Kimberly MacMillan

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Date: Wed, May 4, 2011 at 3:29 PM
Subject: Comments on the Northern Arizona Proposed Mineral Withdrawal
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Dear Secretary Salazar,

On behalf of the Center for Biological Diversity, the Grand Canyon Trust, the Grand Canyon Wildlands Council and the Sierra Club's Grand Canyon Chapter, please find attached comments on the Draft Environmental Impact Statement for the Northern Arizona Proposed Mineral Withdrawal.

Thank you in advance for your consideration.

Sincerely,

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CENTER FOR BIOLOGICAL DIVERSITY
GRAND CANYON TRUST
GRAND CANYON WILDLANDS COUNCIL
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4 May 2011

The Honorable Ken Salazar
Secretary
U.S. Department of the Interior
1849 C Street, N.W.
Washington DC 20240

Scott Florence, District Manager
Bureau of Land Management
Arizona Strip District Office
345 East Riverside Drive
St. George, Utah 84790–6714

RE: COMMENTS ON THE NORTHERN ARIZONA PROPOSED MINERAL WITHDRAWAL DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Secretary,

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the Proposed Northern Arizona Mineral Withdrawal. For reasons explained below, the undersigned organizations, representing over a million American citizens, strongly support your proposal to withdraw 1,010,776 acres of National Forest System lands and public lands in northern Arizona from location and entry under the Mining Law of 1872, (30 U.S.C. 22–54) (Mining Law), subject to valid existing rights.

1. BACKGROUND

On July 21, 2009, the Department of the Interior published a notice of the Secretary of the Interior Ken Salazar's proposal to withdraw approximately 1,010,776 acres of National Forest System lands and public lands in northern Arizona from location and entry under the Mining Law of 1872, (30 U.S.C. 22–54) (Mining Law), subject to valid existing rights. The purpose of the withdrawal would be "to protect the Grand Canyon watershed from adverse effects of locatable hard-rock mineral exploration and mining."

Under section 204 of the Federal Land Policy and Management Act (FLPMA), publication of the Federal Register notice of the proposed withdrawal had the effect of segregating the lands involved for up to two years from the location and entry of new

mining claims, subject to valid existing rights, during which time the Bureau of Land Management (BLM) would complete an analysis of the proposed withdrawal. The notice also initiated an Environmental Impact Statement evaluating the proposed withdrawal.

On February 18th, 2011, the Department of the Interior published a Notice of Availability of the Draft Northern Arizona Proposed Withdrawal Environmental Impact Statement (DEIS). The DEIS analyzes the potential effects of four alternatives on resources within, and in the vicinity of, the potential withdrawal areas as well as within, and in the vicinity of, the Grand Canyon National Park:

- Alternative A is the No Action Alternative, under which no lands would be withdrawn and mineral exploration and mining would continue throughout the proposed withdrawal area in accordance with existing regulations and land use plans.

- Alternative B, which is the Proposed Action, is a Secretarial withdrawal for 20 years, subject to valid existing rights, of approximately 1,010,776 acres in three parcels from location and entry under the Mining Law, but not the mineral leasing, geothermal leasing, mineral materials, or public land laws. Two of the three parcels are north of Grand Canyon National Park on BLM managed Arizona Strip lands and the North Kaibab Ranger District of the Kaibab National Forest, and the remaining parcel is south of the Grand Canyon on the Tusayan Ranger District of the Kaibab National Forest.

- Alternative C is a Secretarial withdrawal of approximately 652,986 acres from the Mining Law for 20 years, subject to valid existing rights. This alternative would withdraw the largest contiguous area identified on resource location maps with concentrations of cultural, hydrologic, recreational, visual, and biological resources which could be adversely affected by additional locatable mineral exploration and mining.

- Alternative D is a Secretarial withdrawal of 300,681 acres from the Mining Law for 20 years, subject to valid existing rights. This alternative would withdraw the contiguous area identified on resource location maps where there is the highest concentration of overlapping cultural, hydrologic, recreational, visual, and biological resources, which could be adversely affected by additional locatable mineral exploration and mining.

The following comments pertain to the analysis of the above four alternatives as set forth in the Draft Environmental Impact Statement.

2. COMMENTING ORGANIZATIONS

a. Center for Biological Diversity

The Center for Biological Diversity (CBD) is a nonprofit corporation with over 320,000 members and online activists dedicated to the preservation, protection, and restoration of biodiversity and ecosystems throughout the world. The Center's main office is located in Tucson, Arizona. The Center also has an office in Flagstaff, Arizona. The Center works through science, law, and creative media to secure a future for all species, great or small, hovering on the brink of extinction.

b. Grand Canyon Trust

Grand Canyon Trust (GCT) is a nonprofit corporation headquartered in Flagstaff, Arizona with over 3,500 members. The mission of the Grand Canyon Trust is to protect and restore the canyon country of the Colorado Plateau – its spectacular landscapes, flowing rivers, clean air, diversity of plants and animals, and areas of beauty and solitude. One of the Trust's goals is to ensure that the Colorado Plateau is a region characterized by vast open spaces with restored, healthy ecosystems, and habitat for all native fish, animals, and plants.

c. Grand Canyon Wildlands Council

The Grand Canyon Wildlands Council is a conservation organization based in Flagstaff, Arizona, committed to the protection and restoration of Wild Nature in the Grand Canyon Ecoregion.

d. Sierra Club

The Sierra Club is America's oldest, largest, and most influential grassroots environmental organization. Inspired by nature, the Sierra Club's more than 750,000 members – including 12,000 plus in Arizona as part of the Grand Canyon Chapter – work together to protect our communities and the planet. Sierra Club's members recreate – hike, backpack, camp, raft, fish, and more -- in the areas affected by the proposed withdrawal and any potential mining activities, and have been involved for decades in protecting the lands, waters, and wildlife of the region.

3. SUPPORT FOR THE PROPOSED ACTION

a. Proposed action, Alternative "B," best serves the purpose and need

Alternative B, the proposed action, best meets the proposed mineral withdrawal's stated purpose and need. By setting aside the most acres from potential future uranium mining and thereby reducing the potential for future mining impacts to the greatest extent, Alternative B among alternatives analyzed is most likely "to protect the Grand Canyon watershed from adverse effects of locatable hard-rock mineral exploration and mining;" It therefore best serves the stated purpose and need of the proposed withdrawal. The DEIS demonstrates that Alternative B will cause fewer and less severe adverse environmental impacts than the other three alternatives that are likely to allow more

uranium exploration and mining in the future. Alternative B would best protect national interests, notwithstanding the DEIS's biases that downplay mining impacts and exaggerate potential ore production and corresponding economic benefits.

b. BLM cannot guarantee against or correct aquifer depletion or contamination

Public agencies, including the Bureau of Land Management (BLM), the U.S. Forest Service (USFS), etc., cannot guarantee that future uranium mining would not deplete or contaminate aquifers. As discussed below in the Inadequacy of Existing Regulatory Mechanisms section, the Arizona Department of Environmental Quality (ADEQ) aquifer protection permits do not require down-gradient aquifer water monitoring, do not require remediation plans to correct contamination if it did occur, and do not require bonding to ensure a remediation plan is implemented. Aquifer remediation, and especially deep aquifer remediation, would be a monumental, if not impossible, task rendering aquifer contamination—and possibly also the contamination of receiving waters and ecosystems—permanent and irretrievable. By setting aside the most acres from potential future uranium mining, Alternative B is most likely to protect ground water that feeds Grand Canyon's surface water from permanent, irretrievable damage from uranium mining.

c. Duties to Conserve and Comply With Applicable Legal Requirements

Alternative B is supported by the following statutory duties to conserve because, among alternatives analyzed, it is most likely to prevent adverse uranium mining impacts to the withdrawal area and Grand Canyon National Park; Alternative B is most likely to conserve natural ecosystems, biodiversity, cultural and other values therein.

i. Endangered Species Act

The Endangered Species Act (ESA)was enacted in part to provide a "means whereby the ecosystems upon which endangered species and threatened species depend may be conserved ... [and] to provide a program for the conservation of such endangered species and threatened species ...." 16 U.S.C. § 1531(b). As interpreted by the Supreme Court, "[t]he plain intent of Congress in enacting [the ESA] was to halt and reverse the trend toward species extinction, whatever the cost." *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 175 (1978). Reflecting "a conscious decision by Congress to give endangered species priority over the 'primary missions' of federal agencies," the ESA serves as an important check on agencies' actions. *Id.* at 185.

Section 2(c) of the ESA establishes that it is "the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."16 U.S.C. § 1531(c)(1). The ESA defines "conservation" to mean "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary." 16 U.S.C. § 1532(3).

Section 7(a)(1) of the ESA directs that the Secretary review "other programs administered by him and utilize such programs in furtherance of the purposes of the Act" (emphasis added). 16 U.S.C. § 1536(a)(1). The Secretary's administration of the Northern Arizona Mineral Withdrawal is such a program because it would prevent adverse impacts to threatened and endangered species and ecosystems from future uranium mining. The ESA vests primary responsibility for administering and enforcing the statute with the Secretaries of Commerce and Interior. The Secretaries of Commerce and Interior have delegated this responsibility to the Fisheries Division of the National Oceanic and Atmospheric Administration ("NOAA Fisheries") and the U.S. Fish and Wildlife Service ("FWS") (collectively "Services"). 50 C.F.R. §402.01(b).

ii. National Environmental Policy Act

The National Environmental Policy Act (NEPA) provides a longstanding umbrella for a renewed emphasis on pollution prevention in all federal activities. Indeed, NEPA's very purpose is "to promote efforts which will prevent or eliminate damage to the environment...." 42 USC § 4321.

Section 101 of NEPA contains Congress' express recognition of "the profound impact of man's activity on the interrelations of all components of the natural environment" and declaration of the policy of the federal government "to use all practicable means and measures...to create and maintain conditions under which man and nature can exist in productive harmony...." 42 USC § 4331(a). In order to carry out this environmental policy, Congress required all agencies of the federal government to act to preserve, protect, and enhance the environment. See 42 USC § 4331(b). Further, Section 102 of NEPA requires the federal agencies to document the consideration of environmental values in their decision making in "detailed statements" known as environmental impact statements (EIS). 42 USC § 4332(2)(C)). As the United States Supreme Court has noted, the "sweeping policy goals announced in § 101 of NEPA are thus realized through a set of 'action-forcing' procedures that require that agencies take a 'hard look' at environmental consequences." Robertson v. Methow Valley Citizens Council, 490 U.S. 332 (1989).

The very premise of NEPA's policy goals, and the thrust for implementation of those goals in the federal government through the EIS process, is to avoid, minimize, or compensate for adverse environmental impacts before an action is taken. Virtually the entire structure of NEPA compliance has been designed by the Council on Environmental Quality (CEQ) with the goal of preventing, eliminating, or minimizing environmental degradation. Thus, compliance with the goals and procedural requirements of NEPA, thoughtfully and fully implemented, can contribute to the reduction of pollution from federal projects, and from projects funded, licensed, or approved by federal agencies.

CEQ defines and uses the term "pollution prevention" broadly. Indeed, any reasonable mechanism, including mineral withdrawal, which successfully avoids, prevents, or reduces pollutant discharges or emissions other than by the traditional method of treating pollution at the discharge end of a pipe or a stack should, for purposes of NEPA, be considered pollution

prevention. Among alternatives analyzed in the DEIS, Alternative B is most consistent with both NEPA and the purpose of the Northern Arizona Mineral Withdrawal, which is "to protect the Grand Canyon watershed from adverse effects of locatable hard-rock mineral exploration and mining," because it is most likely to prevent adverse uranium mining impacts, including pollution, to the withdrawal area and Grand Canyon National Park; Alternative B is most likely to conserve natural ecosystems, biodiversity, cultural and other values therein.

iii. Federal Land Policy and Management Act

FLPMA provides that the nation's public lands are to be managed "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use[.]" 43 U.S.C. § 1701(a)(8).

FLPMA mandates that the DOI Secretary "shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the [public] lands." 43 U.S.C. § 1732(b). Regulations implementing FLPMA as well as the Mining Law establish the "procedures and standards" that "ensure that operators and mining claimants" meet their duties to "prevent unnecessary or undue degradation of the land and reclaim disturbed areas." 43 C.F.R. § 3809.1(a) (referring to 43 C.F.R. Subpart 3809). These regulations also provide that "unnecessary or undue degradation" means, among other things, "conditions, activities, or practices" that fail to comply with "other Federal and state laws related to environmental protection ...." (emphasis added; see section 4(c) of these comments). 43 C.F.R. § 3809.5.

FLPMA also authorizes the Secretary to "make, modify, extend, or revoke withdrawals" of public lands. 43 U.S.C. §§ 1714(a), (b)(1); 43 C.F.R. Subpart 2310. A "withdrawal" is the withholding of an area of federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities in order to maintain other public values in the area or for reserving the area for a particular public purpose or program ...." 43 C.F.R. § 2300.0-5(h). Among alternatives analyzed in the DEIS, Alternative B is most consistent with both FLPMA and the purpose of the Northern Arizona Mineral Withdrawal, which is "to protect the Grand Canyon watershed from adverse effects of locatable hard-rock mineral exploration and mining," because it is most likely to prevent adverse uranium mining impacts, including pollution, to public values within the withdrawal area and Grand Canyon National Park; Alternative B is most likely to conserve natural ecosystems, biodiversity, cultural, public and other values therein.

d. Absent Alternative B, Existing Regulatory Mechanisms Will Not Limit The Harms From Uranium Mining

The DEIS states, "For purposes of this EIS, it must be assumed that state and federal regulations have been and are being met." DEIS at 4-57. The DEIS relies on that assumption throughout its analyses to conclude that uranium mining and exploration would not cause environmental damage. A discussion of the fallacy of these assumptions and thus the

inadequacy of existing regulatory mechanisms follows in these comments. *See* Support for Proposed Action section and subsection "c" immediately below in these comments.

4. GENERAL THEMES OF THE DEIS

Commenting organizations provide the following general overview of the DEIS and the information, analyses, methods, assumptions and conclusions therein.

a. The DEIS downplays uranium mining impacts and exaggerates economic benefits of continued mining

The DEIS consistently downplays the impacts of past, current and potential future uranium mining on the proposed withdrawal area and Grand Canyon National Park while exaggerating its potential economic benefits.

For example:

- The DEIS presumes that existing regulatory mechanisms will be followed and will prevent pollution; facts demonstrate that existing regulatory mechanisms are inadequate, not consistently followed or enforced, and are not implemented in a way that prevents pollution. *See* Support for Proposed Action section and subsection "c" immediately below in these comments.

- The DEIS fails to analyze a worst-case scenario for aquifer contamination. The U.S. Geological Survey (USGS) Hydrology report noted that, "The Hermit Mine sump concentrations ranged from 3,310 to 36,600 µg/L (the highest reported value of any sample type in this study) in 1989–90 (figs. 9*A*, 13)" and "These high concentration mine shaft and sump waters may be sources of dissolved uranium for nearby sites if mine water is capable of entering the regional groundwater flow system." Hydrology report at 184. Rather than evaluating such a scenario, the DEIS relies on much lower dissolved uranium concentrations observed at the Orphan Mine to predict ground water pollution. The DEIS altogether ignores the potential impact of rapid recharge events flushing water through mined pipes into ground water flow systems. *See* Ground Water section of these comments and section "b" below.

