched aquifer springs and wells.</i> South Parcel: <i>Probability of impact: 0 %.</i> <i>Potential impact: No new mines would be located within the groundwater drainage areas that support perched aquifer springs and wells.</i>	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Probability of impact: 10.9%.</i> <i>Potential impact: 5% to 20% estimated probability that a perched aquifer spring would have a mine located within its groundwater drainage area. This range of values generally indicates more than an 80% probability that any spring would not be impacted.</i> East Parcel: <i>Probability of impact: 0%.</i> <i>Potential impact: No new mines would be located within the groundwater drainage areas that support perched aquifer springs and wells.</i> South Parcel: <i>Probability of impact: 0.3 %.</i> <i>Potential impact: Between 0% and 5% estimated probability that a perched aquifer spring would have a mine located within its groundwater drainage area. This range of values indicates more than a 95% probability that any spring would not be impacted</i>
Perched aquifer wells quantity and quality of water	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: Impacts could vary from no mines located where they may affect wells, to as many as 11. East Parcel: Impacts could vary from no mines located where they may affect wells, to 1. South Parcel: Impacts could vary from no mines located where they may affect wells, to as many as 4.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: Impacts could vary from no mines located where they may affect wells, to as many as 5. East Parcel: No mines located where they may affect wells. South Parcel: Impacts could vary from no mines located where they may affect wells, to 1.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: Impacts could vary from no mines located where they may affect wells, to as many as 7. East Parcel: Impacts could vary from no mines located where they may affect wells, to 1. South Parcel: Impacts could vary from no mines located where they may affect wells, to as many as 2.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: Impacts could vary from no mines located where they may affect wells, to as many as 10. East Parcel: Impacts could vary from no mines located where they may affect wells, to 1. South Parcel: Impacts could vary from no mines located where they may affect wells, to as many as 3.

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Water Resources, continued				
Deep aquifer springs quantity of flow	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%)</p> <p>East Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%)</p> <p>South Parcel: <i>For Havasu and Blue Springs</i>, the total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%) <i>For South Rim springs</i> The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be from 0% to more than 10% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (0% to more than 10%)</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%)</p> <p>East Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be 0% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (0%)</p> <p>South Parcel: <i>For Havasu Springs only</i>: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%) <i>For all other springs</i>: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be 0% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (0%)</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%)</p> <p>East Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%)</p> <p>South Parcel: <i>For Havasu Springs only</i>: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%) <i>For all other springs</i>: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be 0% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (0%)</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%)</p> <p>East Parcel: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (more than 0% to less than 5%)</p> <p>South Parcel: <i>For Havasu Springs only</i>: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be between 0% and 5% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. ((more than 0% to less than 5%) <i>For all other springs</i>: The total anticipated volume of water withdrawn from mine-related R-aquifer wells would be 0% of the estimated aggregate flow from R-aquifer springs located downgradient from mine production wells. (0%)</p>
Deep aquifer springs water quality	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: From no, to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels, but not drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at the Kanab and Showerbath spring complex.</p> <p>East Parcel: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels, but not drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at the Fence Fault spring complex.</p> <p>South Parcel: <i>For Havasu and Blue Springs</i>, From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels. <i>For South Rim springs</i>. From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels and drinking water standards (30 µg/L uranium or 10 µg/L arsenic).</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels, but not drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at the Kanab and Showerbath spring complex.</p> <p>East Parcel: No mines would contribute impacted water to the R-aquifer.</p> <p>South Parcel: <i>For Havasu Springs only</i>: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels. <i>For all other springs</i>: No mines would contribute impacted water to the R-aquifer.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels, but not drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at the Kanab and Showerbath spring complex.</p> <p>East Parcel: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels, but not drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at the Fence Fault spring complex.</p> <p>South Parcel: <i>For Havasu Springs only</i>: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels. <i>For all other springs</i>: No mines would contribute impacted water to the R-aquifer.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>North Parcel: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels, but not drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at the Kanab and Showerbath spring complex.</p> <p>East Parcel: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels, but not drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at the Fence Fault spring complex.</p> <p>South Parcel: <i>For Havasu Springs only</i>: From no to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels. <i>For all other springs</i>: No mines would contribute impacted water to the R-aquifer.</p>

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Water Resources, continued				
Deep aquifer wells water quantity, including Tusayan wells in South Parcel	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. East Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. South Parcel: Decrease in water levels in non-mine R-aquifer wells would be expected to range between 0 and 10 feet after 5 years of pumping any single mine well.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. East Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. South Parcel: Decrease in water levels in non-mine R-aquifer wells would be expected to range between 0 and 10 feet after 5 years of pumping any single mine well.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. East Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. South Parcel: Decrease in water levels in non-mine R-aquifer wells would be expected to range between 0 and 10 feet after 5 years of pumping any single mine well.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. East Parcel: No decrease in water levels in non-mine R-aquifer wells would occur, because no such wells are assumed to occur in the parcel. South Parcel: Decrease in water levels in non-mine R-aquifer wells would be expected to range between 0 and 10 feet after 5 years of pumping any single mine well.
Deep aquifer wells water quality, including Tusayan wells in South Parcel	Impact duration: <i>More than 5 years.</i> North Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. East Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. South Parcel: From none to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels and drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at non-mine R-aquifer wells.	Impact duration: <i>More than 5 years.</i> North Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. East Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. South Parcel: From none to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels and drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at non-mine R-aquifer wells.	Impact duration: <i>More than 5 years.</i> North Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. East Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. South Parcel: From none to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels and drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at non-mine R-aquifer wells.	Impact duration: <i>More than 5 years.</i> North Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. East Parcel: No mines would contribute impacted water to non-mine R-aquifer wells, because no such wells are assumed to occur in the parcel. South Parcel: From none to at least 1 mine might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic might exceed ambient levels and drinking water standards (30 µg/L uranium or 10 µg/L arsenic) at non-mine R-aquifer wells.
Surface water quantity	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Perennial Streams:</i> Reduction could range from undetectable where flow is supported by R-aquifer springs to large if supported by impacted perched aquifer springs, which have a probability of 13.2% of being impacted. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable, but where mining-related disturbances occur in or adjacent to areas of steep topography, changes might be detectable and extend beyond the immediate vicinity of disturbed areas. East Parcel: <i>Perennial Streams:</i> No perennial streams receive flow from R-aquifer springs except the Colorado River; see Resource Category/Issue for Colorado River water quantity and quality below. Reduction might be large if flow is supported by impacted perched aquifer springs, which have a probability of 1.3% of being impacted. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable, but where mining-related disturbances occur in or adjacent to areas of steep topography, changes might be detectable and extend beyond the immediate vicinity of disturbed areas. South Parcel: <i>Perennial Streams:</i> Reduction would not be expected to be detectable where flow is supported by Havasu and Blue Springs. Reduction would range from 0% to more than 10% where flow is supported by South Rim springs. Reduction might be large if flow is supported by impacted perched aquifer springs, which have a probability of 0.2% of being impacted. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable, but where mining-related disturbances occur in or adjacent to areas of steep topography, changes might be detectable and extend beyond the immediate vicinity of disturbed areas.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Perennial Streams:</i> Reduction could range from undetectable where flow is supported by R-aquifer springs to large if supported by impacted perched aquifer springs, which have a probability of 5.4% of being impacted. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable, but where mining-related disturbances occur in or adjacent to areas of steep topography, changes might be detectable and extend beyond the immediate vicinity of disturbed areas. East Parcel: No water quantity impacts to perched aquifer springs that support surface water flow, and no surface disturbance would occur as a result of mining-related activities. South Parcel: <i>Perennial Streams:</i> Where flow is supported by Havasu Springs, reduction would not be expected to be detectable. No reduction would occur where flow is supported by Blue Springs, South Rim springs, or perched aquifer springs. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Perennial Streams:</i> Reduction could range from undetectable where flow is supported by R-aquifer springs to large if supported by impacted perched aquifer springs, which have a probability of 6.6% of being impacted. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable, but where mining-related disturbances occur in or adjacent to areas of steep topography, changes might be detectable and extend beyond the immediate vicinity of disturbed areas. East Parcel: <i>Perennial Streams:</i> No perennial streams receive flow from R-aquifer springs except the Colorado River; see Resource Category/Issue for Colorado River water quantity and quality below. No reduction would occur where flow is supported by perched aquifer springs. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable. South Parcel: <i>Perennial Streams:</i> Where flow is supported by Havasu Springs, reduction would not be expected to be detectable. No reduction would occur where flow is supported by Blue Springs, South Rim springs, or perched aquifer springs. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: <i>Perennial Streams:</i> Reduction could range from undetectable where flow is supported by R-aquifer springs to large if supported by impacted perched aquifer springs, which have a probability of 10.9% of being impacted. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable, but where mining-related disturbances occur in or adjacent to areas of steep topography, changes might be detectable and extend beyond the immediate vicinity of disturbed areas. East Parcel: <i>Perennial Streams:</i> No perennial streams receive flow from R-aquifer springs except the Colorado River; see Resource Category/Issue for Colorado River water quantity and quality below. No reduction would occur where flow is supported by perched aquifer springs. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable. South Parcel: <i>Perennial Streams:</i> Where flow is supported by Havasu Springs, reduction would not be expected to be detectable. No reduction would occur where flow is supported by Blue Springs or South Rim springs. Reduction might be large if flow is supported by impacted perched aquifer springs, which have a probability of 0.3% of being impacted. <i>Ephemeral Streams:</i> Changes would generally not be expected to be detectable, but where mining-related disturbances occur in or adjacent to areas of steep topography, changes might be detectable and extend beyond the immediate vicinity of disturbed areas.

