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Forest Service

Southwestern
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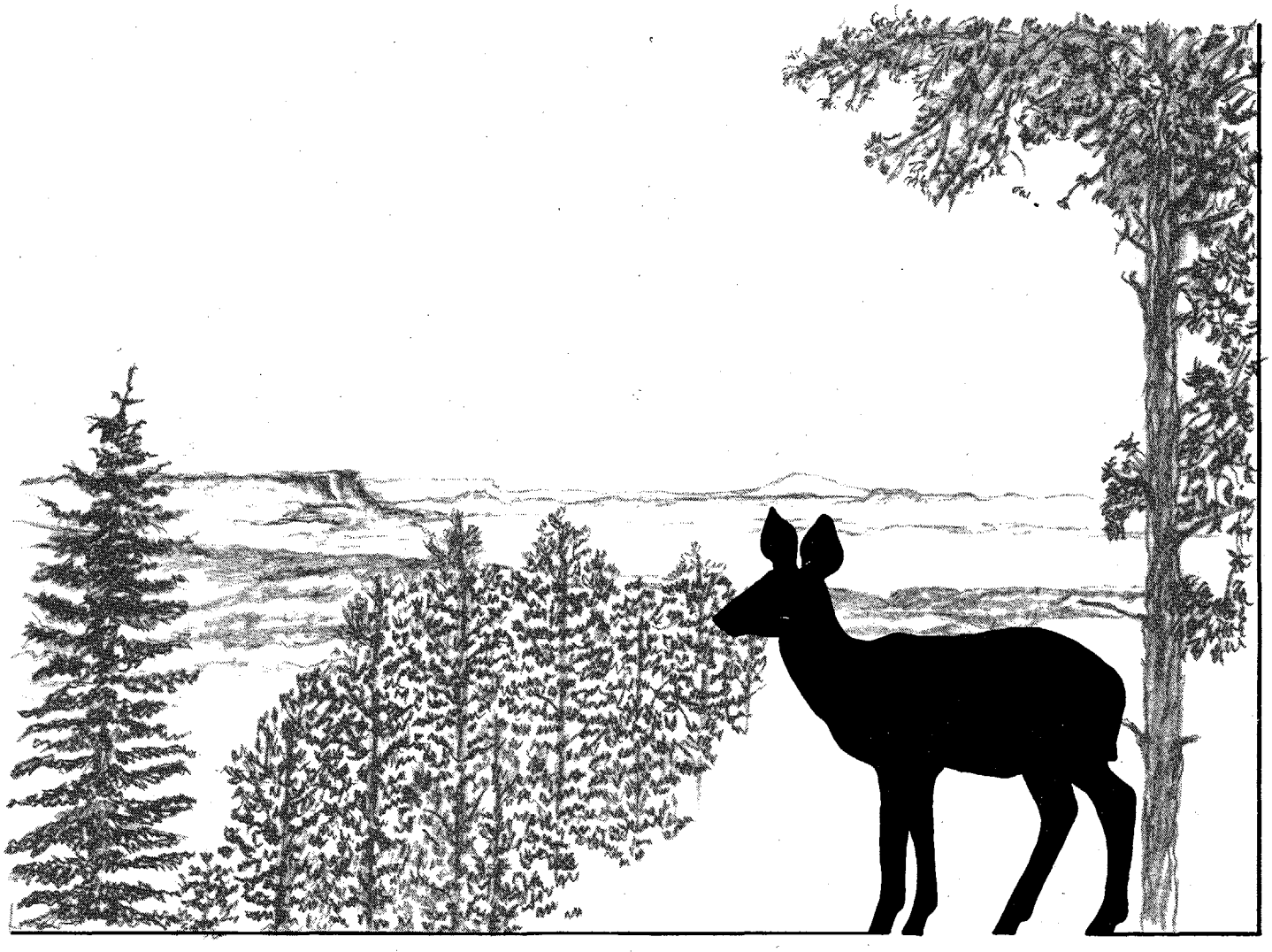
Kaibab National
Forest

August 1986

Final Environmental Impact Statement Canyon Uranium Mine



ENVIRONMENTAL IMPACT STATEMENT
CANYON URANIUM MINING PROPOSAL
COCONINO COUNTY, ARIZONA

Transmitted to EPA and Public: DRAFT Feb. 28, 1986 FINAL _____

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ABSTRACT

This EIS is in response to an initial application in October 1984 by Energy Fuels Nuclear, Inc. to develop a uranium mine south of the Grand Canyon on the Tusayan Ranger District of the Kaibab National Forest. Three alternatives to the proposed development are presented and analyzed along with a No Action Alternative to continue the current management activities in the area. This EIS meets the requirements of the National Environmental Policy Act (NEPA).

Appendices A through F to the Draft EIS were printed separately and are available for loan at public libraries or local Forest Service offices.

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SUMMARY

1. PURPOSE OF AND NEED FOR ACTION

In October 1984, Energy Fuels Nuclear, Inc. (EFN) submitted to the U.S.D.A. Forest Service, Kaibab National Forest, a Plan of Operations to mine uranium on unpatented mining claims on the Tusayan Ranger District. The proposed mine is located in Coconino County Arizona, approximately 6 miles south of Tusayan. The discovery of this ore body was made during an earlier exploratory drilling program approved by the Forest.

The proposed Canyon Mine would involve disturbance of approximately 17 acres for the mine shaft and surface facilities, plus some new or improved roads within the Forest, depending on which ore transportation route is ultimately selected. The ore would be hauled to the licensed mill at Blanding, Utah.

The federal action considered in this document is the approval by the Forest Supervisor, Kaibab National Forest, of a Plan of Operations for the Canyon Mine (Appendix A) with reasonable mitigation measures that are in addition to those proposed by EFN. The Supervisor's decision may be to approve the Company's plan as proposed or to require modification of the plan.

2. SCOPING AND EIS PROCESS

A primary objective of this Environmental Impact Statement (EIS) is to disclose for both Forest Service officials and the public, information sufficient to permit a reasoned evaluation of the environmental aspects and implications of implementing a range of project alternatives.

An evaluation of the extensive public review of the Canyon Mine proposal indicated significant public concern about uranium mining in Northern Arizona. Although much of this concern is based on opposition to the eventual uses of uranium, there are also many concerns related to the effects of uranium mining on the human, physical, and biological environment.

After intensive screening and evaluation, ten issues and concerns were identified for analysis in the EIS. These issues and concerns were used in the formulation and evaluation of alternatives and assessment of impacts. To varying degrees,

these issues and concerns are the focus of this EIS. However, other issues and impacts are identified and discussed as appropriate.

1. What social and economic impacts will the uranium mine have on the local communities and Coconino County?

2. What reclamation measures will be required for site restoration?

3. Can proponent-incurred project costs be held to a reasonable level?

4. What impacts will the mining operation have on important wildlife habitats?

5. What effect will the mining activities have on forest vegetation?

6. What effect will the mining activities have on visual quality of the Kaibab Forest, State Highway 64, and the Grand Canyon?

7. What effects will the mining activities have on the air quality of the surrounding area?

8. What impacts will the mining transportation system have on the local environment and the management of National Forest System Lands?

9. What impacts will the mining activities have on the soil, and surface and subsurface water quantity and quality?

10. What impacts will mining and ore transportation have on Indian religious sites and practices?

Following scoping, the Draft Environmental Impact Statement (DEIS) was prepared for the Canyon Mine. The DEIS was transmitted to EPA and the public on February 28, 1986. The public comment deadline was May 1, 1986 though substantive comments received after that date were also considered and are included in the EIS to the maximum extent possible. The DEIS considered five alternatives in detail, including the No Action Alternative and four operational alternatives. Those alternatives are described in detail in Chapter 2.

The EIS has been revised to reflect the comments received on the DEIS. Important changes include:

1. Addition of Indian religious concerns as an issue and concern.

The potential impact of the Canyon Mine on Indian religious sites and practices was considered in the DEIS in conjunction with a general analysis of impacts on American Indians. Comments on the DEIS by the Hopi and Havasupai Tribes alleged that religious sites and practices would be adversely affected by the Canyon Mine, a concern which was not raised by the Tribes during scoping or earlier consultation with the Tribes. Based on those comments and continuing consultation with the affected Tribes, the Forest Service has added Indian religious concerns to the list of issues evaluated in detail by the EIS. The text of the FEIS includes an expanded discussion of Indian religious sites and practices in the affected area. The Forest Service has also requested a meeting with tribal representatives at the proposed mine site to identify any specific sacred sites that might be disturbed by mining activity. To date, neither Tribe has committed to a visit to the mine site. Consultation with the Tribes regarding religious concerns will continue beyond completion of the NEPA process.

2. Expanded discussion of potential groundwater impacts.

Several comments expressed concern about potential depletion or contamination of groundwater resources in the area, including potential impacts on seeps and springs which flow from underground aquifers. The DEIS evaluated the impacts on surface and subsurface water as a major issue and concern. The DEIS concluded that adverse impacts either during or after mining operations were extremely unlikely. In response to public comments, the FEIS includes an expanded discussion and analysis of groundwater conditions and potential impacts. The additional analysis confirms the conclusion of the DEIS that no adverse impacts are expected. The Preferred Alternative includes a monitoring well at the mine site. If groundwater is present at the site, the well will disclose any unanticipated changes in water quality resulting from mine operations.

3. ALTERNATIVES CONSIDERED INCLUDING THE PROPOSED ACTION

The major issues and concerns identified through the scoping process, management concerns of affected State and Federal agencies and pertinent legal and regulatory requirements were used in developing suitable alternatives for analysis. The

alternatives to be considered in detail represent a reasonable range of opportunities that address the significant issues and concerns. Briefly the five alternatives developed are:

1. No action, or disapproval of the Plan of Operations. This alternative provides baseline data against which the impacts of the following alternatives can be compared.

2. Plan of Operations as proposed by EFN which includes using Haul Route #1 along the north boundary of Tusayan Ranger District and south of the Grand Canyon National Park; shortest distance overhead powerline; pooled worker transportation; ten 20-ton ore trucks per day to the Blanding, Utah mill; 5 to 10 year mining period; holding ponds for mine-yard runoff; 6-foot chainlink security fence; runoff channels around mine yard; and potable water from ground water or trucked from Williams.

3. Proposed Plan of Operations with the following modifications: monitoring of air, soil and water; equivalent wildlife habitat replacement; use either haul route #1 or #2 along the northern boundary of the Tusayan Ranger District; modified diversion channels with dikes; and construction of a 35-car parking lot.

4. Proposed Plan of Operations with the following modifications: monitoring of air, soil and water; equivalent wildlife habitat replacement; construction of haul route #5 off the east end of the Coconino Rim escarpment; and an overhead powerline along access road.

5. Proposed Plan of Operations with the following modifications: monitoring of air, soil and water; buried powerline along access road; minimize road construction by use of haul route #7 near SP Crater (pending right-of-way acquisition across 20 miles of State and private land), or haul route #6 which utilizes State Highway 64 south to I-40, east to US 89, north on US 160 and 191 to Blanding, Utah.

The intent of the general constraints, guidelines and mitigation measures contained in each alternative is to ensure that adverse environmental impacts are avoided or minimized during construction and operation of the project, and during reclamation after mine closure. These requirements also aid in the process of identifying the Preferred Alternative.

4. PREFERRED ALTERNATIVE

No Preferred Alternative was identified in the DEIS. Based on the analysis in the DEIS and public comments received in response to the DEIS, Alternative 5 has been selected as the Preferred Alternative with one minor modification. Alternative 5 included a buried powerline along the access road to the mine site; the Interdisciplinary Team concluded that, given the relative temporary nature of the project, burying the powerline would increase costs significantly with no corresponding environmental benefits and the Interdisciplinary Team has therefore, substituted an above ground powerline.

The operational elements of the Preferred Alternative are:

1. Expanded monitoring of soil, air and water (described in Sections 2.5.10 and 2.5.11);
2. Modified surface water diversion structure (Section 2.5.12);
3. Use of haul route #6 (the all highway route described in Section 2.2.1.1) or haul route #7 (the SP Crater road described in Section 2.2.1.1);
4. An overhead powerline from Highway 64 following the access road to the mine site (Section 2.2.1.1);
5. Transportation of mine workers by the company (Section 2.2.1.1); and
6. The mitigation measures applicable to all alternatives (described in Section 2.5) including equivalent acre replacement of disturbed wildlife habitat and relocation of key wildlife waters.

The DEIS noted that "Generally, no environmental impacts have been identified in any alternative which cannot be mitigated to a substantial extent." This conclusion is still valid. However, the Preferred Alternative represents the combination of operational components, mitigation measures and haul routes which minimize potential impacts and best responds to the issues and concerns identified in the EIS.

5. CONCLUSION

Adverse environmental impacts identified with past uranium mine activities in Northeastern Arizona and Northwestern New Mexico, such as radionuclide contamination of surface and ground water, radon gas emissions affecting the health of mine workers and a general degradation of the environment, can be minimized by

implementation of the monitoring, mitigation measures and operating procedures required in Alternatives 2, 3, 4 and 5. The Preferred Alternative includes all of the monitoring and mitigation measures evaluated in the EIS.

Throughout most of the analyses, potential impacts were analyzed by assuming extreme conditions in order to assure maximum confidence in the results of the analysis.

There do not appear to be any significant adverse radiological impacts on the environment from the Canyon Mine Project. This conclusion is based on evaluation of existing and projected radiation, radon and dust emissions levels, the requirements of the Clean Water Act and the water quality permits applicable to the mine, and the fact that no discharge from the mine is anticipated.

During mine operation the direct radiation from the ore piles will probably not be measurable at distances greater than a few hundred meters from the mine site. In any event, it should not be possible to distinguish the mine induced radiation from the variations in the natural radiation environment which currently exist in the vicinity of the site.

Changes in radon gas levels in the community of Tusayan from the Canyon Mine are projected to be too small to detect and will remain within normal radon level fluctuations existing in the environment.

Ore transport to the mill will not expose inhabitants along the haulage route to any measurable increase in radiation. A few accidents may occur during the life of the mine when ore spillage occurs. A thorough and timely cleanup of any spills will not pose a health hazard from the radiation of the ore.

An extreme flood event exceeding that to be expected once every 500 years, followed by a total loss of the mine site diversion structures, could release several Curies of radioactivity from the ore piles to the downstream wash. However, residual contamination would be removed and returned to the mine yard. There would be no health hazard. The mine site is being designed to preclude accidental discharges to the wash; however, if an accidental release occurs, the impact must be assessed immediately and cleanup effected if the situation warrants.

Social and economic impacts will likely be felt the most in the community of Williams and are generally considered to be beneficial because of increased employment. Population increases or other development in Tusayan will probably be discouraged by lack of housing, a limited water supply and a

small existing work force. However, because the resources of the town are limited, even small increases in population will result in noticeable impacts.

Development of the mine site could slightly reduce the amount of land available for Indian religious practices, including hunting and gathering activities. However, mine development is not expected to affect the current level of Indian religious practices in the area. An archeological review of the site and consultation with affected Tribes have failed to disclose any specific sacred sites or properties which would be disturbed by any of the alternatives.

In comments regarding other proposed actions on the Kaibab National Forest, the Hopi Tribe has expressed a belief that the earth is sacred and that it should not be subjected to digging, tearing or commercial exploitation. While this conflict has not been raised directly in relation to the Canyon Mine, it is acknowledged that commercial use of the Forest within the area of Hopi ancestral occupancy is inconsistent with these stated religious beliefs.

Wildlife habitat on the Tusayan Ranger District or near vacant State and privately owned lands along haul route #7, can be adversely affected by the development of the mine site, improvement of the required haul routes and increased traffic flows over these routes. The additional mitigation measures developed in Alternatives 3, 4 and 5 should be more effective in reducing these impacts than measures described in Alternative 2.

The use of state highways for haul route #6 in Alternative 5 should have no measurable impacts on adjacent wildlife habitat since the increase in traffic level resulting from the 10 ore trucks would be insignificant when compared to the 2800-3800 average daily traffic that is already using these routes.

The possibility of significant ground water contamination from the mine is remote. Ground water flows, if they exist, are likely to be at least 1,000 feet below the lower extremities of the mine. This, plus the low potential for encountering groundwater in the mine, effectively eliminates the possibility of contaminating the Redwall-Muav aquifer. Groundwater flows, if present, will be monitored by a test well drilled at the site. Water samples will be taken, and if contamination is found, the well will be pumped and the water will be held on site or discharged in accordance with the Clean Water Act.

Data and information contained in this EIS indicates that neither the Grand Canyon National Park nor Havasupai Indian

Reservation should be affected either directly or indirectly by the development of the Canyon Mine. This conclusion is further supported from the apparent lack of any environmental degradation (other than visual impacts and the obvious inconsistent land use) caused by the operation of the Orphan Uranium Mine, located 2 miles west of Grand Canyon Village on the south rim of the Grand Canyon. It was active during the period from 1956 to 1969, under regulatory guidelines much less restrictive than those which exist today. Radionuclide contamination of air, soil or water from the Orphan Mine has not been identified. For comparative purposes, the proposed Canyon Mine is some 13 air miles from the rim of the Grand Canyon. Implementation of mitigation measures in Alternatives 2-5 will minimize the likelihood of any adverse environmental impacts on the Grand Canyon National Park.

Alternatives 3, 4, and 5 provide for postoperational monitoring of the air, soil and water resources. Data will be compared to preoperation baseline data to determine if any significant environmental changes are occurring.

In summary, an evaluation of the development of the Canyon Mine has not identified any environmental impacts of Alternatives 2-5 which cannot be mitigated to a substantial extent through the implementation of the additional mitigation measures identified in the Plan of Operations and Alternatives 3, 4 and 5.

Comparison of Alternatives for Resolution of Issues and Concerns

None of the project alternatives fully resolves all of the identified issues and concerns (IC's). However, by implementing the mitigation measures identified in Section 2.5, Alternatives 3, 4 and 5 are considered environmentally acceptable by the Forest Service. Alternative 5, with the substitution of an overhead power line, has been selected as the Preferred Alternative.

IC #1-Social and economic impacts on the community of Williams and Coconino County as a whole are considered by the Forest Service to be beneficial and virtually the same for Alternatives 2-5.

If the No Action Alternative were implemented, there would be no change in current levels of employment, income, tax revenue or output as a result of the Canyon Mine. Demand for public services would remain at current levels. No cultural resource sites would be identified or disturbed by mine development or road improvement or construction.

IC #2-Reclamation measures required at the mine site are judged by the Forest Service to be satisfactory in Alternatives 2-5 although measures called for in Alternatives 3-5 are more comprehensive and oriented toward improving wildlife habitat at the mine site upon its closing. Under the No Action Alternative, of course, no reclamation would be required at the Canyon Mine site.

IC #3 -The least cost alternative is Alternative 2. Alternatives 3-5 indicate increased expenditures of $360,000 to $1,300,000 can be expected depending on the haul route used and mitigation measures required. Increased expenditures are generally associated with mitigation requirements. The No Action Alternative would result in no construction or development costs, however, the costs of exploration and environmental review could not be recovered by EFN.

IC #4 -Wildlife habitat will be affected to varying degrees in all alternatives depending on the ore haulage route used. Alternative 5 has the least impact on wildlife. Alternative 2 would have the greatest impact because of a lack of mitigation requirements. Mitigation measures in Alternatives 3 and 4 should be effective in reducing the adverse impacts on wildlife resulting from increased road traffic.

Alternatives 3-5 all call for "equivalent habitat replacement" resulting from the Forest's assumptions about the impacts of decreased habitat utilization caused by the mine and expanded transportation system. Alternative 3 also includes a proponent choice of road closure during May and June in lieu of habitat replacement.

The No Action Alternative would have no impact from mining or ore transport on wildlife or wildlife habitat and would require no mitigation. Any benefits associated with construction of alternative wildlife waters or replacement habitat would not be realized.

IC #5-Implementation of Alternatives 2-5 will have a negligible and insignificant effect on the make-up of vegetative types now present on the Tusayan Ranger District. The No Action Alternative would have no impact on vegetation at the Canyon Mine site.

IC #6-Visual quality associated with the Grand Canyon will not be affected by the development of the Canyon Mine regardless of the alternative selected for implementation. Alternatives 2-5 will alter the short term visual quality at the mine site. Reclamation measures should effectively restore the area to its present characteristic landscape.

Haul route selection will have a limited effect on the scenic qualities on the Tusayan Ranger District. Implementation of Alternative 4 would have the greatest effect by constructing a road off the Coconino Rim in a location that would be visible to travelers going to and from the Grand Canyon using the east Highway 64 entrance. The No Action Alternative would have no impact on the visual quality of the area near the mine site.

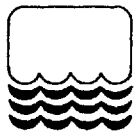
IC #7 -Implementation of Alternatives 2-5 will have no appreciable effect on the air quality, which includes particulates, radon gas, or radioactive dust, at either the Grand Canyon or the community of Tusayan. Increases in particulate matter will be site specific along haul routes and at the mine site itself and are expected to be well within air quality standards. Current levels of air quality in the vicinity of the Canyon Mine site and haul routes would be unchanged by the No Action Alternative.

IC #8 -Implementation of Alternative 5 and use of either the SP Crater haul route or the State Highway system would minimize impacts on National Forest resources and general forest environmental setting. It would, however, transfer the use, and resulting impacts, to private and State lands and existing highway systems at a greater cost to EFN. It is felt the environmental impacts on adjacent lands would be less than the overall impacts associated with the transportation routes identified in Alternatives 2, 3 or 4 if either of these routes are used.

The haul route identified in Alternative 4 would be most cost effective in providing a road that would meet long term management needs in the event other mines are developed in the eastern quadrant of the Tusayan Ranger District.

Haul routes included in Alternatives 2 and 3 are the most cost effective routes for hauling ore from the Canyon Mine to the mill in Blanding, Utah.

No ore would be transported under the No Action Alternative.



IC #9 -Mitigation measures and operational procedures included in Alternatives 3-5 will reduce the possibility of radionuclide contamination to surface or subsurface water sources, and identify any contamination at the earliest possible time. Alternative 2 does not include air, water and soil monitoring requirements to insure the operational designs of the mine are functioning properly. Under the Alternative 1, current parameters for water quantity and water quality would remain unchanged at the mine site. Soil resources at the mine site would not be affected.

Neither the water quality on the Havasupai Indian Reservation nor the Grand Canyon National Park should be environmentally affected by the development of this mine under Alternatives 2-5. The Havasupai Reservation is located about 35 miles downstream from the mine site. A documented 100-year flood dissipated because of topographic features, about 14 miles downstream and 20 miles above the Reservation. Mitigation measures taken at the mine site would prevent any significant downstream radionuclide contamination in the event of an extreme flood occurrence.

IC #10 -Implementation of Alternatives 2-5 will have no demonstrable effect on Indian religious sites and practices. Consultation with the Hopi and Havasupai Tribes has not identified any specific sacred site which would be disturbed by the development of the mine or any of the haul route options. Similarly, a detailed archeological review of the site has disclosed no sites of religious significance.

In comments regarding other proposed actions on the Kaibab National Forest, the Hopi Tribe has expressed a belief that the earth is sacred and that it should not be subjected to digging, tearing or commercial exploitation. While this conflict has not been raised directly in relation to the Canyon Mine, it is acknowledged that commercial use of the Forest within the area of Hopi ancestral occupancy is inconsistent with these stated beliefs.

Development of the mine site (Alternatives 2-5) and haul route options requiring new construction (Alternatives 2-4) could slightly reduce the land area available for Indian religious practices. However, the current level of religious activity is not expected to be curtailed by any alternative nor will access to any religious sites or areas be restricted. Furthermore, there is no physical evidence of Indian religious activity at the mine site. The development of the mine is not expected to significantly burden the traditional religious beliefs of either the Hopi or Havasupai Tribes.

The Preferred Alternative will include only the limited impacts associated with development of the mine site, as the haul route options included in the Preferred Alternative do not include any new road construction or significant reconstruction.

The No Action Alternative would have no impact on Indian religious sites or practices. The Hopi and Havasupai Tribes have expressed a preference for the No Action Alternative.

CHAPTER 1

PURPOSE OF AND NEED FOR ACTION

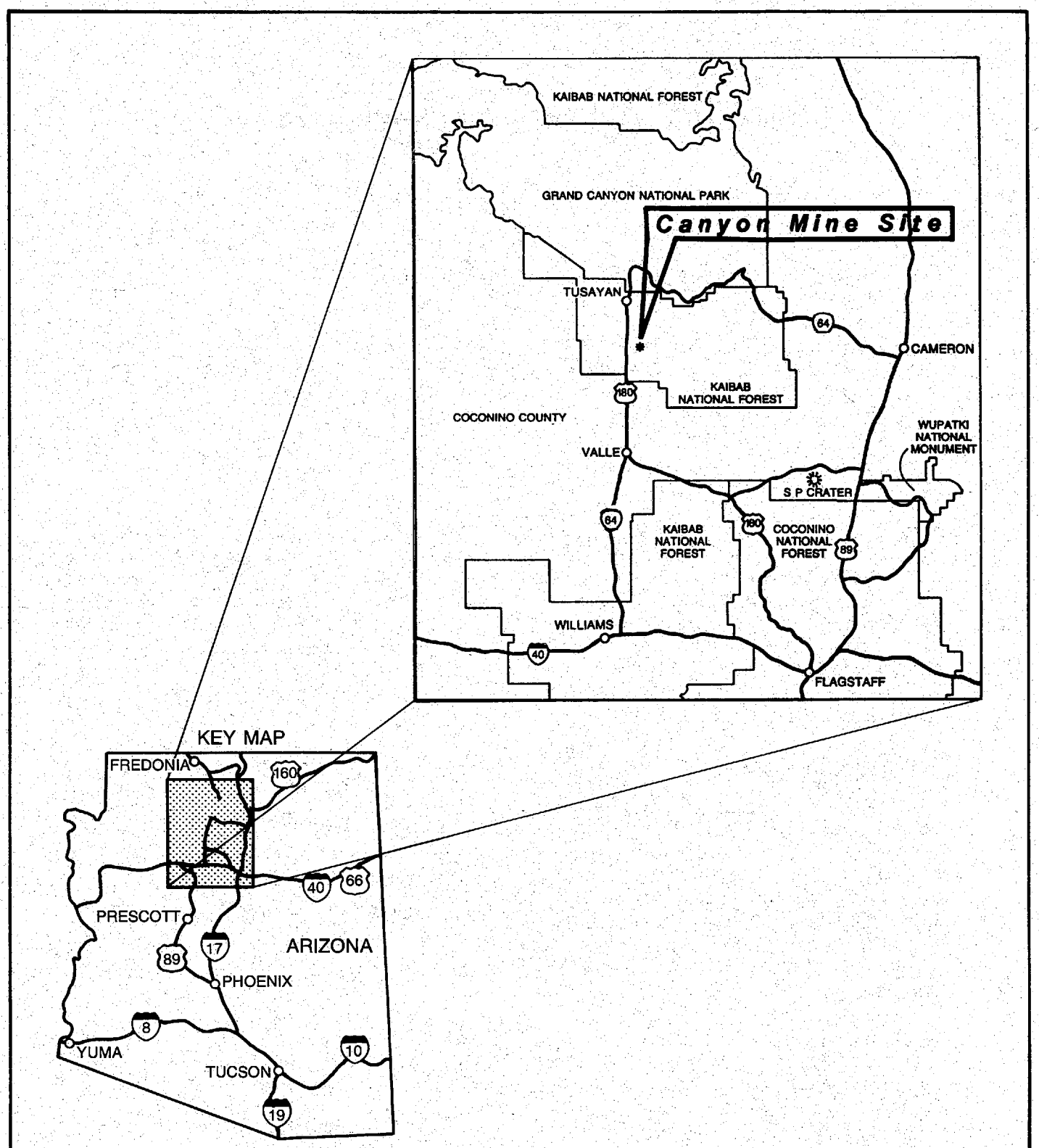
1.1 INTRODUCTION AND NEED FOR ACTION

In October 1984, Energy Fuels Nuclear, Inc. (EFN) submitted to the U.S.D.A. Forest Service, Kaibab National Forest, a Plan of Operations to mine uranium on unpatented mining claims on the Tusayan Ranger District, approximately 6 miles south of the village of Tusayan (Fig. 1.1). The discovery of this ore body was made during an earlier exploratory drilling program approved by the Forest.

Ore to be mined at the Canyon Mine is initially found at a depth of 900 feet below the surface in a breccia pipe occurring in the Coconino Sandstone geologic formation. The pipe extends downward another 500 feet into the Supai Formation or to a depth of approximately 1,400 feet below the surface. The ore will be extracted from a single 8 foot by 18-foot vertical shaft which parallels the ore bearing breccia pipe. A second 8-foot diameter ventilation and emergency escape shaft will also be drilled.

The proposed Canyon Mine would involve disturbance of approximately 17 acres for the mine shaft and surface facilities, plus some new or improved roads within the Forest, depending on which ore transportation route is ultimately selected. The ore would be hauled to EFN's licensed mill at Blanding, Utah, which has a daily design capacity that far exceeds scheduled ore production from the known uranium deposits being developed by EFN, including the proposed Canyon Mine. Estimated ore production from the Canyon Mine will comprise about ten percent of the total mill processing capacity.

Initial public input on the Canyon Mine proposal was sought during the months of December 1984 through February 1985, to determine the degree of public interest in the proposal and appropriate level of environmental review. A letter soliciting public comment which summarized the Plan of Operations, the NEPA process, and legal authorities applicable to the project, was mailed to federal, state and local government agencies, affected Indian tribes, the news media, and over 1,700 individuals on the Kaibab National Forest mailing list who have expressed an interest in mineral development or environmental documents.



LOCATION MAP OF THE CANYON MINE SITE

FIGURE 1.1

Over 200 letters were received by the Forest Service in response to requests for written comment. Analysis of these comments, along with input received at several public meetings, made it clear there was substantial public concern and controversy about this uranium mine proposal and its potential effects on the quality of the human environment and that an environmental impact statement should be prepared.

The Canyon Mine is located on one of many mining claims filed in Northern Arizona, and Energy Fuels is only one of several companies who have located such claims. The uncertainty of the depressed domestic uranium market and many problems associated with the detection of breccia pipe deposits make it impossible to predict the level of future mining activity and specific future mine locations. There are no mining proposals except the Canyon Mine at this time, but it is likely that exploration and mining activity will continue in several locations in Northern Arizona south of the Grand Canyon, for the foreseeable future. Each uranium mining proposal should generate similar issues and have similar environmental impacts. A complete analysis of the Canyon Mine through an environmental impact statement (EIS) will provide data and experience useful in evaluating future mining proposals. Furthermore, the data generated by an EIS and subsequent monitoring of the mining operations will enable the Forest Service to better evaluate the potential of any cumulative impacts associated with additional mines.

A primary objective of this EIS is to disclose for both Forest Service officials and the public, information sufficient to permit a reasoned comparison of the environmental impacts of implementing a range of reasonable project alternatives.

The federal action considered in this document is the approval by the Forest Supervisor, Kaibab National Forest, of a Plan of Operations for the Canyon Mine (Appendix A) and the establishment of reasonable mitigation measures that are in addition to those proposed by EFN. The Supervisor's decision may be to approve the Company's plan as proposed or to require modification of the plan.

1.1.1 Statutory and Regulatory Authorities

The general mining laws provide a statutory right to explore and extract certain minerals from National Forest System lands. The minerals subject to the general mining laws are called locatable minerals; uranium is one such mineral. The Forest Service is directed to integrate, consistent with multiple-use management principles, the exploration, development and removal of locatable minerals with the use and

conservation of other resources. This policy is consistent with various legislative mandates including the Organic Act, Mining and Minerals Policy Act, Federal Land Policy and Management Act, and most recently, the National Materials and Mineral Policy, Research and Development Act. The Forest Service does not have the discretionary authority to deny access for the purpose of prospecting for and extracting minerals on those National Forest System Lands that are open to mineral entry.

The Forest Service is not authorized to manage locatable mineral resources on National Forest System Lands. However, the Forest Service is concerned with methods and techniques of prospecting, exploration, mining, or mineral processing to the extent that certain methods or techniques have greater or lesser environmental impacts.

It is the responsibility of the Forest Service to review and where necessary, modify proposed plans of operations for the development of a mine. Review and modification of plans is to insure that the mining operations will be conducted in a manner which minimizes, prevents, mitigates, or repairs adverse environmental impacts on National Forest system lands. The Forest Service does not have the authority to categorically deny reasonable operations proposed under the mining laws.

A brief summary of some laws and regulations relevant to the proposed action follows.

Statutory Authorities

(1) General Mining Law of 1872

EFN has the statutory right under U.S. Mining Law (30 U.S.C. 21-54) to enter on open National Forest System lands for the purpose of conducting exploration and mining activities. Development of a mine is subject to approval of a Plan of Operations and the Forest Service must adhere to the provisions of the National Environmental Policy Act (NEPA) and 36 CFR 228 before approving, approving with conditions, or denying a Plan of Operation.

As enacted and interpreted, the General Mining Law expressly incorporates the "free access" principle of mineral entry on public lands:

> Except as otherwise provided, all valuable mineral deposits in lands belonging to the United States shall be free and open to exploration and purchase . . .

(2) Organic Administration Act of June 4, 1897

This is the Act that eventually created the National Forest System. The Act specifically mentions the mineral resource

> . . .Nor shall anything herein prohibit any person from entering upon such forest reservation for all purposes, including that for prospecting, locating, and developing the mineral resources thereof: Provided, that such persons comply with the rules and regulations covering such forest reservations.

Court decisions have interpreted this to mean that the national forests are open for entry "for all proper and lawful purposes, including that of prospecting, locating and developing the mineral resources thereof." 16 U.S.C. 478.