- The DEIS rejects high "outlier" samples of legacy pollution in its assessment of potential future impacts to ground water but then relies on a single high outlier sample to double natural background soil uranium concentrations over USGS definitions. This methodology (discarding outliers in one case, relying on them in others) downplays potential mining impacts by reducing foreseeable pollution and the amount of that pollution that can be attributed to anthropogenic rather than natural sources. *See* Soil Resources and Ground Water sections of these comments.

- The DEIS employs small, fixed capture radii to assess the potential impact of mines to perched aquifers; fixed radii ignore the potential for much larger capture zones resulting from groundwater moving greater distances along fractures, fissures and impermeable strata prior to discharging at seeps and springs. This is especially true of rapid recharge events. *See* Ground Water section of these comments.

- The DEIS overstates and misrepresents the potential ore production and corresponding economic benefits of mining. The DEIS presumes favorable future market and investment conditions in its characterization of Reasonable Future Development (RFD) and ignores the potential for downturns in uranium spot prices and capitol investment as could be catalyzed by global events. Global events catalyzed downturns in the 1980s, 1990s and, in the wake of Japan's nuclear crisis, similar downturns are again underway. The effect of these assumptions is to inflate the environmental consequences of Alternative B, assessed in Chapter 4 of the DEIS. In doing so, the DEIS minimizes the potential beneficial environmental impacts that would occur if new uranium claims were not allowed to be developed during the 20-year withdrawal. *See* Economic Conditions section of these comments.

- The DEIS fails to attempt to analyze the amount and effects of fine particulate (PM 2.5) *uranium* dust originating from mining facilitates. Fine particulate uranium dust emits alpha particles and can enter the blood stream through inhalation, causing health effects to humans and, presumably, other species. The DEIS seems to try to justify this failure by quoting ADEQ's refusal to analyze those effects in its permitting of the Arizona 1 uranium mine north of Grand Canyon. *See* Air Quality section.

- By grouping effects into categories of severity, the DEIS undermines the comparison of alternatives by precluding a discussion of relative impact of effects grouped in common categories.

The consequence of downplaying uranium mining impacts in the aforementioned and other analyses throughout the DEIS is a misleading underestimation of environmental impacts that would result from Alternatives C, D and A, and a misleading overestimation of economic impacts that would result from Alternative B. Analyses downplaying impacts to soil and water resources in turn undermine other analyses in the DEIS that rely on those assumptions to assess impacts to biological and other resources. The net effect is to paint a rosier and less risky picture of uranium mining's overall impacts.

b. Grand Canyon's Black Swan: Worst-case Pollution Scenarios

Governments' failure to anticipate low probability, high-consequence, worst-case environmental scenarios, or "black swan events," has contributed centrally to recent global-scale environmental disasters. In their permitting of the BP Deepwater Horizon oil drilling, Interior Department agencies repeatedly dismissed the possibility of a deep-water oil spill and assumed

that response resources and systems were adequate to prevent significant environmental harm in the event that a spill did occur. The spill indeed happened, and response resources and systems were inadequate to prevent one of America's most consequential environmental disasters. Similarly, Japan's failure to anticipate the effects of a 9.0 magnitude earthquake in the engineering and design of its Fukushima nuclear facilities contributed to the failure of the facilities' cooling systems and dangerous releases of radiation now impacting people and the environment. In both cases, failure to anticipate system failure caused system failure.

The DEIS fails to anticipate system failure—regulatory, engineering or otherwise—relating to uranium mines around Grand Canyon. It naively presumes that existing regulatory mechanisms are adequate, compliance with existing regulatory mechanisms will occur, that compliance can or will be monitored or enforced, and it presumes that the existing regulatory mechanisms themselves are adequate. As we discuss later, none of those assumptions are true. The DEIS presumes that the maximum possible discharge of uranium-contaminated water into deep aquifers is one gallon per minute of 400 micrograms per liter uranium concentrations. This ignores the possibility of much higher dissolved uranium concentrations moving into ground water systems (like the Hermit Mine sump's concentrations of 36,000 micrograms per liter) and it ignores the possibility of a rapid aquifer recharge event flushing much higher volumes of water though mined or explored ore bodies and into ground water flow systems in very short time periods.

The DEIS also avoids discussion of the monumental tasks and hundreds of millions or billions of dollars required to clean up deep aquifer contamination, assuming it is even possible. Commenting organizations raised this issue in scoping. Neither the federal government nor industry can guarantee that uranium mining would not deplete or contaminate aquifers. The failure of industry and federal clean-up efforts to remediate shallow uranium-contaminated aquifers in the Four Corners region casts significant doubt on their ability to remove uranium pollution in aquifers thousands of feet below the Grand Canyon region's rock strata. The failure of past cleanup attempts and the almost certain impossibility of remedy in Grand Canyon's aquifers warrants caution to preclude any mining or exploration that carries with it even the most remote potential for aquifer damage.

c. The DEIS incorrectly assumes that compliance with existing regulatory mechanisms will occur or will prevent harmful effects from mining and exploration

As described below, facts do not support the DEIS's assumption that compliance with existing regulatory mechanisms will occur or will prevent harmful effects from mining and exploration. Ensuing analyses throughout the DEIS that discount the possibility of effects stemming from non-compliance, or that are based on an assumption that non-compliance will not occur, are therefore invalid and underestimate the potential environmental impacts that could result from mining and exploration activity.

The DEIS states, "For purposes of this EIS, it must be assumed that state and federal regulations have been and are being met." DEIS at 4-57. The DEIS relies on that assumption to conclude that uranium mining and exploration would not cause environmental damage. For example, the DEIS further states, "In accordance with current regulations, impacts to water

resources resulting from mine operations are reduced and controlled by way of implementation of appropriate design features and standard operating procedures." DEIS at 4-66. But as is evident by the State's regulation of ground water, Arizona completely ignores contamination of the aquifer from a mine shaft and refuses to require aquifer monitoring.

BLM's assumption that uranium mining companies will follow applicable laws and regulations, or that responsible agencies will ensure those laws and regulations are followed, is not supported by facts. As reported in the *Arizona Daily Sun's* article "Mining on the Honor System," ADEQ's first inspection of the Arizona mine in September 2010, nine months after the mine had commenced operations, yielded four major violations:

(1) There were no pumps in the mine to eliminate any water there, as was required;

(2) A test measuring the permeability of the rock in the mine hadn't been done, as was required;

(3) A pipe was sticking through a lined pond that is intended to prevent groundwater contamination from ore or water pumped out of the mine.

(4) Plans for the mine didn't match what inspectors found when they visited.

Those violations were ongoing for nine months for lack of any regulatory oversight from BLM, ADEQ, EPA or any other regulatory agency.

Similarly, a site visit by Center for Biological Diversity staff to inspect exploratory drilling operations by VANE Minerals in 2009 documented drilling operations in violation of conditions set forth in the Forest Service Decision Memo authorizing that activity:

(1) Drilling residues were required to be contained in a closed container or open fluid waste pits; drilling residues were instead dumped into an open truck trailer that in turn leaked residue into Deer Creek Wash, two miles from the boundary of Grand Canyon National Park.

(2) Drilling residues, if left an open fluid waste pit, were required to be netted on the top to prevent access to the pits by birds; there was no netting to prevent birds from being exposed to drilling wastes. Drilling waste was left in the wash.

(3) The Decision Memo required open fluid waste pits to be fenced along the sides to protect wildlife; neither the trailer nor the drilling waste that flowed into and down Deer Creek Wash were fenced to prevent wildlife exposure.

McKinnon Declaration at 2. (Appendix 1).

In the former case, the Arizona 1 mine had been reopened for nine months prior to ADEQ's first inspection in September 2010; the four major violations it yielded had been ongoing for nine months for lack of any regulatory oversight. In the latter case, the U.S. Forest Service had not visited VANE's exploration site, or had visited it and not enforced conditions of the authorizing Decision Memo.

Neither case demonstrates voluntary industry compliance with law or regulation. Neither case demonstrates a capacity among responsible agencies to monitor or ensure compliance with laws and regulations in a consistent, timely manner. Both cases demonstrate industry non-compliance with laws and regulations. Both cases demonstrate failure by responsible agencies to ensure that applicable laws and regulations are followed while mining and exploration activities are underway.

The chasm separating the DEIS' regulatory aspirations from regulatory reality is found in the DEIS itself:

> *Reclaimed sites are monitored on a regular basis after closure to evaluate the effectiveness of the reclamation actions and to maintain the designed features against erosion.*

DEIS at 4-101. The DEIS then states:

> *Detailed documentation of specific reclamation results for the five reclaimed mines (Hack 1, 2, and 3; Hermit; and Pigeon) on the North Parcel was either incomplete or unavailable for this analysis. General documentation was available in documents submitted to the administering agencies, and helpful details were obtained from discussions with former mine personnel.*

DEIS at 4-66. The DEIS' own facts undermine its assumptions by demonstrating the failure of responsible agencies to ensure that applicable laws and regulations are followed.

Nor are ADEQ Aquifer Protection Permits for existing uranium mines in the withdrawal area adequate to protect ground water resources because:

(1) Mine shaft water monitoring is required only quarterly, thereby precluding detection of pollution problems for up to three months following pollution events;

(2) Permits do not require down-gradient aquifer monitoring to detect contamination plumes in perched and deep aquifers;

(3) Permits do not require remediation plans to determine the measures, resources and procedures needed to correct perched or deep aquifer contamination;

(4) Permits lack sufficient bonding to ensure that resources exist to implement non-existent remediation plans upon detection of perched or deep aquifer contamination.

Long monitoring intervals preclude immediate pollution detection; lack of aquifer monitoring precludes aquifer pollution detection; lack of remediation plans and bonding preclude pre-planning and resource availability for aquifer remediation. Remediation of deep aquifers is likely impossible in the event of uranium pollution; remediation of perched aquifers is likely cost-prohibitive, particularly absent bonding. BLM's assertion that ADEQ's administration of Aquifer Protection Permits precludes the possibility of pollution of aquifers and receiving surface waters is, like its other claims of regulatory adequacy and compliance, dubious at best.

By minimizing future mining and avoiding uranium mining hazards, Alternative B assures maximum protection against unforeseen or under-predicted environmental impacts that could arise from factors discussed above. In the face of uncertain or under-predicted effects, Alternative B therefore represents the prudent and precautious course of action.

5. WATER RESOURCES

The DEIS established a principle for hazard avoidance in its discussion of impacts to American Indian resources. It states:

> *Since damage to traditional cultural and sacred place is irreversible, the preferred mitigation measure is avoidance.*

DEIS at 4-210.

The DEIS should apply the hazard avoidance principle to aquifer contamination. Aquifer contamination, if it did occur, would be irreversible. It would be impossible to clean up. State and federal agencies cannot guarantee against such a result if mining is allowed to continue. Here too the preferred mitigation measure should be avoidance.

a. The DEIS Ignores Contrary Data and Selectively Uses Data Without Reason

The DEIS contradicts the 2010 USGS hydrology report prepared for the proposed withdrawal; the DEIS fails to reconcile that contradiction. The 2010 USGS report states that breccia pipes are conduits for downward movement of water through ore bodies and into groundwater.

> *Fractures, faults, sinkholes, and breccia pipes occur throughout the study area and are pathways for downward migration of surface water and groundwater. Collapse features and breccia pipes in particular can intercept precipitation, runoff, and groundwater in perched water-bearing zones and can direct that water deeper into the subsurface. In areas containing mineralized pipes, this process can dissolve trace*

elements and radionuclides in the deposits and transport them to groundwater deeper in the subsurface.

USGS 2010 Hydrology Report at 147. These findings are consistent with generally accepted principles of groundwater recharge in the region. Conversely, relying predominantly on unpublished industry reports and personal communications with uranium industry personnel, the DEIS claims that breccia pipes are impermeable. DEIS at 3-57. In making this pronouncement, the DEIS fails to acknowledge contradictory information or explain the differing propositions.

The DEIS then relies on a notion of impermeable breccia pipes to downplay the potential for aquifer contamination by uranium mining. This in turn downplays the potential impacts from uranium mining to receiving surface water and associated species and ecosystems throughout several analyses set forth in Chapter 4 of the DEIS. Worse, the DEIS (BLM, we presume) fails to discuss the discrepancy in breccia pipe permeability or disclose the industry reports upon which it relies in its contradiction of USGS. BLM further fails to discuss the discrepancy between industry claims about breccia pipe permeability and congressional testimony by Dr. David Kreamer and Dr. Abe Springer cited in commenting organizations' scoping comments.

The DEIS excludes the highest dissolved uranium samples compiled by USGS from consideration of pollution that could contribute to groundwater contamination:

> *Based on their 2009 water quality sampling study, which included sampling of the Pinenut and Canyon mine wells, Bills et al. (2010) concluded that relationships between the occurrence of dissolved uranium and 13 other trace elements and mining activities were few and inconclusive. Therefore, the concentrations in the Hermit Mine sump were not considered representative for post-mining drainage at mines in the proposed withdrawal area, nor would similar concentrations be expected in R-aquifer groundwater.*

DEIS at 4-61. The purpose of the DEIS is to anticipate effects that could attend future mining, not to constrain that analysis to documentation of past effects in the face of admitted uncertainty and inadequate past monitoring. The DEIS narrative rejects the Hermit Mine sump data despite the USGS' characterization of contaminated sump water at Hermit Mine and the threat of it moving into groundwater flow systems:

> *The Hermit Mine sump concentrations ranged from 3,310 to 36,600 µg/L (the highest reported value of any sample type in this study) in 1989–90 (figs. 9A, 13). These high concentration mine shaft and sump waters may be sources of dissolved uranium for nearby sites if mine water is capable of entering the regional groundwater flow system.*

USGS hydrology report at 184. The USGS clearly contemplates the possibility for water to move through breccia pipes, like the Hermit Sump, into ground water flow systems:

> *Fractures, faults, sinkholes, and breccia pipes occur throughout the study area and are pathways for downward migration of surface water and groundwater. Collapse features and breccia pipes in particular can intercept precipitation, runoff, and groundwater in perched water-bearing zones and can direct that water deeper into the subsurface. In areas containing mineralized pipes, this process can dissolve trace elements and radionuclides in the deposits and transport them to groundwater deeper in the subsurface.*

USGS 2010 Hydrology Report at 147.

After rejecting contamination values from the Hermit Mine sump from the analysis, the DEIS narrative then relies on contamination values detected at the Orphan mine to characterize the potential for groundwater contamination. Those values are 400 µg/L; the 36,600 µg/L value recorded at the Hermit Mine sump is excluded from analysis. Again, the effect of the DEIS' methodology is to downplay the potential for uranium mining related pollution, thereby downplaying the potential for that pollution to impact receiving surface waters and related species and ecosystems in Grand Canyon National Park.