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Water Resources, continued				
Surface water quality, including surface water runoff from active mines	<p>Impact duration: 1 year to more than 5 years.</p> <p>North Parcel: <i>Perennial Streams:</i> Impacts could range from no change to changes that might result in exceedance of ambient levels where flow is supported by R-aquifer springs. Changes might be large if flow is supported by impacted perched aquifer springs, which have a probability of 13.2% of being impacted.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels; where mining-related disturbances occur in or adjacent to areas of steep topography, such changes might extend beyond the immediate vicinity of disturbed areas.</p> <p>East Parcel: <i>Perennial Streams:</i> No perennial streams receive flow from R-aquifer springs except the Colorado River; see Resource Category/Issue for Colorado River water quantity and quality below. Changes might be large if flow is supported by impacted perched aquifer springs, which have a probability of 1.3% of being impacted.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels; where mining-related disturbances occur in or adjacent to areas of steep topography, such changes might extend beyond the immediate vicinity of disturbed areas.</p> <p>South Parcel: <i>Perennial Streams:</i> Where flow is supported by Havasu and Blue Springs, impacts could range from no change to changes that would not be expected to result in exceedance of ambient levels. Where flow is supported by South Rim springs, changes could range from no change to changes that might result in exceedance of drinking water standards. Changes might be large if flow is supported by impacted perched aquifer springs, which have a probability of 0.2% of being impacted.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels; where mining-related disturbances occur in or adjacent to areas of steep topography, such changes might extend beyond the immediate vicinity of disturbed areas.</p>	<p>Impact duration: 1 year to more than 5 years.</p> <p>North Parcel: <i>Perennial Streams:</i> Impacts could range from no change to changes that might result in exceedance of ambient levels where flow is supported by R-aquifer springs. Changes might be large if flow is supported by impacted perched aquifer springs, which have a probability of 5.4% of being impacted.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels; where mining-related disturbances occur in or adjacent to areas of steep topography, such changes might extend beyond the immediate vicinity of disturbed areas.</p> <p>East Parcel: No water quality impacts to perched aquifer or R-aquifer springs that support surface water flow, and no surface disturbance would occur as a result of mining-related activities.</p> <p>South Parcel: <i>Perennial Streams:</i> Where flow is supported by Havasu Springs, impacts could range from no change to changes that would not be expected to result in exceedance of ambient levels. No changes would occur where flow is supported by Blue Springs, South Rim springs, or perched aquifer springs.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels.</p>	<p>Impact duration: 1 year to more than 5 years.</p> <p>North Parcel: <i>Perennial Streams:</i> Impacts could range from no change to changes that might result in exceedance of ambient levels where flow is supported by R-aquifer springs. Changes might be large if flow is supported by impacted perched aquifer springs, which have a probability of 6.6% of being impacted.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels; where mining-related disturbances occur in or adjacent to areas of steep topography, such changes might extend beyond the immediate vicinity of disturbed areas.</p> <p>East Parcel: <i>Perennial Streams:</i> No perennial streams receive flow from R-aquifer springs except the Colorado River; see Resource Category/Issue for Colorado River water quantity and quality below. No changes would occur where flow is supported by perched aquifer springs.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels.</p> <p>South Parcel: <i>Perennial Streams:</i> Where flow is supported by Havasu Springs, impacts could range from no change to changes that would not be expected to result in exceedance of ambient levels. No changes would occur where flow is supported by Blue Springs, South Rim springs, or perched aquifer springs.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels.</p>	<p>Impact duration: 1 year to more than 5 years.</p> <p>North Parcel: <i>Perennial Streams:</i> Impacts could range from no change to changes that might result in exceedance of ambient levels where flow is supported by R-aquifer springs. Changes might be large if flow is supported by impacted perched aquifer springs, which have a probability of 10.9% of being impacted.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels; where mining-related disturbances occur in or adjacent to areas of steep topography, such changes might extend beyond the immediate vicinity of disturbed areas.</p> <p>East Parcel: <i>Perennial Streams:</i> No perennial streams receive flow from R-aquifer springs except the Colorado River; see Resource Category/Issue for Colorado River water quantity and quality below. No changes would occur where flow is supported by perched aquifer springs.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels.</p> <p>South Parcel: <i>Perennial Streams:</i> Where flow is supported by Havasu Springs, impacts could range from no change to changes that would not be expected to result in exceedance of ambient levels. No changes would occur where flow is supported by Blue Springs or South Rim springs. Changes might be large if flow is supported by impacted perched aquifer springs, which have a probability of 0.3% of being impacted.</p> <p><i>Ephemeral Streams:</i> Changes would not be expected to result in exceedance of ambient levels; where mining-related disturbances occur in or adjacent to areas of steep topography, such changes might extend beyond the immediate vicinity of disturbed areas.</p>
Surface water stream function	<p>Impact duration: 1 year to more than 5 years.</p> <p>All three parcels: Changes in runoff and sediment loads would generally not be expected to result in adverse impacts stream morphology and function, but where mining-related disturbances occur in or adjacent to areas of steep topography, small changes in morphology and function might extend beyond the immediate vicinity of disturbed areas.</p>	<p>Impact duration: 1 year to more than 5 years.</p> <p>North Parcel: Changes in runoff and sediment loads would generally not be expected to result in adverse impacts stream morphology and function, but where mining-related disturbances occur in or adjacent to areas of steep topography, small changes in morphology and function might extend beyond the immediate vicinity of disturbed areas.</p> <p>East Parcel: No surface disturbance would occur as a result of mining-related activities.</p> <p>South Parcel: Changes in runoff and sediment loads would generally not be expected to result in adverse impacts stream morphology and function.</p>	<p>Impact duration: 1 year to more than 5 years.</p> <p>North Parcel: Changes in runoff and sediment loads would generally not be expected to result in adverse impacts stream morphology and function, but where mining-related disturbances occur in or adjacent to areas of steep topography, small changes in morphology and function might extend beyond the immediate vicinity of disturbed areas.</p> <p>East and South Parcels: Changes in runoff and sediment loads would generally not be expected to result in adverse impacts stream morphology and function.</p>	<p>Impact duration: 1 year to more than 5 years.</p> <p>North and South Parcels: Changes in runoff and sediment loads would generally not be expected to result in adverse impacts stream morphology and function, but where mining-related disturbances occur in or adjacent to areas of steep topography, small changes in morphology and function might extend beyond the immediate vicinity of disturbed areas.</p> <p>East Parcel: Changes in runoff and sediment loads would generally not be expected to result in adverse impacts stream morphology and function.</p>

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Water Resources, continued				
Virgin River water quantity and quality	Impact duration: <i>More than 5 years.</i> North Parcel: Water quantity impacts could vary from none to a reduction of less than 0.5% of the estimated aggregate flow from R-aquifer springs located along the Virgin River in northwest Arizona. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.	Impact duration: <i>More than 5 years.</i> North Parcel: Water quantity impacts could vary from none to a reduction of less than 0.5% of the estimated aggregate flow from R-aquifer springs located along the Virgin River in northwest Arizona. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.	Impact duration: <i>More than 5 years.</i> North Parcel: Water quantity impacts could vary from none to a reduction of less than 0.5% of the estimated aggregate flow from R-aquifer springs located along the Virgin River in northwest Arizona. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.	Impact duration: <i>More than 5 years.</i> North Parcel: Water quantity impacts could vary from none to a reduction of less than 0.5% of the estimated aggregate flow from R-aquifer springs located along the Virgin River in northwest Arizona. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.