(3) Mining and Minerals Policy Act of 1970

This Act establishes policy for the Federal Government related to all types of mineral activity and specifically addresses the development of domestic sources of uranium.

> Sec. 2. The Congress declares that it is the continuing policy of the Federal Government in the national interest to foster and encourage private enterprise in (1) the development of economically sound and stable domestic mining, minerals, metal and mineral reclamation industries, and (2) the orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security and environmental needs . . .
>
> For the purpose of this Act, 'minerals' shall include all minerals and mineral fuels including oil, gas, coal, oil shale and uranium.

(4) Federal Land Policy and Management Act of 1976

This Act contains provisions which directly relate to minerals.

> Congress declares that it is the policy of the United States that . . . the public lands be managed in a manner which recognizes the Nation's need for domestic sources of minerals . . .

(5) National Materials and Minerals Policy, Research and Development Act of 1980

> This Act had the purpose of reinforcing and expanding previous laws passed by Congress dealing with the need for a continuous supply of mineral materials necessary to

maintain National security, economical well-being, industrial production, etc.

Forest Service Regulatory Authorities

Regulations protect the surface resources of the National Forests during mining and prospecting operations and provide for rehabilitation of lands afterward. The regulations are currently found in 36 CFR Part 228 - Minerals. They apply to National Forest System lands subject to location and entry under the mining laws.

Among the major provisions of these regulations pertinent to this EIS are the following:

* All operations under the General Mining Law must be conducted, insofar as feasible, to minimize adverse environmental impacts on the National Forests, and take into consideration requirements for meeting Federal, State, and local air and water quality standards and solid waste disposal; harmony with scenic values; protection of fish and wildlife habitats; and minimization of road construction damage.

* The plan of operations must also show what steps the operator will take for feasible rehabilitation of the area when the prospecting or mining is completed.

* Upon filing the plan of operations, the operator may be required to furnish a bond commensurate with the expected cost of rehabilitating the area.

* The plan of operations must be approved by the authorized forest officer before any operations are conducted.

In analyzing each plan for approval, the forest officer will consider the economics of the operation along with other factors in determining the reasonableness of the requirements for surface resource protection. The Forest Service will assess the environmental impacts of the proposed operation, reasonable alternatives, and prepare any environmental documents that might be required under the National Environmental Policy Act.

1.2 SCOPING PROCESS

Public involvement is necessary in the environmental analysis process in order to identify issues and concerns relating to environmental impacts of the proposed action. The issues and concerns are then used to define and formulate alternatives that specifically address these issues and concerns. Issues raised by the public and federal and state agencies serve as a basis for comparison of the alternatives. Laws, regulations, and land management directives are also considered in order to frame issues, formulate alternatives and determine the overall scope of the evaluation.

Following EFN's submission of the Plan of Operations, more than 100 copies of the plan were distributed to interested parties. The proposal received extensive media coverage. More than 30 articles concerning the proposal appeared in area newspapers and magazines between October 1984 and May 1985. Following the decision to prepare an EIS, a "Notice of Intent" was published in the Federal Register on April 30, 1985. Then, over 2,000 scoping letters were distributed by the Forest Service to federal state and local government agencies, Indian tribes, news media and interested individuals in preparation for a public scoping session held in Flagstaff on May 15, 1985.

As a result of the analysis of the earlier public comments and agency discussion, eleven preliminary areas of concern were identified. The EIS scoping session, as well as written comments received in response to the scoping letter, was used to further refine these issues and concerns and to identify any new ones which may have been overlooked.

An evaluation of the extensive public review of the Canyon Mine proposal indicated significant public concerns about uranium mining in Northern Arizona. Some comments were directed to issues clearly within the potential impacts of the project, such as impacts on wildlife. Others, such as nuclear proliferation, were less directly associated with it. All of the issues and concerns raised by the public were screened to determine which were appropriate for consideration in this document as part of the NEPA process. It was determined that comments which dealt with the desirability of nuclear power or other uses of processed uranium, or disposal of high level nuclear wastes would not be addressed by this document because the impact of this proposal on such issues is too far removed for meaningful analysis. Similarly, detailed consideration of issues such as the health of uranium miners or the history of uranium mining in other areas such as Grants, New Mexico, also were determined to be beyond the scope of this analysis.

As a result of the scoping process, ten issues and concerns were identified that to a greater or lesser extent are the focus of this EIS. These issues and concerns were used in the formulation and evaluation of alternatives. The ten issues and concerns (IC's) are:

IC #1. What social and economic impacts will the uranium mine have on the local communities and Coconino County?

IC #2. What reclamation measures will be required for site restoration?

IC #3. Can Company-incurred project costs be held to a reasonable level?

IC #4. What impacts will the mining operation have on important wildlife habitats?

IC #5. What effect will the mining activities have on forest vegetation?

IC #6 What effect will the mining activities have on visual quality of the Kaibab Forest, State Highway 64, and the Grand Canyon?

IC #7. What effects will the mining activities have on the air quality of the surrounding area?

IC #8. What impacts will the mining transportation system have on the local environment and the management of National Forest System Lands?

IC #9. What impacts will the mining activities have on the soil, and surface and subsurface water quantity and quality?

IC #10. What impacts will mining activities and ore transportation have on Indian religious sites and practices?

1.2.1 Issues and Concerns Not Covered as Separate Items in the Analysis

During the scoping process, several concerns were raised which are not analyzed as a separate issue in this document. These concerns will be analyzed, but integrated into the discussion of other related issues. For example, radiation and mitigation measures surfaced throughout the public involvement process as major concerns. These concerns are relevant to many issues

such as effects of the mining operation on air quality, surface and subsurface water quality and reclamation measures. Similarly, monitoring requirements and questions related to impacts on the Grand Canyon are considered under each appropriate issue and concern.

1.2.2 Cumulative Effects

Considerable interest was generated under the general topic of addressing potential cumulative effects of multiple mines on the environment and local population. The question most often asked in this regard, was "how many mines will be too many for the physical and biological environment to support without seriously affecting the human environment?"

The potential for uranium mining on the Tusayan Ranger District of the Kaibab National Forest south of the Grand Canyon, is uncertain and problematical. While literally thousands of mining claims have been filed in the Tusayan area, this has little relation to the number of mines that may ultimately be developed. There are no known proposed mines other than the Canyon Mine, on the Tusayan Ranger District south of the Grand Canyon. The highly speculative nature of mineral prospecting and exploration, the fact that mining claims are located prior to discovery of a mineral deposit, the current depressed conditions of the domestic uranium market and the highly localized nature of breccia pipe deposits, all contribute to the difficulty in predicting the extent of future uranium developments. Because the exact schedule and location of future mining is not possible to predict, this EIS analyzes potential cumulative impacts by hypothesizing the addition of several new mines in the area, developed concurrently with the Canyon Mine.

The analysis for the Canyon Mine is based on a site specific proposal. Based on components of the proposal, effects of the mine operation on various resource values specific to the mine site and affected area can be estimated. Upon implementation, intensive monitoring of the mine operation will allow assessment and verification of estimated impacts, and the relative effectiveness of prescribed mitigation measures. The results can then be used for estimating individual and cumulative impacts of successive mine developments, as can the information and data contained in specific technical reports found in the Appendices.

If, in the future, additional mines are proposed in the general area, data gathered through monitoring of the Canyon Mine will greatly assist in the estimation of impacts of future site

specific proposals. It is therefore apparent that monitoring of environmental effects of the Canyon Mine is desirable.

1.3 PERMITTING PROCESS

There are a number of federal, state and local regulatory permits, controls and constraints which apply to the proposed Canyon Mine. The following list describes the primary permits and approvals necessary for implementing the proposed project. EFN must comply with all applicable requirements. Additional permits and approvals may also be necessary during the life of the project.

FEDERAL

Permit or Approval	Responsible Agency
Approve Plan of Operations (36 C.F.R. Part 228)	U.S.D.A. Forest Service
Approve Rights-of-way or Special Uses on National Forest System Lands (36 C.F.R. Part 251)	U.S.D.A. Forest Service
Consult with U.S. Fish and Wildlife Service in compliance with Endangered Species Act (16 U.S.C. 1531, et seq., 50 C.F.R. Part 402)	U.S.D.A. Forest Service
Consult with Arizona State Historic Preservation Office in compliance with National Historic Preservation Act (16 U.S.C. 470 et seq., 36 C.F.R. Part 800)	U.S.D.A. Forest Service
Consult with affected Indian tribes in compliance with American Indian Religious Freedom Act (42 U.S.C. 1996)	U.S.D.A. Forest Service
Issue National Pollutant Discharge Elimination System (NPDES) Permit, if necessary	U.S. EPA, Arizona State Department of Health Services

Issue National Emission Standards for Hazardous Air Pollutants (NESHAPS) permit for Radon-222 emissions from underground uranium mines. [50 Fed. Reg 15 386 (1985)] (to be codified at 40 C.F.R. Part 61)	U.S. EPA
Comply with Mine Safety and Health Standards for Metal and Non-Metal Underground Mines (30 C.F.R. Part 57)	U.S. Mine Safety and Health Administration Arizona State Mine Inspector
Comply with Federal Motor Carrier Regulations (49 C.F.R. Parts 390-393, 395 - 397)	Arizona State Department of Transportation
Comply with Hazardous Materials Hauling Regulations (49 C.F.R. Parts 171-173, 177, 178) (Notification of ore spills.)	Arizona State Department of Transportation

STATE OF ARIZONA

Permit or Approval	Responsible Agency
Groundwater Quality Protection Permit [A.R.S. 45-511 to 45-528 (1985) and A.R.S. 36-1859 (1986)]	Arizona Department of Health Services, Division of Environmental Health Services
Construction Approval of on-site water and wastewater systems [A.R.S. 36-1881 and A.R.S. 36-132(8) (1984)]	Arizona Department of Health Services, Division of Environmental Services
Well Permit [A.R.S. 45-999 (1984)]	Arizona Department of Water Resources
Notification of Operation	Arizona Department of Revenue
Arizona Motor Carrier Safety Regulations (Title 28, Sections 2401-2405)	Arizona Department of Transportation

COCONINO COUNTY

Building Permit for on-site facilities	County Building Inspector
Approval of on-site wastewater system	County Health Inspector

1.4 UNITS OF MEASURE FOR ESTIMATING RESOLUTION OF ISSUES AND CONCERNS

The following is a table of units which were used to estimate how well each alternative resolves the issues and mitigates the concerns. They provided the analytical basis for the selection of the Preferred Alternative. Not all issues and concerns can be quantified. These are described in narrative form and can be qualitatively compared.

Issue or Concern	Units of Measure
1. Social & Economic Impacts	
a. Local & Regional Economic Impacts	-change in employment (primary and secondary -number of jobs affected)
	-changes in total annual income for Coconino County ($)
	-changes in total annual gross output for Coconino County ($)
	-annual tax revenues (sales, property and severance) ($)
b. Effect on Williams Water Supply	-total storage capacity (ac.-ft.)
	-potable City consumption (ac.-ft./yr.)
	-Canyon Mine projected needs (ac. -ft./yr.)

		-change in City's annual demand caused by the mine (%)
	c. Cultural Resources	-relative archeological site density along transportation corridor
	d. Social Impacts	-lifestyle, beliefs, and attitudes
		-population change
	e. City & County Infrastructure	
	1) School Enrollment	-enrollment
	2) No. of Police	-number of police
	3) Fire Protection	-amount
	4) Medical Facilities	-amount
	5) Housing	-amount
2.	Reclamation of Mine Site	
	a. Need for Reclamation	-area requiring restoration (acres)
	b. Measures/Methods	-<u>revegetation</u> -mixture (species) -application (type)
		-stabilization of stockpiled topsoil (narrative)
		-surface facilities removal (narrative)
		-radioactive waste disposal (narrative)
	c. Reclamation Bond Assessment	-amount ($) (narrative)

3. Project and Mitigation Costs		
	a. Transportation	-hauling ($) -construction ($) -maintenance ($)
	b. Monitoring	-<u>radiation</u>: -air, soil, & water ($) -<u>groundwater</u>: -well construction ($) -water sampling ($)
	c. Equivalent Habitat Improvement	-<u>key waters</u>: -relocation ($) -<u>create equivalent acres</u> of foraging areas ($)
	d. Site Reclamation	-total costs ($)
	e. Worker Transportation	-total costs ($)
	f. Cultural Resource Mitigation	-total costs ($)
	g. Powerline	-total costs ($)
	h. Right-of-Way Acquisition	-total costs ($)
	i. Total Project Costs	-net discounted cost (NDC)($)
4. Impacts on Wildlife		
	a. Elk Calving Habitat	-acres potentially impacted (within .5 mi. of road)
	b. Deer, Antelope & Turkey Fawning/Nesting Habitat	-acres potentially impacted
	c. Elk Migration Routes	-percent of population potentially impacted
	d. Habitat Lost From New Road Construction	-acres taken out of production
	e. Big Game Foraging Habitat	-acres directly impacted
	f. Key Waters	-number of waters impacted

		-percent of key waters in affected area (%)
g.	Total Acres of Habitat Replacement	-equivalent acres required (ac.)
5.	Effect on Vegetation	
a.	Loss of Grazing Capacity and Timber Production	
1)	Grazing Capacity	-district total (AUM's) -amount lost (AUM's) -amount lost (%)
2)	Timber Volume	-district annual allowable cut (AAC) (MBF/yr.) -amount (ACC) lost (MBF/yr.) -amount (AAC) lost (%)
b.	Loss of Vegetation	
1)	Ponderosa Pine	-district total (acres) -amount lost (acres) -amount lost (%)
2)	Pinyon-Juniper	-district total (acres) -amount lost (acres) -amount lost (%)
3)	Forest Vegetation Similar to Mine Site	-district total (acres) -amount lost (acres) -amount lost (%)
c.	Threatened, Endangered and Sensitive Plant Species	-species present & amount of impact (narrative)
6.	Effect on Visual Quality of the Grand Canyon, and Kaibab National Forest	
a.	Impacts on Viewed Landscape	-Forest Service visual quality objectives (narrative)
b.	Impacts on Grand Canyon National Park and State Highway 64	-changes in visual quality

7. Effect on Air Quality at Grand Canyon, Tusayan, and Mine Site		
	a. Predicted Impacts on Air Quality	-predicted impacts of fugitive dust and radon gas emissions on air quality at Grand Canyon National Park (narrative) -predicted impacts of fugitive dust and radon gas emissions on air quality at mine site, Tusayan and along haul routes <u>Radon:</u> (pCi/L) average for western U.S. projected levels at: Owl Tank Tusayan <u>Particulates:</u> (ug/m3) NAAQS standards current levels projected levels 1) mine site 2) haul routes <u>Radioactive Dust:</u> current levels (narrative) projected levels (ug/m^3)
	b. Monitoring	-requirements (narrative)
8. Effects of Transportation Route Selection		
	a. Road Construction	-new construction (miles) -reconstruction (miles)
	b. Hauling Distance	-to Cameron (ton/miles)
	c. Integration with Potential Future Forest Resource Management Needs	-degree of integration (narrative)

	d. Surfacing Material	-total required (vol. in cu. yd. & surface acres disturbed)
	e. Traffic Use on Haul Route	-seasonal average daily traffic count before project construction
		-projected average daily traffic count after project construction
		-increase in traffic (%)
	f. Monitoring	-traffic count after project implementation
		-radiometric surveys along haul roads (Y/N)
	g. Wildlife	-potential increase in impacted area of key wildlife habitat (ac.)
9.	Impacts on Soil and Water Resources	
	a. Radionuclide contamination of downstream lands and waters by flooding of ore stockpiles at Mine Site	-diversion channel capacity (cfs)
		-expected 500-yr. flood peak (cfs)
		-potential of flood waters reaching ore stockpiles (narrative)
		-potential of 100-yr. flood reaching lower portion of Cataract Creek (narrative)

		-sampling for change from baseline surface water quality (pCi/L): Arizona statewide average gross alpha gross beta Ra-226 current levels at Owl Tank gross alpha gross beta Ra-226 Uranium
		-sampling for changes from soil baseline radionuclides (piC/L) gross alpha gross beta Ra-226 Uranium
	b. Possible Groundwater Contamination by Radionuclides	-sampling for change from baseline quality at Redwall Springs in Grand Canyon and Havasu Canyon current levels: gross alpha (pCi/L) gross beta (pCi/L) Ra-226 (pCi/L) Uranium (pCi/L)
10. Impacts on American Indian Religious Concerns		
	a. Direct Impact on Religious Sites	-Number of sites affected
	b. Continued Access to Religious Sites	-Number of sites affected
	c. Gathering of Ceremonial Plants, Animals and Herbs	-Acres of land temporarily lost to religious activities.
	d. Compatibility with Traditional Religious Beliefs	Consistency with stated beliefs (narrative)

CHAPTER 2

ALTERNATIVES CONSIDERED INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

This chapter provides a general but concise description of the action proposed by EFN and a range of reasonable alternatives. The project was broken down into its operational components (separate elements that, when joined together, form complete project alternatives). Each operational component was then discussed, reviewed and screened by the Forest Service Interdisciplinary Team during the preparation of the EIS, in order to effectively reduce the number of alternatives to those which would be financially and technically feasible and environmentally acceptable.

The major issues and concerns identified through the scoping process, management concerns of affected State and Federal agencies, pertinent legal and regulatory requirements and other relevant public comments were used in developing suitable alternatives for analysis. The alternatives to be considered in detail represent a reasonable range of opportunities that address the significant issues and concerns.

2.2 FORMULATION OF ALTERNATIVES

On November 29, 1978, the Council on Environmental Quality issued "Final Regulations for Implementing the National Environmental Policy Act" (NEPA) (Federal Register, Vol. 43, No. 230). In July 1979, the U.S. Department of Agriculture Forest Service issued Implementation Procedures for the National Environmental Policy Act (Revised November 1981, July 1982 and June 1985), which further defines Forest Service procedures. The regulations are intended to provide federal agencies with efficient, uniform procedures for translating the law into practical action.

The regulations direct that a reasonable range of alternatives be developed, and that alternatives are fully and impartially discussed and evaluated to disclose the environmental consequences of implementation of the proposed action and alternatives to the proposed action. One objective of the Forest Service is to develop a reasonable alternative which minimizes the environmental effects of project implementation.

The alternatives considered in detail can be used to estimate varying degrees of biological and physical effects which may result from mining operations. Generally, no environmental impacts have been identified in any alternative which cannot be mitigated to a substantial extent through the implementation of environmental mitigation measures.

Section 2.4 describes the alternatives evaluated and the mitigation measures unique to the particular alternative, while Section 2.5 provides a description of mitigation measures common to all alternatives.

2.2.1 Independent Operational Mine Components Considered in the Development of Alternatives

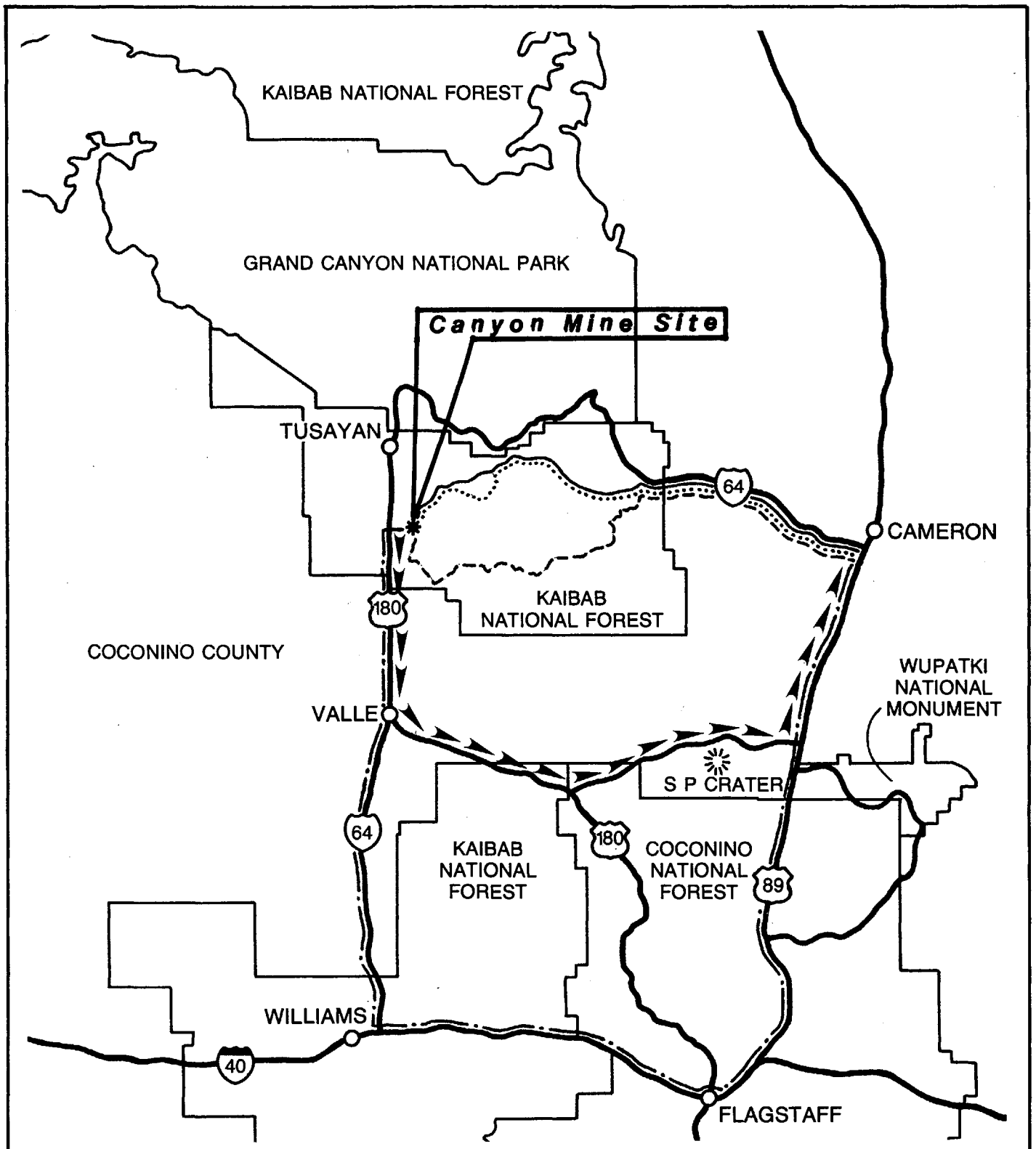
A mining project generally lends itself to analysis by operational components. Operational components are those separate elements that when joined together, form complete project alternatives (e.g. alternative mining methods, haul routes, etc.). The comments received during the scoping process were also frequently aimed at specific components. All reasonable component alternatives identified from the proposed Plan of Operations were considered in the component analysis. Independent operational components considered were:

1. Haul routes
2. Utility corridors
3. Transportation of workers
4. Sewage
5. Method of ore transport
6. Mine production rate
7. Method of mining
8. Potable water
9. Site configuration

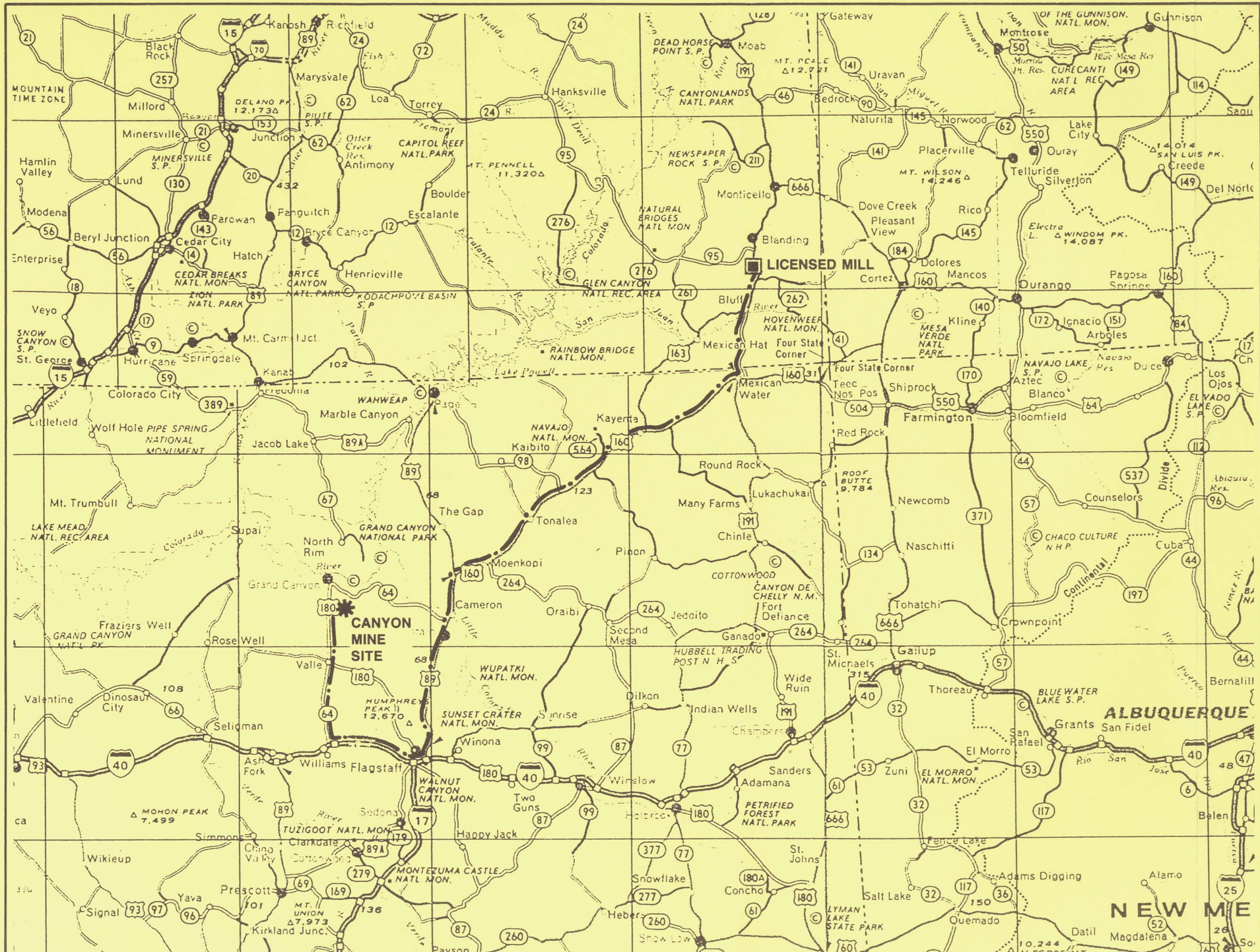
Variations in location and geographic setting were considered for all design and operational components except the actual mine site., which is fixed by the ore body and claim ownership and control.

2.2.1.1 Operational components requiring separate alternative analysis

Each operational component was evaluated based on its potential to produce environmental effects.



HAUL ROUTE OPTION BY PROJECT ALTERNATIVE				
PROJECT	HAUL ROUTE	N	PROPOSED HAUL ROUTE OPTIONS FROM THE CANYON MINE SITE	FIGURE 2.1
ALTERNATIVE 2&3	OPTION 1			
ALTERNATIVE 3	OPTION 2			
ALTERNATIVE 4	OPTION 5			
ALTERNATIVE 5	OPTION 6			
ALTERNATIVE 5	OPTION 7			


LICENSED MILL
CANYON MINE SITE
CANYONLANDS NATL. PARK
CAPITOL REEF NATL. PARK
GLEN CANYON NATL. REC. AREA
BRYCE CANYON NATL. PARK
ZION NATL. PARK
CEDAR BREAKS NATL. MON.
GRAND CANYON NATIONAL PARK
MESA VERDE NATL. PARK
NAVAJO NATL. MON.
RAINBOW BRIDGE NATL. MON.
WUPATKI NATL. MON.
SUNSET CRATER NATL. MON.
WALNUT CANYON NATL. MON.
PETRIFIED FOREST NATL. PARK
MONTEZUMA CASTLE NATL. MON.
CHACO CULTURE N.H.P.
ALBUQUERQUE
NEW ME
Moab
Monticello
Blanding
Bluff
Mexican Hat
Gateway
Uravan
Bedrock
Naturita
Norwood
Montrose
Gunnison
Placerville
Telluride
Silverton
Ouray
Lake City
Creede
Del Norte
Dove Creek
Pleasant View
Rico
Dolores
Cortez
Mancos
Durango
Pagosa Springs
Kline
Ignacio
Arboles
Aztec
Bloomfield
Farmington
Shiprock
Four State Corner
Teec Nos Pos
Kayenta
Tonalea
Red Rock
Round Rock
Many Farms
Chinle
Lukachukai
Newcomb
Naschitti
Counselors
Cuba
Tohatchi
Crownpoint
Gallup
Thoreau
Grants
San Rafael
San Fidel
El Morro
Zuni
Ganado
Fort Defiance
Jeddito
Second Mesa
Oraibi
Cameron
Moenkopi
Tuba City
Kaibito
Page
Lake Powell
Colorado River
San Juan River
Escalante River
Paria River
Virgin River
Little Colorado River
Hanksville
Torrey
Loa
Marysvale
Junction
Minersville
Beaver
Milford
Black Rock
Kanosh
Richfield
Antimony
Panguitch
Escalante
Boulder
Parowan
Cedar City
Beryl Junction
Modena
Enterprise
Hamlin Valley
Lund
Veyo
St. George
Hurricane
Springdale
Mt. Carmel Jct.
Hatch
Henrieville
Kanab
Fredonia
Colorado City
Littlefield
Wolf Hole
Marble Canyon
Jacob Lake
Supai
Mt. Trumbull
Frazers Well
Rose Well
Valle
Seligman
Dinosaur City
Valentine
Williams
Flagstad
Winona
Sunrise
Dilkon
Indian Wells
Chambers
Winslow
Sanders
Adamana
Holbrook
Two Guns
Ash Fork
Sedona
Clarkdale
Cottonwood
Jerome
Prescott
Prescott Valley
Chino Valley
Simmons
Happy Jack
Wikieup
Yava
Signal
Kirkland Junc.
Payson
Snowflake
Heber
Show Low
Concho
St. Johns
Salt Lake
Adams Digging
Fence Lake
Quemado
Alamo
Datil
Magdalena
Belen
Bernalillo
Los Ojos
Abiquiu
Chama
Navajo Res.
Blue Mesa Res.
Morrow Mt. Res.
Curecanti Nat'l Rec. Area
Electra L.
Mt. Wilson 14,246
Windom Pk. 14,087
14,014 San Luis Pk.
Mt. Pennell 11,320
Mt. Peale 12,921
Dead Horse Point S.P.
Newspaper Rock S.P.
Natural Bridges Natl. Mon.
Hovenweep Natl. Mon.
Navajo Lake S.P.
Bluewater Lake S.P.
El Vado Lake S.P.
Lyman Lake State Park
Roof Butte 9,784
Humphreys Peak 12,670
Mohon Peak 7,499
Mt. Union 7,973
Tuzigoot Natl. Mon.
Hubbell Trading Post N.H.S.
Canyon de Chelly N.M.
Cottonwood
Kodachrome Basin S.P.
Snow Canyon S.P.
Otter Creek Res.
Fish Lake
Piute S.P.
Minersville S.P.
Delano Pk. 12,173
Pipe Spring National Monument
Grand Canyon Natl. Pk.
Lake Mead Natl. Rec. Area
Navajo
Ute
Jicarilla Apache
Mountain Time Zone
PREFERRED ROUTE
CANYON MINE SITE
LICENSED MILL
PREFERRED HAUL ROUTE OPTION
N
1¾" = 1 MILE
FIGURE
2.1A

HAUL ROUTE OPTION BY PROJECT ALTERNATIVE

PROJECT	HAUL ROUTE
ALTERNATIVE 2&3	OPTION 1
ALTERNATIVE 3	OPTION 2
(NO ALTERNATIVE)	OPTION 3
(NO ALTERNATIVE)	OPTION 4
ALTERNATIVE 4	OPTION 5
ALTERNATIVE 5	OPTION 6
ALTERNATIVE 5	OPTION 7

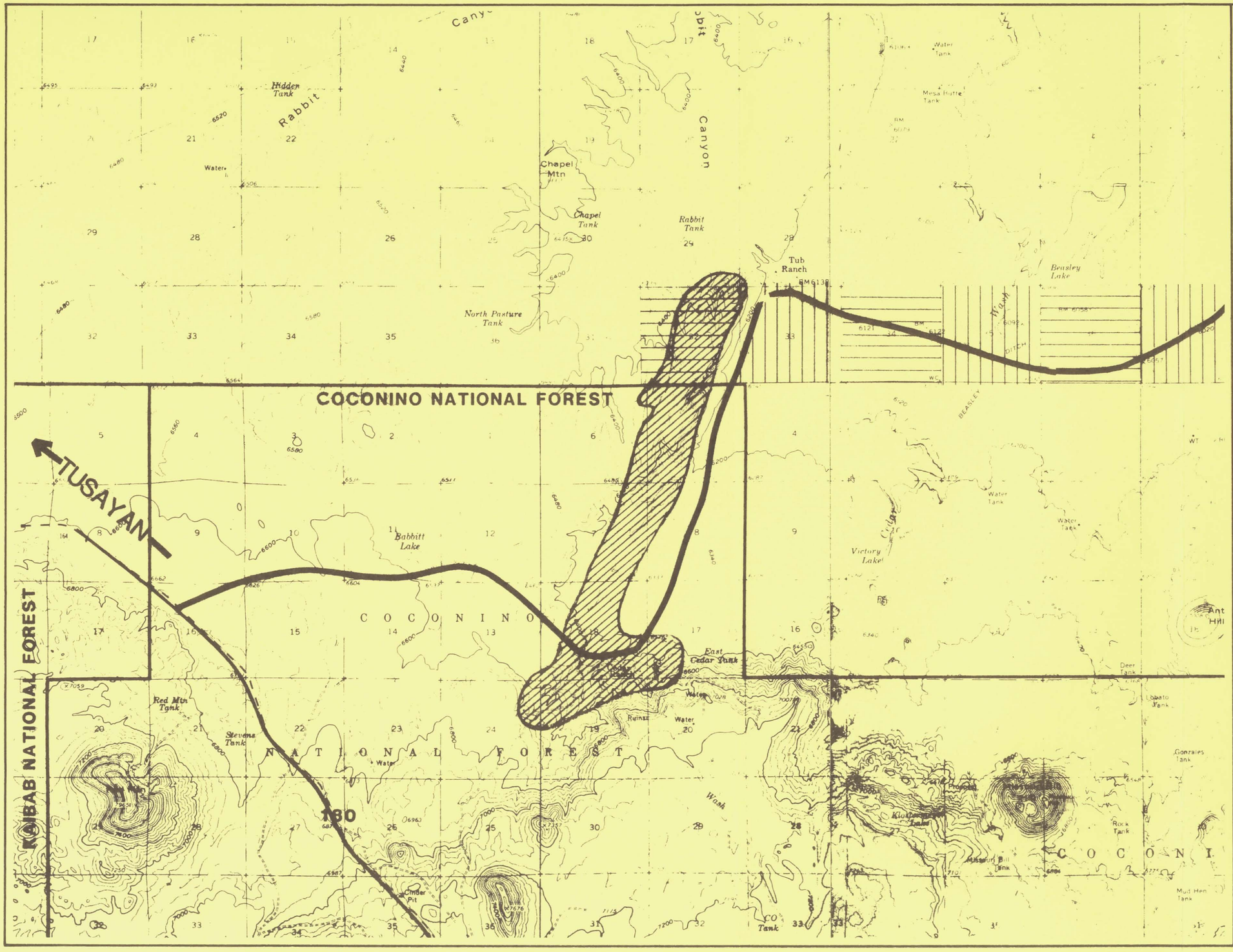
✱ CANYON MINE SITE

HAUL ROUTE OPTIONS

N

½" = 1 MILE

FIGURE 2.2



MIGRATION CORRIDOR

STATE/PRIVATE LANDS
RIGHT-OF-WAY
ACQUISITION NEEDS

STATE

PRIVATE

INVENTORY MAP OF MIGRATION CORRIDOR FOR DEER AND ELK

PROJECT ALTERNATIVE 5
HAUL ROUTE OPTION 7

N

½" = 1 MILE

FIGURE

2.3

(1) Haul routes.