By minimizing future mining and avoiding uranium mining hazards, Alternative B assures maximum protection against unforeseen or under-predicted environmental impacts that could arise from factors discussed above. In the face of uncertain or under-predicted effects, Alternative B therefore represents the prudent and precautious course of action.

b. Grand Canyon's Black Swan: Worst-case Uranium Mining Pollution Scenarios

In order to serve and inform the purpose and need of the withdrawal EIS, which is "to protect the Grand Canyon watershed from adverse effects of locatable hard-rock mineral exploration and mining," the EIS must reasonably define and analyze a worst-case scenario for those adverse effects. In order to do so, the EIS must reasonably identify maximum dissolved uranium concentrations that could be expected to enter ground water flow systems, and it should reasonably identify maximum flow rates in addition to a fixed flow rate at which contaminated water might enter those systems (such as that which could result from a rapid recharge event). Taken together, maximum concentrations and flow rates form a basis for establishing the outer limits of potential adverse impacts from uranium mining.

For purposes of identifying maximum dissolved uranium concentrations that could enter ground water flow systems, the DEIS cannot rely on Liebe's (2003) Orphan mine samples. Although breccia pipe mining at the Orphan Mine has contaminated deep aquifers, it is unreasonable to assume that values recorded there represent a worst-case scenario for potential contamination that could result from future mining. The EIS should instead rely on maximum values measured in mine wells or sumps and assume, for the sake of a worst-case pollution scenario, that such water is able to enter the ground

water system. USGS reported uranium concentrations at the Hermit mine sump far exceeding values recorded at Orphan Mine.

> *The Hermit Mine sump concentrations ranged from 3,310 to 36,600 µg/L (the highest reported value of any sample type in this study) in 1989–90 (figs. 9A, 13). These high concentration mine shaft and sump waters may be sources of dissolved uranium for nearby sites if mine water is capable of entering the regional groundwater flow system.*

USGS hydrology report at 184. Thus, for purposes of a worst-case pollution scenario, and in order to best inform which alternative best serves the purpose and need of the proposed mineral withdrawal, the EIS should employ a maximum contamination value of 36,600 µg/L

The DEIS assumes a constant flow rate of one gallon per minute from mines into deep aquifers. For purposes of defining a maximum flow rate, the EIS must evaluate a rapid recharge event moving through a contaminated mine sump and moving that water into the ground water flow system. In his 2008 testimony before Congress, Dr. Abe Springer described rapid recharge events:

> *Although there are multiple and very deep (over 3,000 foot deep) aquifers in the vicinity of the Grand Canyon, recharge to these aquifers tends to be mostly focused and very rapid through faults, fractures, and sinkholes. Recharge to these deep aquifers can be on the order of hours and days, not weeks or years. The faults, fractures, and sinkholes can be pervasive and any enhancement of them can lead to enhanced recharge to the aquifer.*

Springer congressional testimony at 1. In addition to assuming a constant flow rate of one gallon per minute, the EIS should also anticipate the potential impacts of a rapid recharge event moving through a mined ore body and into regional ground water flow systems. The analysis should consider increases in uranium dissolution that would attend spikes in flows entering mined ore bodies that encounter oxidized uranium normally above water

By minimizing future mining and avoiding uranium mining hazards, Alternative B assures maximum protection against unforeseen or under-predicted environmental impacts that could arise from factors discussed above. In the face of uncertain or under-predicted effects, Alternative B therefore represents the prudent and precautious course of action.

c. Surface water: Seeps, Springs, Creeks, Caves

Analysis of potential impacts to surface water quality at seeps, springs, creeks and caves should reflect a worst-case pollution scenario, as described in section 4(d) of these comments, and as discussed further below.

In the proposed withdrawal area, seeps and springs issue from fractures, bedding planes, or sandstone strata in perched aquifers in the Chinle, Moenkopi, Kaibab, and Toroweap formations, Coconino Sandstone, and Supai Group along the walls and channels of canyons or from outcrops on the plateaus.

The DEIS acknowledges that uranium mining can drain and thus deplete perched aquifers that can feed seeps and springs. It also acknowledges that water from perched aquifers can move downward through breccia pipes and mined ore bodies.

> *At the breccia pipe uranium mines in the study area, perched water-bearing zones, if present (typically above the Hermit Formation basal confining unit), are small, thin, and discontinuous. Water yield to mine openings from these perched zones typically decreases over the first few months to 2 years of mining, from several gallons per minute to no measurable flow (Canonie Environmental 1988). Because of the dipping of adjacent formation layers down toward the solution-collapse breccia pipe, any perched groundwater that is present is expected to drain inward to the mine openings, which function as local hydrologic sinks. This water collects in the sump at the bottom of the mine and is used for mine operations; the water remaining after the demands of mine operations are met is pumped to lined evaporation and containment impoundments at land surface (Energy Fuels Nuclear 1984, 1986, 1987, 1988a; JBR Environmental 2010; personal communication, Roger Smith, formerly with Energy Fuels Nuclear, Inc. 2010).*

DEIS at 3-59. The DEIS also acknowledges that water feeding perched aquifers can travel laterally along confining rock layers.

> *Where open, extensive vertical fractures and solution openings do not convey the water directly to the deep aquifer system, this infiltrated water moves downward until it encounters a confining rock layer with sufficiently small permeability to impede vertical movement of the water. Where downward migration of the water is impeded, a thin, saturated zone, referred to as a perched groundwater zone, may form above the confining layer, and lateral groundwater movement may occur. Because confining layers are not completely impermeable, part of the perched groundwater eventually seeps downward through the confining layer matrix. The remaining perched groundwater moves laterally until it 1) encounters the edge of the confining unit and moves downward; 2) encounters fractures or other openings that permit downward movement through the confining layer; 3) discharges along canyon walls as seeps, springs, or evapotranspiration; or 4) is withdrawn from the perched aquifer via active wells. Groundwater travel time from land surface to the deep aquifers varies temporally and spatially owing to variations in precipitation, air temperature, root zone and soil properties and thickness, faults and fractures, hydrologic properties of the geological strata in the unsaturated zone (Flint et al. 2004).*

DEIS at 3-69. The DEIS further acknowledges that recharge can happen rapidly.

> *Rainstorm events are often sporadic and localized, resulting in amounts of short-term, local groundwater recharge that can vary substantially from long-term, regional average recharge estimates. The frequency and magnitude of these events for a specific area can range widely from year to year. Therefore, although long-term average recharge for an*

area may be small, amounts of local, rainstorm-based recharge may be relatively large. Groundwater travel time from land surface to the deep aquifers varies temporally and spatially owing to variations in precipitation, air temperature, properties and thickness of the root and soil zone, presence of faults and fractures, and hydrologic properties of the geological strata in the unsaturated zone (Flint et al. 2004)... Many flash floods sink directly into "swallow holes" along fault zones in the Kaibab (Huntoon 2000). Where open, extensive vertical fractures and solution openings do not convey the water directly to the deep aquifer system, this infiltrated water moves downward until it encounters a confining rock layer with sufficiently small permeability to impede vertical movement of the water.

DEIS at 3-69. Even though the DEIS acknowledges uranium mines drain perched aquifers, and even though the water recharging those aquifers can result from surface and ground water traveling long distances along confining layers (i.e., flash flood sinking into "swallow holes"), the DEIS applies small buffers around springs to assess potential impact zones. While the DEIS argues that its buffers are conservatively large (DEIS at 4-51), there is no evidence to indicate that those buffers are large enough or of an appropriate shape to capture the origin points of recharge water. For example, they are clearly not large enough to capture the spatial extent of watersheds from which "swallowed" flash floods could originate. Because we know that surface water and flash floods can recharge perched and deep aquifers, the DEIS should employ the boundaries of sub-watersheds within which springs occur as potential spring impact zones.

By allowing the least amount of mining and exploration activity in the future, among alternatives analyzed Alternative "B" best ensures against contamination and depletion of aquifers feeding seeps, springs and caves and, therefore, also best ensures against damage to the human and ecological communities associated with those receiving surface waters. Alternative B assures maximum protection against unforeseen or under-predicted environmental impacts that could arise from factors discussed above. In the face of uncertain or under-predicted effects, Alternative B therefore represents the prudent and precautious course of action.

6. SOIL RESOURCES

a. The DEIS Misrepresents and Selectively Uses Data Without Reason

Relative to Otton et al. (2010), the DEIS creates a new category for characterizing naturally occurring uranium and arsenic in undisturbed soil and sediment called "study area maximum." Study area maximum is additional to "regional average values" defined by Otton et al (2010). DEIS at 3-102.

If the purpose of adding an additional category is to better describe past and potential future mining impacts relative to undisturbed soil conditions, then it is curious why the DEIS fails to also add a "study area minimum" category, or a "minimum" value for undisturbed soil samples collected at breccia pipes. Adding only maximum values to average values described by Otton et al. (2010) has the effect of downplaying past and potential mining

impacts to soil uranium concentrations and accordingly skewing effects analyses. An objective characterization of conditions and effects would either just rely on an average value, as did Otton et al. (2010), or include minimum, average and maximum values.

The study area maximum value is derived from a single sample collected by Hopkins et al. (1984) at the Pigeon breccia pipe, the location of the Pigeon uranium mine. The Pigeon pipe is located in a drainage; the sample relied on in the DEIS, which measures 5.6 ppm uranium, is one of 40 samples collected from stream alluvium. All other 39 samples measured 2.6 ppm or less; the DEIS relies on a single high outlier sample to establish "study area maximum" soil uranium concentration for the entire analysis of effects.

But it is not even clear that the Pigeon pipe samples collected by Hopkins et al. (1984) were collected prior to exploratory drilling or therefore reflect undisturbed natural background soil conditions. Hopkins et al. report samples were collected in 1982. Otton et al. (1984) state:

> *The pipe was discovered in 1980. The site was prepared and developed from 1982 to 1984, and mining began in December 1984.*

Otton et al. (1984) at 63. In mining parlance, "discovered" typically marks the confirmation of a viable ore body after exploratory drilling. The LR2000 database shows that the first application received for the Pigeon pipe, serialized as AZA025967, was received on March 16, 1981. Both dates, 1980 and 1981, precede sampling in 1982 by Hopkins et al. (1984); this suggests that the Pigeon pipe in 1982 had already been subject to exploratory drilling and was not "undisturbed soil." In fact, Hopkins et al. (1984) state that rocks had been altered at the time of sampling, indicating that some activity had occurred at sample sites, and that those altered rocks were included in samples:

> *We collected rock samples from outcrops or exposures in the vicinity of the plotted site location. Most samples were collected from unaltered rock. Rock samples provide information on elements in rocks that have not been affected by alteration or mineralization. In addition, some altered rocks were collected.*

Hopkins et al. (1984) at 3. Unless BLM can demonstrate that Hopkins et al.'s (1984) Pigeon pipe sample was not measuring drilling residue, the DEIS cannot rely on that value to characterize a "study area maximum" of "naturally occurring uranium in undisturbed soil."

After relying on a single, high outlier value to characterize natural background uranium concentrations in soil, the DEIS then excludes high outlier values in its characterization of post-mining "reclaimed" soil conditions at the Pigeon mine. In its discussion of the Pigeon mine, the DEIS states:

> *The average concentration of 15 soil samples obtained in the vicinity of the operations area was about 11.9 ppm for uranium and about 29 ppm for arsenic (excluding one anomalously high sample result with a uranium concentration of 206 ppm, and an arsenic concentration of 455 ppm). Several isolated deposits of mine*

waste remaining on-site, primarily in the operations area, were sampled; uranium concentrations as high as 1,230 ppm and arsenic concentrations as high as 1,980 ppm were detected in these samples.

DEIS at 3-103. In addition to excluding the 206 ppm uranium sample, the DEIS then also excludes the 1230 ppm uranium sample from reporting of "outliers" in Table 3.5.3.; it instead reports as high outlier values of 68 and 79.1 ppm. The effect of excluding both values, 206 and 1230 ppm, is to downplay and misrepresent the impact of past mining.

This reveals a recurring methodological inconsistency in the DEIS; it selectively includes and excludes outlier samples in its analyses. In the soil resources section, the DEIS relies on a single high outlier value to establish "study area maximum" for natural background soil uranium concentrations. DEIS at 3-102. It then excludes high outlier values of 206 and 1230 ppm in its characterization of post-mining conditions. DEIS at 3-103. In its analysis of potential ground water impacts, the DEIS also excludes from consideration the high outlier water contamination values measured in the Hermit Mine sump. DEIS at 4-61. All three cases have the effect of misrepresenting and downplaying the past and potential future impacts of uranium mining by increasing the range of soil uranium that can be expected to occur naturally and misrepresenting and downplaying the amount of pollution that has been documented from past mining (and can therefore be anticipated from future mining).

These methodological inconsistencies contribute to a pro-mining bias that runs throughout much of the DEIS and that was evident to the public in BLM's refusal to directly answer questions in public meetings about the DEIS.

7. SPECIAL STATUS SPECIES, FISH AND WILDLIFE

Apart from seasonal floods and the Colorado River, all of the surface water in Grand Canyon National Park, and much of the surface water in the withdrawal area, originates from springs fed by perched and deep aquifers that could be depleted or polluted by uranium mining. Thus, because the DEIS fails to analyze a worst-case groundwater pollution scenario, we are generally concerned that the DEIS also underestimates potential effects of uranium mining to species dependent on surface water in the withdrawal area and Grand Canyon National Park. As the DEIS describes, species occupying those aquatic habitats are particularly prone to harm from mining pollution or water depletion:

Uranium and its decay products can be transported by way of infiltration into groundwater and surface waters. In addition to aquatic exposure pathways, wildlife can be exposed to chemical and radiation hazards through various pathways, including ingestion of soil and food (prey species), inhalation, and various cell absorption processes. As discussed by the USGS (Bills et al. 2010), some streams, seeps, and springs within the proposed withdrawal area contain high concentrations of dissolved trace elements and radionuclides owing to past mining activities and natural processes of evaporation, weathering, and erosion. Aquatic organisms and plants rely on these water bodies, and minor changes in water quality and quantity

could result in mortality of fish and other aquatic organisms or in degradation of their habitat.

DEIS at 4-144. Under a worst-case pollution scenario, we would expect those effects to be greatly magnified.

The cumulative effects analysis in the DEIS for threatened, endangered and candidate species is inconsistent with its analysis of direct and indirect effects. In its discussion of Alternative A, the DEIS cites potential impacts to amphibians and aquatic invertebrate species:

Impacts to riparian habitats and water quality could affect several amphibian species and an aquatic-dependent invertebrate. These species include the relict leopard frog, northern leopard frog, lowland leopard frog, and Kanab ambersnail. The location of the mine facility and the influence of the mine on the quantity and quality of groundwater and surface flows at seeps and springs could influence the magnitude of these impacts on these amphibian and invertebrate species.

DEIS at 4-145. It also cites potential impacts to birds under Alternative A:

Birds may be injured or killed by collisions with vehicles traveling on the road system. Birds of prey, including bald eagle, California condor, Mexican spotted owl, and American peregrine falcon, may be impacted by physical land disturbances associated with mining and increased risk of injury as a result of traffic power lines. Impacts to riparian habitats and water quality anywhere within the proposed withdrawal area could impact these bird species, as well as the southwestern willow flycatcher, found along Kanab Creek (North Parcel), and Yuma clapper rail, found along the Virgin River

DEIS at 4-145.

The DEIS does not discuss the potential for uranium mining to impact endemic aquatic species by depleting or contaminating water feeding springs. Instead, the BLM simply references its own Resource Management Plan.

Actions that degrade riparian habitat or reduce the potential of the area to support riparian vegetation will be modified, restricted, or prohibited (BLM 2008b). No net loss will occur in the quality and quantity of suitable habitat for endemic fish, amphibians, and aquatic invertebrate species (BLM 2008b).