Colorado River water quantity and quality	Impact duration: <i>1 year to more than 5 years.</i> All parcels: Water quantity impacts could vary between 0% and 0.002% of the average minimum flow in the Colorado River. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.	Impact duration: <i>1 year to more than 5 years.</i> North Parcel: Water quantity impacts could vary between 0% and 0.002% of the average minimum flow in the Colorado River. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels. East Parcel: <i>no impact.</i> No water quantity or water quality impacts to perched or R-aquifer springs that support surface water flow, and no surface disturbance would occur as a result of mining activities. South Parcel: Water quantity impacts could vary between 0% and 0.002% of the average minimum flow in the Colorado River. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.	Impact duration: <i>1 year to more than 5 years.</i> All parcels: Water quantity impacts could vary between 0% and 0.002% of the average minimum flow in the Colorado River. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.	Impact duration: <i>1 year to more than 5 years.</i> All parcels: Water quantity impacts could vary between 0% and 0.002% of the average minimum flow in the Colorado River. Water quality impacts could vary from no mine to at least one mine which might contribute impacted water to the R-aquifer. If any impact would occur, the resultant concentration of uranium or arsenic would not be expected to exceed estimated ambient levels.
Soil Resources (4.5)				
Disturbance of soil resources	Impact duration: <i>More than 5 years all three parcels.</i> Disturbance acreage: North Parcel, 945 acres; East Parcel, 107 acres; and South Parcel, 312 acres. Disturbance relative to respective parcel area: $\leq 0.17\%$.	Impact duration: <i>More than 5 years North and South Parcels, No impact East Parcel.</i> Disturbance acreage: North Parcel, 163 acres; East Parcel, 0 acres; and South Parcel, 1 acre. Disturbance relative to respective parcel area: $\leq 0.03\%$.	Impact duration: <i>More than 5 years all three parcels.</i> Disturbance acreage: North Parcel, 320 acres; East Parcel, 54 acres; and South Parcel, 158 acres. Disturbance relative to respective parcel area: $\leq 0.06\%$.	Impact duration: <i>More than 5 years all three parcels</i> Disturbance acreage: North Parcel, 668 acres; East Parcel, 54 acres; and South Parcel, 209 acres. Disturbance relative to respective parcel area: $\leq 0.12\%$.
Loss of soil productivity	Area of disturbance: Impact duration: <i>More than 5 years</i> Anticipated soil disturbance in each proposed withdrawal parcel would be less than 1% of the parcel area. Potential for increased erosion: <i>All three parcels</i> Impact duration: <i>1 to 5 years.</i> Where soils are sensitive to erosion, increased erosion and sedimentation could range from being limited to the immediate vicinity of roadways, power lines, drill sites, and mines, to possibly extending beyond the immediate vicinity of these disturbances.	Area of disturbance: Impact duration: <i>1 to 5 years.</i> Anticipated soil disturbance in each proposed withdrawal parcel would vary from none to less than 1% of the parcel area. Potential for increased erosion: Impact duration: <i>1 to 5 years.</i> North Parcel: Where soils are sensitive to erosion, increased erosion and sedimentation could range from being limited to the immediate vicinity of roadways, power lines, drill sites, and mines, to possibly extending beyond the immediate vicinity of these disturbances. East Parcel: Soil erosion would be at the regional baseline soil loss rate. South Parcel: Increased erosion and sedimentation would be expected to be limited to the immediate vicinity of roadways, power lines, drill sites, and mine sites.	Area of disturbance: Impact duration: <i>More than 5 years</i> Anticipated soil disturbance in each proposed withdrawal parcel would be less than 1% of the parcel area. Potential for increased erosion: Impact duration: <i>1 to 5 years.</i> North Parcel: Where soils are sensitive to erosion, increased erosion and sedimentation could range from being limited to the immediate vicinity of roadways, power lines, drill sites, and mines, to possibly extending beyond the immediate vicinity of these disturbances. East and South Parcels: Increased erosion and sedimentation would be expected to be limited to the immediate vicinity of roadways, power lines, drill sites, and mine sites.	Area of disturbance: Impact duration: <i>More than 5 years</i> Anticipated soil disturbance in each proposed withdrawal parcel would be less than 1% of the parcel area. Potential for increased erosion: Impact duration: <i>1 to 5 years.</i> North and South Parcels: Where soils are sensitive to erosion, increased erosion and sedimentation could range from being limited to the immediate vicinity of roadways, power lines, drill sites, and mines, to possibly extending beyond the immediate vicinity of these disturbances. East Parcel: Increased erosion and sedimentation would be expected to be limited to the immediate vicinity of roadways, power lines, drill sites, and mine sites. Increased sensitivity to wind erosion in some areas might result in substantially increased rates of erosion if disturbance occurs in those areas.

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Soil Resources, continued				
Soil contamination	<p>Potential for constituent distribution: Impact duration: <i>More than 5 years for all three parcels.</i></p> <p>Impacts at 30 mine sites (21 in North Parcel, 2 in the East Parcel, and 7 in the South Parcel) could range from: Concentrations of uranium and arsenic in soil would be expected to be at or above regional background levels off site, but generally at or below applicable remediation standards; levels exceeding standards would be expected to be limited to the immediate vicinity of mine sites; To: Concentrations of uranium and arsenic in soil might be generally at or above applicable remediation standards off site; such concentrations might extend beyond the immediate vicinity of mine sites.</p>	<p>Potential for constituent distribution: Impact duration: <i>More than 5 years</i></p> <p>North Parcel: Impacts at 10 mine sites could range from: Concentrations of uranium and arsenic in soil would be expected to be at or above regional background levels off site, but generally at or below applicable remediation standards; levels exceeding standards would be expected to be limited to the immediate vicinity of mine sites; To: Concentrations of uranium and arsenic in soil might be generally at or above applicable remediation standards off site; such concentrations might extend beyond the immediate vicinity of mine sites.</p> <p>East Parcel: Impacts at 0 mine sites would be: Levels of contaminants in soil would be expected to be at background levels.</p> <p>South Parcel: Impacts at 1 mine site would be: Concentrations of uranium and arsenic in soil would be expected to be at or above regional background levels off site, but generally at or below applicable remediation standards; levels exceeding standards would be expected to be limited to the immediate vicinity of mine sites.</p>	<p>Potential for constituent distribution: Impact duration: <i>More than 5 years</i></p> <p>North Parcel: Impacts at 13 mine sites could range from: Concentrations of uranium and arsenic in soil expected to be at or above regional background levels off site, but generally at or below applicable remediation standards; levels exceeding standards would be expected to be limited to the immediate vicinity of mine sites; To: Concentrations of uranium and arsenic in soil might be generally at or above applicable remediation standards off site; such concentrations might extend beyond the immediate vicinity of mine sites.</p> <p>East Parcel and South Parcels: Impacts at 1 mine site in the East Parcel and 4 mine sites in the South Parcel would be: Concentrations of uranium and arsenic in soil would be expected to be at or above regional background levels off site, but generally at or below applicable remediation standards; levels exceeding standards would be expected to be limited to the immediate vicinity of mine sites.</p>	<p>Potential for constituent distribution: Impact duration: <i>More than 5 years</i></p> <p>North and South Parcels: Impacts at 20 mine sites in the North Parcel and 5 mine sites in the South Parcel could range from: Concentrations of uranium and arsenic in soil expected to be at or above regional background levels off site, but generally at or below applicable remediation standards; levels exceeding standards would be expected to be limited to the immediate vicinity of mine sites; To: Concentrations of uranium and arsenic in soil might be generally at or above applicable remediation standards off site; such concentrations might extend beyond the immediate vicinity of mine sites.</p> <p>East Parcel: Impacts at 1 mine site in the East Parcel would be: Concentrations of uranium and arsenic in soil would be expected to be at or above regional background levels off site, but generally at or below applicable remediation standards; levels exceeding standards would be expected to be limited to the immediate vicinity of mine sites.</p>
Vegetation Resources (4.6)				
Disturbance of vegetation	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on vegetation are possible depending on the location of mine facilities. Impacts could vary from changes in overall density and diversity of vegetation resources not being measurable or apparent to being measurable but not apparent. Impacts to density and diversity of aquatic and terrestrial habitats could be measurable but not apparent. Estimated acres of disturbance: 1,432</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts to vegetation are expected to not be measurable or apparent Impacts on density and diversity of aquatic and terrestrial habitats are not anticipated to be measurable or apparent. Acres disturbed represent an approximate 88% decrease from Alternative A. Estimated acres of disturbance: 203</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts to vegetation are expected to not be measurable or apparent. Impacts on density and diversity of aquatic and terrestrial habitats are not anticipated to be measurable or apparent. Acres disturbed represent an approximate 61% decrease from Alternative A. Estimated acres of disturbance: 604</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on vegetation are possible depending on the location of mine facilities. Impacts could vary from changes in overall density and diversity of vegetation resources not being measurable or apparent to being measurable but not apparent. Impacts to density and diversity of aquatic and terrestrial habitats could be measurable but not apparent. Acres disturbed represent an approximate 30% decrease from Alternative A. Estimated acres of disturbance: 1,065</p>