Development of new or improvement of existing transportation systems on National Forest System lands have the potential of altering the general forest environment and setting. Consequently, proposed changes in existing transportation systems are viewed as having implications on the existing management of the Tusayan Ranger District.

A detailed analysis of the possible haul routes in the transportation component was undertaken, in order to identify the most effective haul routes (Appendix B). The analysis considered costs as well as environmental consequences to narrow the range of feasible haul route options. This was accomplished by comparing ore hauling routes to the individual issues that could be affected by changes in these routes. Figure 2.1, 2.1A, 2.2 and 2.3 are maps of the routes by assigned number. Table 2.1 lists the amount of new construction and reconstruction needed on each route.

Route #1 is the northern route south of the north Forest boundary proposed by EFN in the Plan of Operation. There will be a slight realignment near Hull Cabin.

Route #2 involves slight modifications to route #1, including realignments north of the mine site to avoid the Hull Cabin area.

Route #3 is the shortest alignment that could be devised without excessive new road construction. Route #3 requires new road construction to drop off the Coconino Rim escarpment near Newt Lewis Tank.

Route #4 incorporates a southern alignment to avoid key wildlife habitats, and then turns north and links up with route #3 at the Coconino Rim. Route #4 requires the same construction as in route #3 to drop off the Coconino Rim.

Route #5 traverses the southern portion of the Tusayan Ranger District. It requires new road construction off the Coconino Rim near the eastern boundary. This route was considered based on the possibility of future mining in the eastern quadrant of the Tusayan Ranger District. It is included to evaluate the environmental impacts and cost effectiveness of such a route in the event additional mines are proposed.

Route #6 involves almost entirely all highway haulage, except for the 4.8 miles from the mine site to State Highway 64. It eliminates the need for extensive new road construction.

Route #7 is a southern route that utilizes highway hauling and an existing road across State and private lands near SP Crater. It also minimizes road construction on the Forest and avoids most of the key wildlife habitats and waters.

TABLE 2.1 -- Haul Route Lengths and Comparison of Construction Needs by Haul Route

Route Number	New Construction	Reconstruction	Total[1]
	----------miles----------		
1	3.6	23.9	27.5
2	4.1	21.3	25.4
3	4.4	19.6	24.0
4	4.4	30.0	34.4
5	2.9	30.6	33.5
6	-0-	4.8	4.8
7	-0-	29.8	29.8

[1]Total length on Forest roads (off black-top).

Haul Route Evaluation

As a result of the evaluation shown in Table 2.2, five potential haul corridors were identified which will be incorporated as discrete component parts in the analysis of the four project alternatives.

Without a sophisticated weighting analysis of the various issues, any numerical ranking of the potential routes would be meaningless. The routes are thus ranked subjectively as providing a low, medium, or high resolution of the affected issue. These ratings are only meant to show relative impacts of the haul route options.

TABLE 2.2 -- Screening Matrix For Transportation Component

Issue	Haul Route Option 1	2	3	4	5	6	7
IC#3, Costs minimized:							
-maintenance	M[1]	M	L	L	L	H	H
-construction	M	M	L	L	L	H	H
-haul costs	H	H	H	M	M	L	L
IC#4, Wildlife							
-elk calving areas	L	M	L	H	H	H	H
-key big game areas	L	M	L	L	H	H	M
_key waters	M	M	H	L	M	H	H
IC#5, Vegetation (loss of comm. timber)	M	L	M	M	H	H	H
IC#6, Visual Quality	M	M	L	L	L	H	H
IC#7, Air Quality (potential to affect air quality at Grand Canyon)	M	M	M	M	H	H	H
IC#8., Transportation -compatibility with potential future Dist. mgt. needs	H	H	L	L	H	N/A	N/A
-minimize impacts on private & State lands	H	H	H	H	H	H	L
IC#10, Indian Concerns -compatibility with religious sites and practices	M	M	M	M	M	H	H

[1]Ranking: H = High resolution of the issue
M = Moderate resolution of the issue
L = Low resolution of the issue

Rankings reflect impacts from new road construction, impacts from increased traffic flows associated with improved roads, and impacts from road use that displaces wildlife (Appendices B and C).

Haul routes #3 and #4 were eventually dismissed from further consideration because the new road construction necessary to implement these haul route options would create more environmental impacts on wildlife, recreation and visual qualities than would the use of existing transportation corridors.

Route #6 was evaluated as an optional component under the same alternative as route #7. Use of this route would be done in compliance with existing State and Federal transportation regulations.

Route #5, while not being as cost effective to EFN in this particular evaluation, was retained as a viable option since it avoids most key wildlife areas and could possibly serve future Forest management needs in a cost effective manner.

Routes #1, #2, and #7 were retained since they are reasonable from a cost standpoint, and environmental and social impacts could effectively be minimized through monitoring and mitigation measures.

Because of their similarity, Routes #1 and #2 are considered collectively under Alternative 3. Routes #6 and #7 are also similar and therefore both considered under Alternative 5. Routes #6 and #7 are designed to minimize road construction.

As a result of the screening analysis, five haul routes, #1, #2, #5, #6 and #7, were selected for detailed evaluation in project alternatives. These corridors may also include some internal alignment variations to prevent resource conflicts or reduce costs.

(2) Utility corridors

Utility corridors were evaluated because of their potential impacts on wildlife, surface disturbance and effects on visual resources through the removal of vegetation.

Three utility corridor options were considered: 1) overhead 3-phase 12.5KW powerline starting at the existing 69KW line just east of U.S 64 and following the shortest access to the mine site, 2) buried cable from Highway 64 along Forest Roads 305 and 305A to mine site, 3) overhead powerline from Highway 64 along Road 305 and 305A to the mine site, and 4) electrical generators at the mine.

Utility option 4 was eliminated due to the relative high cost with no apparent environmental advantages. While eliminating the need for a new utility corridor clearing, this option creates additional environmental concerns related to fuel storage, noise and air pollution from on-site power generation.

Because of their potential environmental effects, utility options 1-3 are evaluated as discrete parts of Alternatives 2-5.

(3) Transportation of workers

The transportation of mine workers was evaluated because of the potential for impacts resulting from increased traffic and a parking lot at the mine site.

The nearest available housing for mine workers is in Williams, a distance of 45 miles one-way from the Canyon Mine site. Some form of pooled transportation would seem to be a logical choice; however, the option of driving personal autos was considered as part of Alternative 3 because this preference by the mine workers may exist.

2.2.1.2 Description of independent operational components common to Alternatives 2-5

The component evaluation procedure eliminated those components which were of little or no consequence to the environment. These component parts did not have the potential to create measurable environmental consequences, and did not significantly affect issue resolution either by themselves or collectively; therefore, they did not warrant separate project alternative analyses. Project alternatives were analyzed with most such components identical or only slight modifications.

(1) Holding ponds

Waste rock generated during shaft sinking, development and mining will be removed and stockpiled on the surface in the waste disposal areas, to the extent such material cannot be utilized for road maintenance, dike construction, or utilized in the construction of the mine yard. Ore will be stockpiled on the surface near the shaft until shipment to a mill takes place. Since local precipitation will be in contact with this uranium ore, all surface runoff within the mine yard, as well as all water encountered during mining which cannot be utilized in the mining operation, will be collected and retained on-site in holding ponds until it evaporates or until it meets the discharge standards under the NPDES permit.

The holding pond(s) (Appendix B) must be adequate to receive local runoff from a 100 year thunderstorm event, plus normal annual runoff and water that may be pumped from the mine. The volume of water in the pond(s) must be maintained at a level that will allow a reserve pond volume to accommodate unforeseen and normally expected runoff events (Appendix B and Sec. 2.5.12).

The holding pond(s) would only be discharged in exceptional circumstances in accordance with the NPDES permit. Exact pond volume will depend on the amount of water encountered during the shaft sinking operation.

(2) Sewage

Sewage at the mine can be handled by using vault toilets, or by installing a leach field sewage system if sufficient water is available.

(3) Method of ore transport

In the early stages of identifying haul routes options, consideration was also given to transporting the ore by helicopter or rail. Both methods were deemed unreasonable due to exorbitant costs. Trucking was determined to be the only viable method. Specific haul routes are considered in detail in the four project alternatives.

(4) Mine production rate

The proposed Operating Plan calls for an average production rate of 200 tons/ day for the life of the mine. Although a number of production rates could be proposed, reasonable variances in these rates would not appreciably affect the impacts of the mine on the environment.

(5) Method of mining

Ore to be mined at the Canyon deposit occurs at a minimum depth of 900 feet. Open pit mining is not considered a reasonable alternative for this deposit as it is not economically feasible and would create greater surface disturbance and environmental impacts. In-situ leaching is not feasible because water is not available for injection and recovery wells. Underground mining is considered to be the only viable method.

Access to the deposit will be by a vertical shaft located northeast of the deposit in the area of operations as shown on Plate 2, Appendix A. This shaft will be sunk utilizing either a surface drill rig or by conventional methods using drilling and blasting.

After the vertical shaft has been sunk to a depth of approximately 1,400 feet below the surface and paralleling the breccia pipe, workings will be driven toward the deposit at various levels off the main shaft. The highest level of the mine will be located approximately 900 feet below the surface in the Coconino Formation and the lowest level is expected to be approximately 1,400 feet below the surface in the Supai Formation.

Once the initial underground drilling program has fully delineated the extent of the ore deposit, the lower level will be driven underneath the deposit due south to a point just outside of the furthest extent of the ore reserve. At this point, a vertical ventilation shaft will be drilled from the surface to connect with the workings. The ventilation shaft is used to exhaust air, thereby creating adequate airflow throughout the mine workings and, in addition, providing a second exit or escapeway from the mine in the event of an emergency. The ventilation shaft will be drilled using a one-foot diameter pilot hole from the surface to intersect the lowest elevation level. An eight-foot diameter upward reaming bit will then be attached to the drill pipe and the vertical ventilation shaft drilled upward to the surface.

Raises or vertical workings within the mine will connect the various mining levels within or very near the deposit. At various elevations from these raises, sublevel workings will be driven off to extract ore from the deposit. The broken ore will be dropped down raises, designed for such use, to draw points on the lower level. The ore will be hauled to the shaft, placed in skips and hoisted to the surface.

(6) Potable water

A water source of a few gallons per minute is needed for sanitation and underground drilling. At the start of activities, water will be trucked to the site. It is hoped that drilling the mine shaft may generate a flow of a few gallons per minute of water from the base of the Coconino Formation at a depth of approximately 1,000 feet. The ground water well that will be drilled to the Redwall formation at 2,500 to 3,000 feet is a second possible source of water although its primary purpose is for monitoring groundwater quality below the ore body. If neither of these sources produce water, trucking water from Williams or Bellemont will continue throughout the operation of the mine.

(7) Site configuration

Alternative configurations of facilities at the mine site were eliminated due to a lack of measurable and meaningful differences associated with alternative locations for on-site facilities. For example, the buildings or the holding ponds could be relocated within the project area but the change in environmental impacts to the area would be minimal.

2.3 ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

The range of alternatives is relatively fixed in the case of a mining proposal on public land. Under certain circumstances, however, several alternatives other than modifications to the proposed Plan of Operation can be considered. Two alternatives that were initially considered as possible agency actions, but were dropped from further consideration, were withdrawal of land from mineral entry, and patenting (fee title ownership of mine site) of the lands in the area of the Canyon Mine by EFN.

It is national policy that public lands be open to mineral exploration and development unless there is some overriding need for protection of a surface resource(s) such as in the case of municipal watersheds, wilderness areas, or critical habitat for threatened and endangered species. And in addition, withdrawals must exempt any previous valid existing claims. It is therefore obvious that withdrawal is not a reasonable alternative for consideration.

Patenting of a mining claim is a discretionary option available to the claimant. EFN could apply for a patent from the United States, conveying fee title to the land encompassed by the claim. While such an action would change the legal relationships, it is probable that EFN would proceed with the mine as outlined in the proposed Plan of Operation. Forest Service authority would then be limited to the selection of haul routes and the mitigation measures associated with these routes. The patent alternative would not be advantageous to the Forest Service, because inholdings of private land are difficult to administer. Furthermore, the degree of monitoring for certain environmental impacts could possibly be lessened, at least within the patented mine site.

Other non-project alternatives were considered but eliminated from detailed consideration as remote, speculative and conjectural, providing no additional information which could aid the public or the Forest Service in considering the impacts of the proposed Canyon Mine. Furthermore, none of these alternatives would meet the need expressed by the applicant. Alternatives considered but eliminated as unreasonable in this context include energy conservation, alternative energy development (both fossil fuel and renewable resources) and obtaining uranium from other sources including opening new mines in other locations or reopening existing mines that have been closed due to economic circumstances.

2.4 ALTERNATIVES CONSIDERED IN DETAIL

The following alternatives have been developed to evaluate a reasonable range of project alternatives and to display the potential environmental consequences which may result from their implementation. The ultimate objective of this evaluation is to select a reasonable alternative or alternatives which address the identified issues and concerns and mitigate the effects of project implementation.

Alternative #1 - No Action Alternative

The No Action Alternative, for the purposes of this environmental evaluation, would involve disapproval of the Plan of Operations for the Canyon Mining Project. The plan would be returned stating the reasons for disapproval and request the proponent to submit a new plan that would meet the environmental and administrative constraints. While the Forest Service can require or impose reasonable environmental controls or conditions on an operating plan, they do not have the authority to disapprove a reasonable operating plan for a mining operation which will be conducted in a reasonable and apparently environmentally responsible manner (re: General Mining Law and 36 CFR 228). The use of this alternative, however, is consistent with previous Forest Service administrative decisions to treat the no action mining alternative as the no project option. It provides a sound baseline against which all other options can be compared.

For purposes of comparing alternatives and projecting environmental consequences, it is assumed that the No Action Alternative (disapproval of the Plan of Operations) will mean that no uranium mine will be developed at the Canyon Mine site. However, because EFN has contractual obligations and a need for uranium ore, disapproval of the Plan of Operations may encourage EFN to expand or accelerate its existing exploration program. If such exploration results in the discovery of a suitable ore body, implementation of the No Action Alternative could lead to the development of a mine at a different site. That site, and any impacts associated with such development, cannot be anticipated or predicted based on present knowledge. A subsequent mine proposal would, however, be subject to environmental review.

Alternative #2 - Proposed Plan of Operations Using Hull Cabin Haul Route #1

This alternative involves the approval of the Plan of Operations as submitted by the proponent, EFN (Plan of Operations, Appendix A). The ore body at the Canyon Mine will be mined over a period of 5 to 10 years. The mining activities as proposed would require surface facilities within the area of operations encompassing approximately 17 acres, installation of a shortest-route overhead electric power line to provide power to the project area, and the utilization and upgrading of existing roads for access and ore haulage.

Prior to the construction of the mine yard, topsoil within the area of operations will be removed and stored in the form of a dike, for use in final reclamation activities. Several water diversion structures will be constructed and maintained by EFN to ensure that no surface runoff from outside the area of operations is allowed to enter. Surface drainage from the mine yard will flow into several holding ponds constructed within the area of operations. All surface runoff within the area of operations and all water encountered during the operations which cannot be utilized in connection with mining will be held on site in these holding ponds until it evaporates or until it meets the discharge standards of the Arizona Department of Health Services and the United States Environmental Protection Agency.

A portion of the mine yard will be used to stockpile up to 20,000 tons of ore prior to shipment to a mill for processing. Ore pads will be constructed to prevent leaching of mineral values contained within the ore grade material into the soil. At the conclusion of mining, all uranium ore which is uneconomical to process, will be hauled from the site to a previously approved location, or disposed of underground in the mined-out workings.

Ore haulage from the area of operations will take place along existing Forest Service roads, which are located south of the Grand Canyon National Park boundary (Fig. 2.1). Some realignment and upgrading will be necessary to improve the transportation system haul routes to acceptable standards. This work will be the responsibility of EFN. They will also share in the required maintenance of the Forest Service roads used during the ore haulage in proportion to use by EFN and other road users. Once ore production begins, it is anticipated that on the average, 10 ore trucks per day will enter, and 10 ore trucks per day will leave the area of operations. Ore haulage will be by trucks that meet the

Arizona Highway weight restrictions. Each load will be covered with a tarpaulin to prevent loss of material in transit.

After development work is completed, the mine will be operated at an average rate of 200 ton-per-day for approximately five years. Planned underground exploration may increase the tonnage to be mined and consequently, extend the operation's life by a number of years. Employment at the mine during the first few years of development will range from 15 to 30 personnel. As production capacity grows, employment could reach an estimated high of approximately 35 men at the 200 ton-per-day rate. A few experienced miners and supervisors will be transferred from existing EFN operations, but the majority of the work force will be hired locally.

At the end of all mining activities, EFN will remove all structures, clean the area of operations, seal the mine entrance, and reclaim all disturbed areas. After the removal of all equipment, the main shaft and vent shaft will be sealed in a manner approved by the appropriate regulatory agencies. The mine yard will be radiometrically surveyed and cleaned up to the extent dictated by regulations applicable at the time of closure or to the general range of naturally occurring background concentrations in the area if no such regulations then exist. The area of operations and all disturbed areas will be recontoured to blend with the surrounding topography. Previously stockpiled topsoil will then be spread evenly over the entire area of operations and revegetated.

All independent operational mine components described under Sec. 2.2.1.2 above, would be part of this alternative.

Alternative #3 - Proposed Plan of Operations with Monitoring of Soil, Air and Water; Equivalent Acre Wildlife Habitat Replacement and Relocation of Wildlife Waters., Hull Cabin Haul Route 1 and 2; Shortest Distance Overhead Powerline.

Alternative 3 is comprised of those independent operational mine components common to all alternatives described under Section 2.2.1.2, with several additional features:

1) modified surface water diversion structure design (2.5.12);

2) expanded monitoring program (2.5.10 and 2.5.11);

3) option to use haul routes #1 or #2, and the option to restrict hauling during May and June in lieu of wildlife habitat replacement for identified elk calving areas (2.5.14); and

4) private-car parking lot of .2 acre for 35 vehicles (Appendix B).

Alternative #4 - Proposed Plan of Operations with Monitoring of Soil, Air, and Water; Relocation of Wildlife Waters and Equivalent Acre Wildlife Habitat Replacement; Construct Coconino Rim Haul Route #5.

Alternative 4 is comprised of those independent operational mining components common to all alternatives that are described under Section 2.2.1.2, with several additional features:

1) modified surface water diversion structure design (2.5.12);

2) expanded monitoring program (2.5.10 and 2.5.11);

3) use of haul route #5 to lessen wildlife impacts and optimize future potential transportation system needs (Table 2.2);

4) overhead powerline along access road; and

5) Company provided common transportation for employees to and from mine site.

Alternative #5 - Proposed Plan of Operations with Monitoring of Soil, Air, and Water; Equivalent Acre Wildlife Habitat Replacement and Relocation of Wildlife Waters; Use S.P. Crater Haul Route #7 (Pending Right-of-Way Acquisition Across 20 Miles of State and Private Lands), or utilization of State and Federal highways over Haul Route #6.

Alternative 5 is designed to minimize road construction and reduce changes in the environmental setting associated with development of ore transportation routes. It is comprised of those independent operational mining components common to all alternatives that are described under Section 2.2.1.2, with several additional features:

(1) modified surface water diversion structure design (2.5.12),

(2) expanded monitoring program (2.5.10 and 2.5.11);

(3) use of haul route #6 (all highway) or #7 (if rights-of-way across State and private lands can be acquired);

(4) buried powerline along access road; and

(5) Company provides common transportation for employees to and from mine site.

Road Construction standards, maintenance requirements, Right-of-Way fees, and other items requiring special attention will be mutually agreed upon by EFN, State of Arizona, and private land owners.

Preferred Alternative

No Preferred Alternative was identified in the DEIS. Based on the analysis in the DEIS and public comments received in response to the DEIS, Alternative 5 has been selected as the Preferred Alternative with one minor modification. Alternative 5 included a buried powerline along the access road to the mine site; the Interdisciplinary Team concluded that burying the powerline increases costs significantly with no corresponding environmental benefits. The Interdisciplinary Team has, therefore, substituted an aboveground powerline.

The operational elements of the preferred alternative are:

1) Expanded monitoring of soil, air and water (described in Sections 2.5.10 and 2.5.11);
2) Modified surface water diversion structure (2.5.12);
3) Use of haul route #6 (the all highway route described in Section 2.2.1.1) or haul route #7 (the SP Crater road described in Section 2.2.1.1);
4) An overhead powerline from Highway 64 following the access road to the mine site (2.2.1.1);
5) Transportation of mine workers by the company (2.2.1.1); and
6) The mitigation measures applicable to all alternatives (described in Section 2.5) including equivalent acre replacement of disturbed wildlife habitat and relocation of key wildlife waters.

The DEIS noted that "Generally, no environmental impacts have been identified in any alternative which cannot be mitigated to a substantial extent." This conclusion is still valid. However, the Preferred Alternative represents the combination of operational components, mitigation measures and haul routes which are expected to minimize potential impacts and best responds to the issues and concerns identified in the EIS.

The reasons for selecting the specific components of the Preferred Alternatives are as follows:

1) Expanded Monitoring -- The air, soil and water monitoring program responds to issues and concerns raised during scoping and evaluated in the DEIS (IC #7, IC #9) and to comments on the DEIS. The

groundwater monitoring well, while expensive, is an important element of the monitoring/mitigation strategy as it assures that important water sources, including springs which are sacred to the Hopi and Havasupai, will not be adversely affected by the Canyon Mine. The monitoring program also responds to the fear of radioactive contamination of air, water and soil expressed by some members of the public. Finally, the results of the monitoring program will provide important data for the evaluation of future mining proposals in the area, if any.

2) Modified Surface Water Diversion -- The alternative flood diversion plan is clearly superior. It provides for increased flood control capacity (a 500-year event) with less surface disturbance at the mine site.

3) Haul Routes -- The Preferred Alternative offers EFN the choice of two haul routes -- haul route #6, the all highway route through Williams and Flagstaff, and haul route #7, the SP Crater road which crosses private and state lands south of the Kaibab National Forest. Either haul route option minimizes potential impacts on wildlife (Table 2.7.), cultural resources and Grand Canyon National Park. These benefits, however, create substantial increased costs for the applicant. Haul route #6 is the longest route, resulting in the highest hauling costs. Haul route #7 is the next most expensive option and will also require that EFN acquire state and private rights-of-way at additional costs.

These haul route options were selected for the Preferred Alternative, despite the increased costs, for three reasons. First, this alternative is most responsive to public comments. Second, while it is believed that the impacts of any haul route option evaluated in the EIS can be successfully mitigated, this alternative creates the least potential for adverse impacts. Finally, and most importantly, this alternative provides the most flexibility for future transportation decisions and precludes an irrevocable commitment of resources to road construction or improvements which might foreclose future transportation options. As the EIS notes, future uranium mines in this region are possible, however, it is impossible to predict the specific sites of any future mines. The selection of the Preferred Alternative, which uses existing roads and minimizes new construction, will allow reconsideration of ore

transportation routes when future mines, if any, are proposed. Selection of this alternative also allows future decisionmakers to consider the option of consolidating or dispersing ore truck traffic to minimize transportation costs and environmental impacts.

4) Overhead Powerline -- Alternative 5 includes a buried powerline along the access road to the mine site. Burying the powerline substantially increases project costs (Table 2.6) without any corresponding environmental benefit. Accordingly, Alternative 5 has been modified for purposes of the Preferred Alternative to include a surface powerline following the access road to the mine site.

5) Transportation of Mine Workers -- Company transportation of mine workers is preferable to private transportation because it reduces surface disturbance (no large employee parking lot is required), access to the mine site and traffic to and from the mine.

6) Wildlife Mitigation -- While the potential wildlife impacts of Alternative 5 are small, any loss of key wildlife habitat should be mitigated. Implementation of the Preferred Alternative will require that EFN replace the 32 acres of big game foraging habitat lost at the mine site and replace one key watering area. In addition, operating restrictions may be placed on the use of haul route #7 to avoid potential impacts on elk migration.

7) Other Mitigation -- Other mitigation measures, including management of ore transportation, reclamation and fire protection (see Section 2.5) are common to all project alternatives, including Alternative 5. All of those measures are incorporated in the Preferred Alternative.

2.5 MITIGATION MEASURES

Management constraints and guidelines, corresponding mitigation, and monitoring and control measures needed "to ensure that the final actions conform to all other applicable laws relating to Forest Service activities" are discussed in this chapter, as directed by the Forest Service NEPA Procedures

Handbook (FSH 1909.15 6/85). The intent of the general constraints, guidelines, and mitigation measures is to ensure that adverse environmental impacts are avoided or minimized during construction and operation of the project, and during reclamation following mine closure.

Special attention was directed toward (1) controlling drainage, reducing erosion and sedimentation potential, and offsite radionuclide contamination from the mine area, waste piles and roads, and (2) mitigating the effects of the selected ore haulage route.

Monitoring programs were designed to mitigate public and resource management concerns, and to verify the projected effects of project implementation. These programs concentrate on air, soil and surface and ground water quality monitoring.

2.5.1 Regulatory Requirements

Operations of the proposed Canyon Mine will be subject to legal and regulatory requirements imposed by federal and state law. The question of applicable environmental standards was raised at the public scoping meeting. While these standards are not technically mitigation, in response to those questions important statutes and requirements that limit to some extent the magnitude of any impacts of mining, are summarized in this section.

Clean Water Act

Water quality is regulated by the Environmental Protection Agency and the State of Arizona. The Canyon Mine has applied for a National Pollutant Discharge Elimination System (NPDES) permit under Section 402 of the Clean Water Act to regulate any discharge from the mine site. EPA and the State share responsibility to insure compliance with that permit. Before the permit is granted, the State of Arizona must certify that the discharge from the mine site, if any, will comply with Arizona water quality standards. The permittee has an affirmative duty under the permit to notify EPA of any incident of noncompliance which may endanger health or environment. EPA retains authority to inspect the mine site or company records to insure compliance with the permit. Noncompliance with the conditions of the permit subject Energy Fuels to substantial civil and criminal penalties under Section 309 of the Act. Citizens' suits are also possible to ensure compliance.

The federal Clean Water Act regulates the discharge of pollutants into surface waters. The Canyon Mine must receive a National Pollution Discharge Elimination System (NPDES) permit from the EPA in order to release any water from the mine site. Although EFN does not anticipate encountering significant quantities of groundwater at the site, the company applied for an NPDES permit on December 20, 1984, for the possible discharge of mine drainage water.

The proposed mine is a "new source" under EPA regulations. Pursuant to Section 511 of the Clean Water Act, the issuance of an NPDES permit to a new source is subject to the environmental review requirements of NEPA. EPA is meeting its obligations under NEPA by cooperating with the Forest Service in the preparation of this EIS. A final NPDES permit for the Canyon Mine cannot be issued until at least 30 days after the date of issuance of the FEIS. Prior to issuing an NPDES permit, EPA must also make a proposed permit available for public review and comment, and provide the opportunity for a public hearing if there is significant public interest.

An NPDES permit for the discharge of mine drainage from a uranium mine must contain effluent limitations established under national EPA guidelines for the Ore Mining and Dressing Point Source Category at 40 CFR Part 440, Subpart C. These guidelines contain limitations on carbonaceous oxygen demand, zinc, dissolved radium 226, total radium 226, uranium, pH, and total suspended solids. In addition, all NPDES permits must contain any more stringent limitations necessary for achieving compliance with State Water Quality Standards.

The applicable Arizona State Water Quality Standards are those radiochemical standards which apply to all Arizona surface waters, and specific standards for trace substances which are based upon the protected uses of the receiving waters. The radiochemical standards are found at A.C.R.R. 9-21-204.B. and are based on federal drinking water standards. The protected uses of the receiving waters are those which are designated for the nearest downstream surface water segment listed in Appendix A of R9-21-208. The nearest designated surface water segment downstream of the proposed discharge point is Cataract Creek (tributary to Havasu Creek). The protected uses of this segment are: Aquatic and Wildlife (cold water fishery), Full Body Contact, Agricultural Irrigation, and Agricultural Livestock Watering. As no discharges will be permitted which do not meet these standards, authorized discharges will have no adverse environmental impact, and it is recommended that a permit be issued.

Under NPDES permits, facilities are required to sample their discharges and report pollutant concentrations to EPA and the Arizona Department of Health Services (ADHS). Such reports are public information. Permitted facilities are inspected regularly for compliance with the Clean Water Act. NPDES permits give EPA and ADHS personnel right of entry for inspection and sampling. Violation of the Clean Water Act are subject to civil penalties of up to $10,000 per day, with higher penalties for willful or negligent violations.

Cultural Resource Protection Laws

Cultural resources are protected pursuant to a number of Federal laws, the most important of which are the Antiquities Act of 1906 (16 USC §§ 431-433), National Historic Preservation Act of 1966 as amended in 1980 (16 USC §§ 470-470a), Historical and Archaeological Data Preservation Act of 1974 (16 USC §§ 469-469h), American Indian Religious Freedom Act (42 USC § 1996) and the Archaeological Resource Protection Act of 1979 (16 USC §§ 470aa-47011). Generally, the acts require consultation and/or surveys and other investigations of significant cultural resources and attempt to protect such resources from theft, vandalism, removal or other direct or indirect adverse impacts, by data recovery, site recovery or avoidance.

Clean Air Act

The EPA has promulgated standards to protect the public from exposure to Radon-222 emissions under authority of Section 112 of the Clean Air Act. These regulations call for bulkheading (sealing-off) abandoned areas of a mine, in order to reduce radon-222 emissions to the above ground air. These requirements are specified at 40 CFR Part 61. Airborne radiation from the Canyon Mine is discussed in Section 4.2.5.2, and Appendix E.

Endangered Species Act

Protection of threatened or endangered species occurs under the Endangered Species Act. (16 USC § 1531 et seq.). Section 7 of that Act generally prevents the Forest Service from authorizing any action that is likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of its critical habitat. Section 9 of that Act prohibits EFN from taking, hunting, harassing, killing or harming any wildlife species listed as endangered. Section 11 of the Act imposes substantial civil and criminal penalties for knowing or willful violations of the Act. Citizen suits are also available to ensure compliances.

Mine Safety and Health Act

Mine safety and health is regulated by the Federal Mine Safety and Health Administration and the Arizona State Mine Inspector. The Mine Safety and Health Administration imposes substantive standards for mine construction and operation, in 30 CFR § 57,"Safety and Health Standards--Metal and Non-Metal Underground Mines," and retains authority for inspection of mines and enforcement of its standards. Any incidents of noncompliance may give rise to civil and criminal penalties. The Arizona State Mine Inspector has similar authority. He applies the safety and health standards of Chapter 3 of Title 27 of the Arizona Statutes.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act requires that Federal Agencies consider Native American beliefs and practices in the formulation of policy and approval of actions. The intent of the Act is to insure for traditional Native religions the same rights of free exercise enjoyed by other religions. However, it does not afford Indian religions a more favored status than other religions, but only insures equal treatment. The Act does not mandate protection of Tribal religious practices to the exclusion of all other courses of action. It does require that Federal actions be evaluated for their impacts on Indian religious beliefs and practices.