DEIS at 4-119. Because BLM cannot guarantee that uranium mining will not contaminate or deplete springs feeding springs that are sources for endemism, BLM cannot simply conclude that the existence of its Land and Resource Management Plan precludes impacts to endemism. To the contrary, the depletion or contamination of seeps and springs has the potential to impact endemic species. Seeps, springs and caves whose water uranium mining could impact could harbor endemic species not yet known to science. Long-term changes in

water quality and quantity feeding springs has the potential to extirpate or retard the persistence and continued evolution of endemic species.

Nor does the DEIS sufficiently consider the potential impacts of uranium mines on migrating birds. BLM does not require uranium mine tailing ponds to be covered. Migrating birds, especially water birds, can therefore be attracted to mine tailing ponds for feeding, wading, drinking, bathing and resting during migration. Because mine water can be polluted with mining waste, exposure to mine tailing pond water could poison or kill migrating birds. Because mine ponds contain no fish or invertebrates, migrating water birds that are attracted to and attempt to forage in mine tailing ponds will expend energy attempting to gain energy, thereby depleting rather than restoring critical fat reserves necessary for migration. In these ways, uranium mining tailings ponds can serve as habitat traps for migrating birds. In April of 2011 Taylor McKinnon of the Center for Biological Diversity documented a White-faced ibis (*Plegadis chihi*) at the Pinenut mine tailing pond. It was perched on the barbed-wire fence adjacent to the pond and was observed perched at and flying over the pond. (Figure 1)

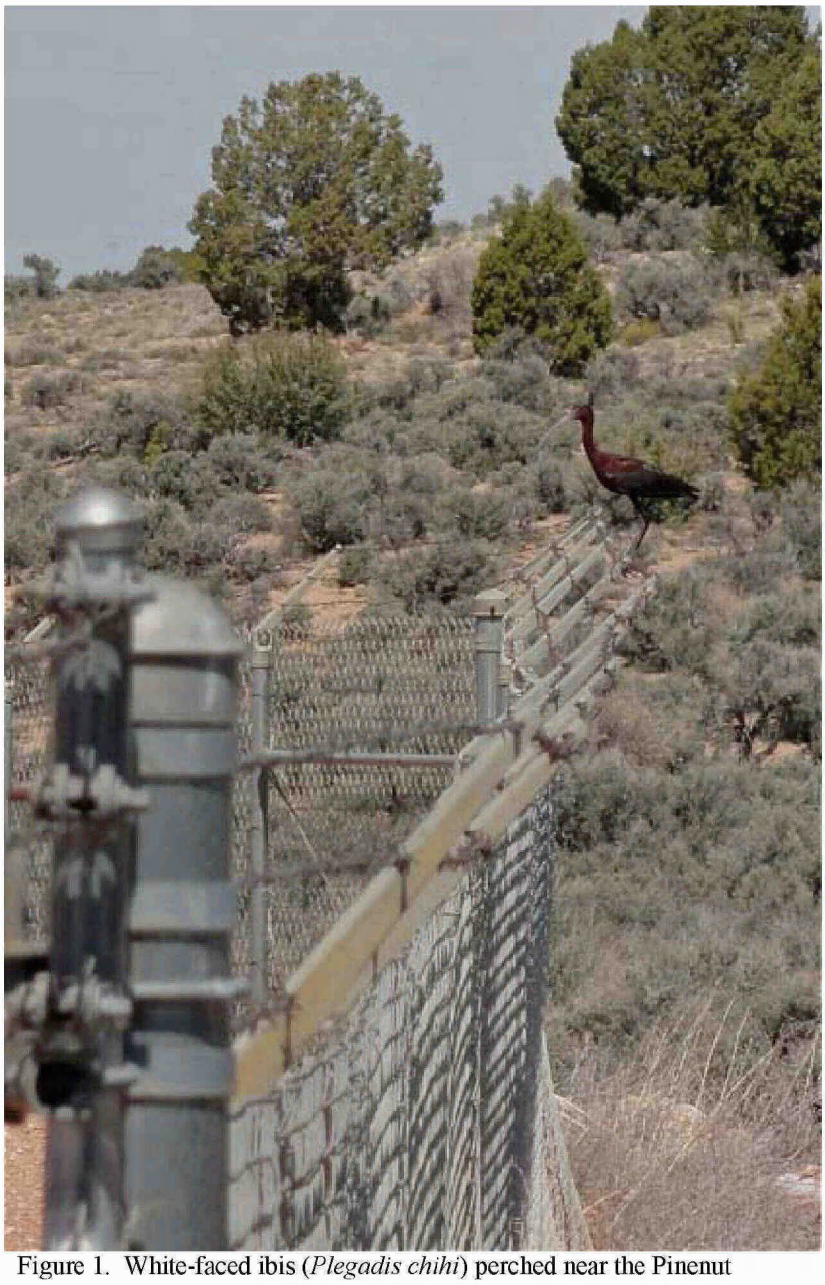

Figure 1. White-faced ibis (*Plegadis chihi*) perched near the Pinenut uranium mine tailing pond in April, 2011.

Fig. 3.7-1 in the DEIS ignores some critical wildlife linkages, and may therefore underestimate the impacts of mining and hauling on large mammals. Maps of radio-collared deer prepared by the Arizona Game and Fish Department (AGFD), and a dispersing mountain lion tracked by the National Park Service (NPS), reveal nearly identical travel routes for these large mammals between the Grand Canyon and the San Francisco Peaks (Fig. 1, this document). Fig 3.7-1 should be amended to show this corridor, which covers a large portion of the south segregation area. Mining and trucking activities that bisect a wildlife corridor could disproportionately impact animal populations. Mule deer and elk stay

at least 500-3700m from developed areas when possible, and shift distributions into more marginal habitats to avoid mines (Edge & Marcum 1985, Sawyer et al 2006). Impacts to wildlife corridors are predicted to negatively impact wildlife populations *and* recreation (hunting, wildlife watching, photography).

There may be more unidentified migration corridors in other parts of the action area. For example, a letter from Norris L. Dodd, then-president of The Wildlife Society, to G. William Lamb, District Manager of the Bureau of Land Management (BLM) on April 3, 1988, identifies the vicinity of the Arizona 1 Mine as a travel corridor for pronghorn antelope (Dodd 1988 letter, attached). This corridor is not identified in Fig 3.7-1.

The map on the right side of Fig. 1 is evidence of mountain lion presence in the proposed withdrawal area, and the column "Documented in the Proposed Withdrawal Area?" in Table 3.7-1 in the DEIS should be amended from "Possible" to "Yes" for mountain lions.

Risks to mountain lions, as Management Indicator Species (MIS), are recognized in the DEIS (p. 3-123):

> *"Large tracts of roadless habitat are necessary to maintain individual populations, and the corridors that connect these tracts are required for dispersal of lions between populations. In addition, any loss of habitat of their prey species (deer) may cause a reduction in the mountain lion population."*

DEIS 3-123. Prey species such as deer *will* be impacted by uranium mines in and near these corridors. For example, the Final EIS for a single mine, the Canyon Mine (USDA 1986), states:

> *Five elk calving areas totaling approximately 2,000 acres, have the potential to be impacted by the mine proposal... Water is an important component in elk calving habitat. Calving occurs during the dry months of May and June when water becomes limited. This makes the habitat adjacent to reliable waters particularly critical. Each of the known calving areas is within the proximity of a reliable water source." (p. 3.15, USDA 1986)*
>
> *"Approximately 9,900 acres of deer fawning habitat have been identified in the vicinity of the mine and ore haul routes... Quality forage and available water are essential components in optimum fawning habitat." (p. 3.18, USDA 1986)*
>
> *"Three [antelope] fawning areas, totaling roughly 2,300 acres have been identified in the vicinity of the mine and ore haul routes." (p. 3.18, USDA 1986)*
>
> *"Approximately 1,600 acres of turkey nesting habitat have the potential to be impacted by the mine." (p. 3.18, USDA 1986)*

Haul route traffic is likely to disrupt the use of adjacent wildlife water sources… These waters represent 13 percent of all reliable waters in the affected area which are historically used by wildlife. The predicted loss in utilization of these tanks will reduce the overall habitat carrying capacity." (p. 4.15, USDA 1986)

Impacts to deer, elk, antelope, and turkey will negatively impact wildlife populations *and* recreation (hunting, wildlife watching, photography).

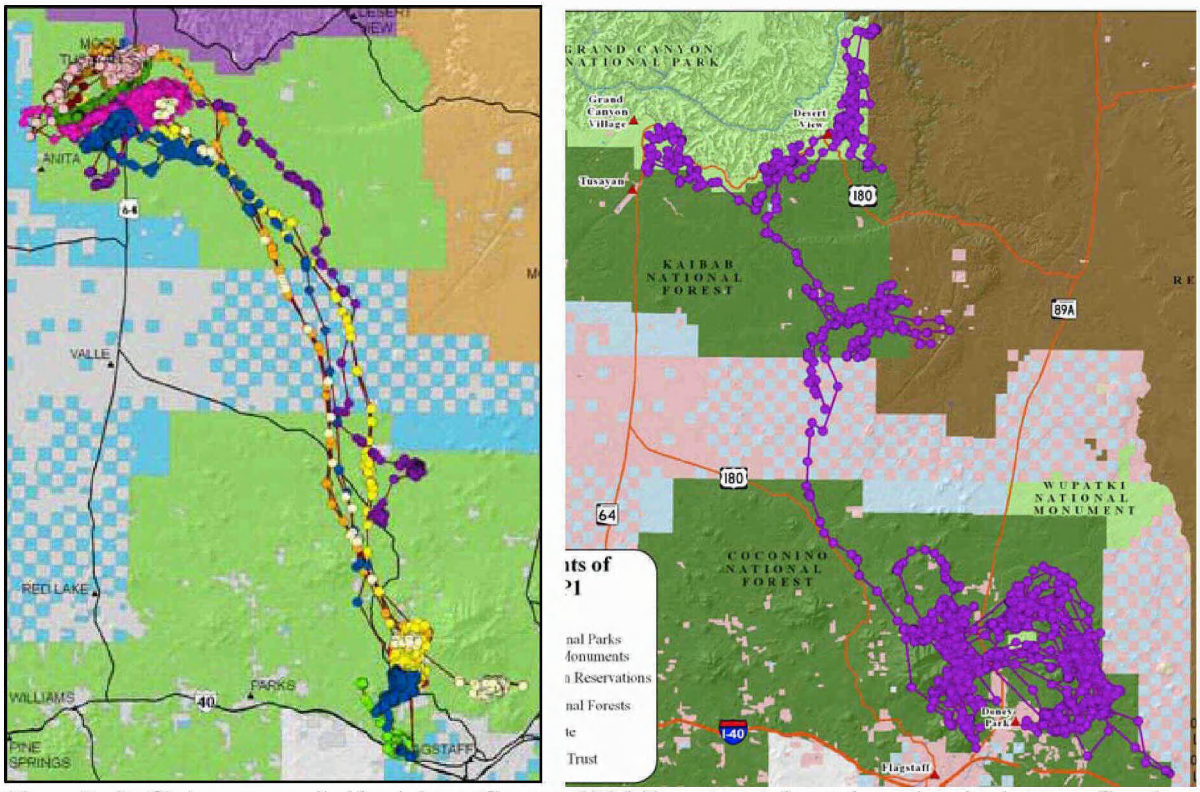

Figure 2. (Left) A map compiled by Arizona Game and Fish Department shows deer migration between Grand Canyon and the San Francisco Peaks, (Right) A map of dispersing mountain lion P1 reveals a nearly identical route used by other large mammals (NPS data).

Roads will not only remove and fragment habitat, increase mortality from vehicle collisions, release dust, spread non-native species, create noise and visual impacts; it will also lead to the negative impacts that accompany easier access to remote areas. One of these impacts, which is not addressed in the DEIS, is poaching. A letter from Richard W. Marks, then-Superintendant of Grand Canyon National Park, to BLM, dated May 6, 1988, raises concerns about increased poaching when roads create easy access to remote areas (Marks 1988 letter, attached). More recently, in proceedings at the 2009 Arizona Hydrological Society Annual Water Symposium, Don Bills of the U.S. Geological Survey (USGS) recognized that, "Increases in wildlife poaching within and near the park boundaries have been associated with increased mining exploration activities in previous years." (Bills et al.

2009) Poaching will negatively impact wildlife populations *and* recreation (legal hunting, wildlife watching, photography).

By minimizing future mining and avoiding uranium mining hazards, Alternative B assures maximum protection against unforeseen or under-predicted environmental impacts that could arise from factors discussed above. In the face of uncertain or under-predicted effects, Alternative B therefore represents the prudent and precautious course of action.

8. AIR QUALITY

a. Fine Particulate Matter Dust

The DEIS discloses that Alternatives A, B, C and D will cause 2532, 956, 1472 and 2214 tons respectively of fine particulate matter dust emissions (PM 2.5) over the twenty-year withdrawal period. Fine particulate uranium dust can emit alpha radiation and when inhaled can enter the blood stream and cause harmful health effects. DEIS' Hazardous Air Pollutant Impact Assessment neglects to analyze the potential impacts of fine particulate uranium dust originating from mining facilities and operations. Instead of analyzing those effects, the DEIS quotes ADEQ's Technical Review and Evaluation of Application for Air Quality Permit No. 46700 for Denison's Arizona 1 Mine:

> *Radiation exposure from dust associated with the mining operation is dependent on the concentrations of dust in the air and the activity of the compounds in the dust. Since these values are variable, it is not feasible to estimate the radiation impact from the dust.*

DEIS 4-20. The DEIS needs to estimate the radiation and exposure effects that would result from all phases of uranium mining. The ADEQ's refusal to analyze those effects does not license the BLM to do the same.

By minimizing future mining and avoiding uranium mining hazards, Alternative B assures maximum protection against unforeseen or under-predicted environmental impacts that could arise from factors discussed above. In the face of uncertain or under-predicted effects, Alternative B represents the prudent and precautious course of action.

9. VEGETATION

The DEIS fails to acknowledge the link between increased public and industrial access to wildlands resulting from road construction for exploration and mining, and resulting increased incidence of invasive weed spread, fire, and synergies thereof. Roads for exploration and mining would facilitate vehicle and off-road vehicle access into wildlands thus providing new vectors for weed spread. Increased public and industrial access will also facilitate increased incidence of human-caused fires. The DEIS also fails to acknowledge the strong link between the spread of invasive species, particularly cheatgrass, and fire, and the consequence of continued spread and eventual type conversion resulting from the cheatgrass fire cycle.

The DEIS states:

Impacts to the vegetation resource could result in reduced biological productivity, weed invasion, and unwanted changes in the composition and structure of vegetation communities. These changes, in turn, could influence forage availability for wildlife and livestock. Where actions result in loss or reduction of vegetative cover and/or soil erosion or compaction, cultural, wildlife, water, soil, and air resources could be impacted.

DEIS 4-113.

Loss of forage availability is not the only consequence of impacts to vegetation resources. Wildlife also use vegetation for habitat cover and may depend on vertical structure to evade predation. For example, this would be important for pronghorn antelope in the North and East parcels. Perhaps more importantly, the analysis neglects to acknowledge the influence of non-native species such as bromes, Russian thistle, and medusahead on fire regimes. Spread of these species increases the probability of fire, which will likely lead to additional spread and additional fire.