Vegetation productivity	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on the productivity of aquatic and terrestrial habitats are expected to not be measurable or apparent; Indirect impacts on wildlife and soil stability are not anticipated to be measurable or apparent.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on the productivity of aquatic and terrestrial habitats are expected to not be measurable or apparent; Indirect impacts on wildlife and soil stability are not anticipated to be measurable or apparent.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on the productivity of aquatic and terrestrial habitats are expected to not be measurable or apparent; Indirect impacts on wildlife and soil stability are not anticipated to be measurable or apparent.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on the productivity of aquatic and terrestrial habitats are expected to not be measurable or apparent; Indirect impacts on wildlife and soil stability are not anticipated to be measurable or apparent.</p>
Fish and Wildlife Resources (4.7)				
Wildlife habitat (aquatic and terrestrial habitats)	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on aquatic and terrestrial habitats are anticipated and would depend on the location of mines. Overall water quality and quantity impacts on area seeps, springs, and other water bodies could vary from not being measurable or apparent to measurable and apparent.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts are anticipated on aquatic and terrestrial habitats and on overall water quality and quantity impacts of area seeps, springs, and other water bodies. These impacts are not anticipated to be measurable or apparent. Acres disturbed represents an approximate 88% decrease from Alternative A.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts are anticipated on aquatic and terrestrial habitats and on overall water quality and quantity impacts of area seeps, springs, and other water bodies. These impacts are not anticipated to be measurable or apparent. Acres disturbed represents an approximate 61% decrease from Alternative A.</p>	<p>Impact duration: <i>More than 5 years.</i></p> <p>Impacts on aquatic and terrestrial habitats are anticipated and depend on the location of mines. Overall water quality and quantity impacts of area seeps, springs, and other water bodies are anticipated to be measurable but not apparent. Acres disturbed represents an approximate 30% decrease from Alternative A.</p>

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Fish and Wildlife Resources, continued				
Chemical and radiation impacts	Impact duration: <i>More than 5 years.</i> Uranium and its decay constituents may impact individual animals (including possible mortality); impacts are not anticipated to alter overall fish and wildlife populations.	Impact duration: <i>More than 5 years.</i> Impacts in the vicinity of sensitive aquatic and terrestrial habitats, such as Kanab Creek Canyon, are afforded greater protection under Alternative B than under Alternative A. Increases may impact individuals (including possible mortality); impacts are not anticipated to alter overall fish and wildlife populations.	Impact duration: <i>More than 5 years.</i> Alternative C affords greater protection than Alternative A. Reductions in aquatic and terrestrial habitat quality and quantity may impact individuals (including possible mortality); impacts are not anticipated to alter overall fish and wildlife populations.	Impact duration: <i>More than 5 years.</i> Impacts are anticipated to be reduced in the vicinity of sensitive aquatic and terrestrial habitats, such as Kanab Creek, Alternative D affords greater protection than Alternative A. Reductions in aquatic and terrestrial habitat quality and quantity may impact individuals (including possible mortality); however, impacts are not anticipated to alter overall fish and wildlife populations.
Habitat fragmentation	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat are anticipated. Magnitude would depend on the location of mines and on the magnitude of water quality and quantity impacts on area seeps, springs, and other water bodies due to mining. Increased fragmentation may impact individuals (including possible mortality); impacts are not anticipated to alter overall fish and wildlife populations.	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat are anticipated. Magnitude would depend on the location of mines and on the magnitude of water quality and quantity impacts on area seeps, springs, and other water bodies due to mining. Impacts near sensitive aquatic and terrestrial habitats, such as Kanab Creek, are afforded greater protection under Alternative B than Alternative A. Increased fragmentation may impact individuals (including possible mortality); impacts would not be measurable or apparent and are not anticipated to alter overall fish and wildlife populations.	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat are anticipated that would be neither measurable nor apparent; the magnitude of specific impacts would depend on the location of mines and overall water quality and quantity impacts on area seeps, springs, and other water bodies. Impacts are anticipated to be reduced near sensitive aquatic and terrestrial habitats, such as Kanab Creek, Alternative C affords greater protection than Alternative A. Increased fragmentation may impact individuals (including possible mortality); impacts are not anticipated to alter overall fish and wildlife populations.	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat are anticipated that would be neither measurable nor apparent; the magnitude of specific impacts would depend on the location of mines and overall water quality and quantity impacts on area seeps, springs, and other water bodies. Impacts are anticipated to be reduced near sensitive aquatic and terrestrial habitats, such as Kanab Creek, Alternative C affords greater protection than Alternative A. Increased fragmentation may impact individuals (including possible mortality); impacts are not anticipated to alter overall fish and wildlife populations.
Special Status Species (4.8)				
Special status species habitat (aquatic and terrestrial habitats)	Impact duration: <i>More than 5 years.</i> Magnitude would depend on the location of mines and on the magnitude of water quality and quantity impacts on area seeps, springs, and other water bodies due to mining. Impacts to habitats could vary from effects to individual animals and effects to habitat that are neither measurable nor detectable, to having effect on individuals and have the potential to be both measurable and apparent.	Impact duration: <i>More than 5 years.</i> Impacts on both aquatic and terrestrial habitats and impacts on water quality and quantity of seeps, springs, and other water bodies are anticipated; however, these impacts are not anticipated to be measurable or apparent. Acres disturbed represents an 88% decrease, compared with Alternative A.	Impact duration: <i>More than 5 years.</i> Impacts on both aquatic and terrestrial habitats are anticipated; the magnitude of specific impacts would depend on the location of mines and overall water quality and quantity impacts on area seeps, springs, and other water bodies. However, these impacts are not anticipated to be measurable or apparent. Acres disturbed represents a 61% decrease compared with Alternative A.	Impact duration: <i>More than 5 years.</i> Impacts on both aquatic and terrestrial habitats are anticipated; the magnitude of specific impacts would depend on the location of mines and overall water quality and quantity impacts on area seeps, springs, and other water bodies; however, these impacts are anticipated to be measurable but not apparent. Acres disturbed represents a 30% decrease compared with Alternative A.
Chemical and radiation impacts	Impact duration: <i>More than 5 years.</i> Increases in the level of uranium and its decay constituents in water and soil are anticipated that would be neither measurable nor apparent. Increases may impact individuals (including possible mortality); however, impacts are not anticipated to alter special status species populations.	Impact duration: <i>More than 5 years.</i> Increases in the level of uranium and its decay constituents in water and soils are anticipated that would be neither measurable nor apparent. Increases may impact individuals (including possible mortality); however, impacts are not anticipated to alter special status species populations. Impacts near sensitive aquatic and terrestrial habitats, such as Kanab Creek, are afforded greater protection under Alternative B than Alternative A.	Impact duration: <i>More than 5 years.</i> Increases in the level of uranium and its decay constituents in water and soils are anticipated that would be neither measurable nor apparent. Increases may impact individuals (including possible mortality); however, impacts are not anticipated to alter special status species populations. Because approximately 2/3 of the proposed withdrawal area would be withdrawn, impacts are anticipated to be reduced near sensitive aquatic and terrestrial habitats, such as Kanab Creek, Alternative C affords greater protection than Alternative A.	Impact duration: <i>More than 5 years.</i> Increases in the level of uranium and its decay constituents in water and soils are anticipated that would be neither measurable nor apparent. Increases may impact individuals (including possible mortality); however, impacts are not anticipated to alter special status species populations. Because approximately 1/3 of the proposed withdrawal area would be withdrawn, impacts are anticipated to be reduced near sensitive aquatic and terrestrial habitats, such as Kanab Creek, Alternative D affords greater protection than Alternative A.