2.5.2 Reclamation Plan

The Reclamation Plan for the Canyon Mine Project is described in the Plan of Operations in Appendix A and supplemented by the Forest Service in Appendix B. The objective of the plan is to restore the approximately 17-plus acres of land disturbed by the mining operation and the mine entrance road, to as near natural a condition as possible after the mine is closed. The plan outlines a program for returning the disturbed area to vegetative productivity.

Prior to the construction of the mine yard, topsoil within the area of operations will be removed and stored for use in final reclamation activities. Storage will be in the form of a dike around the northern perimeter of the yard.

At the end of mining activities, EFN will remove all structures, clean the area of operations, seal the mine entrance and reclaim the disturbed areas. After the removal of all equipment, the main and vent shafts will be sealed in a manner approved by the appropriate regulatory agencies. The

mine yard will be radiometrically surveyed and cleaned-up to the extent dictated by regulations applicable at the time of closure. The area of operations and all disturbed areas will be recontoured to blend with the surrounding topography. Previously stockpiled topsoil will then be spread evenly over the entire area of operations and revegetated.

EFN will be required to provide a performance and reclamation bond of $100,000 before mining activities start. The amount of this bond was determined by using cost estimates in Appendix B (p. 13) and adding a contingency amount based on inflation and possible estimating error, then discounted over a 7-year planning horizon.

The reclamation plan will be updated prior to closure, utilizing any revised forest land use objectives, new technology and operating experience.

2.5.3 Visual Impacts

The mine head frame and support facilities will be painted with earth tone colors. Implementation of this mitigation measure will be ensured by ongoing review by the Forest Service.

2.5.4 Public Safety

A 6-foot chainlink security fence with lockable gates will be constructed on the outside edge of the top of the 4-foot dike that surrounds the area of operations. All gates will be locked during periods of inactivity at the mine. Signs will be posted on all sides of the fenced perimeter to indicate "no trespassing," and "uranium mine." Energy Fuels will maintain the integrity of this fencing as well as monitor other aspects of the safety and security program. Federal safety inspection requirements, administered by the State Mine Inspector through the Mine Safety and Health Administration, will ensure that a safe working environment is maintained.

2.5.5 Ore Haulage Control

All ore trucks will be covered with a tarpaulin to prevent loss of material in transit. The tarpaulin will be lapped over the sides of of the truck bed approximately one foot and secured every 3 or 4 feet with a tiedown rope. In the event of a truck accident that causes ore spillage, Energy Fuels will take

immediate aggressive action to: 1) notify Arizona or Utah Departments of Public Safety and Transportation, 2) notify appropriate tribal councils and the Bureau of Indian Affairs, if the ore spill occurs on Indian lands, and 3) clean up any spilled material. All uranium ore will be removed from the spill site within two working days of the time of the spill, unless the appropriate Federal and State agencies deem that such action is prevented by conditions beyond the control of Energy Fuels. In any event, all State and Federal cleanup standards relating to spillage of the ore will be strictly adhered to.

2.5.6 Air Quality

Ore stockpiles will be managed at all times to eliminate the potential for wind dispersed radioactive dust. This may require management of the stockpiled ore by wetting or chemical treatment. In project alternatives that incorporate the following sections of roads, excessive dust will be controlled by appropriate dust abatement methods: Forest Service Road 302 from the junction of Forest Service Road 2723 to the junction of Forest Service Road 307; Forest Service Road 307 from the junction of Forest Service Road 302 to the junction of Forest Service Road 2804.

2.5.7 Noise

The project will be designed and operated in a manner to reduce noise to the lowest practical levels. All equipment will be carefully maintained to achieve the lowest practical noise levels (e.g., replacing worn-out mufflers, tightening loose parts, etc.).

2.5.8 Erosion Control

Erosion from all access and haul roads and the area of operations that are disturbed during construction activities will be controlled by revegetating these areas immediately after construction. Stabilization of the stockpiled topsoil will also be accomplished by revegetation. The outside slopes of the dikes that surround the mine yard will be riprapped with barren rock fragments taken from the mine during shaft construction. These fragments should exceed six inches on any one face.

The following species and application rates are recommended for revegetation of disturbed areas:

Species	Percent in Mix		Lbs./Acre for 25 seeds per sq. ft.		Pounds Needed In Mixture
Crested Wheat	30	X	6.4	=	2
Pubescent Wheatgrass	30	X	15.4	=	4.5
Smooth Brome	25	X	9.8	=	2.5
Yellow Sweet Clover	15	X	4.6	=	1
Lbs. of mix. for 25 seeds/ft. (pure live seed)				=	10 lbs./ac.*

*Application rate is for drilling; for broadcasting double this rate.

Drill the following browse species separately:

Four-wing saltbush	4 lbs./ac.
Winterfat	4 lbs./ac.

The following general guidelines will be followed as a part of the erosion control mitigation measures:

1. Construct drainage on relocated roads in accordance with forest Service standards.

2. Minimize changes in configuration of existing drainage courses around the mine perimeter.

3. Improve drainage channels in the immediate area of the mine site by removing obstructions to increase channel capacity.

4. Revegetate all disturbed areas as soon as possible. Reseed previously reclaimed areas if necessary until a vigorous vegetative cover is established.

5. The minimum elevation of the base of the ore pads at the southern end of the yard, will be at the height of the top of the dike ... well above the 500-year-flood high-water level.

6. All abandoned roads outside the mine perimeter will be brought to original grade, ripped, water barred and revegetated.

7. The dike and the primary drainage courses in the vicinity of the mine will be routinely maintained to ensure ther integrity at all times.

2.5.9 Fire Protection

The riprapped dike slopes surrounding the mine yard will be maintained as a fire break. A water storage tank of 12,000 gallon capacity and fire extinguishers as required by OSHA, will be maintained on-site in case of structural or wildland fires. Project personnel will be instructed in appropriate fire suppression techniques.

2.5.10 Radiological Monitoring Before and During Mine Operation

Under CEQ regulations, monitoring of impacts may be treated as mitigation. The following monitoring is contemplated as part of the proposed action or the alternatives.

The radiological monitoring program involves collection of appropriate data before the mine is operational. Additional measurements will be made as needed during mine operation and in the event of an accidental release of radioactivity to the downstream wash. A final survey will be conducted at the time the mine is closed to assess the impact of the mine, if any, on the project area.

Preoperational Baseline Information

The preoperational baseline data collection program will last one year prior to ore production and will involve background measurements of direct gamma radiation, radon gas and progeny concentrations, and radioactivity concentrations in air, soil and water.

Direct gamma radiation measurements will be obtained by duplicate independent monitoring devices and at a minimum of 12 locations. Dosimeters will be exchanged quarterly and provide cumulative dose information. Readings from a pressurized ion chamber and a scintillometer will be recorded whenever the dosimeters are exchanged. The monitoring sites are described below and shown in Figure 2.4. Measurements to date are reported in Appendix E.

Mine Sites	Eight compass headings and a special additional location in the wash immediately south of site. Each site is approximately 1/4 mile from proposed mine shaft.

Owl Tank	In center of wash just north of tank.
Tusayan	Grand Canyon Airport.
Tusayan	Tusayan Ranger District Office.

Radon measurements have been and will be performed quarterly using an instrument which obtains independent measurements of radon gas concentrations and the daughter product "working level" exposure. Measurements will be made at the mine site, Tusayan and other locations as deemed necessary.

Water samples have been and will be collected from the wash and Owl Tank semiannually, based on availability of water. Additional samples will be collected at Havasu Springs, Indian Gardens, and Blue Springs. Results to date are reported in Appendix F.

Soil samples have been and will be collected from the sites listed here and shown in Figure 2.4. Results to date are reported in Appendix E.

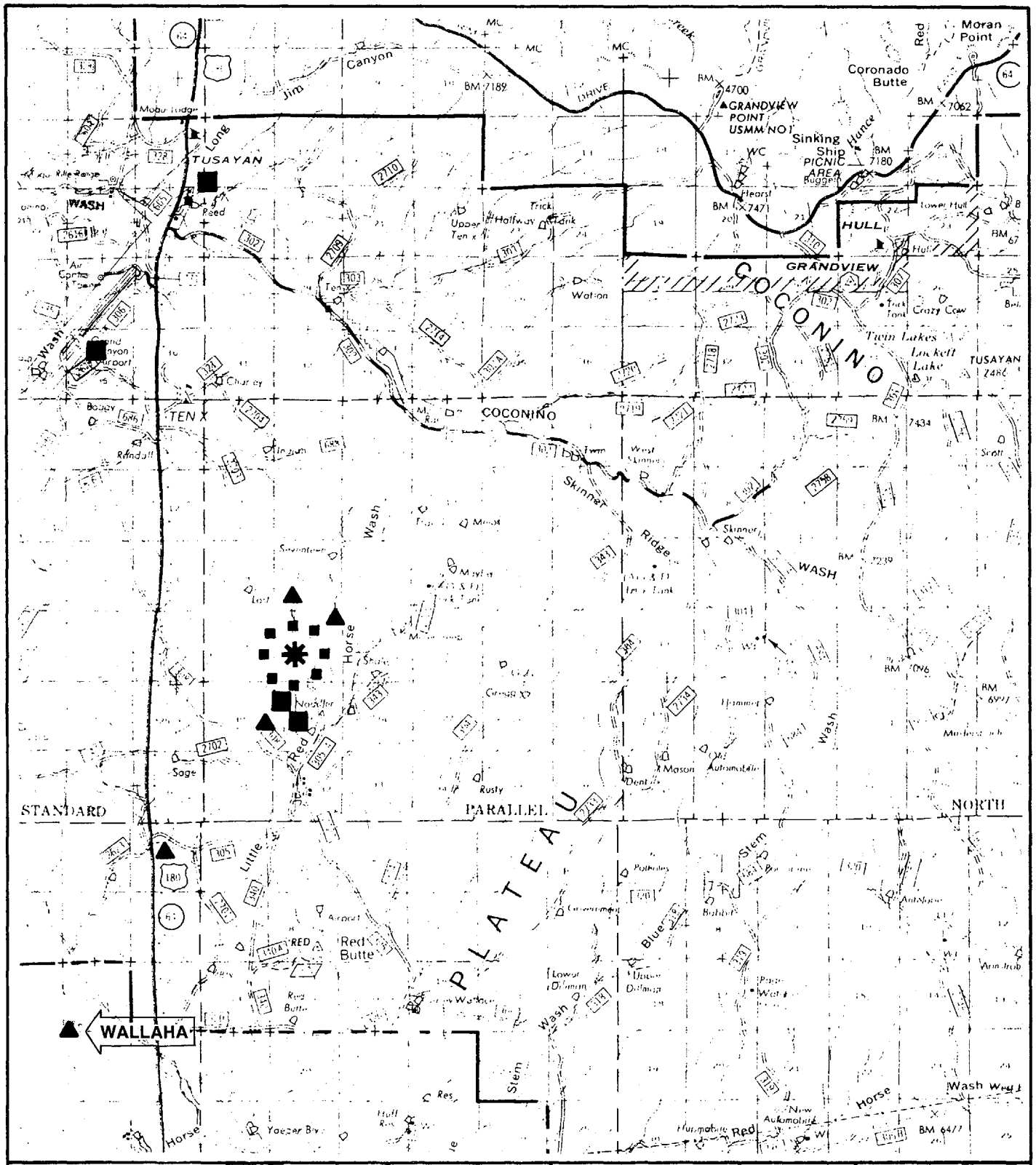
-Upwash north of Canyon Mine Site (background)
-Upwash northwest of Canyon Mine Site (background)
-Downwash immediately below Canyon Mine Site
-Owl Tank
-Little Red Horse Wash at U.S. Highway 180
-Big Red Horse Wash at east-west dirt road (unnamed) crossing just west of north-south railroad spur, and approximately 1 mile west of Willaha ranch-house ruins.

Operational Measurements

After the mine is in operation, the quarterly dosimetry measure ments, pressurized ion chamber, and scintillometer measurements will continue at the 12 established sites. Additional sites may be established along the haulage route.

Based on time and need, radon measurements will continue at Tusayan and will be rotated among other sites such as Owl Tank, the ore and waste piles, in the mine office, and atop the exhaust vent. The objective will be to collect sufficient radon information to determine whether any measurable increase occurs at Tusayan.

Soil and water samples will be collected until such time as sufficient data is available to delineate possible radionuclide increases from accidental releases and to ensure that ground water, if present, will not be adversely impacted. Thereafter, except for water from the mine well and soil from the survey



■ BACKGROUND RADIATION SITES AROUND PROPOSED MINE ■ ADDITIONAL BACKGROUND RADIATION SITES ▲ SOIL COLLECTION SITES ✱ CANYON MINE SITE	N ½" = 1 MILE	**RADIOLOGICAL MONITORING SITES**	**FIGURE 2.4**

location immediately downwash from the mine yard, routine soil and water sampling should not be needed unless some extraordinary event dictates additional samples be taken.

Whenever a haulage accident occurs, a radiological report will be prepared. The report will contain such information as the amount of material spilled, the extent of area affected, measures taken to provide an adequate cleanup, results of the final radiological survey, and estimates of any possible non-occupational exposures.

Following any storm event where the surface water control features fail, the flooded area downstream from the mine site would be radiometrically surveyed. Any soil showing radiation levels above baseline measurements would be removed and returned to the mine site.

2.5.11 Groundwater Monitoring

A water well to the Redwall-Muav aquifer will be constructed and tested at the Canyon Mine site prior to the intersection of ore by mining operations. If groundwater is yielded, the well would be completed with blank and steel casing, and a standard 5-day single borehole pumping test, followed by a 5-day recovery period, would be conducted to determine aquifer permeability and to obtain groundwater samples for laboratory chemical analyses. After the pumping test program is complete, the well would be equipped as a water supply and groundwater monitoring well. Water samples for chemical analyses will be obtained at 3-month intervals during the first year of the sampling program. After results for the first year are analyzed, the frequency of sample collection may be modified. The water samples will be analyzed for routine constituents, trace elements, gross alpha and beta radiation, uranium and radium 226.

In the event that groundwater becomes contaminated during the mining operations, continuous pumping will be maintained until critical constituents are reduced to drinking water standards or to within ten percent of ambient concentrations, or to some comparable standard approved by the Forest Service. The pumped water will be stored in the mine yard ponds and discharged only when it meets NPDES standards. With the drawdown that occurs as a result of pumping, no contaminants should leave the area in the groundwater since all flow would be directed toward the well.

If groundwater is not yielded from the Redwall-Muav aquifer at the mine site, the test borehole will be plugged and abandoned in accordance with requirements for the Arizona Department of Water Resources.

2.5.12 Surface Floodwater Control at Mine Site

The adequacy of the proposed flood channels at the mine site was investigated as part of the hydrologic studies that tracked the disposition of flood flows through the mining area toward the Havasupai Reservation. Based on the specifications given in the proposed Plan of Operations, the proposed flood channels were adequate for at least a 100-year flood event. However, there was concern raised about locating an artificial channel along the sideslope at the east side of the mine yard. An alternative to this proposal was drafted (Appendix D) by the consulting hydrologist. This modified design would increase the flood carrying capacity of the channels to handle a 500-year event and would preclude the possibility of runoff from local intense storms from either entering or leaving the operating site, thereby eliminating the potential of downstream radionuclide contamination from ore stock piles. Construction of these channels will require less surface disturbance than the original proposal. The original diversion proposal is a part of Alternative 2. This modified proposal has been incorporated into Alternatives 3-5.

Holding pond(s) in the mine yard must be adequate to receive local runoff from a 100-year thunderstorm event, plus normal annual runoff and water that may be pumped from the mine. The volume of water in the pond(s) must be maintained at a level that will allow a reserve pond capacity to accommodate unforeseen and normally expected runoff events. With these factors taken into consideration, a pond volume of about 6 acre-feet is recommended, with no more than 3 acre-feet of storage used at any time. The ponds must be lined with plastic or impervious material to prevent percolation into the substrate. (See Appendices B & D for detailed discussion of mine-yard runoff).

Average annual potential evaporation at the mine site is estimated to be greater than 50 inches per year. A pond having a surface area of one acre and a depth of 4 feet can be expected to lose most of its capacity to evaporation each year. Thus, one storage facility of this capacity could be used to hold water pumped from the mine and runoff from the portion of the mine yard which contains ore. A second storage facility could be used to collect non-contaminated runoff from within the yard, and would be discharged in accordance with the NPDES permit. Exact pond volume will depend on the amount of water encountered during the shaft-sinking operation.

Prior to stockpiling ore, EFN will construct an ore pad at least one foot thick. This pad will prevent leaching of mineral values from the ore into the soil as a result of rainfall.

2.5.13 Traffic Control

Traffic control will be needed for ore trucks entering State Highway 64 from Forest Road 305, when the highway haul options are used.

2.5.14 Wildlife Mitigation

The following are recommended methods of mitigating potential wildlife impacts:

1. Mine Site:
   Improve and rehabilitate an alternate 32-acre foraging area. Create a forage opening in the pinyon-juniper woodland by mechanically removing trees and brush and seeding with desired species. See Appendix C, page 25 for details.

2. Elk Calving Areas:
   Construct one reliable wildlife water source on the Tusayan District. (The water source will be located in an area with suitable forage and cover, and will be fenced to exclude livestock. See Appendix C for details.) Closing the affected road section to all traffic during the calving season (May 1-June 30) may be used as an alternative to construction of a wildlife water source.

3. Key Waters:
   Important wildlife waters impacted by the haul road traffic will be relocated. For each impacted key water source, one earthen tank will be constructed in a suitable location away from roads. All new tanks will be fenced to exclude livestock.

4. New Road Construction:
   Improve and rehabilitate an alternate foraging area equivalent to the number of acres removed from production by new road construction (in addition to "1" above).

2.5.15 Raptor Protection

Overhead powerlines must have a 60-inch minimum separation of wires.

2.5.16 Pooled Worker Transportation

Employees will be provided transportation to and from the mine site by a Company van or bus. Driving of individual vehicles to the mine will be discouraged.

Table 2.3 summarizes the mitigation measures that apply to the different alternatives.

TABLE 2.3 -- Mitigation Measures That Apply to Project Alternatives

MITIGATION MEASURE	Alternative # 2[1]	3	4	5
1. Compliance with laws and regulations	X[2]	X	X	X
2. Mine site reclamation	X	X	X	X
3. Visual resource	X	X	X	X
4. Public safety controls	X	X	X	X
5. Ore haulage control (spills)	X	X	X	X
6. Air quality management		X	X	X
7. Noise management		X	X	X
8. Erosion control	X	X	X	X
9. Fire protection		X	X	X
10. Radiological monitoring		X	X	X
11. Groundwater monitoring		X	X	X
12. Surface runoff diversion	X	X	X	X
13. Control of truck access at SR 64				X
14. Wildlife mitigation				
a. replacement foraging area		X	X	X
b. new water source to offset loss of elk calving habitat near haul road or close road during calving season		X		
c. construct replacement waters impacted by haul route		X	X	X
15. Raptor protection		X	X	X
16. Pooled worker transportation	X		X	X

[1]The mitigation measures that are marked under this alternative were proposed by EFN in the original Plan of Operations.

[2]An "X" indicates that the listed mitigation measure is specified as part of that alternative.

2.6 COMPARISON OF ALTERNATIVES

Under Alternative 1, No Action, the Forest Service would reject the Proposed Plan of Operations. No mine would be allowed and no roads constructed or improved. The No Action Alternative is intended to provide baseline data relevant to the issues and concerns, against which the impacts of the other four alternatives can be compared. Implementation of this alternative is in direct conflict with the general mining laws and Secretary regulations which provide a statutory right to pursue a reasonable mining operation, and also provide the Forest Service the authority to require reasonable environmental controls.

The following tables display the effects of each alternative against the identified issue and concern. A narrative discussion relates those effects which could not be quantified.

TABLE 2.4 SOCIO-ECONOMIC IMPACTS ON COCONINO COUNTY

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT	ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION
Local and Regional Economic Impacts	Change in Employment (primary and secondary - number of jobs affected)	-0-	Williams +58 Coconino Co. +102 (occurs over 1-5 yr)	----------same for all Alternatives----------		
	Changes in Total Annual Income For Coconino County ($)	-0-	3,086,900 +0.52%	3,086,900 +0.52%	3,086,900 +0.52%	3,086,900 +0.52%
	Changes in Total Annual Gross Output for Coconino County ($)	-0-	3,925,400 +0.16%	3,925,400 +0.16%	3,925,400 +0.16%	3,925,400 +0.16%
	Annual Tax Revenues (Sales, Property and severence) ($)	-0-	297,500	297,500	297,500	297,500
Effect on Williams Water Supply	Total Storage Capacity (ac.ft.)	2,750				
	Potable City Consumption 1/ (ac.ft./yr.)	350				
	Canyon Mine Projected Needs (ac.ft./yr.)		8	8	8	8
	Change in City's Annual Demand(%)		2.3	2.3	2.3	2.3
Cultural Resources 2/	Relative Archeological Site Density along Haul Routes	No Effect	Low	Low	High	Low to moderate
Social Impacts	Lifestyle, Beliefs and Attitudes	No Effect	Most employment should come from existing labor pool in Williams, provided employment qualifications can be met. For some people who fear radiation or covet solitude, the existence of a uranium mine may change their attitude and beliefs regarding the project area.			
	Population Change	No Effect	Population of Williams or Coconino County will not change appreciably as a result of the mine.			
City & County Infrastructure						
a) School Enrollment	Enrollment	No Effect	A small increase in school enrollment at Williams would have no impact. Excess capacity now exists.			
b) No. of Police	Number of Police	No Effect	No significant change anticipated.			
c) Fire Protection	Amount	No Effect	No change required.			
d) Medical Facilities	Amount	No Effect	Adequate emergency medical facilities available in Grand Canyon Village and Williams.			
e) Housing	Amount	No Effect	Adequate housing exists in Williams. None available in Tusayan.			

1/ Includes all water sold by the City of Williams to all customers, local and otherwise. Design capacity is 1120 ac-ft/yr. (Data from the City of Williams Draft Comprehensive Plan, 1985)

2/ Low site density = <9 sites/mi.^{2}, moderate density = 9-25 sites/mi.^{2}, high density = >25 sites/mi.^{2}.

TABLE 2.5 RECLAMATION OF MINE SITE

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT	ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION
Need for Reclamation	Area Requiring Restoration (ac.)[1/]	NA	17	17	17	17
Measures/Methods	Revegetation		Seeding of all disturbed sites will be accomplished as specified in Section 2.5, for erosion control.			
	-mixture (species)	NA				
	-application (type)	NA				
	Stablilization of Stockpiled Topsoil (narrative)	NA	Not required	Stockpiled top soil will be seeded with the same application specified in Section 2.5.8 for erosion control.		
	Surface Facilities Removal (narrative)	NA	All improvements will be removed from the mining site.			
	Radioactive Waste Disposal (narrative)	NA	The mine yard will be radiometrically surveyed and any material found which exceeds normal background levels will be removed from the area, backfilled into the shaft or hauled from the Project Area.			
Reclamation Bond	Amount ($)	NA	-0-	100,000	100,000	100,000

[1/] Minor amounts of road obliteration will be required during construction of haul route. These amounts are not included here. Similarly a small amount of restoration is required in the utility corridor, but since this is constant and insignificant, it is not included in this table.

TABLE 2.6 PROPONENT INCURRED PROJECT AND MITIGATION COSTS 1/

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; WILDLIFE MITIGATION; MONITOR WATER, AIR AND SOIL; USING HAUL RTS 1 OR 2; SHORTEST DISTANCE OVERHEAD POWERLINE		ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION	
				Route #1	Route #2		Route #6	Route #7
Transportation	Hauling ($)	-0-	2,790,000	2,790,000	2,693,200	3,351,000	4,866,800	3,940,080
	Construction ($)	-0-	1,371,400	1,371,400	1,328,700	1,920,500	225,600	643,906
	Maintenance ($)	-0-	192,500	192,500	177,800	227,500	33,600	208,600
Monitoring	Radiation:							
	Air, Soil and Water ($)	-0-	-0-	70,000	70,000	70,000	70,000	70,000
	Groundwater:							
	Well Construction ($)	-0-	-0-	250,000	250,000	250,000	250,000	250,000
	Water Sampling ($) 2/	-0-	-0-	42,000	42,000	42,000	42,000	42,000
Equivalent Habitat Improvement	Key Waters:							
	Relocation ($) 3/	-0-	-0-	34,080	25,560	25,560	8,520	8,520
	Create Replacement 4/							
	Foraging Area ($)	-0-	-0-	6,840	6,910	6,680	6,170	6,170
Site Reclamation	Total Costs ($)	-0-	72,320	72,320	72,320	72,320	72,320	72,320
Worker Transport. 5/	Total Costs ($)	-0-	51,300	3,600	3,600	51,300	51,300	51,300
Cultural Resource Mitigation	Total Costs ($) (incl. haul route clearance)	-0-	11,550	11,550	11,340	12,150	9,280	11,500
Powerline	Total Costs ($)		90,200	90,200	90,200	236,100	309,600	309,600
Right-of-Way Acquisition	Total Costs ($) (incl. survey)	-0-	-0-	-0-	-0-	-0-	-0-	12-30,000
Total Project Costs	Net Discounted Costs ($) 6/	-0-	3,398,282	3,760,971	3,643,962	4,785,699	4,242,417	4,102,632

1/ Some costs are one-time expenditures, such as road construction and reclamation; others are recurring annual costs; all are shown here as total project costs, based on 2 pre-mining & 5 mining years. Cost estimates are based on data from contractors, trade journals, etc., and are for comparison only. Actual costs could vary significantly from these estimates.

2/ Prior to the start of mining operations samples will be taken at the Redwall-Muav springs every 6 months for 18 months. After the groundwater well has been drilled, and if it produces water, samples will be taken from the well 4 times each year. This will replace the sampling at the springs. If groundwater contamination is detected at the well, pumping will be initiated, along with sampling at the springs. (See Section 2.5.11 for details.)

3/ Estimated at $8,520 for construction of a new tank, including fencing.

4/ This is an "equivalent-acre" cultural treatment required to mitigate the loss of habitat at the mine site and new road construction.

5/ Alternatives 2, 4 & 5 include Company costs of pooled worker transportation; Alt.3 includes cost of 35-car parking lot.

6/ Includes all listed project costs, discounted at 10% over a projected 7-year planning horizon.

TABLE 2.7 IMPACTS ON WILDLIFE

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; WILDLIFE MITIGATION; MONITOR WATER, AIR AND SOIL; USING HAUL RTS 1 OR 2; SHORTEST DISTANCE OVERHEAD POWERLINE; 35-CAR PARKING LOT		ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION	
				Route #1	Route #2		Route #6	Route #7
Elk Calving Habitat 1/	Acres Potentially Impacted (within 0.5 mi. of road)	-0-	228	228	55	-0-	-0-	-0-
	Percent of Habitat Impacted (%)	-0-	11	11	3	-0-	-0-	-0-
Deer/Antelope/Turkey Fawning & Nesting Habitat 2/	Acres Potentially Impacted	-0-	---------- No Quantifiable Impacts ----------					
Elk Migration Routes	Percent of Population Affected	-0-	-0-	-0-	-0-	-0-	-0-	11 8/
Area Lost From New Road Construction 3/	Acres Taken Out of Production by Roads	-0-	9	9	10	7	-0-	-0-
Big Game Foraging Habitat 4/	Area Directly Impacted by Mine Site (acres)	-0-	32	32	32	32	32	32
Total Acres of Habitat Replacement 5/	Acres of Vegetative Treatment Required (ac.)	-0-	-0-	41	42	39	32	32
Key Waters 6/	Number of Waters Impacted % of All Key Waters in Area	-0- -0-	3 13	3 13	2 9	3 13	1 4	1 4
Replacement Waters 7/	Total Needed as Mitigation Measure (no.)	-0-	-0-	4	3	3	1	1

1/ Estimated total acres of elk calving habitat within Tusayan Ranger District is 2,000 acres. Impacted elk calving habitat will be mitigated by constructing 1 water.

2/ To date there are no studies that show a definite relationship between increased traffic and impacts on these habitats.

3/ Habitat lost from new road construction will be mitigated by vegetative treatments at alternate sites.

4/ Includes acreage of natural opening at mine site; mitigated by vegetative treatments at alternate sites (reflected in total acres of habitat replacement).

5/ Based on total acres impacted: acreage within the natural opening at the mine site, and acres of habitat taken out of production by new road construction.

6/ Important waters that are adjacent to the haul road.

7/ Number of new wildlife waters needed to offset the impacts of elk calving habitat impacted and key waters along the haul routes.

8/ Impacts to elk migration are speculative and unquantifiable. If additional information indicates that significant impacts occur, the haul road would be temporarily closed during the migration period.

TABLE 2.8 EFFECT ON VEGETATION

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; WILDLIFE MITIGATION; MONITOR WATER, AIR AND SOIL; USING HAUL RTS 1 OR 2; SHORTEST DISTANCE OVERHEAD POWERLINE; 35-CAR PARKING LOT		ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION
				Route #1	Route #2		(same for both haul route options)
Loss of Grazing Capacity and Timber Production 1/							
1) Grazing Capacity	District Total (AUM's)	16,424.0					
	Amount Lost (AUM's)	-0-	7.9	7.9	8.0	6.6	5.2
	Amount Lost (%)	-0-	0.05	0.05	0.05	0.04	0.03
2) Timber Annual Allowable Cut	District Total (MBF) 2/	1809.0					
	Amount Lost (MBF/yr.)	-0-	1.52	1.52	2.89	0.62	0.06
	Amount Lost (%)	-0-	0.08	0.08	0.16	0.03	0.003
Loss of Vegetation							
1) Ponderosa Pine	District Total (acres)	96,182.0					
	Amount Lost (acres)	-0-	7.9	7.9	8.0	3.2	0.3
	Amount Lost (%)	-0-	0.008	0.008	0.016	0.003	0.00
2) Pinyon-Juniper	District Total (acres)	175,770.0					
	Amount Lost (acres)	-0-	2.4	2.4	2.4	6.9	6.9
	Amount Lost (%)	-0-	0.001	0.001	0.001	0.004	0.00
3) Forest Vegetations Similar to Mine Site	District Total (acres)	13,551.0					
	Amount Lost (acres)	-0-	15	15	15	15	15
	Amount Lost (%)	-0-	0.11	0.11	0.11	0.11	0.11
Threatened, Endangered and Sensitive Plant Species	Species Present Amount of Impact (narrative)	Disturbed rabbitbrush	No T&E species are present on the Ranger District. The only known sensitive species "disturbed rabbitbrush" (Chrysothamnus molestus) can safely be avoided in both haul route and power corridor location. It does not exist in the mine-yard area.				

1/ As a result of mine yard construction and road improvements.

2/ The timber removed is associated with road clearings, and represents a permanent loss of annual allowable cut.

TABLE 2.9 EFFECT ON VISUAL QUALITY OF GRAND CANYON AND KAIBAB FOREST [1]/

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT	ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION
Impacts on Viewed Landscape	Forest Service Visual Quality Objectives (VQO) [2]/ 1) Preservation: Management activities except for very low visual impact recreation facilities are prohibited. 2) Retention: No change in landscape qualities related to size, intensity, amount, direction, pattern, etc., should be evident. 3) Partial Retention: Man's activities remain visually subordinate to the characteristic landscape. 4) Modification: Man's activities dominate but will borrow from existing visual characteristics. 5) Maximum Modification: Man's activities will dominate the view.	Current Objectives: Retention, partial retention, modification and maximum modification for various locations on the Tusayan Ranger District (See Fig. 3.6)	Current Objectives: Modification and maximum modification--Meets objectives and will not appreciably alter visual characteristics adjacent to haul routes	Current Objectives: Modification an maximum modification--Meets objectives and will not appreciably alter visual characteristics adjacent to haul routes	Current Objective: Maximum modification--Within Forest guidelines but will result in road scar on Coconino Rim	Current Objective: Maximum modification--Changes in visual appearance of Forest will remain unaltered along existing forest roads
Impacts on Grand Canyon Park and State Highway 64	Changes in Visual Experience at Park and State Route 64	No Change	No Change [3]/	No Change [3]/	No Change	No Change

[1]/ The Canyon Mine is located 13 miles south of the south rim of the Grand Canyon. Terrain and vegetative cover restricts visibility of the mine in the surrounding area to less than 1/2 mile. Therefore the Canyon Mine will not be seen from either SH. 64 or the Grand Canyon. Visual quality impacts on Forests lands will largely be dependent on haul route selection.

[2]/ Visual quality objectives are determined by: (1) variety class [i.e., attraction of the area's physical features (landforms, vegetation and waterform)]. and (2) sensitivity level (i.e., people's concerns about the scenic quality of an area. See Sec. 3.2.4.)

[3]/ The only potential effect mining activity might have on the Grand Canyon National Park, is a slight reduction in visibility in the extreme SE corner of the Park. This would result from road dust from ore trucks traversing the sharp turn near Hull Cabin on haul route #1, under extreme meteorological conditions. Visibility into the Grand Canyon would be unaffected since this small affected area is south of the rim road.