The DEIS states:

The time required for successful reclamation would depend on soil, topography, rainfall, vegetation type, and the reclamation method used.

DEIS 4-114. This statement assumes that it is possible to successfully reclaim areas. This is not necessarily the case, particularly in the most arid regions of the withdrawal area and over the large acreages where surface disturbance would occur. Reseeding arid lands is extremely difficult. The EIS should include an assessment of the viability of reclamation in arid lands to more accurately determine whether reclamation to established benchmarks is truly possible. Beyond this – invasive species such as cheatgrass, Russian thistle, Russian knapweed, medusahead, and others are extremely difficult to control and an assessment of the viability of controlling these species should also be conducted to identify the probability of successful reclamation. Also, mining companies should be held accountable for providing resources to continue reclamation activities until benchmarks for success are achieved.

The DEIS states:

Preventive measures, such as power washing of all construction vehicles prior to their entry onto construction sites and monitoring reclamation sites, would minimize establishment and spread of invasive species as part of reclamation activities.

DEIS 4-116. If that's true, these activities should be included in the list in 4.6.2. in the section titled "Compliance with Environmental Regulations and Permitting." Also, while these activities could potentially reduce spread, they would not "minimize" it because power-washing immediately off-site would simply deposit seeds on public land adjacent to said sites

(in wash-water that could facilitate weed establishment); this does not preclude establishment and subsequent spread of invasive plants. Moreover, monitoring does nothing to minimize establishment and spread.

As indicated above, this analysis does not acknowledge the strong linkages between spread of invasive species, particularly cheatgrass, and fire, and the consequences of continued spread and eventual type conversion that are part of the cheatgrass fire cycle. Thus, the cumulative impacts to vegetation are underestimated, as they are unlikely to be solely limited to areas where surface disturbance has occurred in the instances where they facilitate the spread of fire to adjacent parts of the landscape.

The following citations speak to the strong connection between fire risk and cheatgrass.

Title: Bromus tectorum cover mapping and fire risk
Author(s): Link SO, Keeler CW, Hill RW, et al.
Source: INTERNATIONAL JOURNAL OF WILDLAND FIRE Volume: 15 Issue: 1 Pages: 113-119 Published: 2006

Title: Risk-based determination of critical nitrogen deposition loads for fire spread in southern California deserts
Author(s): Rao LE, Allen EB, Meixner T
Source: ECOLOGICAL APPLICATIONS Volume: 20 Issue: 5 Pages: 1320-1335 Published: JUL 2010

The following citations speak to the relation between cheatgrass and fire:

Title: Environmental and climatic variables as potential drivers of post-fire cover of cheatgrass (Bromus tectorum) in seeded and unseeded semiarid ecosystems
Author(s): Shinneman DJ, Baker WL
Source: INTERNATIONAL JOURNAL OF WILDLAND FIRE Volume: 18 Issue: 2 Pages: 191-202 Published: 2009

Title: Fire and restoration of sagebrush ecosystems
Author(s): Baker WL
Source: WILDLIFE SOCIETY BULLETIN Volume: 34 Issue: 1 Pages: 177-185 Published: 2006

Title: Impact of prescribed fire and other factors on cheatgrass persistence in a Sierra Nevada ponderosa pine forest
Author(s): Keeley JE, McGinnis TW
Source: INTERNATIONAL JOURNAL OF WILDLAND FIRE Volume: 16 Issue: 1 Pages: 96-106 Published: 2007

Title: Investing in rangeland restoration in the Arid West, USA: Countering the effects of an invasive weed on the long-term fire cycle

Author(s): Epanchin-Niell R, Englin J, Nalle D
Source: JOURNAL OF ENVIRONMENTAL MANAGEMENT Volume: 91 Issue: 2 Pages: 370-379 Published: NOV-DEC 2009

Title: Cheatgrass (Bromus tectorum L) dominance in the Great Basin Desert - History, persistence, and influences to human activities
Author(s): Knapp PA
Source: GLOBAL ENVIRONMENTAL CHANGE-HUMAN AND POLICY DIMENSIONS Volume: 6 Issue: 1 Pages: 37-52 Published: APR 1996

Title: Effects of nitrogen availability and cheatgrass competition on the establishment of Vavilov Siberian wheatgrass
Author(s): Mazzola MB, Allcock KG, Chambers JC, et al.
Source: RANGELAND ECOLOGY & MANAGEMENT Volume: 61 Issue: 5 Pages: 475-484 Published: SEP 2008

Title: Fuel buildup and potential fire behavior after stand-replacing fires, logging fire-killed trees and herbicide shrub removal in Sierra Nevada forests
Author(s): McGinnis TW, Keeley JE, Stephens SL, et al.
Source: FOREST ECOLOGY AND MANAGEMENT Volume: 260 Issue: 1 Pages: 22-35 Published: JUN 15 2010

Title: Conversion of sagebrush shrublands to exotic annual grasslands negatively impacts small mammal communities
Author(s): Ostoja SM, Schupp EW
Source: DIVERSITY AND DISTRIBUTIONS Volume: 15 Issue: 5 Pages: 863-

Title: Effects of fire and environmental variables on plant structure and composition in grazed salt desert shrublands of the Great Basin (USA)
Author(s): Haubensak K, D'Antonio C, Wixon D
Source: JOURNAL OF ARID ENVIRONMENTS Volume: 73 Issue: 6-7 Pages: 643-650 Published: JUN-JUL 2009

Title: Post-fire plant recovery in the Mojave and Sonoran Deserts of western North America
Author(s): Abella SR
Source: JOURNAL OF ARID ENVIRONMENTS Volume: 73 Issue: 8 Pages: 699-707 Published: AUG 2009

The DEIS analysis omits several narrowly-endemic plant species of the Grand Canyon region or plant species whose genetics are poorly understood. All of these species may occur in the withdrawal area and could be impacted by ground disturbing activities relating to mining or exploration (Table 1).

By minimizing future mining and avoiding uranium mining hazards, Alternative B assures maximum protection against unforeseen or under-predicted environmental impacts

that could arise from factors discussed above. In the face of uncertain or under-predicted effects, Alternative B therefore represents the prudent and precautious course of action.

Table 1. Narrowly endemic plant species or plant species whose genetics are poorly understood not included in the DEIS that may occur within the proposed withdrawal area and whose populations could be impacted by uranium exploration, mining, and associated ground-disturbing activities.

Agave phillipsiana	*Delphinium tenuisectum*	*Opuntia cf. laevis*
Aletes macdougalii ssp. macdougalii	*Dodecatheon pulchellum var. zionense*	*Opuntia phaeacantha var. mojavensis*
Allium bigelovii	*Draba asprella var. kaibabensis*	*Opuntia pinkavae*
Amsonia tomentosa var. stenophylla	*Draba asprella var. stelligera*	*Ostrya knowltonii*
Amsonia tomentosa var. tomentosa	*Echinocactus polycephalus xeranthemoides*	*Paronychia sessiliflora*
Antirrhinum kingii	*Encelia resinifera var. tenuifolia*	*Pediocactus paradinei*
Arnulocaulis leisolenus var. leisolenus	*Epipactis gigantea*	*Petalonyx nitidus*
Arabis gracilipes	*Ericameria arizonica*	*Phacelia filiformis*
Arctomecon californica	*Ericameria cervina*	*Phacelia glechomiifolia*
Argemone arizonica	*Erigeron lobatus*	*Phacelia higginsii*
Asclepias viridiflora var. lanceolata	*Eriogonum heermannii var. subracemosum*	*Phacelia hughesii*
Astragalus septentrionoma	*Eriogonum zionis var. coccineum*	*Phacelia incana*
Astragalus subcinereus	*Euphorbia aaron-rosii*	*Phyllodoce empetriformis*
Beckmannia syzigache	*Evolvulus nuttallianus*	*Platanthera sparsiflora*
Betula occidentalis	*Fimbristylis thermalis*	*Psorothamnus arborescens var. pubescens*
Boehmeria cylindrica	*Fraxinus cuspidata var. macropetala*	*Pteryxia petraea*
Brickellia floribunda	*Fritillaria atropurpurea*	*Ranunculus uncinatus*
Calypso bulbosa	*Galium bifolium*	*Sairocarpus kingii*
Camissonia confertiflora	*Haplopappus cervinus*	*Salvia davidsonii*
Camissonia specuicola ssp. hesperia	*Hesperodoria salicinus*	*Sclerocactus parviflorus*
Camissonia specuicola var. hesperia	*Hesperodoria scopulorum var. scopulorum*	*Scutellaria platyphylla kaibabensis*
Carex alma	*Hesperoyucca newberryi*	*Selaginella watsonii*
Carex scirpoidea var. curatorum	*Hymenoxys subintegra*	*Silene rectiramea*
Castilleja kaibabensis	*Iliamna grandiflora*	*Sphaeralcea leptophylla*
Ceanothus martini	*Ipomopsis congesta var. frutescens*	*Talinum validulum*
Cheilanthes fendleri	*Ipomopsis spicata ssp. tridactyla*	*Thelypodiopsis purpusii*
Cheilanthes villosa	*Ivesia arizonica*	*Thelypteris puberula var. sonorensis*
Chrysothamnus molestus	*Leptoloma cognatum*	*Trichachne californica*
Cirsium hualapaiense	*Lesquerella kaibabensis*	*Vanclevea stylosa*
Cirsium mohavense	*Lomatium foeniculaceum var. macdougalii*	*Xylorhiza tortofolia var. imberbis*
Cirsium rydbergii	*Machaeranthera mucronata*	*Yucca angustissima x baccata*
Clematis hirsutissima var. hirsutissima	*Mentzelia abyssa*	*Yucca elata x baccata*
Crossosoma parviflorum	*Mentzelia hualapaiensis*	
Cryptantha capitata	*Mortonia scabrella*	
Cylindropuntia abyssa		

10. ECONOMIC CONDITIONS

As described below, the DEIS exaggerates the amount of ore and economic benefits that would be realized from mining. The DEIS' Reasonably Foreseeable Development Scenario (RFD) relies on optimistic market assumptions that fail to account for market fluctuations and downturns relating to global-scale events. In total, economic conditions in the DEIS exaggerate economic benefits to be expected from mining activities.

a. Valid Existing Rights and Economic Assumptions About Future Mines

The basis for the assessment of impacts for all of the alternatives is derived from activity assumptions developed in the "Reasonably Foreseeable Development" (RFD) scenarios (Appendix B of the DEIS). Its authors note on page B-1: "The RFD is by its nature speculative in attempting to predict future types and levels of locatable mineral exploration and development. The important feature of the RFD is not its numeric accuracy when it comes to drill holes, ore tonnage, mines, or acres, but rather that it uses consistent assumptions to portray the relative levels of reasonably foreseeable future actions across the alternatives." While applying assumptions consistently throughout the assessment is appropriate, beginning with accurate assumptions can be even more important in determining impacts from each alternative.

The RFD assumes that 11 mines would be developed under Alternative B. This assumes that the four mines with previously approved plans of operations would be mined. But these plans were approved in the 1980s, as were their assessments of environmental impacts. In the case of the Canyon Mine, the U.S. Forest Service has indicated that a new plan of operations and a new environmental impact statement will need to be completed before that mine can be reopened (personal communication with Kaibab Forest Supervisor Mike Williams). Changing environmental, economic, and legal conditions may make it cost prohibitive to invest in the process of permitting and operating a uranium mine near the south entrance of Grand Canyon National Park. Therefore, we question whether it is reasonable to assume "business as usual" and that all mines with preexisting plans of operations will be mined.

The RFD further assumes that seven mining claims that have confirmed uranium resources will also be mined under Alternative B. "For the purposes of the RFD scenario, it is assumed that these breccia pipes have valid existing rights and would be mined." However, the BLM project manager Chris Horyza stated publicly on April 7 that none of the claims within the proposed withdrawal area have valid existing rights. Again, we question whether it is reasonable to assume that these seven mines would be developed if the Secretary of the Interior's proposed withdrawal is adopted. An objective assumption would be to start with the fact that none of these claims have valid existing rights, rather than to assume that they do (page B-39).

The effect of these assumptions is to inflate the environmental consequences of Alternative B, assessed in Chapter 4 of the DEIS. Similar assumptions are made in assessing consequences for Alternatives C and D. In doing so, the DEIS minimizes the potential beneficial environmental impacts that would occur if new uranium claims were not allowed to be developed during the 20-year withdrawal. The Final Environmental Impact Statement should use an objective set of activity assumptions when assessing the environmental consequences that would result under Alternatives B, C and D.

In addition, the BLM and associated consultants and contractors should be held accountable for failing to provide an objective and independent source for a key assumption used in the DEIS analysis of economic impacts derived from uranium mining in northern Arizona. As concluded in Attachment 1: "*The source of the estimated output of 3 million pounds of U3O8 per mine is indicated on page B-26 of Appendix B as the American Clean*

Energy Resources Trust (ACERT), which has a vested interest in the uranium assets of northern Arizona on behalf of its members. ACERT issued an economic impact report prepared by Tetra Tech entitled "Economic Impact of Uranium Mining on Coconino & Mohave Counties, Arizona" in September 2009." By relying on the Tetra Tech report, the agency introduced an unwarranted and blatant bias into a NEPA analysis that is supposed to objectively evaluate the impacts of the proposed action.

b. DEIS Overestimates of Economic Impact of Uranium Mining

Based on an independent peer review of potential economic impacts on mining from a withdrawal, the economic benefits attributed to mining in the DEIS are baseless.[1] The peer review report provides the following assessment:

> *Throughout the DEIS, we note a variety of inconsistencies in the use of data and inaccuracies in modeling the economic impact of the withdrawal that cause us to seriously question the veracity of the final conclusions related to the four withdrawal alternatives. Most of our concerns fall under questioning of the methodology of the economic impact analysis and its assumptions.*
>
> *The analysis presented in the DEIS related to the economic impact of uranium mining in northern Arizona contains errors in inputs and assumptions as well as interpretation of the economic output and value added of mining activities. These errors demonstrate a serious misunderstanding of economic impact theory on the part of the authors.*
>
> *We question the assumption for the average uranium ore body per mine of 3 million pounds or 1,500 tons of U3O8. This assumption is more than twice the expected output from existing mines that are currently in production or permitted and planned for production in the near future. It is a fundamental assumption that is used throughout the economic analysis.*
>
> *The economic impact analysis of uranium mining extends well beyond the two counties in Arizona. If the DEIS is to evaluate the impact of mining on northern Arizona, there is little need to extend the impact to the distant San Juan County, Utah where processing of the uranium ore will occur. That processing operation is wholly separate from the mining of the ore and does not impact northern Arizona.*
>
> *By including the uranium processing operation in Blanding, Utah in the economic impact assessment on northern Arizona, the economic impact of mining is greatly expanded in the report and could mislead lay persons on the true impact of uranium*

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[1] The full report is provided in Attachment 2 to our comments. It was written by Rick Merritt, President of Elliott D. Pollack & Company. Mr. Merritt is coauthor of the *Arizona Statewide Economic Study* that established an economic development strategy for the State of Arizona and its regions. Mr. Merritt and associates of the firm have produced a number of economic impact reports for private clients on mining in Arizona.

mining in northern Arizona. In addition, any profits related to the sale of yellow cake will flow out of the U.S. to the Canadian company that operates the Blanding, Utah mill and its shareholders. This fact is not addressed anywhere in the DEIS.