Habitat fragmentation	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat (acres) are anticipated that would be neither measurable nor apparent; the magnitude of specific impacts would depend on the location of a mine and overall water quality and quantity impacts on area seeps, springs, and other water bodies. Increased fragmentation may impact individuals (including possible mortality); however, impacts are not anticipated to alter populations of special status fish and wildlife species.	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat are anticipated that would be neither measurable nor apparent; the magnitude of specific impacts would depend on the location of the mines and overall water quality and quantity impacts on area seeps, springs, and other water bodies. Impacts near sensitive aquatic and terrestrial habitats, such as Kanab Creek are afforded greater protection under Alternative B than Alternative A. Increased fragmentation may impact individuals (including possible mortality); however, impacts are not anticipated to alter populations of special status fish and wildlife species.	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat are anticipated that would be neither measurable nor apparent; the magnitude of specific impacts would depend on the location of mines and overall water quality and quantity impacts on area seeps, springs, and other water bodies. Impacts are anticipated to be reduced near sensitive aquatic and terrestrial habitats, such as Kanab Creek, Alternative C affords greater protection than Alternative A. Increased fragmentation may impact individuals (including possible mortality); impacts are not anticipated to alter populations of special status fish and wildlife species.	Impact duration: <i>More than 5 years.</i> Impacts on unfragmented habitat (acres) are anticipated that would be neither measurable nor apparent; the magnitude of specific impacts would depend on the location of mines and overall water quality and quantity impacts on area seeps, springs, and other water bodies. Impacts are anticipated to be reduced near sensitive aquatic and terrestrial habitats, such as Kanab Creek, Alternative D affords greater protection than Alternative A. Increased fragmentation may impact individuals (including possible mortality); however, impacts are not anticipated to alter populations of special status fish and wildlife species.

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Visual Resources (4.9)				
Conformance with BLM Visual Resource Management class objectives	Impact duration: <i>More than 5 years.</i> No withdrawal of sensitive visual designations: Class I, Class II, Preservation, High. Degrees of contrast and impact vary and are specific to each project and from each viewpoint. Impacts could vary from: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer To: Project-related impacts would create a high degree of change within the existing landscape, would dominate the view, and would be a focus of viewer attention (this will be reduced upon completion of reclamation).	Impact duration: <i>More than 5 years.</i> Withdrawal of all sensitive visual designations: Class I, Class II, Preservation, High. Would not produce obvious changes in landscape contrasts.	Impact duration: <i>More than 5 years.</i> Withdrawal of approximately 88% of sensitive visual designations: Class I, Class II, Preservation, High. Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer.	Impact duration: <i>More than 5 years.</i> Withdrawal of approximately 53% of sensitive visual designations: Class I, Class II, Preservation, High. Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer.
Conformance with Forest Service visual objectives	Impact duration: <i>From 1 to more than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. Impacts could vary: From: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer To: Project-related impacts would create a high degree of change within the existing landscape, would dominate the view, and would be a focus of viewer attention (this will be reduced upon completion of reclamation).	Impact duration: <i>From less than 1 year to more than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. Impacts could vary: From: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer. To: Visual impacts that would partially retain the existing character of the landscape, and while attracting the attention of the casual viewer, would not dominate the view.	Impact duration: <i>From less than 1 year to more than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. Impacts could vary: From: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer. To: Visual impacts that would partially retain the existing character of the landscape, and while attracting the attention of the casual viewer, would not dominate the view.	Impact duration: <i>From 1 to more than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. From: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer. To: Project-related impacts would create a high degree of change within the existing landscape, would dominate the view, and would be a focus of viewer attention (this will be reduced upon completion of reclamation).
Conformance with Park visual objectives from key observation points	Impact duration: <i>More than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. Impacts could vary: From: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer. To: Visual impacts that would partially retain the existing character of the landscape, and while attracting the attention of the casual viewer, would not dominate the view.	Impact duration: <i>More than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. Impacts could vary: From: Would not produce obvious changes in landscape contrasts. To: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer.	Impact duration: <i>More than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer.	Impact duration: <i>More than 5 years.</i> Degrees of contrast and impact vary and are specific to each viewpoint. Impacts could vary: From: Project-related visual impacts would retain the existing character of the landscape, create a low level of change, and while visible, would not attract the attention of the casual viewer. To: Visual impacts that would partially retain the existing character of the landscape, and while attracting the attention of the casual viewer, would not dominate the view.
Changes in night sky	Impact duration: <i>More than 5 years.</i> Given the quality of the dark night skies in the area, minimal increases in night lighting could impact the areas night skies. With mitigation, impacts to the area's night sky would be minimal. Impacts could occur to casual observers in the vicinity of the mines and exploration sites, persons traveling along area roads at night, and recreationists camping in the area.	Impact duration: <i>More than 5 years.</i> Reduction in projected mining and associated activities as compared to Alternative A would result in decreased visual impacts to the night sky.	Impact duration: <i>More than 5 years.</i> Reduction in projected mining and associated activities as compared to Alternative A would result in decreased visual impacts to the night sky.	Impact duration: <i>More than 5 years.</i> There is some reduction in projected mining and associated activities as compared to Alternative A that would result in some decreased visual impacts to the night sky.
Soundscapes (4.10)				
Noise disruption from exploration or development activity	Impacts to soundscapes are dependent on mine and haul road locations. If mines or roads are near sensitive areas such as wilderness or Grand Canyon National Park would have a greater impact than those farther away. Sounds from mines and haul roads could be above ambient noise levels within 1.5 miles if unattenuated by vegetation or terrain.	Impacts to soundscapes are dependent on mine and haul road locations. If they are near sensitive areas such as wilderness or Grand Canyon National Park would have a greater impact than those farther away. Sounds from mines and haul roads could be above ambient noise levels within 1.5 miles if unattenuated by vegetation or terrain.	Impacts to soundscapes are dependent on mine and haul road locations. If they are near sensitive areas such as wilderness or Grand Canyon National Park would have a greater impact than those farther away. Sounds from mines and haul roads could be above ambient noise levels within 1.5 miles if unattenuated by vegetation or terrain.	Impacts to soundscapes are dependent on mine and haul road locations. If they are near sensitive areas such as wilderness or Grand Canyon National Park would have a greater impact than those farther away. Sounds from mines and haul roads could be above ambient noise levels within 1.5 miles if unattenuated by vegetation or terrain.