TABLE 2.10 EFFECTS ON AIR QUALITY AT GRAND CANYON, TUSAYAN AND MINE SITE

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT	ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION
Predicted Impacts on Air Quality	Predicted Impacts of Particulates and Radon Gas Emissions on Air Quality at Grand Canyon National Park (narrative)	The GCNP is a mandatory class 1 area.	No significant impact of radon gas or suspended particulates will occur in the park from the proposed mining project, even under the most extreme "worst-case" conditions.			
	Predicted Impacts of Suspended Particulates and Radon Gas Emissions on Air Quality at Mine, Tusayan and Along Haul Routes					
	Radon: (pCi/L)					
	Average for Western U.S.	0.2				
	Projected Increase in Levels (Due To Mine) at:					
	1) Owl Tank		0.019	----Same for all alternatives.--------		
	2) Tusayan		0.005			
	Particulates: (ug/m^3)					
	NAAQS Standards	260 (24-hr. max.)				
	Current Levels	47-58(24-hr. max.)				
	Projected Levels					
	1) Mine Site		26 (24-hr. max.)[2]	----Same for all alternatives.-------		
	2) Haul Routes		22 (24-hr. max.)			
	Radioactive Dust: (ug/m^3)[3]					
	Current Levels	background				
	Projected Levels		0.01 increase[4]	----Same for all alternatives.-------		
Monitoring	Requirements (narrative)	N/A	Required during the life of the mining operation, to detect changes in background readings for radon and radioactive dust.			

1/ Total suspended particulates.

2/ These predicted values are in addition to existing (background) levels.

3/ These calculations assume that all potentially radioactive dust is 1% uranium.

4/ This is 300 times less than limits set for facilities which require a radioactive materials license.

TABLE 2.11 EFFECTS OF TRANSPORTATION ROUTE SELECTION [1]/

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT		ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION	
				Route #1	Route #2		Route #6	Route #7
Road Construction	New Construction (miles)	-0-	3.6	3.6	4.1	2.9	-0-	-0-
	Reconstruction (miles)	-0-	23.9	23.9	21.3	30.6	4.8	29.8
Hauling[2]/	To Cameron (tons/mile)	-0-	48.5	48.5	46.4	54.5	128.8	85.0
Integration With Potential Future Forest Resource Management Needs	Degree of Integration (Narrative)	No commitment, future options open	Compatible (upgrades existing roads)	Compatible (upgrades existing roads)(both routes)		Compatible (access to southwest side) with possible future needs	No commitment on Forest, utilizes State and private land	
Surfacing Material Pits [3]/	Total Required (volume cu. yd.)	-0-	54,000	54,000	54,000	63,500	53,500	53,500
	(surface acres disturbed)	-0-	2.8	2.8	2.8	3.4	3.2	3.2
Traffic Use on Haul Route	Seasonal Average Daily Traffic Before Project Construction (no.) [4]/	Not Applicable	17	17	17	21-23	2,900 to 10,150	not available
	Projected Average Daily Traffic After Construction (no.)	Not Applicable	40	40	40	46	2,900 to 10,150	not available
	Percent Increase in Traffic	Not Applicable	135	135	135	109	0.6	not available
Monitoring	Radiometric Surveys Along Haul Routes[5]/	Not Applicable	Data gathered from other uranium mining operations, show no increase in detectable radiation along ore haul routes.					
Wildlife[6]/	Potential Increase in Impacted Area of Key Wildlife Habitat(ac.)	-0-	237	237	65	7	-0-	-0-

1/ Transportation hauling costs, construction costs and costs associated with mitigation requirements are shown on Tables 2.6 (Project Mitigation) & 2.7 (Wildlife).

2/ May require traffic control at intersection of Forest Road 305 and State 64 if Alternative 5 is selected.

3/ Based on truncated cone 15' deep, 3:1 sideslopes. Calculated area x 2 for clearing, equipment, etc.

4/ Average Daily Traffic (ADT) along haul routes (Seasonal averages on Forest roads). Traffic on Route #6 includes 2,900 ADT on SR 64, 10,150 ADT on I-40, 7,600 ADT on US 89, and 3100 ADT on US 160 to the US 191 turn-off to Blanding.

5/ Based on surveys along haul roads in northern Arizona, any increase in radiation caused by passing ore trucks, will be indistinguishable from background radiation. Individuals standing along the highway shoulder would receive a radiation dose too small to measure. The truck driver will receive slightly more radiation than an airline pilot. (See Appendix E.)

6/Includes direct and indirect impacts from haul routes (acres of elk calving habitat within .5 mi. of haul road and are a taken out of production by new road construction).

TABLE 2.12 IMPACTS ON WATER AND SOIL RESOURCES

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT	ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION
Radionuclide Contamination of Down Stream Lands and Waters thru Flooding of Ore Stockpiles at Mine Site	Diverson Channel Capacity (cfs)	NA	1,827	2,120	2,120	2,120
	Expected 500-yr. Flood (cfs)[1]	NA	2,085	2,085	2,085	2,085
	Potential of Flood Waters Reaching Uranium Ore Stockpiles (narrative)	NA	Uranium ore stockpiles will be above the dike height in the southern part of the mine yard and will therefore be above the 500-year flood level.			
	Potential of 100-yr. Flood Reaching Lower Portion of Cataract Cr.	NA	Maximum flow during August 1984 event (100 yrs.+ recurrence interval) was was 2447 cfs. This flow dissipated at a large flat area about 14 miles below the mine site--about 12 miles upstream from Cataract Creek.			
	Sampling for Change from Baseline Surface Water Quality (piC/L):					
	1) Arizona statewide average:					
	Gross alpha	4.9				
	Gross beta	6.4				
	Ra-226	0.2				
	2) Current levels at Owl Tank:					
	Gross alpha	<2	For the life of the mine and until all post mining cleanup operations are completed, surface water and soil sampling will be required annually between Aug.15 and Sept.15 and after any release of water from mine site.			
	Gross beta	5.6 (25)[2]				
	Ra-226	0.76 (17)				
	Uranium					
	Sampling for Change from Baseline Soil Radionuclide Level	NA				
	Current levels: (piC/L)[3]					
	1) At Owl Tank					
	Gross alpha	35 (9)	" " " " " " " " " "			
	Gross beta	28				
	Ra-226	1.6 (14)				
	Uranium					
	2) Wash SSW					
	Gross alpha (pCi/L)	23 (10)	" " " " " " " " " "			
	Gross beta (pCi/L)	32				
	Ra-226 (pCi/L)	1.8 (14)				
	Uranium					

1/ This flood-flow prediction in cubic feet per second (cfs) is based on a general storm with antecedent soil moisture at saturation.

2/ Values in parenthesis are the percent error at one standard deviation.

3/ See text in Section 3.2.7.4, Chapter 3, for complete assays.

TABLE 2.12 (continued) IMPACTS ON WATER AND SOIL RESOURCES

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT	ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE ROAD CONSTRUCTION
Possible Groundwater Contamination by Radionuclides	Sampling for Change from Baseline Quality at Redwall Springs in Grand Canyon & Havasu Canyon Current levels: 1/	NA				
	1) Havasu 2/		Sampling is not a requirement or part of EFN's Plan of Operation.	Assuming permission is granted by landowner, sampling will be done during the life of the mine and until all post mining cleanup operations are completed.		
	Gross alpha (pCi/L)	<8				
	Gross beta (pCi/L)	6.4 (30) 3/				
	Ra-226 (pCi/L)	0.45 (38)				
	2) Indian Gardens 2/		" " "	" " " " " " " " " "		
	Gross alpha (pCi/L)	<4				
	Gross beta (pCi/L)	3.2 (56)				
	Ra-226 (pCi/L)	0.25 (40)				
	3) Mine-Site Well					
	Gross alpha (pCi/L)	NA	Sampling will be required if water is found in the Redwall-Muav aquifer. (See Section 2.5.11 for details.			
	Gross beta (pCi/L)					
	Ra-226 (pCi/L)					

1/ See Table 3.6, Chapter 3, for complete assays.

2/ Before mining operations start, samples will be taken every 6 mos. for 18 mos. After the groundwater well has been drilled, and if it produces water, samples taken 4 times a year from the well, will replace the sampling at the springs, unless groundwater contamination is detected at the well. Then pumping will be initiated, along with renewed sampling at the springs.

3/ Values in parenthesis are the percent error at one standard deviation.

TABLE 2.13 IMPACTS ON AMERICAN INDIAN RELIGIOUS CONCERNS

Preferred Alternative

ISSUE OR CONCERN	UNITS OF MEASURE	ALTERNATIVE 1 NO ACTION (BASELINE DATA)	ALTERNATIVE 2 PROPOSED PLAN OF OPERATION (P.P.O.) USING HULL CABIN HAUL ROUTE TO CAMERON (ROUTE #1)	ALTERNATIVE 3 P.P.O.; MIT.WILDLIFE; MONITOR SOIL, WATER & AIR; USE HAUL RTS. 1 OR 2; SHORTEST DIST. OVERHEAD POWERLINE; 35-CAR PARKING LOT		ALTERNATIVE 4 P.P.O; WILDLIFE MITIGATION; MONITORING AIR, SOIL & WATER; COC. RIM ROUTE #5; OVERHEAD POWERLINE ALONG ACCESS ROAD	ALTERNATIVE 5 P.P.O.; MONITORING AIR, S&W;WILDLIFE MITIGATION USING HAUL ROUTE #6(ALL HIGHWAY) OR ROUTE #7 (SP CRATER) TO MINIMIZE HAUL ROUTE IMPACTS
				Route #1	Route #2		
Direct Impact on Religious Sites	Sites Affected (no.)	0	No specific sites have been identified which would be impacted by the development of the mine site or the proposed haul routes.				
Interference With Access to Religious Sites (eg. burial grounds or shrines)	Sites Affected (no.)	0	Access to religious sites would not be curtailed by operational activities.				
	Trails Intersected by Mine Site or Haul Routes (no.)[a]	0					
Interference With Gathering of Religious Articles (eg. feathers & herbs)	Land Temporarily Lost to Hunting & Gathering (ac.)[b]	0	39	39	36	37	32
	Potential Gathering Areas Impacted by Ore Hauling (mi.)[c]	0	3.6	3.6	2.3	2.9	0
Compatibility with Traditional Religious Beliefs	Narrative	Consistent with traditional beliefs	Development of lands of Hopi ancestral occupancy for commercial purposes conflicts with stated Hopi traditional religious beliefs.				

[a] Trails leading to sites with religious significances.

[b] The Hopi and Havasupai Tribes indicate that the area near the mine site is used for hunting and gathering, but there is no evidence that the Canyon Mine site has been used for religious practices. (Areas shown here represent the sum of the mine site plus any new road corridors.)

[c] Number of miles of new road construction.

2.6.1 Comparison of Alternatives for Resolution of Issues and Concerns

None of the project alternatives fully resolves all nine identified issues and concerns, however by implementing the identified mitigation measures in Section 2.5, Alternatives 3, 4 and 5 are environmentally acceptable to the Forest Service. Alternative 5, with the substitution of an overhead powerline, has been selected as the Preferred Alternative.

IC #1 -Social and economic impacts on the community of Williams and Coconino County as a whole are considered by the Forest Service to be generally beneficial and virtually the same for Alternatives 2-5.

If the No Action Alternative were implemented, there would be no change in current levels of employment, income, tax revenue or output as a result of the Canyon Mine. Demand for public services would remain at current levels. No cultural resource sites would be identified or disturbed by mine development or road improvement or construction.

IC #2 -Reclamation measures required at the mine site are considered by Forest Service to be satisfactory in Alternatives 2-5, although measures called for in Alternatives 3-5 are more comprehensive and oriented toward improving wildlife habitat at the mine site upon its closing. Under the no action alternative, of course, no reclamation would be required at the Canyon Mine site.

IC #3 -The least cost alternative is Alternative 2. Alternatives 3-5 indicate increased expenditures of $360,000 to $1,300,000 can be expected depending on the haul route used and mitigation measures required. Increased expenditures are generally associated with mitigation requirements. The No Action Alternative would result in no construction or development costs, however, the costs of exploration and environmental review could not be recovered by EFN.

IC #4 -Wildlife habitat will be affected to varying degrees in all alternatives depending on the ore haulage route used. Alternative 5 has the least impact on wildlife. Alternative 2 would have the greatest impact because of a lack of mitigation requirements. Mitigation measures in Alternatives 3 and 4 should be effective in reducing the adverse impacts on wildlife resulting from increased road traffic.

Alternatives 3-5 all call for "equivalent habitat replacement" to mitigate the impact of decreased habitat utilization caused by the mine and expanded transportation system. Alternative 3 also includes a proponent choice of road closure during May and June in lieu of habitat replacement to offset the impacts to elk calving habitat.

The No Action Alternative would have no impact from mining or ore transportation on wildlife or wildlife habitat and would require no mitigation. Any benefits associated with construction of alternative wildlife waters would not be realized.

IC #5 -Implementation of Alternatives 2-5 will have a negligible and insignificant effect on the makeup of vegetative types now present on the Tusayan Ranger District. The No Action Alternative would have no impact on vegetation at the Canyon Mine site.

IC #6 -Visual quality associated with the Grand Canyon will not be affected with the development of the Canyon Mine regardless of the alternative selected for implementation. Alternatives 2-5 will alter the short term visual quality at the mine site. Reclamation measures should effectively restore the area to its present visual landscape characteristics.

Implementation of mitigation measures in Alternatives 2-5 will minimize the likelihood of any adverse environmental impacts on the Grand Canyon National Park. To date the only apparent environmental impacts of the Orphan uranium mine, located on the south rim of the Grand Canyon at Maricopa Point, have been the conflicts of the mine with the National Park management objectives and some degradation of the scenic qualities of the Grand Canyon rim. Radionuclide contamination of air, soil or water has not been identified. For comparative purposes, the proposed Canyon Mine is some 13 airline miles from the rim of the Grand Canyon.

Haulage route selection will have a limited effect on the scenic qualities on the Tusayan Ranger District. Implementation of Alternative 5 would have the greatest effect by constructing a road off the Coconino Rim in a location that would be visible to travelers going to and from the Grand Canyon using the east Highway 64 entrance. The No Action Alternative would have no impact on the visual quality of the area near the mine site.

IC #7 -Implementation of Alternatives 2-5 will have no appreciable effect on the air quality, which includes particulates, radon gas, or radioactive dust, at either the Grand Canyon or the community of Tusayan. Increases in

particulate matter will be site specific along haul routes and at the mine site itself and are expected to be well within air quality standards. Current levels of air quality in the vicinity of the Canyon Mine site and haul routes would be unchanged by the No Action Alternative.

IC #8 -Implementation of Alternative 5 using the Highway or SP Crater haul routes (#6 or #7) would minimize impacts on the National Forest environment and resources by limiting road improvements to existing roadways. It would, however, transfer the use, and resulting impacts, to private and State lands, and at a greater cost to EFN (Table 2.2).

The haul route identified in Alternative 4 would be most cost effective in providing a road that would meet long term management needs in the event other mines are developed in the eastern quadrant of the Tusayan Ranger District.

Haul routes included in Alternatives 2 and 3 are the most cost effective routes for hauling ore from the Canyon Mine to the mill in Blanding, Utah.

No ore would be transported under the No Action Alternative.

IC #9 -Mitigation measures and operational procedures included in Alternatives 3-5 will reduce the possibility of radionuclide contamination to surface or subsurface water sources, and identify any contamination at the earliest possible time. Alternative 2 does not include air, soil and water monitoring requirements to ensure the operational designs of the mine are functioning properly. Under the No Action Alternative, current parameters for water quantity and water quality would remain unchanged at the mine site. Soil resources at the mine site would not be affected.

Neither the water quality on the Havasupai Indian Reservation nor the Grand Canyon National Park should be affected by the development of the mine under Alternatives 2-5. The Havasupai Reservation is located about 35 miles downstream from the mine site. A documented 100 year flood dissipated because of topographic features, about 14 miles downstream and 20 miles above the Reservation. Mitigation measures taken at the mine site would prevent any significant downstream radionuclide contamination in the event of an extreme flood occurrence.

IC #10 -Implementation of Alternatives 2-5 will have no appreciable effect on Indian religious sites and practices and will not burden traditional Tribal religious beliefs. Consultation with the Hopi and Havasupai Tribes has not identified any specific sacred site or the presence of any sacred plants used for ceremonial purposes which would be

disturbed by the development of the mine or any of the haul route options. Similarly, a detailed archeological review of the site has disclosed no sites of religious significance.

Development of the mine site (Alternatives 2-5) and haul route options requiring new construction (Alternatives 2-4) could slightly reduce the land area available for Indian religious practices. However, the current level of religious activity is not expected to be curtailed by any alternative nor will access to any religious sites or areas be restricted. Furthermore, there is no evidence of Indian religious activity at the mine site itself or along any of the proposed haul routes.

In comments regarding other proposed actions on the Kaibab National Forest, the Hopi Tribe has expressed a belief that the earth is sacred and that it should not be subjected to digging, tearing or commercial exploitation. While this conflict has not been raised directly in relation to the Canyon Mine, it is acknowledged that commercial use of the Forest within the area of Hopi ancestral occupancy is inconsistent with these stated religious beliefs.

The Preferred Alternative will include only the limited impacts associated with development of the mine site, as the haul route options included in the preferred alternative do not include any new road construction or significant reconstruction.

The No Action Alternative would have no impact on Indian religious beliefs, sites or practices. The Hopi and Havasupai Tribes have expressed a preference for the No Action Alternative.

CHAPTER 3

AFFECTED ENVIRONMENT

This chapter describes the physical and biological environment at the Canyon Mine site and surrounding area. All the individual environmental components are described as they exist without mining operations. Those components of the environment that will be directly or indirectly impacted by uranium mining are discussed in detail in Chapter 4.

3.1 ENVIRONMENTAL SETTING

The following paragraphs describe the factors of the environment that warrant some discussion in order to set the stage for evaluating impacts resulting from each alternative.

3.1.1 Location

The proposed Canyon Mine project area is located on the Tusayan Ranger District, Kaibab National Forest approximately 45 miles north of Williams, Arizona, 6 1/2 miles southeast of Tusayan, Arizona, and 10 miles south of Grand Canyon Village in the National Park. The mine site is located in the the western portion of Section 20, Township 29 North, Range 3 East, Gila and Salt River Meridian, Coconino County, Arizona.

3.1.2 Climate

Spring and fall seasons in the area are relatively dry. Summer and winter receive about equal amounts of precipitation. Summer rain usually comes as thunderstorms with locally heavy downpours of short duration. These convective events are mainly formed over the heated walls of the Grand Canyon almost every afternoon from early July until the end of August. In some years, continuous precipitation may result for one or two days during the summer when weak tropical storms move inland from the Pacific Ocean. Practically all winter precipitation occurs as snow associated with middle latitude storms moving eastward from the Pacific Ocean.

Annual precipitation is approximately 15 inches at Grand Canyon Airport (about 6 miles northwest of the mine site), and average monthly temperatures range from 20.1 F. to 75.6 F. Prevailing wind direction at the mine site is from the south.

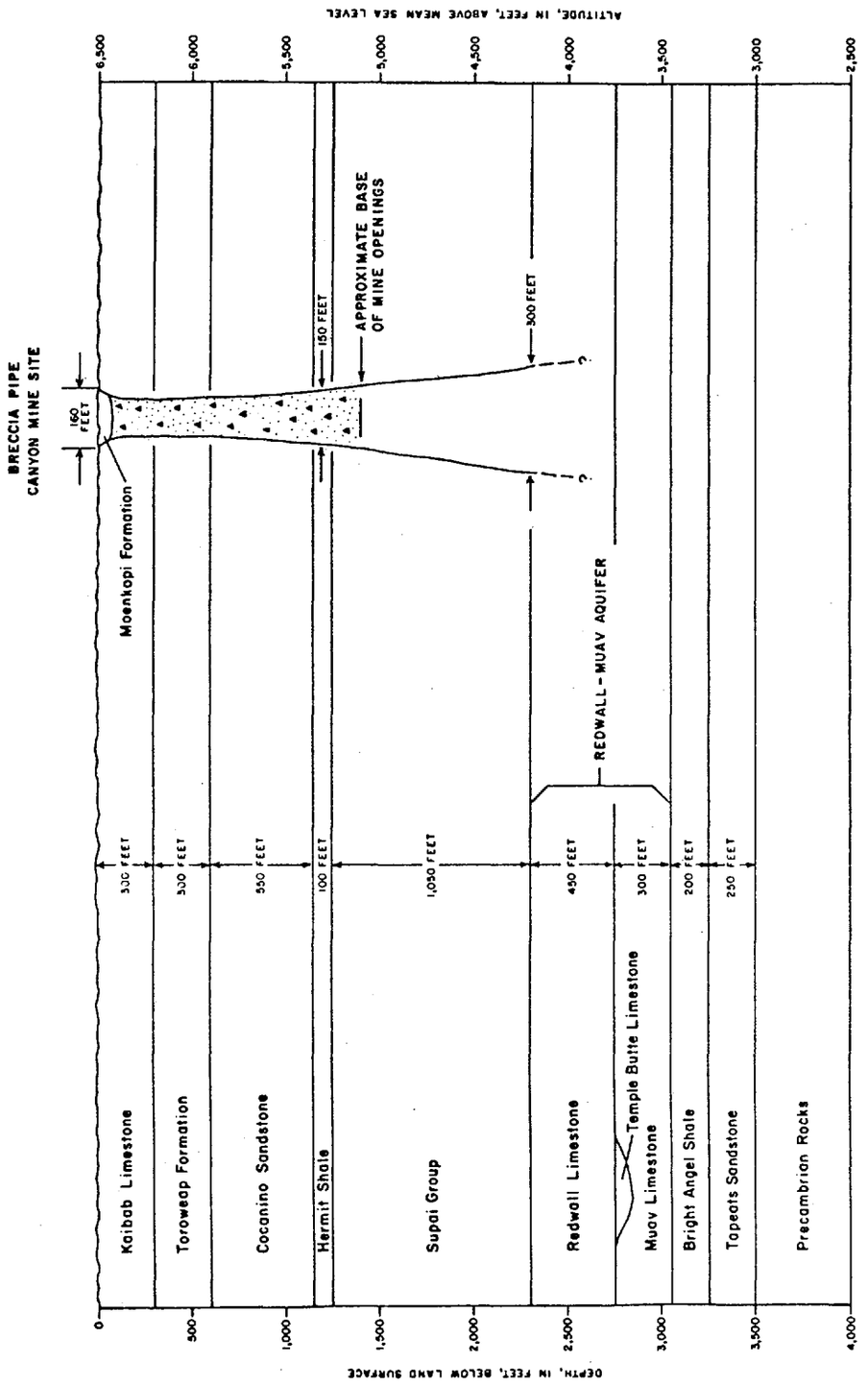
3.1.3 Topography

Major land forms in the general area of the Canyon Mine include nearly level drainage bottoms of recent alluvium, gently sloping plateau ridgetops and moderately sloping canyon sideslopes. Soils have developed from residual or colluvial parent materials, and outcrops of bedrock are typically exposed along shoulder slopes and ridgetops. The Coconino Rim, a north-facing escarpment east and north of the mine, is the major land form obstructing access between the mine and highways to the east.

3.1.4 Geology and Mineralization

The entire Project Area is covered by Mid-Permian Kaibab and Toroweap limestones that dip a few degrees to the south. These formations extend to approximately the 600 foot depth. Below this depth is the Coconino sandstone which is approximately 300 feet thick. This is the formation exposed at the Canyon rim just north of the visitor center at the Grand Canyon National Park. Minor mineralization is noted in the Coconino at the Canyon deposit. The next formation, from depths of 900 to 1,200 feet, is the Hermit Shale. This formation is the bright red rock viewed from Hermit's Rest, eight miles west of the headquarters of the Grand Canyon National Park. Because the Hermit Shale is a dense, clay-cemented siltstone under the much coarser Coconino sandstone, some water, springs or seeps are noted at outcrop contacts between these units. The formation below the Hermit Shale is the Supai formation which extends from 1,200 to 2,300 feet below the surface. The upper few hundred feet of the Supai formation is the resistant sandstone that caused the formation of the inner gorge of the Grand Canyon. It is the main host to the ore deposits that are the object of this mining project. The lower depths of the Supai formation change from a sandstone to a limestone, resting on the older limestones of the Redwall formation.

Uranium mineralization in the Project Area occurs in a breccia pipe structure that cuts vertically through the flat-lying sedimentary rocks (Fig. 3.1). Cavities formed millions of



		SCHEMATIC GEOLOGIC SECTION FOR CANYON MINE SITE	**FIGURE 3.1**

years ago by water dissolving the deeper Redwall limestone created space into which the overlying rock collapsed. The collapsed zone worked its way up hundreds of feet in the form of a cylinder or narrow cone. This broken rock, or pipe, created a favorable environment for mineral deposition. Based upon data from exploration test holes, EFN does not expect that minerals other than uranium will be found in economic quantities in the Canyon Mine.

3.1.5 Seismicity

The following was extracted from "Phase I Investigation and Evaluation Report, I.D. No. AZ00039" by Sergent, Hauskins and Beckwith, consulting Geotechnical Engineers, 1981:

> "The Big Chino, Bright Angel, Mesa Butte and Oak Creek Canyon Fault Zones in the general area of the site are believed to be an extension of a north-south trending zone of moderate seismic activity in western Utah. This zone is classified as the Intermountain Seismic Belt (ISB) by Smith and Sbar (1974). This moderately active section of the ISB is in the transition zone between the Colorado Plateau and Basin and Range Physiographic Provinces.
>
> These faults have not been carefully studied and the relative importance, time of last displacement and probable earthquake magnitudes are inadequately known for positive classification.
>
> However, generalized fault maps (Eguchi and others, 1979, Howard and others, 1978), studies of the regional seismotechtonics (Smith and Sbar, 1974; Sbar and DuBois, 1979), specific studies of the Flagstaff area (Giardina, 1977) and the Mesa Butte Fault System (Shoemaker and others, 1978, Brumbaugh, 1980), and the moderate historical seismic record, suggest that several faults in the area influencing the site may be active in the engineering sense. Relative to evaluation of dams, nuclear power plants and other important structures, a fault is generally classified as active when it displays offsets which have occurred in the last 10,000 to 35,000 years (Slemmons and McKinney, 1977).
>
> The earthquakes of January 25, 1906, September 10, 1910, and September 18, 1912, centered in the area around the north side of the San Francisco Peaks. All produced maximum Modified Mercalli intensities of about VII, to VIII, indicating that the magnitudes were on the order of 5 to 6. It appears these earthquakes could have been associated with either the Mesa Butte or Oak Creek Canyon Fault Systems.

On November 4, 1971, a small earthquake of 3.7 on the Richter Scale occurred in the Williams area.

The mine area is believed to be stable for buildings and most other construction activities.

3.1.6 Soils

Soil types within the area have undergone various degrees of development. Climate, vegetation, parent material, elevation, slope, exposure and landscape position all contribute to the developmental processes which are reflected in a range of physical, chemical and biological properties.

The dominant soil type within the operations area belongs to the fine-loamy, mixed family of Cumulic Haploborolls. Soil profiles are moderately deep to deep (20 to 60 inches), welldrained and have a moderate permeability rating. Surface horizons range from 5 to 30 inches thick and have fine sandy loam textures with dark brown and dark grayish brown colors. Subsoil textures are sandy clay loam or clay loam with brown and grayish brown colors. The internal volume of rock fragments is variable (10 to 40 percent by volume). The depth to limestone bedrock is generally greater than 40 inches. The revegetation suitability and inherent productive potential of this unit ranges from moderate to high. There is approximately 2,600 acres of this soil unit inventoried within the Tusayan Ranger District.

Soils within the contributing watershed to the north and northeast of the project area belong to the loamy skeletal, mixed, mesic and frigid families of Lithic Ustochrept. The mesic component is associated with the woodland species pinyon pine and Utah juniper whereas the frigid soils are associated with the ponderosa pine. Soil profiles are shallow (less than 20 inches) well-drained and have moderately slow to moderate permeability ratings. Surface horizons range from 1 to 3 inches thick and have fine, sandy loam textures with yellowishbrown and brown colors. Subsoil textures are sandy loam or loam, with light brown and brown colors. The internal volume of rock fragments ranges from 35 to 75 percent by volume. The depth to limestone bedrock generally ranges from 10 to 19 inches. The revegetation suitability and inherent productive potential for these units is low. This rating is the result of the soil toxonomic components being shallow over bedrock and high internal coarse fragment content. There are approximately 136,000 acres of these soil units on the Tusayan Ranger District.

Erosional processes in the form of sheet and rill are the result of high intensity summer thunderstorms and resulting overland flow. Saturated soil conditions are generally confined to a 2 or 3 week period during spring when snowmelt occurs.

3.1.7 Land Status and Land Uses

The Canyon Mine site is located on ground which was part of the original Grand Canyon Forest Reserve established in 1893. In 1908, it was incorporated into the National Forest System as part of the Coconino National Forest. Through the years, there have been numerous administrative name changes for this particular area. However, it officially became part of the Kaibab National Forest in 1934. There are no outstanding rights, reservations, executive orders, public land orders or withdrawals which preclude either mineral exploration or development in the immediate area of the Canyon Mine site.

National Forest system land affected by the proposed action are presently managed for multiple use purposes including timber harvesting, cattle grazing, wildlife management, mineral exploration and recreational uses such as Christmas tree cutting, firewood gathering and hunting.

Active copper mining took place on the western edge of the Tusayan Ranger District around the turn of the century. There are some patented mining claims on the Tusayan District which date back to the late 1800's as a result of this activity. These claims have been occasionally worked in the past for oxidized copper ores exposed in surface veins.

Most recent uranium mining activity and development in the immediate vicinity occurred from 1956 to 1969 at the Orphan Mine. This particular mine was patented in 1906 and is located on the rim of Maricopa Point in the Grand Canyon National Park. The Orphan mine produced significant quantities of uranium, copper, silver and gold. Nearly 4.4 million pounds of uranium oxide (U_3O_8) were produced from the Orphan Mine ore during this period. The Grand Canyon National Park is now closed to all forms of mineral exploration and development. The head frame and surface buildings at the Orphan Mine are still present at the site.

3.1.8 Recreation Activities

Recreation use on the Tusayan Ranger District is predominantly associated with Grand Canyon National Park visitation in the form of highway use on State 64 (2,100 average daily traffic)

and providing overnight camping at the Forest Service operated Ten-X Campground.

Recreational activities away from the highway corridors and developed campgrounds is light and fairly seasonal. Most dispersed use is associated with hunting, woodcutting and Christmas tree harvesting. Russell Tank is a small water impoundment which provides a local fishery for Tusayan and Grand Canyon Village residents. Annual recreational use for the Tusayan District in these categories is estimated at 21,000 recreation visitor days (RVD's).

There are no specific recreational activities or unique recreational attributes associated with the Canyon Mine site.

3.1.9 Noise

Background ambient sound levels within the project area and along haulage routes vary depending upon the level of human activity, including traffic, recreation and aircraft flight paths. Major sources of noise unrelated to human activities include insects, birds, wildlife and foliage rustling due to wind.

The Day-Night Average Sound Level (Ldn), for open unpopulated areas away from highways and paved roads can be expected to vary from 30 to 45 decibels (dB).

3.1.10 Cultural Resources

The Canyon Mine site and the associated ore haulage roads are located within an area that has been occupied over thousands of years by various prehistoric and historic American Indian groups. The Canyon Mine site was surveyed in November of 1984 to determine if any cultural resource sites were located in the area. A survey performed by Abajo Archeology disclosed the existence of two prehistoric sites. These sites were archeologically tested in June of 1985 to determine if they met the eligibility criteria for nomination to the National Register of Historic Places pursuant to the National Historic Preservation Act of 1966, 16 U.S.C. § 470 et. seq. and 36 CFR 800.

One site, AZ-H-4-3, 4 and 5 (inclusive), located in an alluvial catchment basin just north of the proposed area of operations, was indicated by sparse, surface artifact scatters containing

evidence of prehistoric Kayenta Anasazi, Cohonina and Cerbat (Pai) groups. Testing of this site revealed no subsurface archeological material, and it was found not to be eligible for the National Register.

A second site, AZ-H-4-6 and 7, located on a ridge sideslope east of the proposed catchment basin, was tested and produced evidence of a subsurface pit structure, as indicated by burned adobe, a wooden post and trash midden. The pit house was tentatively identified as a domestic structure, which may have been constructed and occupied by the prehistoric Kayenta Anasazi (750-950 A.D.). The general site area may have been sporadically occupied as an encampment in later years by the Cerbat (Pai) (about 1300 A.D.) groups. The historical role of sites of this type in the settlement/subsistence patterns and adaptive strategies of such groups is not well understood due to the paucity of the detailed excavation data. For this reason, this site was determined to be eligible for inclusion on the National Register.

In consultation between the Forest Service, the Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation, it was determined that there would be no adverse effect to this site if an acceptable data recovery program was carried out. A data recovery program was proposed by Abajo Archeology and approved by these three agencies. Data recovery field work was carried out in November of 1985. Following data analysis, a final report will be submitted to the Forest Service for review and approval. All recovered data, including artifacts, photographs, maps and analyses will be submitted to the Arizona State Museum at the University of Arizona for curation and storage.

Proposed alternative haul roads have not yet been surveyed for cultural resources. However, based upon a one percent sample survey of the entire Tusayan Ranger District and tens of thousands of acres of project surveys on this same district, probable cultural resource site densities were projected for each of the alternatives as shown in Table 2.4. Probable cultural resource site density is one of the factors that will be considered in final haul route selection. In any case, a complete cultural resource survey will be carried out along the preferred haul route before a commitment is made to use that route. A similar survey will be undertaken for the powerline corridor prior to construction. Any sites located will be evaluated for National Register eligibility and dealt with through consultation between the Forest Service, the Arizona State Historic Preservation Officer and the Advisory Council.

3.1.11 American Indians

Three Indian Reservations can be found within the general vicinity of the Canyon Mine site. The Havasupai Indian Reservation is located approximately 35 miles northwest of the mine site, the Hualapai Indian Reservation is approximately 42 miles west of the mine site and the Navajo Indian Reservation is approximately 25 miles east of the mine site. Arizona State Highway 64 and U.S. Highway 89 intersect within the Navajo Reservation. The Hopi Reservation is approximately 80 miles east of the mine site and 40 miles north of Winslow, Arizona.