The economic impact of mining in northern Arizona should be based on the value of the ore as it is extracted from the ground and transported to Utah. We would recommend that the DEIS address this issue which would permit the development of estimates of the economic impact of uranium mining on northern Arizona.

The Final Environmental Impact Statement should include a careful response to Rick Merritt's full report.

11. VISUAL RESOURCES

For reasons explained below, the DEIS does not adequately analyze impacts of mining to visual resources.

Grand Canyon National Park draws visitors from across the country and the world. These visitors circulate photographs of the spectacular vistas within and surrounding the park, through modes ranging from high-art photography to social media to family gatherings. These photographs have historically inspired millions of people to visit each year, helping us to share our American landscapes and culture, as well as creating economic revenue.

The Grand Canyon region hosts a rare expanse of large, mostly roadless and undeveloped land, and visitors recognize the special sense of place that accompanies protected wildlands. There is no doubt that the Grand Canyon National Park is a showcase and a symbol of our nation. Travel through the lands surrounding Grand Canyon is a part of the visitor experience, as is visiting other parks and national monuments, public lands, tribal lands, and small businesses throughout southern Utah and northern Arizona. Enhancing this experience is the potential to witness truly dark skies; for many, northern Arizona is the first place they ever get to see the Milky Way galaxy.

Visitors will notice if the landscape becomes scarred by linear structures such as roads and power lines, and dominant features such as mine headframes. In the darkness of night, isolated light sources become focal points in the otherwise undeveloped expanse. Instead of envying our nation for its foresight in protecting the Grand Canyon and its viewshed, many will notice visual intrusions and wonder how we could allow them in such a special place.

a. The DEIS Should Prioritize Visual Resources of Grand Canyon National Park, Vermilion Cliffs National Monument, Grand Canyon-Parashant National Monument, Kanab Creek Wilderness, Mt. Trumbull Wilderness, Mt. Logan Wilderness, Paria Canyon-Vermillion Cliffs Wilderness, and Saddle Mountain Wilderness.

The Organic Act [16 USC 1] mandates national parks to conserve unimpaired scenery, and The Wilderness Act [16 USC 1131-1136 2(c)1] requires that each wilderness area "generally appears to have been affected primarily by the forces of nature, with the

imprint of man's work substantially unnoticeable" (emphasis added). Visual resources extend beyond political boundaries, and impacts to land under-managed by one agency can impair and conflict with the purpose of land managed by another. Because viewing the landscapes, wildlife, and skies visible in and from protected public lands constitutes the primary reason for most visitation and recreation in the region, and visitation is a primary economic driver, viewsheds should be preserved to protect economic interests and cultural priorities. Viewsheds are valued highly by visitors from near and far, and altering them will also be a loss to those who consider unimpaired vistas to bring spiritual fulfillment and emotional replenishment. These qualities are irreplaceable and increasingly rare. Many visitors only experience these vistas once in their lifetime. Therefore, the protection of viewsheds from lands with national park, national monument, or wilderness designations should be prioritized over temporary actions in adjacent lands that could create temporary or long-term visual impacts.

b. The DEIS Should Acknowledge Its Underestimation of Impacts

Effects on Visual Resources are based on consideration of the viewshed from roadways, popular scenic viewpoints ("Key Observation Points"), and trailheads. While the viewsheds from these locations are an integral part of the regional visitor experience, they fail to protect those who pursue backcountry experiences. Those who venture away from major roadways in pursuit of untrammeled landscapes are the most likely to be perturbed by visual intrusions from mining and exploration activities. Power lines and roadways are linear impacts that span great distances and are difficult to mask. They change the form, line, color, and texture in the viewshed as they bisect the landscape; dust rising from roadways can increase their detectability; lights, even if they point downward, will be more visible to those participating in backcountry camping away from other developments, or night hikes.

c. Future Conditions Must be Considered

The DEIS assumes that dense ponderosa pine forests will mask visual intrusions in the North and South Parcels. Vegetation thinning, as part of the Four Forests Restoration Initiative on the South Parcel, or as part of individual ecological restoration projects on the North Parcel, will greatly increase visibility through ponderosa pine forests. Also, fires can open large swaths of land, and fire occurrence can increase when there is increased vehicle access through road building or social trails.

d. Alternative B Is The Only Alternative that Protects Visual Resources

Absent a withdrawal under Alternative B, protection of visual resources is left to BLM and USFS visual resource management systems (Visual Resource Management, Scenery Management System, and Visual Management System) and this permits the impairment of national park, national monument, and wilderness area viewsheds.

Potentials for impairment include:

East Parcel: The viewshed from Vermilion Cliffs National Monument includes most or all of the East Parcel. The East Parcel has no tall vegetation or topographic features capable of masking mine operations, exploration activities, roads, or power lines. Alternatives C and D may encourage highly concentrated exploration in a smaller area, and will not prevent mine development. Roads and power lines associated with exploration and mine development will be visible under these alternatives, impairing the viewshed of Vermilion Cliffs National Monument, Paria Canyon-Vermilion Cliffs Wilderness, and Saddle Mountain Wilderness. Highway 89A north of the East Parcel is a popular travel corridor that is an integral part of the visitor experience for many tourists. It provides access to the North Rim of Grand Canyon National Park and other regional national parks and monuments, as well as the Lees Ferry river access, wilderness areas, popular hiking trails, hunting areas, and local businesses. Any mines would alter the existing character, be highly visible, and would not meet Class II objectives. Much of the East Parcel is visible from the House Rock Valley Overlook on Highway 89A (Fig. 3.9-2) and from Point Imperial within Grand Canyon National Park (Fig. 4.9-6). Alternative D leaves an area open to exploration and mining that is considered visually valuable (Fig. 2.4-6).

South Parcel: Some areas on the South Parcel rated as "Low" are adjacent to the SR 64 through Grand Canyon National Park, and will be visible from the road and/or Grandview Point (Figs. 3.9-3, 4.9-4). Other "Low" areas are visible from several Key Observation Points in Grand Canyon National Park (Figs. 3.9-3, 4.9-1, 4.9-3, 4.9-4, 4.9-5, 4.9-6). Night lighting impacts are possible at all Grand Canyon National Park Key Observation Points (Table 4.9-4). Alternatives C and D may encourage highly concentrated exploration in a smaller area, and will not prevent mine development. Alternatives C and D both leave areas open to exploration and mining that are considered visually valuable (Figs. 2.4-4, 2.4-7).

North Parcel: Portions of the North Parcel are visible from Sowats Point (Fig. 4.9-1). More of this parcel is likely to be visible from high points in Grand Canyon-Parashant National Monument, including Mt. Logan Wilderness and Mt. Trumbull Wilderness. Linear features such as roads and power lines will alter the form, line, color, and texture of ponderosa pine forests; dust will decrease the visibility on roads. There is a high probability of mines in Class II areas, in "high use and visually sensitive areas [where they] could be difficult to mitigate to meet the Class II objectives" (p. 4-166). Alternatives C and D may encourage highly concentrated exploration in a smaller area, and will not prevent mine development. Alternatives C and D both leave areas open to exploration and mining that are considered visually valuable (Figs. 2.4-2 and 2.4-5).

12. SOUNDSCAPES

a. Background Conditions

Grand Canyon National Park struggles to achieve restoration of a natural soundscape. In unimpaired locations, the ambient noise level is extremely low – just 20.8 dBA on

average. DEIS at 4-191. Locations impaired by heavy air tour traffic can average >65 dBA, a situation that the National Park Service is attempting to remedy with the *Proposed Action Special Flight Rules Area in the Vicinity of Grand Canyon National Park: Actions to Substantially Restore Natural Quiet*; the Draft Environmental Impact Statement is now accepting public comment (NPS 2011, Fig. 4.8, p. 174). This document sets "a minimum restoration goal" of 50 percent of the park restored to natural quiet for 75 percent to 100 percent of each and every day (NPS 2011, p. v; emphasis copied from document).

EPA acoustical guidelines designate an Ldn of 55 dBA as the maximum day-night average noise level that protects public safety. DEIS at 4-190. Title 36, Parks, Forests, and Public Property, Part 2.12, Audio Disturbances, declares:

> *(a) The following are prohibited:*
>
> *(1) Operating motorized equipment or machinery such as an electric generating plant, motor vehicle, motorized toy, or an audio device, such as a radio, television set, tape deck or musical instrument, in a manner: (i) That exceeds a noise level of 60 decibels measured on the A-weighted scale at 50 feet; or, if below that level, nevertheless; (ii) makes noise which is unreasonable, considering the nature and purpose of the actor's conduct, location, time of day or night, purpose for which the area was established, impact on park users, and other factors that would govern the conduct of a reasonably prudent person under the circumstances.*

The 2003 Coconino County Comprehensive Plan, policy 36, is:

> *The impacts of noise generated by major commercial or industrial uses should be considered when reviewing development projects, especially when adjacent to residential and recreation areas.*

Coconino County Comprehensive Plan Policy 36.

NPS Director's Order 47, Soundscape Preservation and Noise Management,

> *"articulate[s] National Park Service operational policies that will require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources."*

NPS Director's Order 47.

NPS Management Policies (2006), section 8.2.2 mandates that park managers:

> *Monitor, in and adjacent to parks, noise-generating human activities—including noise caused by mechanical or electronic devices—that adversely affect visitor opportunities to enjoy park soundscapes. Based on this*

information, the Service will take action to prevent or minimize those noises that adversely affect the visitor experience or that exceed levels that are acceptable to or appropriate for visitor uses of parks.

b. Noise from Mining and Exploration Adversely Impact Public Lands Visitors

Sounds can negatively impact visitor experience and can negatively impact recreation such as hiking, backpacking, horseback riding, river recreation, enjoying viewpoints, camping, and hunting. In order to achieve the Need for Action in the DEIS, the following should be protected from adverse effects:

Recreational values and opportunities for visitors to the region and for the estimated 4.4 million people who visit Grand Canyon National Park each year.

Designated and proposed wilderness areas, areas allocated for maintenance of wilderness characteristics, and the relevant and important resources for which Areas of Critical Environmental Concern (ACECs) were designated.

Natural soundscapes, designated quiet zones, and quality-of-life values for both area residents and visitors, including intangible issues such as peace, solitude, heritage, and sense of place.

DEIS at 1-4 to 1-5.

c. Potential Noise Impacts to Wilderness Areas Must Be Evaluated and Disclosed

The DEIS's assessment of noise impacts is limited. The DEIS identifies noise sensitive areas (NSAs) as places:

[w]here excessive noise interferes with the normal use of the location. Typical NSAs include parks and wilderness areas.

DEIS at 3-197. The DEIS ignores noise impacts to wilderness areas. Wilderness areas proximate to the proposed withdrawal include Kanab Creek Wilderness, Mt. Trumbull Wilderness, Mt. Logan Wilderness, Paria Canyon-Vermilion Cliffs Wilderness, and Saddle Mountain Wilderness.

d. Sound Can Negatively Impact Wildlife and Must Therefore Be Assessed and Disclosed in the DEIS

Soundscapes should not only be protected for people, they should also protect wildlife. According to the Organic Act [16 USC 1], the purpose of the National Park Service includes conserving "the wild life therein". Sound studies and modeling for the DEIS are weighted to represent human hearing. The DEIS should consider that wildlife can be harmed by sound disturbances. According to a recent sound study, humans will perceive an

approximately 100-fold sound increase in some areas of Grand Canyon National Park, due to mining activities, but the actual measured sound in these locations will be 2000 times ambient sound (Ambrose 2010). This, for example, could impact bats, of which there are at least 20 species in Grand Canyon National Park, 10 being species of concern to one of the wildlife governing agencies (NPS 2010, pp. 22-24). Bats rely on sound to navigate and feed.

If hibernating creatures are disturbed, they could expend more energy than they have reserved for the winter season, leading to mortality.

e. Impacts to Soundscapes Are Underestimated

When combined with other sources of soundscape impairment in Grand Canyon National Park (i.e., aircraft), mining activities will unreasonably increase impairment of the park's soundscape. Low-level aerial surveys for mineral exploration have to be considered with the cumulative impacts from other aircraft flying over the Grand Canyon. (p. 4-197). Aircraft noise travels outward from the flight path and permeates deep within canyon environments, destroying wilderness character. Prospecting flights will spend extended time periods circling over or repeatedly passing a limited area, destroying recreational experiences for people who may be visiting the area only once in their lifetime.

Increased access along new roads or overland routes created for exploration and mining will enable recreational motorized vehicle use, exacerbating noise problems. DEIS 4-201. Although ore trucks made up a small portion of vehicles registered in the United States in 2010, compared to average traffic levels through small communities and popular tourist areas, the impact will be significant. DEIS 4-196-197.

The number of mines predicted under Section 4.10.9 Cumulative Impacts (p. 4-200) is far less than what is predicted in the Reasonably Foreseeable Future Activity (pp. 2-11 to 2-28). These numbers should be reconciled. When the true cumulative impact potential is recognized, Alternative B clearly emerges as the only alternative that will meet the DEIS needs.

f. Alternative B is the Only Alternative That Meets the DEIS's Purpose and Need

Nearly all activities recorded or modeled fail to meet EPA and Title 36 guidelines for maximum allowed sound levels. All activities reported on in Table 4.10-3 except the ore bucket and electric transformer exceed 69 dBA at 50 feet; all activities in Table 4.10-4 exceed 73 dBA at 50 feet; all activities in Table 4.10-5 except the transformer exceed 72 dBA at 50 feet. According to Table 4.10-4, the distance from exploration and development activities to achieve attenuation to ambient sound levels will be 0.9 to 2.3 miles (1.4 to 3.7 km) from the source of sound; according to Table 4.10-5, the distance from mining operation activities to achieve attenuation to ambient sound levels will be 0.4 to 1.5 miles (0.7 to 2.4 km), and the distance from ore hauling activities to achieve attenuation to ambient sound levels will be 1.4 miles (2.2 km). Therefore, several mines within a parcel could create an industrialized landscape where, after leaving the sounds of one mine, a visitor rapidly enters the soundscape of another mine. Networks of roads could distribute sound impacts

throughout the North, East, and South Parcels. Since many people only visit the area once in their lifetime, this is an unreasonable impact, regardless of the total time that the impact persists. Table 4.10-6 identifies 72 percent of Grand Canyon National Park as being within an area where mining noise could be audible. Mining noise could be clearly audible (>6 dBA above ambient sound levels) in 39 percent of the park. Alternatives C and D could concentrate exploration and mining activities, but would not eliminate them. By moving exploration and development activities further from improved roadways, these alternatives could increase the distance travelled by every vehicle associated with exploration and mining activities, increasing the area receiving noise impacts from ore hauling and roadway improvement activities. This would spread noise impacts around a network of roads spanning the parcels.

13. AMERICAN INDIAN RESOURCES

Alternative B would have the least impact on "American Indian resources" (DEIS 4.12), "cultural resources" (DEIS 4.11), and "social conditions" (DEIS 4.15), which include public health and safety and "environmental justice." As acknowledged on page 4-211 of the DEIS, "The Navajo Cultural Landscape, which encompasses the entire Coconino Plateau, a Navajo traditional use area, a Hopi traditional use area, and the Havasupai traditional use range are also at high risk for disturbance" if uranium mining is allowed to continue. It further states that cumulative impacts under Alternative A (no withdrawal) "could desecrate traditional cultural and sacred places" and even exploratory drilling could disturb, harm, or "kill" sacred sites (DEIS, p. 4-212).