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Cultural Resources (4.11)				
Disturbance of historic and prehistoric sites	<p>Impact duration: <i>Exceeds 5 years</i></p> <p>2,655 known sites, as well as undiscovered sites, are located in areas subject to direct and indirect impacts from three existing mines and a projected number of 26 new mines and 728 exploration projects that would disturb 1,364 acres. Assessment of impacts would require site-specific analysis.</p> <p>Direct impacts would be mitigated through established regulations and procedures of avoidance and mitigation. Impacts could result in loss of NRHP eligibility. If avoidance is not possible.</p> <p>Visual and auditory (indirect): Impact duration: From 1 to 5 years in most cases though selected resources eligible for the NRHP under criterion A could lose integrity depending on the extent of alteration of the setting.</p>	<p>Impact duration: <i>Exceeds 5 years</i></p> <p>2,655 known sites are in areas withdrawn from new mining claims and exploration. Sites would be subject to direct and indirect impacts limited to development of valid existing claims. Projected development includes 11 new mines and 11 exploration projects that would disturb 164 acres.</p> <p>Impacts would be largely in the North Parcel, with no new mining or exploration in the East Parcel and a single mine in the South Parcel. Assessment of impacts would require site-specific analysis.</p> <p>Direct adverse impacts would be mitigated through established regulations and procedures of avoidance and mitigation. Impacts could result in loss of NRHP eligibility. If avoidance is not possible.</p> <p>Visual and auditory (indirect): Impact duration: From 1 to 5 years in most cases though selected resources eligible for the NRHP under criterion A could lose integrity depending on the extent of alteration of the setting.</p>	<p>Impact duration: <i>Exceeds 5 years</i></p> <p>2,018 known sites in the proposed withdrawal area would be subject to direct and indirect impacts limited to development of valid existing claims. 637 sites outside the withdrawn areas would also be subject to impacts from new exploration activities, claims, and mines. Projected development includes 18 mines and 207 exploration projects that would disturb 532 acres.</p> <p>The proposed withdrawn areas include zones known to have high densities of important cultural resources. Assessment of impacts would require site-specific analysis.</p> <p>Direct adverse impacts would be mitigated through established regulations and procedures of avoidance and mitigation. Impacts could result in loss of NRHP eligibility. If avoidance is not possible.</p> <p>Visual and auditory (indirect): Impact duration: From 1 to 5 years in most cases though selected resources eligible for the NRHP under criterion A could lose integrity depending on the extent of alteration of the setting.</p>	<p>Impact duration: <i>Exceeds 5 years</i></p> <p>1,230 known sites in the proposed withdrawal area would be subject to direct and indirect impacts limited to development of valid existing claims. 1,425 sites outside the withdrawn areas would also be subject to impacts from new exploration activities, claims, and mines. Projected development includes 26 mines and 431 exploration projects that would disturb 951 acres.</p> <p>Assessment of impacts would require site-specific analysis.</p> <p>Direct adverse impacts would be mitigated through established regulations and procedures of avoidance and mitigation. Impacts could result in loss of NRHP eligibility. If avoidance is not possible.</p> <p>Visual and auditory (indirect): Impact duration: From 1 to 5 years in most cases though selected resources eligible for the NRHP under criterion A could lose integrity depending on the extent of alteration of the setting.</p>
American Indian Resources (4.12)				
<p>Effect on Known Traditional Cultural Properties (TCP)</p> <p>Disturbance of places of traditional cultural practices and uses</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts would result in loss of resource and/or functional use of resource such as Red Butte and other traditional cultural properties.</p> <p>Types of known resources in project area: landscapes, trails, springs, creeks, ceremonial sites, traditional territories, ranges and use areas, resource procurement areas, and camps.</p> <p><i>All three parcels:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource. <i>Long-term direct impacts</i></p> <p><i>Visual and auditory (indirect) impacts:</i> Impact duration: <i>1 to 5 years</i></p> <p>Project-related impacts would occur but resources would retain existing characteristics vital to their cultural functions and uses by American Indians. <i>Short-term</i></p> <p><i>Visual impacts from power lines:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Would avoid adverse effects to Red Butte and other traditional cultural properties.</p> <p>Types of known resources in the proposed withdrawal area: landscapes, trails, springs, creeks, ceremonial sites, traditional territories, ranges and use areas, resource procurement areas, and camps.</p> <p><i>North Parcel primarily in area along Kanab Creek.</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource. <i>Long-term direct impacts.</i></p> <p><i>East Parcel:</i> Would avoid resource.</p> <p><i>South Parcel:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts would occur but resources would retain existing characteristics vital to their cultural functions and uses by American Indians.</p> <p><i>Visual and auditory (indirect) impacts on North and South parcels:</i> Impact duration: <i>1 to 5 years</i></p> <p>Project-related impacts would occur but resources would retain existing characteristics vital to their cultural functions and uses by American Indians.</p> <p><i>Visual impacts from power lines on North and South parcels:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Would avoid adverse effects to Red Butte and other traditional cultural properties.</p> <p>Types of known resources in the proposed withdrawal area: landscapes, trails, springs, creeks, ceremonial sites, traditional ranges and use areas, resource procurement areas, and camps. Types of known resources outside the proposed withdrawal area: landscapes, trails, springs, creeks, ceremonial sites, traditional territories, ranges and use areas, resource procurement areas, and camps.</p> <p><i>North Parcel primarily in area along Kanab Creek.</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource.</p> <p><i>East Parcel in area excluded for withdrawal:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource. <i>Long term</i></p> <p><i>South Parcel:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts would occur but resources would retain existing characteristics vital to their cultural functions and uses by American Indians.</p> <p><i>Visual and auditory (indirect) impacts on all three parcels:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts would occur but resources would retain existing characteristics vital to their cultural functions and uses by American Indians.</p> <p><i>Visual impacts from power lines on North and East parcels:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts would result in loss of resource and/or functional use of resource such as Red Butte and other traditional cultural properties.</p> <p>Types of known resources in the proposed withdrawal area: landscapes, trails, creeks, ceremonial sites, traditional territories, ranges and use areas, resource procurement areas, and camps. Types of known resources outside the proposed withdrawal area: landscapes, trails, springs, creeks, ceremonial sites, traditional territories, ranges and use areas, resource procurement areas, and camps.</p> <p><i>All three parcels since the majority of resources would be outside the withdrawal boundaries:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource.</p> <p><i>Visual and auditory (indirect) impacts:</i> Impact duration: <i>1 to 5 years</i></p> <p>Project-related impacts would occur but resources would retain existing characteristics vital to their cultural functions and uses by American Indians.</p> <p><i>Visual impacts from power lines:</i> Impact duration: <i>More than 5 years</i></p> <p>Project-related impacts that would result in loss of resource and/or functional use of resource.</p>

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
American Indian Resources (4.12), continued				
Protection of tribal trust resources or assets	<p>Impact duration: <i>More than 5 years</i></p> <p>There are no tribal trust resources or assets within the proposed withdrawal area.</p> <p><i>Possible indirect impacts of unknown magnitude on Havasupai Springs, which is outside the proposed withdrawal area.</i></p>	<p>Impact duration: <i>More than 5 years</i></p> <p>There are no tribal trust resources or assets within the proposed withdrawal area.</p> <p><i>Possible indirect impacts of unknown magnitude on Havasupai Springs, which is outside the proposed withdrawal area.</i></p>	<p>Impact duration: <i>More than 5 years</i></p> <p>There are no tribal trust resources or assets within the proposed withdrawal area.</p> <p><i>Possible indirect impacts of unknown magnitude on Havasupai Springs, which is outside the proposed withdrawal area.</i></p>	<p>Impact duration: <i>More than 5 years</i></p> <p>There are no tribal trust resources or assets within the proposed withdrawal area.</p> <p><i>Possible indirect impacts of unknown magnitude on Havasupai Springs, which is outside the proposed withdrawal area.</i></p>
Wilderness (4.13)				
Designated wilderness	<p>Changes in the land's wilderness characteristics:</p> <p>No discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. Outstanding opportunities for solitude and primitive and unconfined recreation would be maintained.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Greatest amount of mineral activity estimated; highest risk of impacts on wilderness characteristics.</p> <p><i>Impacts could vary from:</i> Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p> <p>To: Impacts would be readily apparent within limited areas of the wilderness. It would be apparent that man has altered natural conditions within such areas. There would be no mining related development within wilderness. Outstanding opportunities for solitude or a primitive and unconfined type of recreation would be restricted in limited areas and during limited times of the year.</p>	<p>Changes in the land's wilderness characteristics:</p> <p>No discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. Outstanding opportunities for solitude and primitive and unconfined recreation would be maintained.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Least amount of mineral activity; lowest risk for impacts on wilderness characteristics:</p> <p>Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining-related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p>	<p>Changes in the land's wilderness characteristics:</p> <p>No discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. Outstanding opportunities for solitude and primitive and unconfined recreation would be maintained.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Less mineral activity than Alternative A; less risk for impacts to wilderness characteristics.</p> <p>Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p>	<p>Changes in the land's wilderness characteristics:</p> <p>No discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. Outstanding opportunities for solitude and primitive and unconfined recreation would be maintained.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Less mineral activity than Alternative A; less risk for impacts to wilderness characteristics.</p> <p>Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p>