3.2 ISSUES AND CONCERNS

This section provides descriptions of specific components of the environment which will be directly or indirectly affected by mining activities and which have been identified as major issues and concerns from the scoping process.

Two of the ten identified issues and concerns do not lend themselves to a discussion of their specific affected environment: "Reclamation Measures" and "Cost". The affected environment for reclamation includes general climatic conditions, soils, vegetation, hydrology and geology. These elements are described under the general environmental setting (Section 3.1) and issues and concerns #5 and #9 (Sections 3.2.3 and 3.2.7).

Project costs have zero as an existing baseline, or present environment, and therefore will be discussed only in Chapter 4 when there are projected differences from this zero base.

3.2.1 IC #1 Socio - Economic Impacts on Coconino County

(a) Affected Community Descriptions

Social Environment

Development of the Canyon Mine has the potential of affecting three local communities, Tusayan, Williams and Flagstaff to varying degrees.

Tusayan

Tusayan is located closest to the proposed mine site. It is a

rural unincorporated village with an estimated seasonal population of 500-1,000 people. There is no formal local governing body to manage Tusayan's community affairs. Because of its proximity to the Grand Canyon, the vast majority of employment in Tusayan is oriented towards providing goods and services needed by Grand Canyon visitors.

Williams

Williams is a rural community located some 42 - 45 miles south of the proposed mine site. Major sources of employment are oriented toward providing services and retail goods for Interstate 40 travelers. A substantial number of residents are employed in agriculture and forestry activities.

The economic base of Williams has been declining for many years. Williams has often relied on only one industry at any given time to support the community. In the past, the railroad and sawmill industries were major parts of Williams, however, their influence on the economy has greatly diminished. Williams is now relying on tourism, most of which is summer use from people on I-40.

Williams has a variety of shopping facilities, an available labor force and available housing.

Flagstaff

Flagstaff is a full service city with a population of 38,000 to 40,000. It serves as a regional trade center and has a very stable economic base because of its size, location, and diversity in industry. Flagstaff has a high percentage of professional and government workers, partly because of the University, county seat and growing technical and industrial base.

(b) Infrastructure for Williams and Tusayan

Medical Facilities

Williams

The City of Williams is serviced by a 24-hour-a-day Emergency Center which is affiliated with the Flagstaff Hospital. It is equipped to stabilize patients, and perform minor surgery. The City also has a 24 hour-a-day ambulance service, two physicians and one dentist.

Tusayan

A clinic, operated by the Presbyterian Hospital in Phoenix, is located in the Grand Canyon National Park and is staffed with two doctors. It is equipped to handle emergency services and provides other routine health services.

Police and Fire Protection

Williams

Williams has an 8 man police department that provides 24 hour-a-day protection. The County Sheriff maintains a substation in Williams staffed by 4 full time deputies. In addition, there are several Department of Public Safety Officers stationed in Williams. All the police agencies have common radio frequencies and will provide assistance to each other when requested.

The City of Williams has a fire department which is staffed by 23 volunteers. The Fire Department operates out of 2 fire stations with a total of 8 pieces of apparatus including a light rescue unit. While their primary responsibility is within the city limits, they will respond outside the City when requested under various "Mutual Aid" agreements.

Tusayan

A Coconino County Deputy resides in Tusayan and provides the primary law enforcement needs. Back up help or assistance is available from U.S. Park Service personnel if necessary.

Organized fire protection services in Tusayan are somewhat limited. A fire engine is located at the Grand Canyon Airport and available to the community, provided personnel are available to operate it. Other sources of fire suppression equipment and personnel are the U.S. Park Service and U.S. Forest Service.

Schools

Williams

The Williams school district operates a public elementary and middle school as well as a high school. The school district employs approximately 55 people including 45 faculty members. Current student enrollment is 617, but existing school facilities can accommodate 800 students.

Tusayan

School facilities for Tusayan are located in the Grand Canyon National Park for kindergarten through twelfth grade. Enrollment is between 225-250 students and is nearly always operated near its physical capacity. Growth of the school system is limited by severe housing shortages in both Tusayan and the Park.

Housing

Williams

Williams has a variety of housing types available including single family, mobile home parks and rental apartments. The high costs of constructing domestic water systems has slowed development of subdivisions outside the city limits. Residents of several subdivisions located immediately adjacent to Williams have to haul their potable water from the City. Williams has an annual water supply of approximately 2,750 acre feet of which about 350 acre feet or 13 percent is consumed domestically.

Tusayan

Surplus housing in Tusayan and the Grand Canyon Village is non-existent. This housing shortage and the lack of a domestic water supply have effectively limited the growth of Tusayan and are largely responsible for limiting opportunities for additional employment in the community. At the present time only four privately owned residential dwellings exist. House trailers provide limited housing for the balance of the work force population which varies between an estimated 275 and 700 people on a seasonal basis. A lack of privately owned lands has restricted the construction of additional residential areas. Domestic water for residential and commercial establishments is hauled from Williams or Bellemont on a daily basis. Approximately 80 acre feet is used annually.

Social Services

The following social services are available to residents of Tusayan and Williams:

- Job Training
- County Nurse
- Access Health Care Program
- Energy Assistance
- Emergency Assistance
- Weatherization Program

- Surplus Commodity Distribution
- Coconino Community Guidance Center
- Food Stamp Program
- County Legal Aid
- Senior Citizen Program

(c) Population and Land Base Uses of Coconino County

The State of Arizona and Coconino County in particular, are among the fastest growing areas in the United States. One of the reasons for this growth is the quality of life in the State. This quality of life is a result of the climate, landscape diversity and economic opportunities, as well as the opportunity for many different types of recreation on the vast amount of public lands in the state.

Population[1]

	1980	1984	1990	2000	Increase 1980-2000
	in thousands				
Arizona	2718.4	3053.8	3710.2	4751.9	75%
Coconino County	75.0	82.4	99.1	130.5	74%

Coconino County (18,608 square miles)
Status of Land Ownership[2]

US Forest Service	27%
US Bureau of Land Management	5%
Indian Reservation	45%
State of Arizona	10%
Individual or Corporate	6%
Other	7%

[1]Arizona Department of Commerce, May 1985.
[2]Arizona Statistical Review, 40th Ed., Sept. 1984, Valley National Bank of Arizona.

(d) Employment structure of Williams, Tusayan and Coconino County

Labor Force Data

	Williams[1]	Tusayan	Coconino County[2]
Civilian Labor Force.....	1,155	NOT	35,294
Employed.....	1,055	AVAIL-	32,450
Unemployed.....	100	ABLE	3,100
Unemployment Rate.....	8.7%		8.2%
Total Population.....	2,325*	est.	84,500

*Local sources estimate the Williams and surrounding area 1984 population to be 4,000.

Employment

Estimated Present Employment by Sectors

	Williams[1]	Tusayan[3]	Coconino County[2]
Agriculture and Mining.....	134	22	1,825
Construction.....	76	17	1,125
Manufacturing.....	71	10	2,625
Transportation, Communication and Utilities	104	50	2,225
Wholesale Trade.....	16	10	982
Retail Trade.....	273	108	6,168
Finance, Insurance and Real Estate.....	13	16	600
Services	265	101	7,975
Public Administration.....	103	47	8,925
	1,055	381	32,450

[1]Arizona Department of Commerce, 5/85.
[2]Arizona Statistical Review, 40th Ed., Sept. 1984, Valley National Bank.
[3]Employment information for Tusayan is virtually non-existent.

Figures shown for Tusayan on the above tabulations are estimates based on interpretations of data provided by Tusayan Chamber of Commerce and NACOG.

Contribution of Existing Mining Activity to Tusayan, Williams, and Coconino county

Employment estimates shown for agriculture and mining in the Coconino County regional area are primarily associated with ranching and forestry related activities. Mining operations for sandstone, cinder and rock material pits in the Williams,

Tusayan and Flagstaff areas do provide small amounts of employment. Estimates of total direct income for this sector of employment for the Williams and Tusayan area have not been developed.

3.2.2 IC #4 Wildlife

Mining activities have the potential to affect wildlife populations primarily in the north-central portion of the Tusayan Ranger District.

(A) Habitat

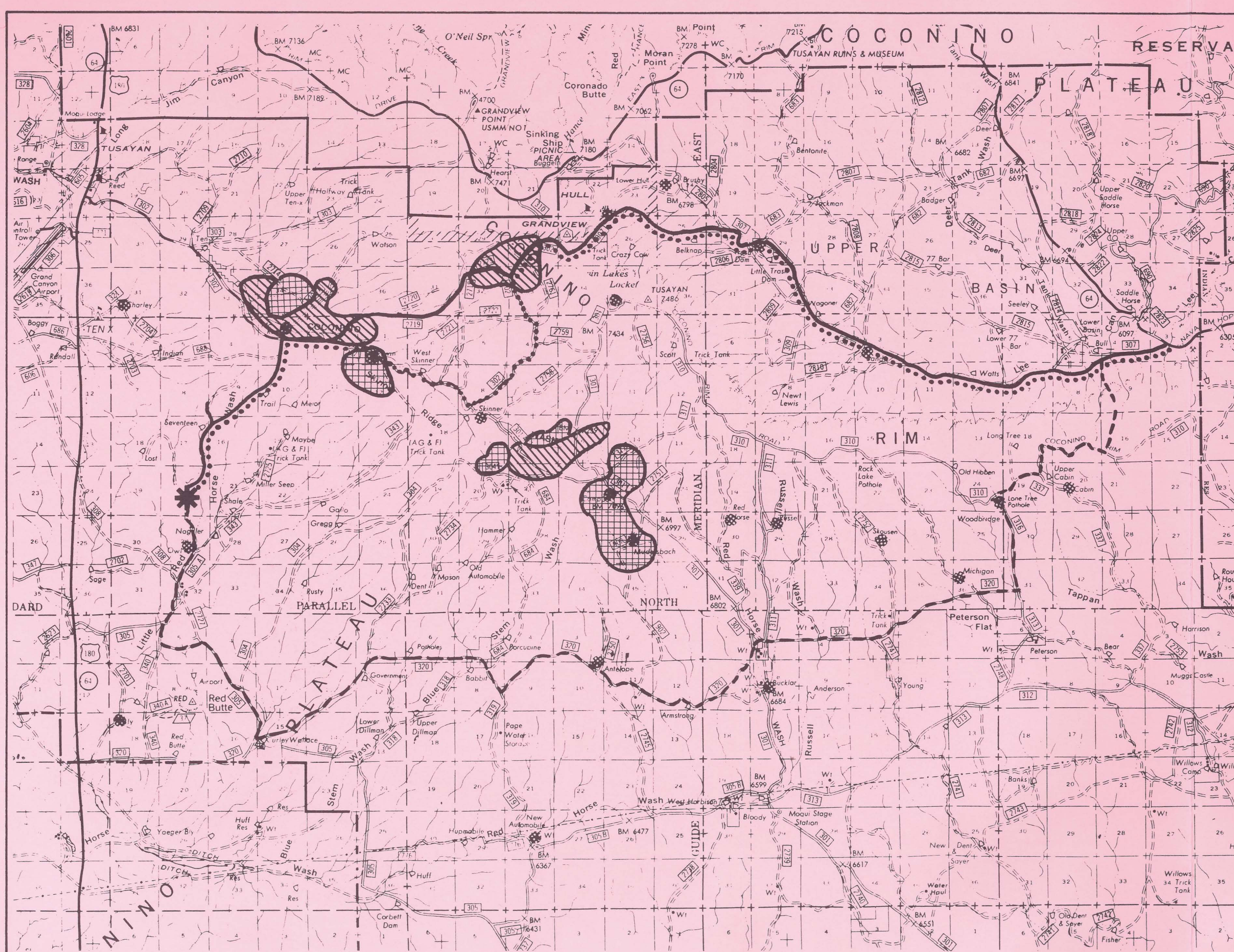
The Tusayan District is located in the northern half of Arizona Game and Fish Department, Game Management Unit 9. The overall carrying capacity (Glossary in Appendix C) of the habitat in Unit 9 is low relative to other units in northern Arizona. This is partly due to the lack of water in the area. Scarcity of reliable water sources in the unit affects the distribution, size and behavior of resident wildlife populations.

Wildlife habitat on the Tusayan Ranger District can be categorized into five vegetation types: Conifer, Pinyon-Juniper, Sagebrush, Browse, and Grassland. (Acreage figures represent the total acres of each vegetation type on the Tusayan Ranger District).

(1) Conifer (96,182 acres)

Ponderosa pine forest covers approximately 96,182 acres on the Tusayan Ranger District. Understory species are typically gambel oak, pinyon pine and juniper. This vegetation type serves as summer habitat for antelope, mule deer, elk, and turkey. The northern goshawk, Cooper's hawk, red-tailed hawk, acorn woodpecker and pygmy nuthatch are among the more than twenty five bird species that nest in the area. The Abert squirrel, golden-mantled squirrel and valley pocket gopher are yearlong residents in this vegetation type.

Five elk calving areas totaling approximately 2,000 acres, have the potential to be impacted by the mine proposal (Fig. 3.2). 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.



ELK CALVING AREA

ANTELOPE FAWNING AREA

IMPORTANT WILDLIFE WATER SOURCE

CANYON MINE SITE

HAUL ROUTE OPTION BY PROJECT ALTERNATIVE

PROJECT	HAUL ROUTE
ALTERNATIVE 2&3	OPTION 1 ••••••••
ALTERNATIVE 3	OPTION 2 ———
ALTERNATIVE 4	OPTION 5 — — —

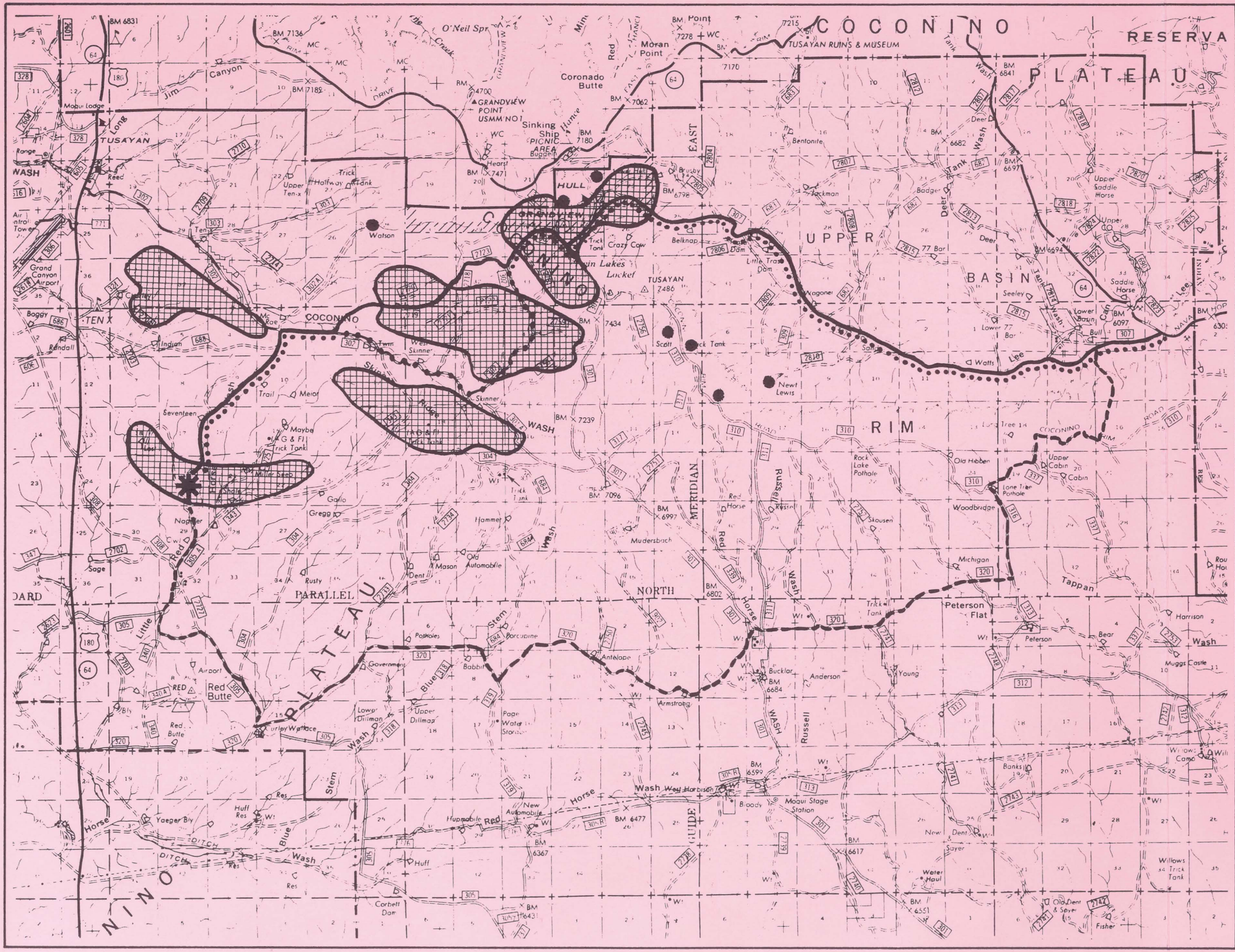
INVENTORY MAP OF ELK CALVING AND ANTELOPE FAWNING AREAS

N

½'' = 1 MILE

FIGURE

3.2



INVENTORY MAP OF DEER FAWNING AND BEAR USE AREAS

FIGURE 3.3

Approximately 9,900 acres of deer fawning habitat have been identified in the vicinity of the mine and ore haul routes (Fig. 3.3). Quality forage and available water are essential components in optimum fawning habitat. "Optimum fawning habitat for deer includes low shrubs or small trees from 0.6 to 1.8 meters (2 to 6 ft.) tall under a tree overstory of approximately 50 percent crown closure" (Thomas 1979).

Antelope fawning occurs primarily in open grassland habitats which provide high visibility as well as adequate grass cover for concealing young fawns. Three fawning areas, totaling roughly 2,300 acres have been identified in the vicinity of the mine and ore haul routes (Fig. 3.2).

Turkey typically select nest sites on slopes in or adjacent to ground cover. Nesting cover is often provided by dense oak thickets, logging slash, logs, or shrubs (Phillips 1982, Jones 1981). Approximately 1,600 acres of turkey nesting habitat have the potential to be impacted by the mine (Fig. 3.4).

(2) Pinyon-Juniper (175,770 acres)

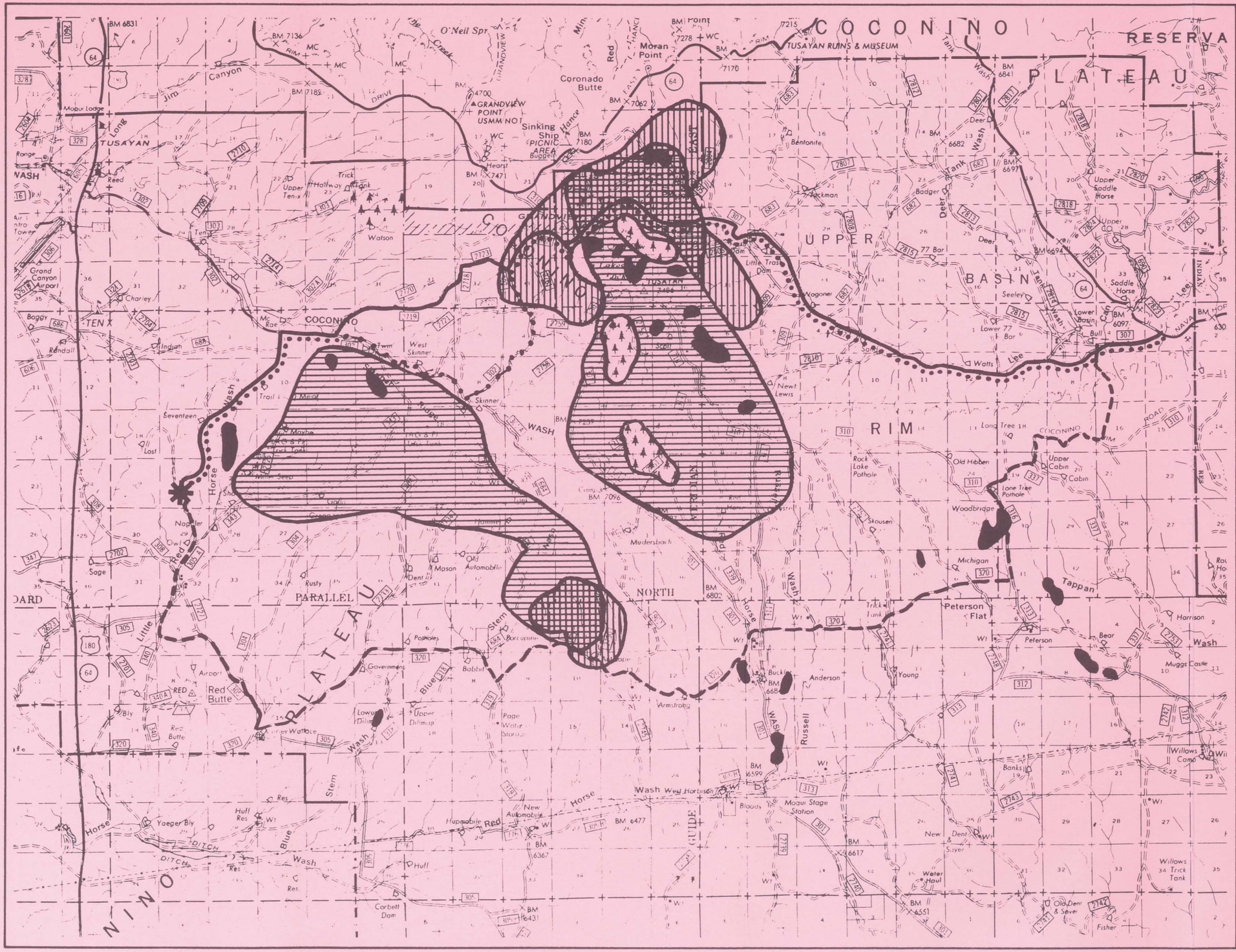
Pinyon pine-juniper woodland is the most extensive vegetation type on the District, covering 175,770 acres. Sagebrush and rabbitbrush are the most common understory species. This vegetation type serves as winter habitat for antelope, mule deer and elk. Other mammals in the area include the grey fox, bobcat, rock squirrel and blacktailed jackrabbit. Pinyon pine and juniper trees provide nest sites for the plain titmouse, pinyon jay and great horned owl.

(3) Sagebrush (27,759 acres)

This vegetation type is dominated by sagebrush, rabbitbrush or a mixture of both. Grasses and forbs are generally very sparse in the understory. Blue grama is typically the most abundant forage species found in this type. The black-throated sparrow and Brewer's sparrow inhabit the area.

(4) Browse (1,731 acres)

Winterfat, cliffrose, and four-wing saltbush are the primary species in the browse vegetation type. The understory forb and grass composition varies depending upon browse stand density and location. Elk, deer, and antelope depend more heavily on browse plants for forage during the



KNOWN NESTING AREA

KNOWN ROOSTING AREA

SUMMER HABITATE

WINTER HABITATE

CANYON MINE SITE

HAUL ROUTE OPTION BY PROJECT ALTERNATIVE

PROJECT	HAUL ROUTE
ALTERNATIVE 2&3	OPTION 1 •••••••
ALTERNATIVE 3	OPTION 2 ———
ALTERNATIVE 4	OPTION 5 – – –

INVENTORY MAP OF TURKEY HABITAT AREAS

N

½'' = 1 MILE

FIGURE

3.4

winter months when palatable grasses and forbs are unavailable. The relatively large seeds from the four-wing saltbush provide a food source for small birds and mammals.

(5) Grassland (23,591 acres)

Grassland openings are dominated by perennial grasses with low densities of forbs and sedges. Primary forage species within these openings are mutton bluegrass, western wheatgrass, squirreltail and blue grama. Crested wheatgrass, an introduced species, is abundant in areas that have been disturbed and reseeded.

The 17-acre mine site is located within a grassland opening. The area is dominated by blue grama and western wheatgrass with low-moderate densities of rabbitbrush and sagebrush. Recent vegetation surveys in the opening indicate that both soil and forage are in fair condition.

The opening is used as a foraging area by elk, antelope, and deer. This is also a quality hunting habitat for raptors due to the availability of surrounding pine trees for perches, high visibility within the opening and abundance of small mammals such as the desert cottontail and pocket gopher. The western meadowlark and lark sparrow nest in this vegetation type.

(6) Water

Lack of dependable water is the primary factor affecting wildlife distribution in the area. Twenty-three stock tanks have been identified as important water sources due to their reliability and historic use by wildlife (Fig. 3.2).

Russell and Bucklar Tanks are the only tanks that are stocked with fish. The Arizona Game and Fish Department stocks Russell Tank with trout on a seasonal basis. Bucklar Tank, on private land, is also occasionally stocked with fish by the landowners. The Arizona tiger salamander is also known to inhabit several stock tanks on the District. Breeding typically occurs in July and August during the summer rains. Adults spend much of the non-breeding season in the underground burrows of small mammals.

(B) Wildlife Populations

(1)Nongame

Nongame animals include all wildlife species except for game mammals, game birds, fur-bearing animals, predators and aquatic species.

A minimum of 141 nongame wildlife species occur in the affected area including 36 mammal species, 82 bird species, 20 reptile species and 3 amphibian species. There is little detailed information available concerning the habitat requirements of most of these species. No known studies of nongame species have been conducted on the Tusayan District to date.

A listing of all game and nongame species that potentially occur in the affected area can be found in Appendix C.

(2) Game

Game animals include all wildlife species that can be legally taken under Arizona State law (Arizona Hunting Regulations 1985).

The following discussion will focus on game species that may be impacted by mining activities. These game species include antelope, elk, mule deer, turkey and black bear.

Big game population estimates for the Tusayan Ranger District are displayed in the following table (Kaibab National Forest Annual Wildlife and Fisheries Report 1983):

Species	Population Estimate
Black Bear	15
Antelope	100
Elk*	325
Turkey	365
Mule Deer	1,200

*Revised 1985 estimate

Bear and antelope population levels are currently static. Deer and turkey populations are on a slight upward trend while the elk population is increasing rapidly at a rate of roughly 20 percent per year.

The elk herd deserves special note due to its unique history, rapid expansion, and developing importance to elk hunters statewide.

Elk were not present on the Tusayan District until the 1950's. The first documented elk sighting was made in 1959, though several unverified sightings were made prior to that date. The animals apparently originated from the elk population in the Williams and Flagstaff area (Game Management Unit 7). The immigration can be partly attributed to increasing competition for resources within the growing Unit 7 herd combined with human encroachment into traditional elk habitat.

The Tusayan elk population is expanding at a rapid rate. At its present population level of 325 animals, the herd is at approximately 60 percent of the area's potential carrying capacity. An unusually high percentage of bulls in this herd are in the older age classes. This is due to the fact that, until recently, it was a virtually unhunted population. Consequently, the herd is gaining popularity statewide among trophy elk hunters.

(C) Threatened, Endangered and Sensitive Species

There are no known threatened, proposed, or sensitive fish or wildlife species that inhabit the area on a permanent basis. The Bald Eagle and Peregrine Falcon are two endangered species that may use the area on a seasonal basis.

The Bald Eagle may be found at low densities on the District as a winter migrant. Eagles forage primarily on winter or road killed deer, elk, livestock and small mammals. Habitat use is sporadic and largely depends on the abundance and location of carrion during the winter months. No roost sites have been identified in the area.

Peregrine Falcons may be found on the Tusayan District on a seasonal basis. Ellis (1978) reported that "[Peregrine] Falcons nesting in the Grand Canyon have been observed hunting over the forests on the rim."

No falcon nest sites have been located in the vicinity of the proposed mine or its haul routes.

Peregrines are known to migrate through the area during the winter and spring months. Like the Bald Eagle, habitat use on the Tusayan Ranger District is at a low intensity and very sporadic.

3.2.3 IC#5 Vegetation

The native vegetation of the project area and the surrounding watersheds represents five plant community types indigenous to the Kaibab Plateau. Their presence is a result of climatic and edaphic interactions along with topographic and geomorphic influences. The proposed mine site is in a valley plain with a predominant sagebrush and grassland vegetation type. Common plant species include sagebrush (Artemesia tridentata), rabbit brush (Chrysothanmus nauseosus), squirreltail (Sitanion hystrix), blue grama (Bouteloua gracilis), blue grass (Poa fendleriana), and crested wheatgrass (Agropyron smithii) with only scattered trees of ponderosa pine (Pinus ponderosa), pinyon pine (Pinus edulis) and Utah juniper (Juniperus osteosperma). The upland plains of the watersheds are typically comprised of coniferous woodland vegetation. Common plant species include ponderosa pine (Pinus ponderosa), pinyon (Pinus edulis), gambel oak, (Quercus gambelii), big sage (Artemesia tridentata), cliffrose (Cowania stansburiana), broom snakeweed (Gutierrezia sarothrae), blue grass (Poa fendleriana), blue grama (Bouteloua gracilis) and squirreltail (Sitanion histrix). Some exposed points and southerly aspects have the presence of droughtier woodland species and these areas generally have an absence of ponderosa pine.

A breakdown and brief description of the five plant communities found on the Tusayan Ranger District are as follows:

1) Conifer type; 96,182 acres - This type is the typical ponderosa pine forest. Understory species are gambel oak, pinyon pine and juniper.

2) Pinyon-Juniper type; 175,700 acres - Pinyon pine and juniper woodland is the most extensive vegetation type on the Tusayan District. Sagebrush and rabbitbrush are the most common understory species.

3) Sagebrush type, 27,759 acres - This vegetation type is dominated by sagebrush and rabbitbrush. Grasses and forbs are generally very sparse in the understory.

4) Browse type; 1,731 acres - Winterfat, cliffrose and four-wing saltbush are the primary species in the browse vegetation type.

5) Grassland; 23,591 acres - Grassland openings are dominated by perennial grasses with low densities of forbs and sedges. Primary grasses are mutton bluegrass, western wheatgrass, squirreltail and blue gramma.

(a) Threatened, Endangered and Sensitive Species

There are no threatened and endangered plants or plants proposed for listing on the District. The following sensitive plants may exist on the Tusayan District (Region 3 Sensitive Plant List 1984):

On Notice of Review

Astragalus cremnophylax
Chrysothamnus molestus
Clematis hirsutissima var. arizonica
Rosa stellata
Silene rectiramea
Talinum validulum

Not On Notice of Review

Aquilegia desertorum
Potentilla multifliolata

To date, C. molestus is the only plant which has been found in the affected area. The population, located approximately five miles to the southwest of the mine site, will not be impacted by mining activities. Additional plant surveys will be conducted within the mine site, along new road alignments and in any other areas where surface disturbance will occur.

3.2.4 IC#6 Visual Impacts

Visual quality objectives (VQO's) are determined by: 1) variety class [i.e., attraction of an area based on its physical features (landforms, vegetation and waterforms)], and 2) sensitivity level (i.e., people's concerns about the scenic quality of an area).

Secondary roads and areas with only occassional use are classified in sensitivity level 3, which is the classification for all the considered haul route options on the Forest. This sensitivity level means that viewer (or user) interest in the scenic quality of the landscape as viewed from these roads, is low (Table 2.9).

Ponderosa Pine Type

Except for the corridor along State Highway 64, in the ponderosa pine type the visual quality objective is "Modification." This objective allows man's activities to dominate the landscape. Along main highways, such as State Route 64, the visual quality objective is Partial Retention or Retention. This means that man's activities must remain subordinate, or changes in the landscape should not be evident.

Pinyon-Juniper Type

In the pinyon-juniper type, "Maximum Modification" is the visual quality objective. This objective allows man's activities to dominate the landscape and may only appear natural when viewed as background. Both of these vegetative types show evidence of having been "modified" by past activities through timber cutting, road construction and numerous range improvement projects.