14. WILDERNESS

The DEIS assumes that any disturbance to the Designated Wilderness and NPS Wilderness areas would be limited to only 1-5 years. This is based on a false model of a limited number of mining sites where the site was mined and remediated in a limited time period. In fact, most of the uranium mine sites in the Grand Canyon ecoregion and Arizona Strip have a record of extended mining of over 20 years with on and off periods of activity. In the meantime, the mining equipment, facility and access roads exist without any remediation. Secondly, by opening any area up to more exploration, there will be continuous activity of equipment, drilling, and road/access building with substantial impairment of the wilderness characteristics of the area forever. Additionally, exploration of an area will not likely be limited to a 1-5 year period. Past experience has demonstrated that exploration will come in waves and be both in the form of land-based travel and helicopter transport of equipment and personnel.

The DEIS assumes that any disturbance to the Designated Wilderness and NPS Wilderness areas would be limited. However, each 20 acres of mine footprint would negatively impact the wilderness characteristics of many square miles of land. These impacts from the activities associated with uranium mining include noise, visual impairment, dust, truck traffic, secondary traffic and OHV use resulting from new road access, low flying aircraft and disturbance to wildlife. All of these would seriously detract from the outstanding opportunities for solitude and enjoyment of a primitive area over a broad landscape.

Since noise and visual impacts cross political boundaries, all wilderness areas in close proximity to the Parcels can be impacted by mine noise. Table 4.10-6 identifies the distance that mining operations are audible as 30 km (18.6 miles) from the sound source. Mt. Trumbull Wilderness and Mt. Logan Wilderness are approximately 5 and 10 miles from the North Parcel and may be subject to noise impacts just as Saddle Mountain Wilderness, Kanab Creek Wilderness, and Paria Canyon-Vermilion Cliffs Wilderness are. Aerial exploration will harass visitors to Wilderness areas. As mentioned under the Soundscapes section of this document, potential noise impacts to Wilderness Areas must be acknowledged.

Visual impacts from exploration and mine operations will also harm Wilderness Areas. In remote Wilderness Areas with truly dark skies, such as the five that are proximal to the Withdrawal Area, isolated lights on mine structures will draw visitors' attention, ruining the untrammeled and undeveloped character of the landscape. As mentioned under the Visual Resources section of these comments, elevated topographic features within Wilderness such as cliff faces and hills enable views far across the landscape. Linear features such as roads and power lines are difficult to mask and will damage the wilderness character of designated and proposed wilderness areas.

Anthropogenic activities involving manipulation of vegetation and soils, such as mining and road building, leave a permanent reminder of human influence in otherwise untrammeled and undeveloped areas. Arizona soils tend to be covered by thin topsoil layers and/or biological soil crusts, which concentrate in the top 3 mm of soils and take decades to begin recovery after disturbance (Belnap and Gillette 1997, Belnap and Gillette 1998). Once soil crusts or topsoil are damaged, site productivity is reduced and erosion is enhanced, inhibiting a return to a natural state. The DEIS states that the Wilderness Areas proximal to the Withdrawal Area, protected as designated Wilderness for 26 years, "contain little to no evidence of surface disturbance, other than former vehicle ways and scattered prospects" (DEIS p. 3-214, emphasis added). This is evidence that temporary roads, overland routes, exploratory activities, and mines leave permanent scars on the landscape and should be considered incompatible with proposed Wilderness and viewsheds from proposed and designated Wilderness.

Public lands with wilderness characteristic (BLM 2008c: Map 2.7) within the proposed withdrawal area include Hack/Robinson and Grama Canyons (also Wildlife Habitat Areas; BLM 2008b) and Upper Kanab Creek (also an ACEC; BLM 2008a). Areas of Critical Environmental Concern (BLM 2008a: Map 2.7) within the proposed withdrawal area include two supposedly protected areas likely to be impacted by mining:

> Kanab Creek ACEC: This ACEC contains significant, regionally important cultural resources vulnerable to vandalism and impacts. The riparian area is a natural system that includes rare, endemic plant communities and suitable unoccupied habitat for endangered Southwest willow flycatcher. It has regional significance. The riparian area is fragile, irreplaceable, and unique and is vulnerable to adverse change. Cause for concern is dewatering, loss of habitat due to development, flooding, and alteration of

the stream channel. Significant lands of regional importance containing wilderness characteristics with a high degree of naturalness, outstanding opportunities for solitude, and opportunities for primitive and unconfined recreation (BLM 2008 :Appendix H-2).

Moonshine Ridge ACEC: This ACEC contains significant, regionally important cultural resources vulnerable to vandalism, OHV damage, and impacts. Significant regional scenic values of the Shinarump cap on Yellowstone Mesa, visible from Highway 389. This ACEC also contains habitat essential for rare, endemic threatened plant species and their communities of national worth and distinctiveness. The pincushion cacti and their communities are fragile, sensitive, rare, irreplaceable, unique, threatened, and vulnerable to adverse change. The direct threat is destruction from vehicle and OHV use (BLM 2008: Appendix H-3).

On the Tusayan Ranger District of the Kaibab National Forest, which is also within the proposed withdrawal area, the Coconino Rim Inventoried Roadless Area (IRA) includes numerous claims (GCT 2009). Mining and exploration activities in this area would diminish its wilderness characteristics.

15. SOCIAL CONDITIONS AND CULTURAL RESOURCES

The DEIS is deficient when it fails to take into account the legacy of harm and cumulative impacts caused by past uranium activities near Navajo communities in its assessment of environmental injustice impacts. DEIS at 4-239. It concludes that "there are other non-environmental justice communities within the study area that could be exposed to the same health risks; therefore, these effects are not expected to be disproportionate....to tribal environmental justice communities." Non-tribal communities, such as St. George, Orderville, and Hildale cited in the DEIS, and non-environmental justice communities have been unaffected by several decades of uranium mining that occurred on Navajo lands, beginning in the 1950s. Unlike Navajo communities, they are not currently suffering from the preexisting cumulative impacts of past uranium activities.

Navajo people will therefore be disproportionately affected by the cumulative impacts of new uranium mining. NEPA requires the consideration of "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency...undertakes such other activities." 40 CFR 1508.7. The DEIS should acknowledge that implementing Alternative A will cause significant impacts to Navajo people because it will result in "Disproportionately high and adverse environmental health impacts to an identified minority or low-income population that appreciably exceed those to the general population around the project area." DEIS at 4-232.

16. CONCLUSION

Thank you again for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the Proposed Northern Arizona Mineral Withdrawal. For reasons explained above, our organizations support Alternative B, your proposal to withdraw

1,010,776 acres of National Forest System lands and public lands in northern Arizona from location and entry under the Mining Law of 1872, (30 U.S.C. 22–54) (Mining Law), subject to valid existing rights.

Sincerely,

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APPENDIX 1

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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ARIZONA
PRESCOTT DIVISION

CENTER FOR BIOLOGICAL DIVERSITY; GRAND CANYON TRUST; and SIERRA CLUB, Plaintiffs vs. RICHARD STAHN, in his official capacity as District Ranger for the Tusayan Ranger District, on the Kaibab National Forest; and UNITED STATES FOREST SERVICE, an agency in the U.S. Department of Agriculture, Defendants.	CIV 08-8031-PCT-EHC SECOND DECLARATION OF TAYLOR McKINNON

I, Taylor McKinnon, declare as follows:

1. I am a resident of Flagstaff, Arizona, where I have lived most of my life. I graduated from Prescott College in 1997 with a BA in environmental studies. I am currently employed as a Public Lands Advocate for the Center for Biological Diversity, and am also a member of the Center for Biological Diversity.

2. On March 29, 2008 at approximately 1:00 p.m., I visited one of the sites where Vane Minerals is conducting exploratory drilling for uranium pursuant to the December 20, 2007 Decision Memo at issue in this case. I visited the "CP-3" site, which is accessed by Forest Service Road 682 and is found in the northeast portion of the project area, approximately 2 miles south of Grand Canyon National Park. The drilling site was located where Forest Road 682 crosses Deer Tank Wash, approximately one and a third miles west of the junction of Forest Road 682 and Highway 64. The drilling site was located in the bottom of Deer Tank Wash, approximately twenty or thirty yards north of the road.

3. At the CP-3 site, I observed one drill rig, with a green plastic hose that stretched from the drill rig to an open tractor trailer. Also on site was a flat bed truck, a small SUV, a tanker truck and one RV. An employee of Del Rio Drilling was staying in the RV. We discussed the drilling operation. He explained that the drilling had been completed on Friday, March 28th and that the open tractor trailer was being used to store drilling wastes. My understanding based on viewing this site and my discussion with the employee is that the green hose was being used to transport the uranium drilling waste from the drill rig to the tractor trailer for temporary storage purposes. I do not know if this trailer was being used to store all or a portion of the drilling waste. A photo of this, taken by me at approximately 1:00 pm on March 29, 2008, is attached hereto as Exhibit A.

4. The December 20, 2007 Decision Memo and February 6, 2008 Amendment require Vane Minerals to use a "portable tank" in place of a fluid waste pit at CP-3 and a few other sites. Pltfs' Exhibit 1 at 3; Pltfs' Exhibit 3 at 1. The tractor trailor being used for storing the drilling fluids and residue at the CP-3 site is not a "portable tank" that should be used for storing this type of liquid fluid and residue. Instead, these types of tractor trailors are commonly used to haul solid materials, such as gravel. See e.g., http://en.wikipedia.org/wiki/Dump_truck#Semi_trailer_bottom_dump_truck

5. At the CP-3 site, it was clear to me that the uranium drilling waste that had been transported from the drill rig to the tractor trailer had been leaking from the trailer onto the ground, and had also spilled over the top of the trailer onto the ground in the bottom of Deer Tank Wash. The residue formed a white-yellow dried mud flow extending about twenty feet downhill from beneath the trailer. This can be seen in additional photos taken by me at the CP-3 site on March 29, 2008, attached hereto as Exhibits B-C.

6. The February 6, 2008 Amendment to the December 20, 2007 Decision Memo requires open fluid waste pits to be netted on the top to prevent access to the pits by birds. Pltfs' Exhibit 3 at 1. The Decision Memo also requires open fluid waste pits to be fenced along the sides to protect wildlife. Pltfs' Exhibit 1 at 3. Even though drilling fluid had spilled onto the ground at the site, there was no fencing or netting placed over the spilled waste, allowing wildlife and birds easy access to it. See Exhibit C, attached hereto. In addition, there was no netting or cover over the tractor trailer, again allowing birds open access to the drilling fluids and residue. See Exhibits D-E, attached hereto.

7. On March 28, 2008, I attended a Congressional field hearing in Flagstaff, Arizona regarding a bill sponsored by Congressional Representative Raul Grijalva, which would ban mineral exploration from a million acres near the Grand Canyon. Witnesses at the hearing who support the bill included representatives from the Navajo, Havasupai, Hualapai, Hopi and Kaibab Piute Indian tribes, and others. The Supervisor of Grand Canyon National Park expressed significant concerns related to uranium development near the Park. A news article summarizing the field hearing is attached as Exhibit F.

8. Attached hereto as Exhibit G is a guest opinion by Representative Raul Grijalva that was recently published in the Tucson Citizen.

9. Attached hereto as Exhibit H is a March 30, 2008, editorial of the Arizona Republic regarding uranium exploration and mining near the Grand Canyon and the March 28, 2008, Congressional field hearing.

10. Attached as Exhibit I is a March 24, 2008 letter-testimony from Abe Springer, a professor of hydrogeology at Northern Arizona University, supporting the bill sponsored by Representative Raul Grijalva and explaining area groundwater and aquifers.

11. Attached as Exhibit J is a March 28, 2008 statement of Chris Shuey, director of the Uranium Impact Assessment Program at the Southwest Research and Information Center, at the request of the Congressional Subcommittee conducting the March 28, 2008, Congressional field hearing.

12. Attached as Exhibit H is a March 17, 2008 letter from the Arizona Game and Fish Commission to Senator John McCain and other members of the Arizona congressional delegation opposing uranium development near Grand Canyon and supporting legislative efforts to withdraw those lands from availability for mineral entry.

In accordance with 28 U.S.C. § 1746 and under penalty of perjury, I swear that the foregoing information is true and correct.

Executed on this 2nd day of April, 2008, in Flagstaff, Arizona.

Taylor McKinnon
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APPENDIX 2

Report on the Economic Analysis
of the 2/18/11 Draft Environmental Impact Statement
For the Northern Arizona Proposed Withdrawal[1]

By Richard Merritt
Elliott D. Pollack & Company
March 23, 2011

Elliott D. Pollack & Company was retained by the Grand Canyon Trust to evaluate the economic impact portions of the Draft Environmental Impact Statement (DEIS) for the proposed withdrawal of approximately 1 million acres of land in northern Arizona from new mining claims. The proposed withdrawal is in response to increased mining interests in the region's uranium deposits in and around the Grand Canyon.

Summary of Findings

Throughout the DEIS, we note a variety of inconsistencies in the use of data and inaccuracies in modeling the economic impact of the withdrawal that cause us to seriously question the veracity of the final conclusions related to the four withdrawal alternatives. Most of our concerns fall under questioning of the methodology of the economic impact analysis and its assumptions.

The analysis presented in the DEIS related to the economic impact of uranium mining in northern Arizona contains errors in inputs and assumptions as well as interpretation of the economic output and value added of mining activities. These errors demonstrate a serious misunderstanding of economic impact theory on the part of the authors.

We question the assumption for the average uranium ore body per mine of 3 million pounds or 1,500 tons of U3O8. This assumption is more than twice the expected output from existing mines that are currently in production or permitted and planned for production in the near future. It is a fundamental assumption that is used throughout the economic analysis.

The economic impact analysis of uranium mining extends well beyond the two counties in Arizona. If the DEIS is to evaluate the impact of mining on northern Arizona, there is little need to extend the impact to the distant San Juan County, Utah where processing of the uranium ore will occur. That processing operation is wholly separate from the mining of the ore and does not impact northern Arizona.

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[1] http://www.blm.gov/az/st/en/prog/mining/timeout.html

By including the uranium processing operation in Blanding, Utah in the economic impact assessment on northern Arizona, the economic impact of mining is greatly expanded in the report and could mislead lay persons on the true impact of uranium mining in northern Arizona. In addition, any profits related to the sale of yellow cake will flow out of the U.S. to the Canadian company that operates the Blanding, Utah mill and its shareholders. This fact is not addressed anywhere in the DEIS.

The economic impact of mining in northern Arizona should be based on the value of the ore as it is extracted from the ground and transported to Utah. We would recommend that the DEIS address this issue which would permit the development of estimates of the economic impact of uranium mining on northern Arizona.

Methodology and Assumptions

Following are our questions regarding the methodology and assumptions related to the economic impact of the proposed withdrawal.