NPS proposed wilderness	<p>Changes in the land's wilderness characteristics:</p> <p>Impacts would have no discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. There would be outstanding opportunities for solitude or a primitive and unconfined type of recreation.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Most mineral activity estimated; highest risk of impacts on wilderness characteristics.</p> <p><i>Impacts could vary from:</i> Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, Outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p> <p>To: Impacts would be readily apparent within limited areas of the wilderness. It would be apparent that man has altered natural conditions within such areas. There would be no mining related development within wilderness. Outstanding opportunities for solitude or a primitive and unconfined type of recreation would be restricted in limited areas and during limited times of the year.</p>	<p>Changes in the land's wilderness characteristics:</p> <p>Impacts would have no discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. There would be outstanding opportunities for solitude or a primitive and unconfined type of recreation.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Least amount of mineral activity; lowest risk for impacts on wilderness characteristics:</p> <p>Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, Outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p>	<p>Changes in the land's wilderness characteristics:</p> <p>Impacts would have no discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. There would be outstanding opportunities for solitude or a primitive and unconfined type of recreation.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Less mineral activity than Alternative A; less risk for impacts on wilderness characteristics.</p> <p>Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, Outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p>	<p>Changes in the land's wilderness characteristics:</p> <p>Impacts would have no discernible effect on wilderness character. Natural conditions would prevail. There would be no mining related development within wilderness. There would be outstanding opportunities for solitude or a primitive and unconfined type of recreation.</p> <p>Impact duration: <i>1 to 5 years</i></p> <p>Less mineral activity than Alternative A; less risk for impacts on wilderness characteristics.</p> <p>Impacts would be slightly detectable within limited areas of the wilderness. Natural conditions would predominate. There would be no mining related development within wilderness. While there might be short-term impacts within the wilderness, over the long-term, Outstanding opportunities for solitude or a primitive and unconfined type of recreation would prevail, but may vary by season.</p>

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Recreation (4.14)				
Visitor use	<p>Impact duration: <i>More than 5 years</i></p> <p>Impacts to visitor use of remote and undeveloped areas, and users accessing adjacent primitive areas, would be:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p> <p>Impact from mining haul trucks to Grand Canyon visitor traffic along Highway 64:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Impacts to visitor use of remote and undeveloped areas, and users accessing adjacent primitive areas, would experience:</p> <p>To retain the existing character of the recreation setting and create a low level of change in the recreation opportunity or desired experiences.</p> <p>Impact from mining haul trucks to Grand Canyon visitor traffic along Highway 64:</p> <p>To retain the existing character of the recreation setting and create a low level of change in the recreation opportunity or desired experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Impacts to visitor use of remote and undeveloped areas, and users accessing adjacent primitive areas, would be:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p> <p>Impact from mining haul trucks to Grand Canyon visitor traffic along Highway 64:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Impacts to visitor use of remote and undeveloped areas, and users accessing adjacent primitive areas, would be:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p> <p>Impact from mining haul trucks to Grand Canyon visitor traffic along Highway 64:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p>
Roads and access	<p>Impact duration: <i>More than 5 years</i></p> <p>The 22.4 miles of new mining-related roads would benefit driving for pleasure and would increase the road density more than the other alternatives. Impact would be:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>The 6.4 miles of new mining-related roads would benefit driving for pleasure and would increase the existing road density the least of the 4 alternatives. Impact would be:</p> <p>To retain the existing character of the recreation setting and create a low level of change in the recreation opportunity or desired experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>The 12.1 miles of new mining-related roads would benefit driving for pleasure. Impact would be:</p> <p>To retain the existing character of the recreation setting and create a low level of change in the recreation opportunity or desired experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>The 19.1 miles of new mining-related roads would benefit driving for pleasure and would increase the road density more than any other action alternative, but less than alternative A. Impact would be:</p> <p>To partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p>
Primitive recreation opportunity	<p>Impact duration: <i>More than 5 years</i></p> <p>The increase of 22.4 miles of roads could adversely impact users seeking primitive recreation opportunities in adjacent areas. No primitive settings occur within the Alternative A area.</p> <p>Impacts would partially retain the existing character of the recreation setting, and would not dominate the recreation opportunity for the desired recreation experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>The increase of 6.4 miles of roads could adversely impact users seeking primitive recreation opportunities in adjacent areas, although minimally. No primitive settings occur within the Alternative B proposed withdrawal area.</p> <p>Impacts would retain the existing character of the recreation setting and create a low level of change in the recreation opportunity or desired experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>The increase of 12.1 miles of roads could adversely impact users seeking primitive recreation opportunities in adjacent areas, although minimally. No primitive settings occur within the Alternative C proposed withdrawal area.</p> <p>Impacts would retain the existing character of the recreation setting and create a low level of change in the recreation opportunity or desired experiences.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>The increase of 19.1 miles of roads could adversely impact users seeking primitive recreation opportunities in adjacent areas. No primitive settings occur within the Alternative D proposed withdrawal area.</p> <p>Impacts would retain the existing character of the recreation setting and create a low level of change in the recreation opportunity or desired experiences.</p>
Social Conditions (4.15)				
Demographics	<p>Impact duration: <i>More than 5 years</i></p> <p>Population increase is estimated to be 332 individuals + families, over a five-county area. Overall, the increase in population would not produce obvious changes in demographics since the population change would be a very small percentage of the total population in the 5-county area (0.13%). The effect in Kanab or Fredonia would be amplified as their populations could increase by about 51 workers and their families.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Population increase is estimated to be 121.9 individuals + families over a five-county area. Overall, the increase in population would not produce obvious changes in demographics since the population change would be a very small percentage of the total population in the 5-county area (0.05%). The effect in Kanab or Fredonia would also be small as their populations might increase by just an estimated 21 workers with their families.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Population increase is estimated to be 161.95 individuals + families over a five-county area. Overall, the increase in population would not produce obvious changes in demographics since the population change would be a very small percentage of the total population in the 5-county area (0.07%). The effect in Kanab or Fredonia would also be small as their populations might increase by just an estimated 34 workers with their families.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Population increase is estimated to be 288.1 individuals + families, over a five-county area. Overall, the increase in population would not produce obvious changes in demographics since the population change would be a very small percentage of the total population in the 5-county area (0.12%). The effect in Kanab or Fredonia would be amplified as their populations could increase by about 49 workers and their families.</p>
Stakeholder values—mineral activity support	<p>Impact duration: <i>More than 5 years</i></p> <p>Greatest amount of mineral activity estimated; most gains for individuals and communities who benefit from mineral activity. Impact is expected to be:</p> <p>Would retain the existing character of the stakeholder values, but would create a low level of change which would not alter the perception of the Grand Canyon region for stakeholders (either residents or visitors).</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Least amount of mineral activity; fewer gains for individuals and communities who benefit from mineral activity. Impact is expected to be:</p> <p>Impacts on social conditions that would adversely affect stakeholders, but can be mitigated.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Less mineral activity than Alternative A; fewer gains for individuals and communities who benefit from mineral activity. Impact is expected to be:</p> <p>Impacts on social conditions that would adversely affect stakeholders, but can be mitigated.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Less mineral activity than Alternative A; fewer gains for individuals and communities who benefit from mineral activity. Impact is expected to be:</p> <p>Impacts on social conditions that would adversely affect stakeholders, but can be mitigated.</p>

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Social Conditions (4.15), continued				
Stakeholder values– withdrawal support	Impact duration: <i>More than 5 years</i> Greatest amount of mineral activity estimated; greatest amount of impacts for individuals and communities who support withdrawal. Impact is expected to be: Alternative A would result in the most considerable adverse direct and indirect impacts to individuals and groups who would like to see mineral activity prohibited in the project area.	Impact duration: <i>More than 5 years</i> Least amount of mineral activity; less severe impacts for individuals and communities who support withdrawal. Impact is expected to be: Alternative B includes some mineral activity (primarily in the North Parcel); however, less estimated activity than under Alternative A so individuals and groups who support mineral withdrawal would be more (positively) impacted.	Impact duration: <i>More than 5 years</i> Less mineral activity than Alternative A; fewer impacts for individuals and communities who support withdrawal. Impact is expected to be: Alternative C includes some mineral activity (concentrated in the North Parcel); however, less estimated activity than under Alternatives A or D. Individuals and groups who support mineral withdrawal would be more (positively) impacted than in Alternatives A or D, but less than C.	Impact duration: <i>More than 5 years</i> Less mineral activity than Alternative A; fewer impacts for individuals and communities who support withdrawal. Impact is expected to be: Alternative D includes some mineral activity (concentrated in the North Parcel); however, less estimated activity than under Alternative A, but more than in B or C. Individuals and groups who support mineral withdrawal would be more (positively) impacted than Alt A, but less than B or C.