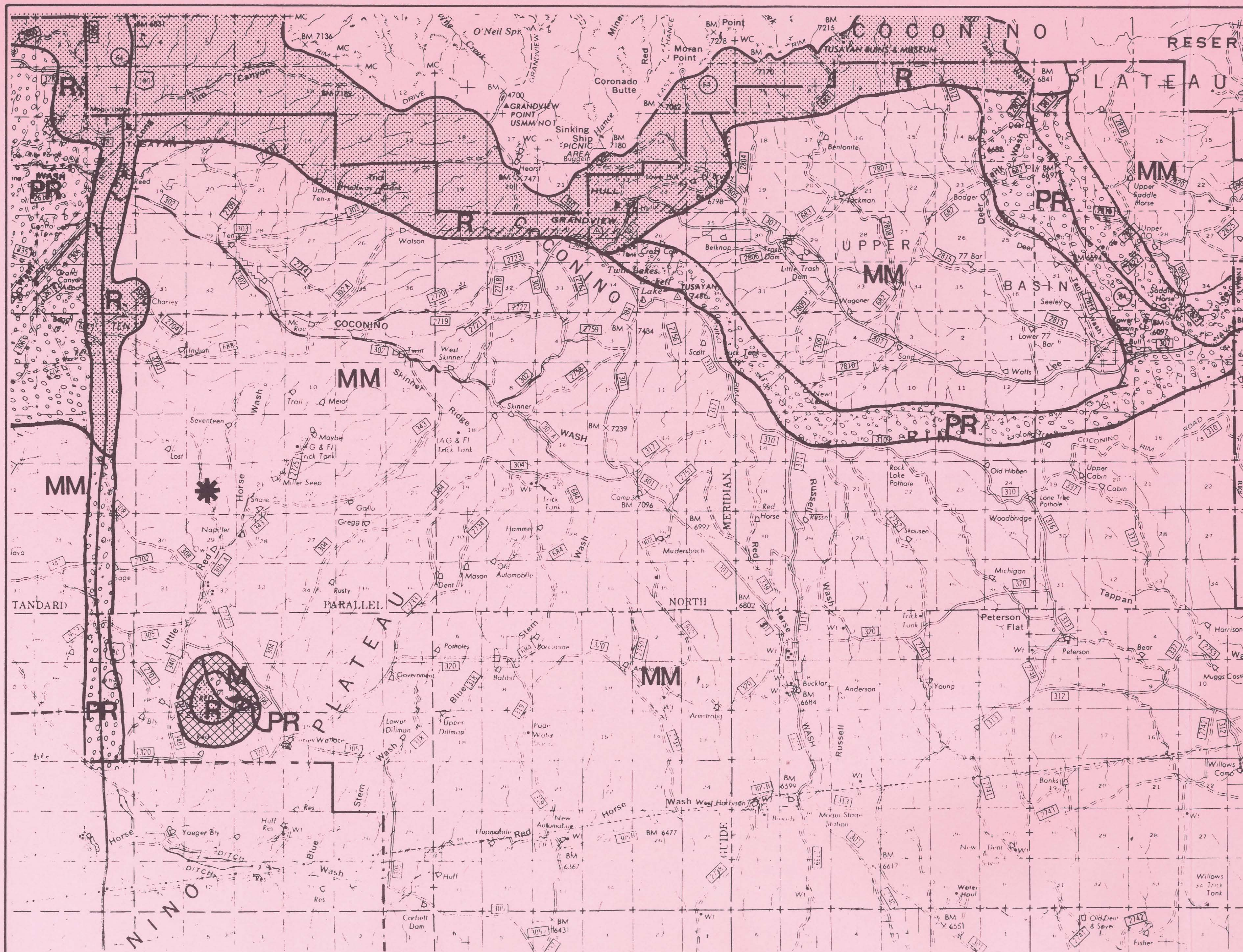
Present visual quality objectives are shown in Figure 3.5.

3.2.5 IC #7 Air Quality – Dust and Background Radiation

3.2.5.1 Particulates

Only particulates will be emitted by the mine or related operations in any measurable quantity. Particulate data have been collected by the Park Service at Hopi Point in Grand Canyon National Park for a number of years. The Hopi Point Total Suspended Particulates (TSP) station is located approximately 16 miles north-northwest of the proposed mine site. Summaries of the 1981 through 1983 TSP data collected at Hopi Point are presented in Table 3.1 showing background particulate concentrations near the proposed mine site. These data show that the annual geometric mean dropped from 16 to 12 ug/m^3 from 1981 to 1982, and dropped substantially in 1983 to 5 ug/m^3. The highest 24-hour concentration measured in the 3 data sets was 58 ug/m^3.

These data are representative of the general area of the proposed Canyon Mine. Proximity, similarity in climatology and the lack of nearby major sources of emissions combine to make the Hopi Point data representative of the particulate



R — RETENTION

PR — PARTIAL RETENTION

M — MODIFICATION

MM — MAXIMUM MODIFICATION

✱ CANYON MINE SITE

VISUAL QUALITY OBJECTIVE MAP

N

½" = 1 MILE

FIGURE 3.5

concentration that would be expected at the project site. The expected TSP baseline of the Project Area should be about 5 to 16 ug/m^3 on an annual basis with maximum 24-hour concentrations in the range of 47 to 58 ug/m^3. No other pollutants have been monitored or are expected in any significant concentrations.

TABLE 3.1 TSP Summary from the Grand Canyon, Collected at Hopi Point by the National Park Service

	Concentration (ug/m^3)		
	1981	1982	1983
Annual Geometric Mean	16	12	5
First 24-hr. Max.	48	47	58
Second 24-hr. Max.	36	33	38
Number of Samples	53	56	55

3.2.5.2 Background Radiation & Radon Gas

The area around the Canyon Mine Site has been surveyed to determine background levels of radiation in air and water. Monitoring stations which measure background radiation were established in April 1985. The twelve monitoring sites are identified in Fig. 2.4.

Background gamma radiation (whole body) ranges between 90 and 130 mrem/yr. The lowest radiation measurements were observed at the stations which are to the south and west of the mine site. Owl Tank registers one of the higher background areas. There is a small, localized anomaly in the wash just south of the mine site where radiation is elevated to approximately 300 mrem/yr. Perhaps this is caused by uranium mineralization which is closer to the surface than the main ore body. Measurements of background radon concentrations in the vicinity of the mine site have ranged from 0.2 to 0.8 pCi/L, providing a lung dose of 125 to 500 mrem/yr.

For purposes of comparison, exposure to the average western U.S. outside air leads to a lung dose of about 125 mrem/yr and indoor radiation levels are usually much higher (Table 3.2). The EPA occupational limit for underground uranium miners is 4 WLM/yr, based on a 0.3 WL atmosphere (maximum).

TABLE 3.2 Radon Doses to Lung Compared to Radon Gas Concentrations and Radon Progeny Exposure

Source of Radon/Progeny	Concentration or Working Level	Lung Dose (mrem/year)
Occupational limit, underground mining	4 WLM/yr	20,000
U.S. uranium miners, current average	2 WLM/yr or less	10,000
Hack Canyon Miners (average)	2.2 WLM/yr	11,000
Avg. exp. to public (natural)	0.2 WLM/yr (3mWL)	375
Average radon levels atop high-grade uranium ore pile	150 pCi/L	93,750
Average radon levels atop mill tailings pile	10 pCi/L	6,250
Energy efficient homes (varies by ventilation, etc.)	5 pCi/L	3,125
Concrete buildings in Arizona	1.7 pCi/L	1,062
Canyon Squire conf. room, Tusayan, Arizona	1.2 pCi/L	750
New Mexico, average outside air	0.5 pCi/L	312
Western U.S. Average outside air	0.2 pCi/L	125
Owl Tank & Mine Site	0.2 to 0.8 pCi/L	125 to 500
Bright Angel Lodge	0.2 pCi/L	125

Note: EPA discourages conversion of WLM to mrem. EPA suggests that use of mrem may be confusing to the public.

3.2.6 IC #8 Transportation

The Tusayan Ranger District is reasonably well-roaded from past activities. The roads that exist are narrow, unsurfaced, generally have poor alignment and are considered low standard. This is due to the lack of the development of an early

transportation plan, established design standards and an inexpensive surfacing material source in the area. The needs for routes to the east have been met by the single road off the Coconino Rim at Hull Cabin (Forest Road 307). Because it is steep and rocky, the rim has been a natural barrier for travel routes in the past.

The major uses of the transportation system on the Tusayan District are for general administrative needs, dispersed recreation (including hunting), timber hauling, range use and mineral exploration.

Winter access to the Forest is nearly non-existent due to snow and adverse weather. No forest roads are maintained for all weather use.

The major routes east of State Route 64 in the area being considered are the east-west Forest Roads 302, on the north side of the District, and 320 in the south-central part of the District. The majority of use originates from SR 64 with these two roads serving as feeders.

Existing roads other than State and Federal Highways proposed as haul routes are described below and shown on Figures 2.1, 2.1A, 2.2 and 2.3.

Haul Route Option #1 This route connects with the major east-west corridor across the north end of the District (Roads 302-307). This road is the Forest arterial which serves both through traffic and connecting roads along the route. The connecting road from the mine to 302 (Road 305A) is a narrow trail which was severely impacted by the 1984 floods. Currently this road is nearly impassable. Portions of Roads 305A, 302 and 307 which are located in higher elevations are subject to seasonal closures due to winter snow accumulations and wet ground conditions during spring thaws.

A portion of Road 307 near Hull Cabin on the Coconino Rim is steep with poor alignment.

Traffic along this route varies from 12 to 30 seasonal average daily traffic (SADT).

Summary of Haul Route Option #1

Road #	Length(mi)	Width(ft)	Alignment	Surfacing
305A	1.7	8	Very Poor	None
305A	2.3	N/A		New

Summary of Haul Route Option #1 (cont'd)

Road #	Length(mi)	Width(ft)	Alignment	Surfacing
302 (1)	4.0	12	Good	Gravel
302 (2)	5.2	12	Fair	None
New	1.3	N/A		New
307 (2)	13.0	12	Good	None
	27.5			

Haul Route Option #2 This route is a modification of Route #1, to improve hauling by shortening the total distance and improving the route off the Coconino Rim. The mill at Blanding is 213 miles over State and Federal Highways after leaving Forest Road 307. This route is also subject to the seasonal closures identified for Route #1.

Summary of Haul Route Option #2

Road #	Length(mi)	Width(ft)	Alignment	Surfacing
305A	4.0	8	Very Poor	None
302, 2719 2720	1.2	12	Good	Gravel
2723	4.4	8	Poor	None
302	1.5	12	Fair	None
307	13.0	12	Good	None
	25.4			

Haul Route Option #5 This route utilizes the southern east-west corridor on the District which is comprised of arterial roads 305 and 320. The connecting roads to this lower route primarily serve ranching needs. At the present time, there is only a primitive road off the Coconino Rim on the eastern part of the Tusayan Ranger District.

Traffic on this route is 6 to 25 SADT. Winter use on the route is low since the roads are not maintained during the winter.

Summary of Haul Route Option #5

Road #	Length(mi)	Width(ft)	Alignment	Surfacing
305A	2.8	8	Very Poor	None

Summary of Haul Route Option #5 (cont.)

Road #	Length(mi)	Width(ft)	Alignment	Surfacing
305	3.8	12	Good	None
320	18.3	12	Good	None
316	2.0	12	Good	None
310	2.3	10	Fair	None
New	2.9	N/A		
307	1.4	12	Good	None
	33.5			

The mill at Blanding is 213 miles over State and Federal Highways after leaving Forest Road 307.

Haul Route Option #6

Route #6 is designed to minimize haul-route impacts on the Forest environmental setting and resources as well as reducing initial development and maintenance costs. It utilizes paved highway almost exclusively. The route would virtually eliminate haul route maintenance. Its drawback is the increased haul distance to the Blanding, Utah mill by a factor of 35 percent over the shortest haul route (#2).

Summary of Haul Route Option #6

Road #	Length(mi)	Width(ft)	Alignment	Surfacing
305A	2.8	8	Very Poor	None
305	2.0	12	Good	None
	4.8			

The mill at Blanding is 316 miles on State and Federal Highways after leaving Forest Road 305. (See Fig. 2.1A.)

Haul Route Option #7 This route utilizes a combination of Forest Road 305, State Routes, county and other roads. The county and private roads are used primarily for ranch access. Maintenance schedules are not known but appear to be quite sporadic. Access on this low elevation route is partially restricted in the winter, but to a lesser degree than the northern routes.

Summary of Haul Route Option #7

Road #	Length(mi)	Width(ft)	Alignment	Surfacing
305A	2.8	8	Very poor	None
305	2.0	12	Good	None
County 417	4.0	24	Very Good	Cinders
State/Private	21.0	12	Good	None
	29.8			

The Blanding mill is an additional 242 miles over State and Federal Highways.

3.2.7 IC #9 Impacts on Water and Soil Resources

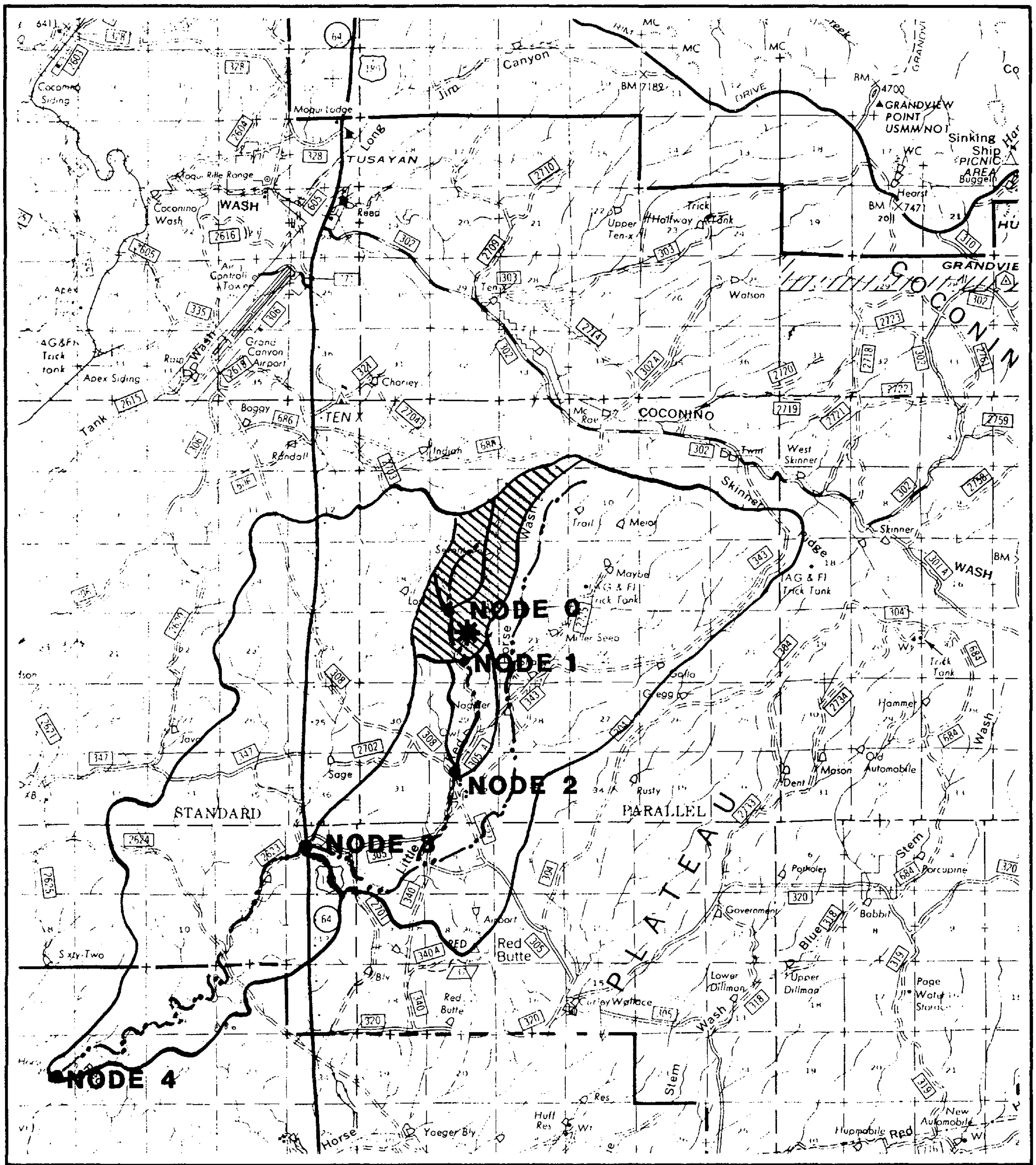
3.2.7.1 Surface water

Surface water drainages near the proposed Canyon Mine are usually dry, but flow intermittently during periods of rainfall or rapid snowmelt. The area is subject to high intensity rainfall and in frequent, but sometimes significant flooding. Heavy rains confined to small areas and of short duration are responsible for most storm runoff.

Figure 3.6 shows watersheds analyzed in the area. The shaded area in Figure 3.6 identifies the watershed that would directly impact the proposed development. Five reference locations, or nodes, define the outlet of the primary drainage areas. Each Node represents the point past which storm runoff from the watershed must pass.

Node 0 is located just upstream from the proposed mine site. This watershed drains approximately 1.0 square mile. Node 1 located just below the site, has a drainage area of 2.3 square miles. Node 2 is just below Owl Tank, and has a drainage area of 3.5 square miles. Node 3, just upstream from Highway 64, receives runoff from 22.7 square miles in Little Red Horse Wash. Node 4 is at the confluence of Little Red Horse Wash in Red Horse Wash some 13.5 miles downstream from the mine site. The drainage area of Node 4 is 43.4 square miles (Appendix D).

The Canyon Mine site will occupy approximately 17 acres. The area is part of a natural clearing approximately 0.2 mile (0.3 km) in diameter. The area generally slopes downward to the



DRAINAGE DIVIDE

DRAINAGE CHANNEL

MINE WATERSHED

CANYON MINE SITE

N

½'' = 1 MILE

STUDY WATERSHEDS

FIGURE 3.6

south, and surface water from small storm events is diverted around the clearing by natural drainageways. The area is surrounded by pinyon, juniper, ponderosa pine and scrub oak.

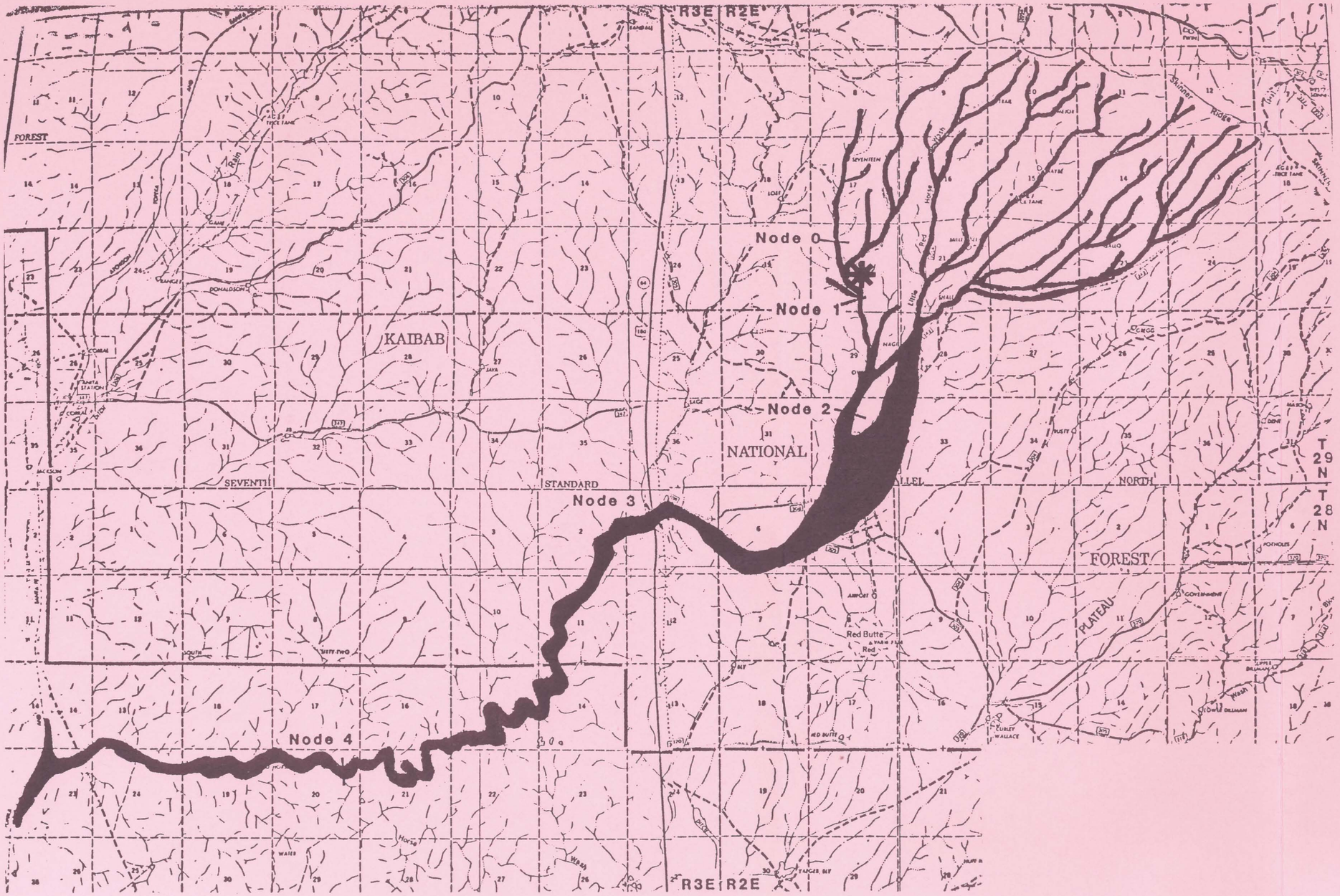
The Canyon Mine site lies in the ephemeral watershed of Little Red Horse Wash, which is tributary to Red Horse Wash, which is tributary to Cataract Canyon and Havasu Creek. In the principal stream channel between the mine site and Cataract Canyon, outcrops of Kaibab Limestone separate sections of channel alluvium. Water flow does not occur across these outcrops except during, and for a short time after, flood flow in the channel. After flood events, water stored in the discontinuous sections of channel alluvium percolates readily downward via fractures and solution openings in the Kaibab Limestone, which comprises an important recharge medium in northern Arizona. Downward percolation of groundwater from temporary groundwater storage in the channel alluvium reduces water content in the alluvium until another flood event occurs. Therefore, groundwater underflow in the channel alluvium in this reach of the drainage does not occur except during, and for a short time after, flood flow in the channel.

Historical data, as well as projections of storm intensity and runoff are important to the design of diversion channels which will protect the mine site and prevent any release from the ore or waste stockpiles to the surface drainages during a storm or heavy runoff. An extreme (100-year recurrence interval) storm event in Little Red Horse Wash in August of 1984 provides useful data to evaluate flooding potential at the mine site.

Peak flows for this storm (at Nodes 0-3) were computed from high water marks and surveys of channel cross-sections and slope.

Node #	Estimated Peak Discharge from August 14, 1984 Storm (c.f.s.)
0	106
1	908
2	1350
3	2447

According to an observer who monitored the flood, the crest overtopped Highway 64, flowed downstream in Little Red Horse Wash, merged with main Red Horse Wash (Node 4) and dissipated in the large flat area some 4 miles downstream (see Fig. 3.7). Apparently, no significant runoff from this event was observed beyond the large open area.



✱ CANYON MINE SITE

STORM RUNOFF IN LITTLE RED HORSE WASH

AUGUST 14. 1984

N

0 1 MILE

FIGURE 3.7

3.2.7.2 Groundwater

An analysis of the hydrogeologic structure of the proposed Canyon Mine site and the results of other wells and boreholes drilled in the area indicate that it is unlikely that any significant groundwater resources or aquifers will be encountered by mine construction and operation.

Figure 3.1 illustrates the formations present at the Canyon Mine site. Any groundwater present will likely be stored in small perched reservoirs. The perched aquifers do not occur at all locations. Most wells drilled to the perched aquifer units in the region do not encounter groundwater and are immediately abandoned. Most wells which encounter perched groundwater fail after a pumping period of several days to several years. Groundwater may be perched above confining layers in areas where fractures are sparse. These conditions occur most commonly in the Toroweap Formation and in the base of the Coconino Sandstone where groundwater may be perched on the mudstone strata of the Hermit Shale. At these places, the perched aquifers may yield small quantities of groundwater for domestic and stock use. Because the perched water leaks slowly downward through the confining layers and moves downward along fractures, the perched reservoirs are commonly small, thin and discontinuous. If the groundwater stored in these perched reservoirs is not replenished annually by rainfall and snowmelt, wells and springs which yield from the perched aquifers may fail. A comparison of the quantity of groundwater yielded to seeps and springs from the perched aquifers to the quantity yielded from the Redwall-Muav aquifer indicates that the principal direction of groundwater movement is downward in the rocks overlying the Redwall-Muav aquifer.

An exploration borehole drilled at the proposed mine site encountered perched groundwater in the Kaibab Limestone at a depth of 140 feet. Initial yield from this aquifer was approximately eight gallons per minute (gpm), later declining until groundwater production ceased. No wells in the area show significant, consistent production.

Groundwater recharge in the Canyon Mine site area occurs via infiltration of rainfall and snowmelt through the rocks which underlie the plateau south of the Grand Canyon. Metzger, in his report on groundwater conditions along the South Rim of the Grand Canyon (U.S. Geological Survey Water-Supply Paper 1475-C, 1961), estimated that average groundwater recharge in the drainage area of Cataract Canyon, in which the mine site lies,

is approximately 0.3 inch of water per year. Under natural conditions, a fraction of the groundwater recharge to the area passes through the Canyon Mine uranium deposit and other similar mineralized breccia pipes. Small quantities of native minerals, including radioactive minerals, are continuously leached from the breccia pipes and other mineralized zones, and travel in solution in the water.

Several springs issue from fractures or sandstone strata in the Toroweap Formation, Coconino Sandstone, and the Supai Group along the south wall of the Grand Canyon and its southern tributary canyons from Havasu Spring to Blue Spring. Records available for three of these springs indicate that average discharge is less than one gpm. The most important springs that discharge from these strata are Sinyella Spring in the western wall of Havasu Canyon, Great Thumb Spring in 140 Mile Canyon, Fossil Spring in Fossil Canyon, and Dripping Springs and Santa Maria Spring in Hermit Creek Canyon. Discharge from the Redwall-Muav aquifer is comparatively large, over 100,000 gm at Blue Spring, Havasu Spring and Indian Gardens Spring. Small springs and seeps discharge from volcanic rocks south of the Canyon Mine site. These springs and seeps are exit points for groundwater which has become perched on generally impermeable unfractured lavaflow rocks. These perched aquifers are discontinuous and lie above the strata in which the mine openings will occur in the volcanic rocks.

Sinyella Spring, a major spring on the Havasupai Reservation, is located about 25 miles west of the mine site and occurs in a tributary canyon along the west wall of Cataract Canyon, about 640 feet above the floor of the canyon. Sinyella Spring was inspected during the initial water sampling round for the groundwater monitoring program for the Canyon Mine project. Sinyella Spring appears to discharge from a perched aquifer at the base of the Coconino Sandstone, where the underlying Hermit Shale retards the downward seepage of infiltrated rainfall and snowmelt.

The Grand Canyon and its tributary canyons provide a regional groundwater drain for the rock units which are cut by the canyons. The existing data do not allow for an exact determination of the direction of groundwater flow in the Redwall-Muav aquifer at the mine site. However, groundwater movement in this aquifer is chiefly lateral from areas of principal recharge located generally south of the mine site toward large springs along the south wall of the Grand Canyon.

3.2.7.3 Groundwater quality

Existing data for chemical quality of groundwater from wells which penetrate perched aquifers are summarized in Table 3, Appendix F. Existing data for chemical quality of groundwater which discharges from the Redwall-Muav aquifer at Havasu, Indian Gardens and Blue Springs have been compiled and summarized in Tables 4 and 5 of Appendix F.

In cooperation with the National Park Service, and the Havasupai, Hopi and Navajo Indian Tribes, a water quality monitoring program has been established by EFN for the Canyon Mine site area. The monitoring program is comprised of three program elements: first, an inventory of existing data for chemical quality of groundwater in the area; second, periodic collection and chemical analysis of water samples from Havasu, Indian Gardens and Blue Springs, which are the largest springs along the south wall of the Grand Canyon; and third, construction by EFN of a groundwater supply and monitoring well at the mine site. The initial results from the second element -- water quality sampling from selected springs -- were reported in Appendix F of the DEIS and discussed in Section 3.2.7.3 of the DEIS.

In accordance with the monitoring program, water samples for laboratory chemical analyses are presently collected from Havasu, Indian Gardens, and Blue Springs at six-month intervals. These springs discharge from the Redwall-Muav aquifer. The initial sampling round was conducted on May 16 - 17, 1985 and the results included in the DEIS. The second sampling round was conducted on December 18, 1985. Results for the sampling rounds are summarized in Tables 3.3, 3.5 and 3.6. The results of the December 1985 sampling round are discussed below. A third sampling round was conducted in June 1986, but laboratory results were not available for inclusion in the FEIS.

The parameters analyzed include routine constituents, trace elements, gross alpha/beta radiation, uranium (isotopic and fluorometric), thorium, radium 226 and radium 228. These parameters were selected to provide comprehensive documentation of water quality at the springs prior to mining operations, and to provide a basis for monitoring water quality during mining operations. In addition, a check sample was obtained from bottled deionized drinking water and was analyzed for radiological parameters. All samples were collected and transmitted to qualified chemical laboratories in accordance with U.S. Environmental Protection Agency (EPA) protocol and

instructions from the laboratories. The samples were collected by Errol L. Montgomery and Associates personnel at the headwaters point where discharge at each spring begins. The water samples were analyzed using laboratory methods recommended by EPA.

At the request of the Havasupai Indian Tribe, duplicate water samples were collected from Havasu Spring for submittal to an independent chemical laboratory selected by the Tribe.

The CFEP (Controls for Environmental Pollution, Inc.) chemical laboratory was selected by the Havasupai Tribe. CFEP analyzed only the water samples submitted by the Havasupai Tribe for Havasu Spring. BC Laboratories, Inc., EAL (EAL Corp.) and ASU (Arizona State University) were selected by Errol L. Montgomery and Associates, Inc., and analyzed water samples from each of the springs. The laboratories and analyses requested include:

Laboratory	Analyses Requested
BC Laboratories, Bakersfield, California	Routine constituents and trace elements
EAL Corp., Richmond, California	Radiological parameters
Arizona State University, Tempe, Arizona	Radiological parameters
Controls for Environmental Pollution, Inc., Santa Fe, New Mexico	Routine constituents, trace elements and radiological parameters

(A) Routine Constituents

Results of laboratory analyses for routine constituents are given in Tables 3.3, 3.5 and 3.6. Federal drinking water standards for parameters analyzed are given in Table 3.4. Results for the December 1985 sampling round corroborate results for the May 1985 sampling round.

(1) Havasu Springs

Results of the December 1985 sampling round for Havasu Spring (Table 3.3A) indicate a calcium bicarbonate water type, with average total dissolved solids content of 584 mg/l (milligrams per liter). With the exception of total dissolved solids content, routine constitutents analyzed do not exceed Federal and Arizona drinking water limits. Total dissolved solids content in the water samples from Havasu Spring exceeds the

suggested Federal drinking water limit of 500 mg/l (U.S. Public Health Service, 1962) but is less than the maximum Federal drinking water limit of 1,000 mg/l (Table 3.4). The water samples from Havasu Spring would be classified as fresh by the USGS (U.S. Geological Survey) water classification system based on dissolved solids content (Heath, 1984). The water samples from Havasu Spring would be classified as very hard by the USGS water classification system based on hardness as calcium carbonate; average hardness as calcium carbonate was 476 mg/l.

Normal data processing procedures for chemical analyses of routine constitutents in water samples include computations of analytical error using methods described in Standard Methods (American Public Health Association et. al., 1981) and in Anderson (1979). Chemical analyses are normally rejected if the analytical error is more than the maximum allowable. Analytical error for routine constitutent results reported by CFEP for the May and December 1985 samples from Havasu Spring exceeds the maximum allowable for error. The groundwater consultant, Errol L. Montomgery and Associates, Inc., recommended that those results be rejected. Analytical error for results reported by BC Laboratories, Inc., EAL, and ASU do not exceed the maximum allowable error.

(2) Indian Gardens Springs

Results of the December 1985 sampling round for Indian Gardens Spring (Table 3.3B) indicate a magnesium-calcium bicarbonate water type, with total dissolved solids content of 310 mg/l. Routine constitutents analyzed do not exceed Federal and Arizona drinking water limits. The water samples from Indian Gardens Spring would be classified as fresh by the USGS water classification system based on dissolved solids content. The water samples from Indian Gardens Spring would be classified as very hard by the USGS system based on hardness as calcium carbonate.

(3) Blue Spring

Results of the December 1985 sampling for Blue Spring (Table 3.3C) indicate a sodium chloride water type, with total dissolved solids content of 2,455 mg/l. With the exception of chloride concentrations, total dissolved solids content, and specific electrical conductance, routine constitutents analyzed do not exceed Federal and Arizona drinking water limits. Concentration of chloride and total dissolved solids content in the water samples from Blue Spring both exceed the maximum Federal drinking water limits. The water samples from Blue Spring would be classified as slightly saline by the USGS water classification system based on dissolved solids content.

Specific electrical conductance exceeds the maximum Federal drinking water limit of 1,600 umho/cm. Specific electrical conductance of water is defined as the electrical conductance of a cube of water with a volume of one cubic centimeter and is reported in micromhos per centimeter (umho/cm). The water samples from Blue Spring would be classified as very hard by the USGS water classification system based on hardness as calcium carbonate.

(B) Trace elements

Results of laboratory analyses for trace elements are given in Tables 3.5 A, B and C. Results for the December 1985 sampling round corroborate the results for the May 1985 sampling round.

(1) Havasu Spring

Results of the December 1985 sampling for Havasu Spring (Table 3.5A) indicate that low concentrations of arsenic, barium, boron, and zinc were detected. Concentration of trace elements analyzed were less than Federal and Arizona drinking water limits.

(2) Indian Gardens Spring

Results of the December 1985 sampling for Indian Gardens Spring (Table 3.5B) indicate a low concentration of zinc was detected. Concentration of trace elements analyzed were less than Federal and Arizona drinking water limits.

(3) Blue Spring

Results of the December 1985 sampling for Blue Spring (Table 3.5C) indicate that low concentrations of boron and zinc were detected. Concentration of the trace elements analyzed were less than Federal and Arizona drinking water limits.

(C) Radiological Parameters

Results of laboratory analyses for radiological parameters are given in Tables 3.6 A, B and C. Field measurements of relative ambient radiation were obtained at each sampling site using scintillometers and results are also provided. The analyses of radiological parameters performed by ASU are not yet complete and therefore are not included. In addition to the Federal drinking water limits given in Table 3.4, the Arizona Department of Health Services (ADHS) has adopted a maximum limit of 35 ug/l (micrograms per liter) for total uranium in drinking water.