1. Comments related to Appendix B Locatable Mineral Resources – Reasonably Foreseeable Development Scenarios.

    - The assumption for the average uranium ore body per mine of 3 million pounds of U3O8 exceeds the expected output from four existing mines that are currently in production or permitted and planned for production in the near future. Those four mines, Arizona 1, Kanab North, Pinenut and Canyon, are expected to average 1.2 million pounds of U3O8 (Tables B-11 and B-12 on page B-35). We question whether the assumptions used in the development of withdrawal scenarios seriously overstate the potential mine output for northern Arizona and, as a result, overstate the economic impacts of mining on the region.

Output from Existing Mines
Northern Arizona

Mine	Ore Tonnage	Grade of Uranium Ore	Lbs U3O8
Arizona 1	70,294	0.68%	956,000
Kanab North	36,122	0.53%	383,000
Pinenut	99,200	1.02%	2,024,000
Canyon	70,500	1.08%	1,523,000
Total	276,116	0.88%	4,886,000
Average	69,029	0.88%	1,221,500

Sources: Tables B-11 and B-12, Page B-35, Appendix B, DEIS

    - Similarly related to Table B-12 on page B-35, the ore tonnage for the existing four mines is listed as 276,166 or 69,000 tons per mine. The number of haul trips for 26 new mines of 289,120 calculates to 11,120

haul trips per mine or 278,000 tons of ore per mine based on 25 tons per haul trip. We question how the ore tonnage for each new mine (278,000) nearly equals the total ore tonnage for the four existing mines (276,116). These estimates extend the production time estimated for each mine to three years when the new mines might require fewer production years. This assumption drives the economic impact analysis and could lead to overstating the expected impact in northern Arizona.

- The source of the estimated output of 3 million pounds of U3O8 per mine is indicated on page B-26 of Appendix B as the American Clean Energy Resources Trust (ACERT), which has a vested interest in the uranium assets of northern Arizona on behalf of its members. ACERT issued an economic impact report prepared by Tetra Tech entitled "Economic Impact of Uranium Mining on Coconino & Mohave Counties, Arizona" in September 2009. That report outlines historic mining activity in the region in Table 2 on page 9. A copy of the table follows:

Table 2. A Summary of Energy Fuels Nuclear Mining History on the Arizona Strip

Mine Name	Production Period	Tons Mined	Grade of U3O8	Total Pounds U3O8
Hack Canyon I	1981-1987	133,822	0.530	1,419,623
Hack Canyon II	1980-1987	497,099	0.704	7,000,273
Hack Canyon III	1981-1987	111,263	0.504	1,121,748
Pigeon	1985-1990	408,794	0.643	5,651,862
Kanab North	1988-1991	260,818	0.531	2,767,570
Pinenut	1988-	25,807	1.020	526,350
Hermit	1989-1990	36,339	0.760	552,449
Total		**1,473,942**	**0.647**	**19,039,875**
Average		**210,563**		**2,719,982**
Median		**133,822**		**1,419,623**

Source: Economic Impact of Uranium Mining on Cononino & Mohave Counties, Arizona prepared for ACERT by Tetra Tech, Golden Colorado, page 9. Data as reported in the 1998 International Uranium Corporation United States Securities and Exchange Commission Registration Statement.

In actuality, according to the table, the historic output per mine in northern Arizona is 2.7 million pounds of U3O8, not 3 million pounds. This overstates the average output by more than 10%. In addition, the data is skewed by the output of The Hack Canyon II mine at 7 million pounds of U3O8. A more logical output estimate may be the median value rather than the average due to the extremely high output of one mine. The median value is 1.4 million pounds. Also, the number of tons of ore mined in the seven mines averages 210,563 with a median value of 133,822 tons. These actual production values are much less than the forecasted 278,000 tons of ore produced per mine contained in the DEIS. Once again, the overstatement of the forecast estimates in the DEIS creates an overstatement of the economic impact of mining on northern Arizona.

- The Denison Mines' website contains a table of expected ore tonnage and uranium output for the Arizona 1 mine and the four additional mines that are planned and permitted in the region. The estimates were obtained from technical reports prepared by Scott Wilson, an engineering firm that is now part of URS Corporation. Those forecasts show similar results as previously mentioned – that the mining of ore and output of U3O8 is much less than 3 million pounds of U3O8 per mine. In the case of the five mines noted below, the amount of ore mined averages 92,840 tons, producing nearly 1.1 million pounds of U3O8.

Expected Production From Dennison Mines' Arizona Strip Mines

Mine	Classification	Ore Tons	Grade (%U3O8)	Lbs U3O8
Arizona1	Inferred	70,300	0.680	956,000
Pinenut	Inferred	99,200	0.440	873,000
Canyon	Inferred	70,500	1.080	1,523,000
EZ1	Inferred	110,500	0.510	1,127,000
EZ2	Inferred	113,700	0.430	978,000
Total		**464,200**	**0.588**	**5,457,000**
Average		**92,840**	**0.588**	**1,091,400**

Source: Dennison Mines' Website, Scott Wilson technical reports

In summary, the estimated output of 278,000 tons of ore and 3 million pounds of U3O8 from each mine appears to seriously overstate the expected economic impact of uranium mining on northern Arizona. These assumptions need further investigation and support.

2. We question why the economic impact analysis considers the impact of uranium mining on five counties in Arizona and Utah when all mining activities will be conducted in just two Arizona counties: Coconino and Mohave. While there certainly will be employment and spending impacts on nearby Utah communities in Washington and Kane Counties related to the North and East Parcels, the much more distant San Juan County will have few direct impacts except for the fact that the uranium ore will be processed in Blanding, Utah at Denison Mines' White Mesa Mill. However, that processing operation is wholly separate from the mining of the ore. If the BLM truly desires to evaluate the impact of mining on northern Arizona, then the economic impact analysis should be focused on the mining activities that occur only in Arizona. Virtually all environmental assessments of the impact of mining in the DEIS focus just on Arizona, not Utah. The economic impact assessment should be conducted in a similar manner.

   By including the uranium processing operation in Blanding, Utah in the economic impact assessment on northern Arizona, the economic impact of mining is greatly expanded in the report and could mislead lay persons on the true impact of

uranium mining in northern Arizona. A major assumption of the economic impact analysis is the market price of uranium yellow cake, the finished product after the ore has been processed. That price of yellow cake is a primary assumption that flows through the entire economic impact analysis and establishes the ultimate economic output (the value of industrial production) of uranium mining. However, the yellow cake is processed in Utah, not Arizona, and is sold out of Utah by Denison Mines, a Canadian company. The economic impact of the processing operation benefits Utah, particularly San Juan County, and not Arizona. In addition, any profits related to the sale of yellow cake will flow out of the U.S. to the Canadian company and its shareholders. This fact is not addressed anywhere in the DEIS.

Instead, the economic impact of mining in northern Arizona should be based on the value of the ore as it is extracted from the ground and transported to Utah. Clearly there is a value to be placed on this ore and, in fact, Denison Mines' White Mesa Plant is purchasing ore from mines in northern Arizona controlled by independent parties. Denison Mines' Independent Miner – Ore Schedule of February 1, 2011 for Arizona Strip uranium ore provides pricing for a ton of ore ranging from $227.50 per ton with a uranium grade of 0.34% to $966.08 per ton with a uranium grade of 1.05% (based on a uranium sales value of $73 per pound). Assuming the grade of the ore averages 0.60%, the mining and hauling operation would account for approximately 60% of the value of the finished uranium yellow cake. At a price of $62.50 per pound (the average price of uranium yellow cake in January 2011), the uranium ore would be worth approximately 57% of the value of yellow cake (uranium spot price hit low of $53 on 3/18 and as of 3/21 was $60.)

A second source of information was found in a technical report prepared by Scott Wilson, an engineering firm that is now part of URS Corporation. The report entitled "Technical Report on the EZ1 and EZ2 Breccia Pipes, Arizona Strip District, U.S.A." was prepared for Denison Mines Corporation and downloaded from their website. The table references historic operating costs from the late 1990s. While dated, the information indicates that mining and transportation represents about 58% of total operating costs. This source could be used to address the value of output from uranium mines in northern Arizona.

TABLE 18-1 HISTORICAL OPERATING COST ESTIMATES BY ENERGY FUELS

Denison Mines Corp. - Arizona Strip Project

Mine	Mining $/ton	Haulage $/ton	Total Mining & Haulage	Milling $/ton	Total $/ton
Canyon (1984)	$38.85	$22.00	$60.85	$43.00	$103.85
Arizona 1 (1993)	$34.28	$25.17	$59.45	$53.24	$112.69
Pinenut (1996)	$39.72	$34.87	$74.59	$41.36	$115.95
Average	**$37.62**	**$27.35**	**$64.96**	**$45.87**	**$110.83**

% of Total Cost	Mining	Haulage	Total Mining & Haulage	Milling $/ton
Canyon (1984)	37.4%	21.2%	58.6%	41.4%
Arizona 1 (1993)	30.4%	22.3%	52.8%	47.2%
Pinenut (1996)	34.3%	30.1%	64.3%	35.7%
Average	**33.9%**	**24.7%**	**58.6%**	**41.4%**

Source: Techical Report on the EZ1 and EZ2 Breccia Pipes, Arizona Strip District, U.S.A. prepared for Dennison Mines Corp.

Holding costs for Arizona Strip properties are minimal and consist entirely of annual fees for unpatented mining claims on BLM land.

Table 3.16-21 on page 3-276 estimates the value of estimated total available uranium resources in the proposed withdrawal area at $2,917,640,000 based on 33,155 tons of U3O8 at $40 per pound. Based on information available, a portion of this value, perhaps 55% to 60%, is related to the value of the raw ore delivered to Blanding, Utah. At a price of $40 per pound for yellow cake, $22 to $24 per pound may be related to the value of the raw ore. This value establishes the ultimate output of the northern Arizona mining operation and is the basis for modeling the economic impact.

3. Comments related to Chapter 3, Section 3.15 Social Conditions.

   - Page 3-251: The authors use Bureau of Economic Analysis (BEA) data for evaluation of employment related to mining and tourism. While the data is useful in certain analyses, it is not current and is only available through 2009. Employment data available from the Bureau of Labor Statistics (BLS) is current on a monthly basis and provides a more realistic picture of employment trends. BLS data is the most widely referenced by the media since it estimates job gains and losses on a monthly basis. BEA data, alternatively, includes both full-time and part-time jobs as well as double counting of jobs for those persons with two jobs. As a result, BEA employment data is upwards of 1/3rd higher than BLS data. While a small issue, we believe BLS data should be used as well in the analysis.

   - Table 3.16-20 on page 3-275 shows that Arizona, Colorado and Utah possess only 10% to 11% of uranium reserves. With reserves available in other states, we question why the reserves near the Grand Canyon, one of the wonders of the world and the major tourism generator in northern Arizona, would be put at risk to uranium exploration and mining.

4. Comments related to Chapter 4, Section 4.16 Economic Conditions. This section outlines the economic impact assessment methodology and assumptions of uranium mining and final impact estimates for each alternative.

   - Pages 4-245 and 4-246 do not identify the economic impact multipliers used in the analysis nor the year in which the dollars are stated (such as, for instance, constant 2008 or inflated dollars). The value of uranium is not identified nor how the wages of mining employees are calculated. While IMPLAN is identified as the input/output modeling system, the inputs to the system are not identified in the chapter.

   - Under Section 4.16.2 Impacts of Alternative A: No Action, employment per mine is incorrectly stated as 75 employees per mine based on seven years of planning and permitting, mine development, mine production, and reclamation with a maximum of six mines operating at one time. Employment in economic impact analysis is typically based on person-years of employment. In actuality, each mine will have 200 person-years of employment over seven years or an average of 28.6 employees per year. This miscalculation of mining employment is the most serious error in the economic impact analysis and calls into question the accuracy of the conclusions of all four withdrawal alternatives.

     The authors of the impact analysis also indicate that direct employment under Alternative A over 20 years is 2,250 employees or 112 per year. This calculation is in error. Actual direct employment under the assumptions, in fact, totals 5,855 person-years over 20 years or an average of 308 direct jobs per year.

     With these miscalculations, the direct, indirect and induced employment and output of the mining operation outlined in this section are in error.

   - The text related to Table 4.16-3 states a total of $5.46 billion in value added and output related to uranium mining, comprised of $2.06 billion in value added and $3.39 billion in output. According to IMPLAN and economic theory, value added is a part of output and the two values cannot be added together to arrive at a total estimated impact. Following are the definitions from IMPLAN.

     > Value Added: The difference between an industry's or an establishments total output and the cost of its intermediate inputs. It equals gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported).
     >
     > Output: Output represents the value of industry production. In IMPLAN these are annual production estimates for the year of the data set and are in producer prices. For manufacturers this would be sales plus/minus change in inventory.

The attempt to combine value added and output represents a serious misunderstanding of economic impact theory on the part of the authors of Chapter 4. These errors flow throughout the four withdrawal alternatives as well as for calculation of indirect and induced impacts.

- The inputs to Table 4.16-3 are not identified in the DEIS. We are not able to analyze the table due to the lack of identification of inputs and the errors noted above. The same situation applies to Table 4.16-4.

- Even in the event that Table 4.16-3 was accurate, the output of $3.39 billion is higher than the value of estimated total available uranium resources in the proposed withdrawal area of $2.92 billion based on 33,155 tons of U3O8 at $40 per pound (see Comment 2 of this report related to Table 3.16-21 of the DEIS Chapter 3). The value of the output of withdrawal Alternative A cannot be larger than the $2.92 billion unless some undisclosed assumptions are provided to explain how they arrived at a higher number. As noted previously, this is just one instance of the inconsistency in the data presented in the economic impact analysis of the DEIS.

- The same comments outlined above apply to Withdrawal Alternatives B, C and D.

Present Valid New Information Relevant to the Analysis

Elliott D. Pollack & Company would be willing to assist in the economic impact analysis for the proposed withdrawal alternatives. However, due to the lack of accurate assumptions and inputs to economic modeling, we are unable to provide new information relevant to the analysis. With proper development of inputs and estimated value of the uranium ore, economic analysis could be undertaken.

Biography of Richard Merritt – President of Elliott D. Pollack & Company

Mr. Merritt has more than thirty-five years of experience in economic development consulting and real estate development. He specializes in economic and fiscal impact analysis, economic development strategies, and real estate market and financial feasibility. Some of his significant accomplishments include co-authoring the *Arizona Statewide Economic Study* that established an economic development strategy for the State of Arizona and its regions. Mr. Merritt authored the *Arizona Affordable Housing Profile*, a study funded by HUD and the Arizona Department of Housing, which examined the housing inventory in each community and county in the State, the affordability of that housing, and efforts being undertaken by those communities to produce new affordable units. In addition, Mr. Merritt and associates of the firm have produced a number of economic impact reports for private clients on mining in Arizona.

Mr. Merritt also managed economic and fiscal impact studies of Bank One Ballpark in Downtown Phoenix and the Arizona Tourism and Sports Authority, the entity charged with constructing a multi-purpose stadium for the Fiesta Bowl and Arizona Cardinals in Glendale. Prior to his present employment, Mr. Merritt worked for retail and land development companies in Greater Phoenix and served as Planning Director and Manager of the Community Development Department for the Town of Gilbert, Arizona.

Mr. Merritt has a Masters of Business Administration from Arizona State University and a Bachelors of Community Planning from the University of Cincinnati. He is a Charter Member of the American Institute of Certified Planners and is an active member in Valley Partnership and Lambda Alpha, an international land economics fraternity.