Health safety risks	Impact duration: <i>More than 5 years</i> Greatest amount of mineral activity estimated; highest risk of health impacts, although health risks are not expected to elevate above current conditions. Impact is expected to be: Would retain the existing character of the public health and safety, but would create a low level of change.	Impact duration: <i>More than 5 years</i> Least amount of mineral activity; lowest risk for health impacts. Impact is expected to be: Would not produce obvious changes in public health and safety.	Impact duration: <i>More than 5 years</i> Less mineral activity than Alternative A; less risk for health impacts. Impact is expected to be: Would not produce obvious changes in public health and safety, although it may be greater than Alternative B.	Impact duration: <i>More than 5 years</i> Less mineral activity than Alternative A; less risk for health impacts. Impact is expected to be: Would retain the existing character of the public health and safety, but would create a low level of change.
Human safety risks	Impact duration: <i>More than 5 years</i> Greatest amount of mineral activity estimated; highest risk of human safety impacts on conditions that would adversely affect stakeholders, but can be mitigated.	Impact duration: <i>More than 5 years</i> Least amount of mineral activity; lowest risk for human safety impacts. Would not produce obvious changes in public health and safety.	Impact duration: <i>More than 5 years</i> Less mineral activity than Alternative A; less risk for human safety impacts. Would retain the existing character of the public health and safety, but would create a low level of change.	Impact duration: <i>More than 5 years</i> Less mineral activity than Alternative A; some risk of human safety impacts on conditions that would adversely affect stakeholders, but can be mitigated.
Environmental justice	Impact duration: <i>More than 5 years</i> Nine communities and four tribes in the analysis area meet EPA criteria for consideration under environmental justice rules. Conditions create a low level of change but no measurable impacts to identified groups.	Impact duration: <i>More than 5 years</i> Nine communities and four tribes in the analysis area meet EPA criteria for consideration under environmental justice rules. Conditions create a low level of change but no measurable impacts to identified groups.	Impact duration: <i>More than 5 years</i> Nine communities and four tribes in the analysis area meet EPA criteria for consideration under environmental justice rules. Conditions create a low level of change but no measurable impacts to identified groups.	Impact duration: <i>More than 5 years</i> Nine communities and four tribes in the analysis area meet EPA criteria for consideration under environmental justice rules. Conditions create a low level of change but no measurable impacts to identified groups.
Economic Conditions (4.16)				
Energy resources available	Impact duration: <i>More than 5 years</i> Potential economic value of uranium mined over 20 years: \$2.91 billion. Impacts vary from: Beneficial impacts on economic conditions that would affect economic conditions for residents, employees, and local and regional economies To: Beneficial impacts that would create a high degree of change within economic conditions for current and potential employees which could alter local and regional economies in the long-term.	Impact duration: <i>More than 5 years</i> Potential economic value of uranium mined over 20 years: \$364.9 million. Impact is expected to be: Beneficial impacts on economic conditions that would retain the existing economic conditions, taxes and revenues, employment, recreation economics, road condition and maintenance, or energy resources but create a low level of change which would not alter economic conditions in the study area for residents, employees, and visitors to the area.	Impact duration: <i>More than 5 years</i> Potential economic value of uranium mined over 20 years: \$1.28 billion. Beneficial impacts on economic conditions that would affect economic conditions for residents, employees, and local and regional economies with tourist-driven economies, but can be mitigated or offset by economic gains from mining activity.	Impact duration: <i>More than 5 years</i> Potential economic value of uranium mined over 20 years: \$2.34 billion. Impacts vary from: Beneficial impacts on economic conditions that would affect economic conditions for residents, employees, and local and regional economies To: Beneficial impacts that would create a high degree of change within economic conditions for current and potential employees which could alter local and regional economies in the long-term.
Effects on economic activity from tourism	Impact duration: <i>More than 5 years</i> Overall regional tourist activity and associated employment will not be affected. Economic value of tourism would be expected to remain at \$3.52 billion per year, (in 2008 dollars), or \$70.4 billion over 20 years. Impact expected: Under Alternative A, tourists and recreationist activity could be displaced as mineral activity increases in specific areas, however, overall regional tourist activity and associated employment is unlikely to be effected Would not produce obvious changes in existing economic activity, taxes and revenues, employment, recreation economics, road condition and maintenance, or energy resources.	Impact duration: <i>More than 5 years</i> Overall regional tourist activity and associated employment will not be affected. Economic value of tourism would be expected to remain at \$3.52 billion per year, (in 2008 dollars), or \$70.4 billion over 20 years. Impact expected: Would not produce obvious changes in existing economic activity, taxes and revenues, employment, recreation economics, road condition and maintenance, or energy resources.	Impact duration: <i>More than 5 years</i> Overall regional tourist activity and associated employment will not be affected. Economic value of tourism would be expected to remain at \$3.52 billion per year, (in 2008 dollars), or \$70.4 billion over 20 years. Impact expected: Would not produce obvious changes in existing economic activity, taxes and revenues, employment, recreation economics, road condition and maintenance, or energy resources.	Impact duration: <i>More than 5 years</i> Overall regional tourist activity and associated employment will not be affected. Economic value of tourism would be expected to remain at \$3.52 billion per year, (in 2008 dollars), or \$70.4 billion over 20 years. Impact expected: Would not produce obvious changes in existing economic activity, taxes and revenues, employment, recreation economics, road condition and maintenance, or energy resources.

Table 2.8-1. Summary of Potential Environmental Impacts by Alternative (Continued)

Resource Category/ Issue	Alternative A No Action Area Remains Open under the Mining Law	Alternative B Proposed Action 20 Years ~1 Million Acres Withdrawn	Alternative C Partial Withdrawal 20 Years ~700,000 Acres Withdrawn	Alternative D Partial Withdrawal 20 Years ~300,000 Acres Withdrawn
Economic Conditions (4.16), continued				
Effects on economic activity from mineral development	<p>Impact duration: <i>More than 5 years</i></p> <p>Direct industry employment:</p> <p>Total regional economic output over 20 years: \$3.39 billion.</p> <p>Overall, the increase in direct employment would not produce obvious changes in economic conditions for residents and local and regional economies since the change would be a very small percentage of the total employment in the 5-county area (0.4%). The effect in Kanab or Fredonia would be amplified as their employment opportunities would increase disproportionately from the rest of the region.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Total regional economic output over 20 years: \$1.24 billion.</p> <p>Overall, the increase in direct employment would produce no changes in economic conditions for residents and local and regional economies since the change would be a very small percentage of the total employment in the 5-county area (0.05%). The effect in Kanab or Fredonia would also be small.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Total regional economic output over 20 years: \$2.03 billion.</p> <p>Overall, the increase in direct employment would produce no changes in economic conditions for residents and local and regional economies since the change would be a very small percentage of the total employment in the 5-county area (0.07%). The effect in Kanab or Fredonia would also be small.</p>	<p>Impact duration: <i>More than 5 years</i></p> <p>Total regional economic output over 20 years: \$2.94 billion.</p> <p>Overall, the increase in direct employment would not produce obvious changes in economic conditions for residents and local and regional economies since the change would be a very small percentage of the total employment in the 5-county area (0.12%). The effect in Kanab or Fredonia would be amplified as their employment opportunities would increase disproportionately from the rest of the region.</p>
Road condition and maintenance	<p>Mining companies would be responsible for maintenance of unpaved public roads used to haul ore.</p> <p>Would not produce obvious changes in existing road condition and maintenance.</p>	<p>Mining companies would be responsible for maintenance of unpaved public roads used to haul ore.</p> <p>Would not produce obvious changes in existing road condition and maintenance.</p>	<p>Mining companies would be responsible for maintenance of unpaved public roads used to haul ore.</p> <p>Would not produce obvious changes in existing road condition and maintenance.</p>	<p>Mining companies would be responsible for maintenance of unpaved public roads used to haul ore.</p> <p>Would not produce obvious changes in existing road condition and maintenance.</p>

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