Considering the low concentrations reported, there is generally good agreement between results of chemical analyses for radiological parameters by the different laboratories and between results of analyses for the May and December 1985 sampling rounds. Small differences between laboratory results may appear to be significant, however, these differences are not unusual because assay of such small amounts of radioactivity approaches the minimum detection limits of laboratory methods.

Because emissions of atomic particles from radioactive elements in a water sample are counted statistically, results of laboratory analyses for radiological parameters are commonly reported as a concentration $\pm$ the statistical error of measurement. For example, a result of 7 $\pm$ 2 pCi/l (picocuries per liter) indicates that there is a 95 percent confidence that the true concentration is within a range from five to nine pCi/l. For problematic analyses, the statistical error of measurement may be large.

(1) Havasu Spring

Results of the December 1985 sampling round indicate that low concentrations of uranium and radium, as well as low levels of gross alpha and gross beta radiation, occur naturally in the groundwater discharged from Havasu Spring (Table 3.6A). Concentrations of other radiological parameters analyzed were zero or slightly greater than zero. None of the radiological parameters analyzed for the December 1985 samples exceed Federal or Arizona limits for drinking water. In general, there is good agreement of results between laboratories and between sampling rounds.

Notable differences between concentrations reported by EAL for the May and December water samples from Havasu Spring occur for gross alpha, gross beta and thorium 228. Concentrations of gross alpha and gross beta reported by EAL for the May 1985 water samples were problematic and were not corroborated by results reported by CFEP and ASU. Analyses for gross alpha radiation for water samples may be affected by impurities in water such as calcium, which increases the detection thresholds and self-absorption corrections and which reduces detection efficiencies. Analyses for gross beta radiation may also be affected by impurities, but to a lesser extent. Concentrations of gross alpha and gross beta reported by EAL for the December samples are more similar to results reported by CFEP and ASU.

(2) Indian Gardens Spring

Results of the December 1985 sampling indicate that low concentrations of uranium and radium, as well as low levels of gross alpha and gross beta radiation, occur naturally in the groundwater discharged' from Indian Gardens Spring (Table 3.6B). Concentrations of other radiological parameters analyzed were zero or slightly greater than zero. None of the radiological parameters analyzed exceed Federal or Arizona limits for drinking water. In general, there is good agreement of results between laboratories and sampling rounds.

A notable difference between concentrations reported by EAL for the May and December samples occurs for thorium 228. EAL reported a concentration of thorium 228 in the May 1985 sample which was definitely greater than zero. However, EAL detected a concentration of thorium 228 in the December 1985 sample which is in the range from zero to 0.5 pCi/l. (Table 3.6B).

(3) Blue Spring

Results of the December 1985 sampling indicate that low concentrations of uranium and radium, as well as low levels of gross alpha and gross beta radiation, occur naturally in the groundwater discharged from Blue Spring (Table 3.6C). Concentrations of other radiological parameters were zero or slightly greater than zero. None of the radiological parameters analyzed exceed Federal or Arizona limits for drinking water. In general, there is good agreement of results between laboratories and sampling rounds.

Due to statistical error of measurement, gross alpha radiation reported by EAL for the May 1985 samples from Blue Spring is within the range from zero to 19.4 pCi/l. Therefore, this level of gross alpha radiation might have exceeded the Federal and Arizona limit of 15 pCi/l for drinking water. The limit of detection reported by ASU for gross alpha radiation in the May 1985 samples was above the Federal and Arizona limit for drinking water. Gross alpha radiation reported by EAL for the December 1985 samples from Blue Spring does not exceed the Federal and Arizona limit. The significant error of measurement for analyses of gross alpha and gross beta in the Blue Spring samples are believed to result from impurities such as calcium.

A notable difference between concentrations reported by EAL for the May 1985 and December 1985 samples from Blue Spring occurs for thorium 228. EAL reported a concentration of thorium 228 in the May 1985 samples which was definitely greater than zero. However, EAL detected a concentration of thorium 228 in

the December 1985 samples which is in the range from zero to 0.5 pCi/l (Table 3.6C).

(D) Check Samples

As a check for quality control for each sampling round, a water sample was obtained from bottled deionized drinking water and was submitted to one of the three laboratories for analyses of radiological parameters. The same brand of bottled water was used for each sampling round.

Results of the May 1985 and December 1985 sampling rounds indicate that low levels of gross alpha and gross beta radiation were detected in the bottled water (Table 3.6D). Concentrations of all other radiological parameters analyzed were zero or, due to statistical error of measurement, slightly greater than zero. None of the radiological parameters analyzed exceed Federal or Arizona standards and there is good agreement of results between sampling rounds.

TABLE 3.3A. SUMMARY OF RESULTS FOR ROUTINE CONSTITUENTS IN WATER SAMPLES COLLECTED FROM HAVASU SPRING

DATE SAMPLED:	05/16/85		12/18/85	
LABORATORY[a]:	BC	CFEP	BC	CFEP
CONSTITUENTS (mg/l)				
CALCIUM	130	127	97	134
MAGNESIUM	44	51	42	47
SODIUM	32	30	34	26
POTASSIUM	4.9	5.2	4.8	4
CARBONATE	0	0	0	0
BICARBONATE	580	534	482	551
SULFATE	37	35	40	21
CHLORIDE	44.6	44	37.2	46
FLUORIDE	0.25	0.25	0.24	0.23
NITRATE	1.8	1.3	1.8	1.4
PHOSPHATE	<0.1	<0.1	<0.1	<0.1
SILICA	16	16.2	18	18.1
ALKALINITY (as $CaCO_3$)	476	438	396	452
HARDNESS (as $CaCO_C$)	506	505	416	518
TOTAL DISSOLVED SOLIDS (residue @ 180°)	605	614	615	552
PARAMETERS				
SPECIFIC ELECTRICAL CONDUCTANCE (umho/cm):				
field	1,200	1,200	970	970
laboratory	1,040	1,060	1,000	940
pH: field	6.7	6.7	6.9	6.9
laboratory	7.5	7.27	7.6	7.46
FIELD TEMPERATURE (°C)	21.5	21.5	21	21

[a] BC - BC Laboratories, Inc., Bakersfield, California
CFEP - Controls for Environmental Pollution, Inc., Santa Fe, New Mexico

TABLE 3.3B. SUMMARY OF RESULTS FOR ROUTINE CONSTITUENTS IN WATER SAMPLES COLLECTED FROM INDIAN GARDENS SPRING

DATE SAMPLED:	05/17/85	12/18/85
LABORATORY[a]:	BC	BC
CONSTITUENTS (mg/l)		
CALCIUM	45	44
MAGNESIUM	32	29
SODIUM	7	6
POTASSIUM	2	2.3
CARBONATE	0	0
BICARBONATE	275	262
SULFATE	17	16
CHLORIDE	9.9	9.9
FLUORIDE	0.16	0.17
NITRATE	2.2	2.2
PHOSPHATE	<0.1	<0.1
SILICA	10	16
ALKALINITY (as $CaCO_3$)	225	215
HARDNESS (as $CaCO_c$)	244	229
TOTAL DISSOLVED SOLIDS (residue @ 180°)	330	310
PARAMETERS		
SPECIFIC ELECTRICAL CONDUCTANCE (umho/cm):		
field	520	430
laboratory	470	460
pH: field	6-7	7.5
laboratory	8.1	8.0
FIELD TEMPERATURE (°C)	18	17.5

[a] BC - BC Laboratories, Inc., Bakersfield, California

TABLE 3.3C. SUMMARY OF RESULTS FOR ROUTINE CONSTITUENTS IN WATER SAMPLES COLLECTED FROM BLUE SPRING

DATE SAMPLED:	05/16/85	12/18/85
LABORATORY[a]:	BC	BC
CONSTITUENTS (mg/l)		
CALCIUM	243	243
MAGNESIUM	74	74
SODIUM	540	550
POTASSIUM	6.4	5.9
CARBONATE	0	0
BICARBONATE	889	903
SULFATE	156	141
CHLORIDE	846	839
FLUORIDE	0.36	0.28
NITRATE	1.8	1.3
PHOSPHATE	<0.1	<0.1
SILICA	16	12
ALKALINITY (as $CaCO_3$)	728	741
HARDNESS (as $CaCO_3$)	912	913
TOTAL DISSOLVED SOLIDS (residue @ 180°)	2,315	2,455
PARAMETERS		
SPECIFIC ELECTRICAL CONDUCTANCE (umho/cm):		
field	5,500	5,000
laboratory	4,100	4,100
pH: field	6.3	6.4
laboratory	7.3	7.3
FIELD TEMPERATURE(°C)	20.5	19.5

[a] BC - BC Laboratories, Inc., Bakersfield, California

TABLE 3.4 FEDERAL DRINKING WATER STANDARDS FOR PARAMETERS ANALYZED

PARAMETERS	MAXIMUM[b] LIMIT	
PRIMARY:		
ARSENIC:	0.05	mg/l
BARIUM	1.0	mg/l
CADMIUM	0.01	mg/l
CHROMIUM (TOTAL)	0.05	mg/l
LEAD	0.05	mg/l
MERCURY	0.002	mg/l
NITRATE (as NO_3)	45	mg/l
SELENIUM	0.01	mg/l
SILVER	0.05	mg/l
FLUORIDE[a]	1.4 - 2.4	mg/l
RADIUM 226	3	pCi/l
COMBINED RADIUM 226 AND RADIUM 228	5	pCi/l
GROSS ALPHA PARTICLE ACTIVITY (EXCLUDING RADON AND URANIUM)	15	pCi/l
GROSS BETA PARTICLE ACTIVITY	50	pCi/l
SECONDARY:		
CHLORIDE	500	mg/l
COPPER	1.0	mg/l
IRON	0.3	mg/l
MANGANESE	0.05	mg/l
SULFATE	500	mg/l
ZINC	5.0	mg/l
TOTAL DISSOLVED SOLIDS	1,000	mg/l
SPECIFIC ELECTRICAL CONDUCTANCE	1,600	umho/cm

[a] Temperature dependent
[b] mg/l - milligrams per liter
pCi/l - picocuries per liter
umho/cm - micromhos per centimeter

TABLE 3.5A. SUMMARY OF RESULTS FOR TRACE ELEMENTS IN WATER SAMPLES COLLECTED FROM HAVASU SPRING

DATE SAMPLED:	05/16/85		12/18/85	
LABORATORY[a]:	BC	CFEP	BC	CFEP
CONSTITUENTS (mg/l)				
ALUMINUM	<0.1	<0.1	<0.5	<0.1
ANTIMONY	<1.0	<0.003	<1.0	<0.01
ARSENIC	0.01	0.01	0.01	<0.01
BARIUM	<0.5	0.2	<0.5	0.2
BERYLLIUM	<0.05	<0.0001	<0.01	<0.001
BORON	0.27	0.3	0.26	0.3
CADMIUM	<0.005	<0.001	<0.005	<0.001
CHROMIUM (total)	<0.01	<0.01	<0.01	<0.01
COPPER	<0.01	<0.01	<0.01	<0.01
IRON	<0.05	<0.01	<0.05	<0.01
LEAD	<0.01	<0.01	<0.01	<0.01
MANGANESE	<0.01	<0.01	<0.01	<0.01
MERCURY	<0.0002	<0.0004	<0.0002	<0.0004
MOLYBDENUM	<0.1	<0.01	<0.1	<0.01
NICKEL	<0.05	<0.01	<0.05	<0.1
SELENIUM	<0.005	<0.01	<0.005	<0.01
SILVER	<0.01	<0.01	<0.01	<0.01
THALLIUM	<0.5	<0.01	<0.5	<0.01
VANADIUM	<0.5	<0.01	<0.5	<0.01
ZINC	<0.01	<0.005	0.01	<0.1

[a] BC - BC Laboratories, Inc., Bakersfield, California
CFEP - Controls for Environmental Pollution, Inc., Santa Fe, New Mexico
(<) Less than

TABLE 3.5B. SUMMARY OF RESULTS FOR TRACE ELEMENTS IN WATER SAMPLES COLLECTED FROM INDIAN GARDENS SPRING

DATE SAMPLED:	05/17/85	12/18/85
LABORATORY[a]:	BC	BC
CONSTITUENTS (mg/l)		
ALUMINUM	<0.1	<0.5
ANTIMONY	<1.0	<1.0
ARSENIC	<0.01	<0.01
BARIUM	<0.5	<0.5
BERYLLIUM	<0.05	<0.01
BORON	<0.1	<0.1
CADMIUM	<0.005	<0.005
CHROMIUM (total)	<0.01	<0.01
COPPER	<0.01	<0.01
IRON	<0.05	<0.05
LEAD	<0.01	<0.01
MANGANESE	<0.01	<0.01
MERCURY	<0.0002	<0.0002
MOLYBDENUM	<0.1	<0.1
NICKEL	<0.05	<0.05
SELENIUM	<0.005	<0.005
SILVER	<0.01	<0.01
THALLIUM	<0.5	<0.5
VANADIUM	<0.5	<0.5
ZINC	<0.01	0.01

[a] BC - BC Laboratories, Inc., Bakersfield, California
(<) Less than

TABLE 3.5C. SUMMARY OF RESULTS FOR TRACE ELEMENTS IN WATER SAMPLES COLLECTED FROM BLUE SPRING

DATE SAMPLED:	05/16/85	12/18/85
LABORATORY[a]:	BC	BC
CONSTITUENTS (mg/l)		
ALUMINUM	<0.1	<0.5
ANTIMONY	<1.0	<1.0
ARSENIC	<0.01	<0.01
BARIUM	<0.5	<0.5
BERYLLIUM	<0.05	<0.01
BORON	0.39	0.42
CADMIUM	<0.005	<0.005
CHROMIUM (total)	<0.01	<0.01
COPPER	<0.01	<0.01
IRON	<0.05	<0.05
LEAD	<0.01	<0.01
MANGANESE	<0.01	<0.01
MERCURY	<0.0002	<0.0002
MOLYBDENUM	<0.1	<0.1
NICKEL	<0.05	<0.05
SELENIUM	<0.005	<0.005
SILVER	<0.01	<0.01
THALLIUM	<0.5	<0.5
VANADIUM	<0.5	<0.5
ZINC	<0.01	0.04

[a] BC - BC Laboratories, Inc., Bakersfield, California
(<) Less than

TABLE 3.6A. SUMMARY OF RESULTS FOR RADIOLOGICAL PARAMETERS IN WATER SAMPLES COLLECTED FROM HAVASU SPRING

DATE SAMPLED:	05/16/85			12/18/85		
LABORATORY[a]:	EAL	CFEP	ASU	EAL	CFEP	ASU
PARAMETER (in picocuries per liter +/- two standard deviations)						
GROSS ALPHA	41.6±34.7	<2	<8	<0.7±5.0	<2	<8.5
GROSS BETA	44.8±40.4	<3	6.4±3.8	<5.4±7.9	5±2	5.4±1.6
TOTAL URANIUM						
picocuries per liter	7±2	3±1	---	3±2	7	---
micrograms per liter	10±3	4±1	---	4±3	10	---
URANIUM 234	3.6±0.2	<0.6	3.1±1.2	3.8±0.2	<0.6	3.0±0.2
URANIUM 235	0±0.2	<0.6	0.3±0.4	0±0.2	<0.6	0.13±0.04
URANIUM 238	1.3±0.1	<0.6	1.6±0.8	1.3±0.1	<0.6	1.2±0.1
THORIUM 228	2.1±0.5	<0.6	---	0±0.5	<0.6	---
THORIUM 230	0±0.2	<0.6	---	0±0.2	<0.6	---
THORIUM 232	0±0.2	<0.6	---	0±0.2	<0.6	---
RADIUM 226	0±0.05	<0.6	0.45±0.34	0.8±0.1	<0.6	0.26±0.05
RADIUM 228	0±0.5	<1	---	0±0.5	<1	---
POTASSIUM 40	---	---	4.1	---	---	---

[a] EAL - EAL Corporation, Richmond, California
CFEP - Controls for Environmental Pollution, Inc., Santa Fe, New Mexico
ASU - Arizona State University, Tempe, Arizona
(<) Less than

TABLE 3.6B. SUMMARY OF RESULTS FOR RADIOLOGICAL PARAMETERS IN WATER SAMPLES COLLECTED FROM INDIAN GARDENS SPRING

DATE SAMPLED:	05/17/85		12/18/85	
LABORATORY[a]:	EAL	ASU	EAL	ASU
PARAMETER (in picocuries per liter +/- two standard deviations)				
GROSS ALPHA	1.5±2.5	<4	1.0±3.0	11.7±8.2
GROSS BETA	2.2±2.0	3.2±3.6	1.9±3.3	<2.0
TOTAL URANIUM				
picocuries per liter	3±2	---	4±2	---
micrograms per liter	4±3	---	6±3	---
URANIUM 234	2.5±0.1	3.1±0.8	2.7±0.1	2.2±0.2
URANIUM 235	0±0.1	0.1±0.1	0±0.2	0.08±0.03
URANIUM 238	0.6±0.1	0.8±0.4	0.8±0.1	0.52±0.07
THORIUM 228	1.4±0.4	---	0±0.5	---
THORIUM 230	0±0.2	---	0±0.2	---
THORIUM 232	0±0.2	---	0±0.2	---
RADIUM 226	0.14±0.05	0.25±0.20	1.4±0.2	0.18±0.03
RADIUM 228	0±0.5	---	0±0.8	---
POTASSIUM 40	---	1.4	---	---

[a] EAL - EAL Corporation, Richmond, California
ASU - Arizona State University, Tempe, Arizona
(<) Less than

TABLE 3.6C. SUMMARY OF RESULTS FOR RADIOLOGICAL PARAMETERS IN WATER SAMPLES COLLECTED FROM BLUE SPRING

DATE SAMPLED:	05/16/85		12/18/85	
LABORATORY[a]:	EAL	ASU	EAL	ASU[b]
PARAMETER (in picocuries per liter +/- two standard deviations)				
GROSS ALPHA	1.5±17.9	<21	1.2±9.5	<24
GROSS BETA	8.4± 8.1	9.4+-4.9	3.9±16.0	5.0±2.4
TOTAL URANIUM				
picocuries per liter	5±2	---	3±2	---
micrograms per liter	7±3	---	4±3	---
URANIUM 234	4.4±0.2	4.4±0.9	3.9±0.2	4.2±0.4
URANIUM 235	0±0.2	0.4±0.2	0±0.2	0.18±0.07
URANIUM 238	1.8±0.1	1.4±0.4	1.7±0.1	1.3±0.2
THORIUM 228	1.7±0.3	---	0±0.5	---
THORIUM 230	0±0.2	---	0±0.2	---
THORIUM 232	0±0.2	---	0±0.2	---
RADIUM 226	0.12±0.05	0.31±0.24	1.0±0.2	<0.5
RADIUM 228	0±0.5	---	0±0.5	---
POTASSIUM 40	---	6.6	---	---

[a] EAL - EAL Corporation, Richmond, California
ASU - Arizona State University, Tempe, Arizona
(<) Less than

TABLE 3.6D. SUMMARY OF RESULTS FOR RADIOLOGICAL PARAMETERS IN CHECK WATER SAMPLES COLLECTED FROM BOTTLED DEIONIZED DRINKING WATER

DATE SAMPLED:	05/17/85	12/18/85
LABORATORY[a]:	EAL	EAL
PARAMETER (in picocuries per liter +/- two standard deviations)		
GROSS ALPHA	0.2±0.6	<0.4±1.5
GROSS BETA	<0.2±1.7	<0.9±2.4
TOTAL URANIUM		
picocuries per liter	0±2	0±2
micrograms per liter	0±3	0±3
URANIUM 234	0±0.1	0±0.1
URANIUM 235	0±0.1	0±0.1
URANIUM 238	0±0.1	0±0.1
THORIUM 228	0±0.5	0±0.5
THORIUM 230	0±0.2	0±0.2
THORIUM 232	0±0.2	0±0.2
RADIUM 226	0±0.05	0±0.1
RADIUM 228	0±0.5	0±0.5
POTASSIUM 40	---	---

[a] EAL - EAL Corporation, Richmond, California
(<) Less than

As part of the sampling procedure, field measurements of relative ambient radiation were made at each sampling site using a scintillometer. At each site, one measurement was made directly above the water surface where samples were collected. A second measurement was made over dry ground approximately 50 feet from the sampling site. Results of the scintillometer measurements are as follows:

SCINTILLOMETER READING
(microrems per hour)

Havasu Spring

Date Measured	At Water Sampling Site[a]	50 Feet From Sampling Site[b]
05-16-85	5 - 7	5 - 7
12-18-85	7 - 7.5	7.5 - 8

Indian Gardens Spring

Date Measured	At Water Sampling Site[a]	50 Feet From Sampling Site[b]
05-17-85	4 - 6	4 - 6
12-18-85	6 - 7	6 - 7

Blue Spring

Date Measured	At Water Sampling Site[a]	50 Feet From Sampling Site[b]
05-16-85	2	5
12-18-85	4	8

[a]Measured at the water sampling site, about six inches above water surface.
[b]Measured about 50 feet from the sampling site, about six inches above ground surface.

Radon commonly occurs as a gaseous emission from springs fed by groundwater containing elevated levels of radionuclides. Radon emissions from springs commonly result in ambient radiation near the springs which is higher than background levels. Results of the scintillometer measurements indicate that radiation detected near the springs was not higher than background radiation detected 50 feet from the springs.

Results of scintillometer measurements made during the December 1985 sampling round are slightly higher than results for the May 1985 sampling round.

3.2.7.4 Soils

Soil samples were collected and assayed for background radionuclides. These sample sites are shown in Figure 2.4, Chapter 2. Results of the assays are as follows:

Radionuclide Assays in Soil (pCi/gm)

Sample	Ra-226	Gross Alpha	Gross Beta	Th-232	TI-208	K-40	Cs-137
Wash NNW	1.3(9)*	20(10)	21	0.7(6)	0.24(4)	13(3)	0.42
Wash NNE	1.3(9)	35(11)	25	1.0(5)	0.36(3)	17(2)	0.32
Wash SSW	1.8(14)	23(10)	32	1.3(8)	0.42(7)	21(4)	1.10
Owl Tank	1.6(11)	35(9)	28	1.0(6)	0.35(4)	18(2)	0.83

*Values in parenthesis are the percent error at one standard deviation.

The results for soil collected from Red Horse Wash at U.S. Highway 180 and at Willaha are not yet available. All soil is also being analyzed for uranium content but results are not yet available. The Ra-226 reported is normal for Arizona soil. The gross alpha and gross beta results are not sufficiently accurate to provide useful information. Improvement in assay technique is not possible due to the magnitude of the self absorption corrections which need to be made. Th-232 and Ti-208 radionuclides are members of the Thorium decay chain and are normal. The naturally occurring K-40 concentrations are the same as other soils measured in Arizona. Fallout Cs-137 concentrations are approximately a factor of two higher than those measured in the Phoenix area.

In summary, the radionuclide concentrations in the soil around the Canyon Mine site are normal and do not indicate the presence of surface deposits of natural radioactivity. It appears that the two prime indicators for changes in the natural radiation environment will be Ra-226 and uranium. Therefore further soil sampling analysis will be limited to these radionuclides.

3.2.8 IC #10 Indian Religious Concerns

Lands historically occupied by Native Americans and their ancestors are common in Northern Arizona. The American Indian Religious Freedom Act, 42 U.S.C. §1996, requires that federal agencies, have an awareness of tribal beliefs and practices and consider these when formulating government policy by: (1) consulting with Tribes with respect to actions which may affect traditional Indian religious practices; and (2) evaluating policies with an aim toward protecting Tribal religious practices. The statute does not require that Federal officials protect Tribal religious practices to the exclusion of all other Federal courses of action nor is it intended to provide Indian religions with a more favorable status than other religions.

In completing this environmental impact statement, the Forest has attempted to identify Indian concerns, both religious and environmental, through the formal scoping process and through informal consultation with tribal leaders.

The primary concern expressed by Indian tribes relates to possible water quality impacts that might result from contamination of the Redwall-Muav aquifer by mine operation. Blue Spring, located in the Little Colorado River Gorge, approximately 30 miles northeast of the mine site, and Havasu Springs, located on the Havasupai Indian Reservation approximately 35 miles northwest of the mine site, both discharge from the Redwall aquifer. Havasu Springs is an important water source and economic asset to the Havasupai Tribe. Blue Spring is an extremely important sacred site for the Hopi Tribe. For a discussion of existing water quality at these springs, see Section 3.2.7.3. Potential impacts are discussed in Section 4.2.7.2.

The Hopi and Havasupai Tribes have suggested that sacred religious sites, including ruins, graves and hunting areas, exist at or near the mine site and haul routes. However, consultation with the Tribes and experts on Indian religious sites and practices as well as archeological inventories have failed to identify any specific Hopi or Havasupai sites of sacred or religious significance near the proposed mine site.

There is evidence that Hopi gather turkeys, pinion nuts and sacred herbs in the area near Tusayan. Turkeys are gathered around Twin Lakes, Skinner Ridge and Red Butte. These practices have religious significance. Hopi also hunt deer

for both food and ceremonial purposes in the Tusayan area and visit ruins of Hopi ancestors.

The Havasupai traditionally cremated their dead until sometime in the 1880's. Since this times they have buried their dead in Supai Canyon with the exception of medicine men, who are buried at locations away from the Grand Canyon.

Hopi also gather golden eagles along U.S. Highway 89 near the Little Colorado River bridge and near the Echo Cliffs. The feathers of golden eagles are used in making "pahos" or prayer feather sticks which convey the prayers of Hopi to the Creator.

The Sipapu and Salt Trails are also of religious importance to the Hopi. Both trails are in the floor of the Little Colorado River near the confluence with the Colorado River.

Other areas sacred to the Hopi are located on the San Francisco Peaks and Bill Williams Mountain, 48 miles south of the mine site. Those areas are discussed in the Environmental Impact Statement for the Bill Williams Mountain Ski Area Proposal. No areas of sacred or religious significance have been identified near the mine site or proposed ore haul routes.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

This chapter of the EIS describes the consequences to the environment that may result from the proposed action and each alternative. Anticipated consequences have been quantified wherever possible. For those consequences that are difficult to quantify, qualitative statements are made to describe relative differences of the various alternatives, emphasizing those impacts that relate to the issues and concerns (IC's) identified in the scoping process.

This chapter discusses the alternatives, including the No Action Alternative, and the projected impacts of each alternative, emphasizing those impacts that relate to the issues and concerns (IC's) identified in the scoping process. IC's #2 (reclamation) and #5 (vegetation) are not treated separately but are addressed wherever appropriate under other factors such as air quality, water quality, wildlife impacts or transportation routes. The effects of the proposed mine on the air quality of the Grand Canyon and water quality of the Havasupai Reservation, and the possibility of radionuclide contamination to the surrounding environment are discussed under related IC's and are not evaluated as separate concerns. A discussion and evaluation and comparison of all the alternatives is presented in Chapter 2.

For many factors, the impacts of the No Action Alternative is to preserve the existing environment as described in Chapter 3. The No Action Alternative serves as a baseline against which the project alternatives can be compared. The impacts of the Proposed Action and Alternatives 3-5 are identical for many factors. For these factors, one discussion and analysis of the impacts is provided for all alternatives for purposes of efficiency and clarity.

Cumulative Impacts

Council on Environmental Quality (CEQ) regulations implementing NEPA, require an analysis of the cumulative impacts of the proposed action where the proposed action and related actions may result in cumulatively significant impacts. Cumulative impacts are those which result from the incremental impact of the proposed action "when added to other past, present and reasonably foreseeable future action." 40 C.F.R. § 1508.7.

Potential cumulative impacts have not been separately identified as a major issue and concern for this document, but

concern about the future impacts of uranium mining was expressed by the public in scoping meetings, and there is the potential for future mining proposals in the Tusayan area. The detailed data and analysis in this document will provide an accurate basis for assessing the impacts of similar proposals in the future. At this time, there are no other proposed mining operations in Coconino County south of the Grand Canyon. However, there is considerable exploration for uranium in the area by several companies. Thus, even though the construction and operation period for the Canyon Mine is relatively brief, it may be reasonably foreseeable that one or more additional mines will be located in the general area during that period.

The specific timing and location of additional mines will be determined by unforseeable geographic and economic factors, so potential cumulative impacts cannot be specifically quantified. Where cumulative impacts are possible, this analysis projects potential impacts of the proposed mine.

Many of the issues considered in this statement are affected only at or near the mine site. Reclamation, vegetation, visual quality and water quality will not generate cumulative impacts unless another mine is located very close to the Canyon Mine site. Other issues, especially those associated with transportation, will generate greater cumulative impacts if separate ore transportation routes are developed to serve additional mines. That possibility is noted as well.

Cumulative impacts are analyzed, as appropriate throughout chapter 4, based on two hypothetical scenarios: first, one additional mine in the Tusayan area near the Canyon Mine and second, three additional mines in Coconino County south of the Grand Canyon. To assess maximum potential impacts, it is assumed that all mines will be producing at a maximum production rate of 200 tons per day at the same time.

4.1 ENVIRONMENTAL CONSEQUENCES OF FACTORS NOT IDENTIFIED AS MAJOR ISSUES OR CONCERNS AND HAVE COMMON IMPACTS FROM IMPLEMENTATION OF ALTERNATIVES 2-5

4.1.1 Wetlands, Floodplains, Prime Farmlands, Rangeland and Forest Land

None of the alternatives will affect wetlands, floodplains, or prime farmlands. A loss of 5 to 8 AUM's grazing capacity is

anticipated with the implementation of the project alternatives 2, 3, 4 and 5. These alternatives will cut between 0.9 and 76.5 thousand board feet of timber in road construction and reconstruction. These effects are considered to be insignificant.

Land displaced for additional mines and haul routes would affect existing uses of the land. Based on projected impacts of the Canyon Mine, one additional mine near Tusayan would result in the loss of an additional 5 to 8 AUM's grazing capacity and an extremely small amount of timber. Precise impacts would of course depend on the exact location and the existing uses of the land. Significant cumulative impacts would not be expected from three additional mines in the County south of the Grand Canyon as the total loss of grazing capacity, timber or forest vegetation would still be small.

Impacts on vegetation will be limited to the land disturbed by each mine site or new road construction. (Each additional mine would be required to fully reclaim the site at the end of mining). However, the total acres disturbed would be additive, that is, each additional mine would add 15 to 20 acres to the total disturbed acreage in the county. After reclamation there would be no impacts on the vegetation.

4.1.2 Civil Rights, Minority Groups and Women

None of the alternatives will have an effect on minority groups and women, other than the Havasupai interests as expressed under the surface and groundwater concern. EFN will be required to be an equal opportunity employer.

4.1.3 Short Term Use and the Maintenance and Enhancement of Long Term Productivity

Short term use is usually considered to be one to nine years. Long term is from 10 to 50 years or more. A large capital investment such as a mine, is normally amortized over the life of the mine. The Canyon Mine is projected to operate for 5-10 years, therefore, there will be no long term commitment of the Forest resources at the mine yard. Acres improved through various cultural treatments to offset the loss of important wildlife habitats and new road construction for ore transport, are considered to be long term commitments.

4.1.4 Irreversible and Irretrievable Commitment of Resources

Irreversible commitment applies to nonrenewable resources such as mineral and cultural resources. All mining alternatives will have an irreversible commitment on the underground ore deposit. There will be an irretrievable loss of timber growth when the trees are cleared for road construction under Alternatives 2, 3, and 4. Cultural resources will be avoided or recovered according to the appropriate laws and regulations.

4.1.5 Agency Financial Burdens

The proposed uranium mine will not create increased financial needs for police or fire protection. Existing off highway roads are inadequate to handle the ore haulage. Road construction and reconstruction will be the responsibility of EFN. Emergency medical facilities in Tusayan, approximately 6-1/2 miles from the site, are adequate to meet perceived needs. No substantial increased financial burdens are expected to accrue to either the local communities or Coconino County. However, if a significant number of the mine employees hired are from areas other than Flagstaff, Williams or Tusayan, the immigration of workers and their families may create some limited burdens. In the event that one or more additional mines are located in the County south of the Grand Canyon during the period of operation for the Canyon Mine, the excess capacity of many services provided by local government will disappear and expansion of some services may be required. If the City of Williams provides water for the project, it will be sold as a commodity, thus providing income.

The Forest Service and those agencies listed in Section 1.3 (Permitting Process) will administer the regulatory requirements of their respective agencies. These responsibilities are not expected to impose any significant additional financial burdens on the regulating agencies.

4.1.6 Possible Conflicts With Other Agency Plans or Policies

There are no known conflicts with other Federal, State or local government plans, policies or regulations.

4.1.7 Energy Requirements

The energy requirements of the alternatives are a function of automobile and truck use and operation of the mine itself. Alternative 1 will keep energy requirements at current levels. All other alternatives will require considerable amounts of electrical and internal combustion energy. Alternative 5 will require slightly more energy and is the least energy efficient alternative because of the increase in ore hauling distance. The mining of a fuel source such as uranium will, however, yield a net gain in terms of energy expenditures.

4.1.8 Noise

Under the operational alternatives (Alternatives 2 - 5), only the occasional passersby on Forest Roads 305A or 308 will be able to hear the mine noises, and then at an acceptable level because of the distance to the mine site. With a mile and a half of tall, fairly dense forest between the mine and the highway, the mine generated noises should be filtered to an insignificant level, particularly since the buffer effects of vegetation and distance are acting in unison. Travelers on State Highway 64 will not be able to hear the mine noises because of the effect of vegetation as a noise screen.

Mine workers will be exposed only intermittently to unacceptable noise levels when they pass within 50 feet of the air compressor room and the vent shaft. Neither location, however, is near a work site that requires extended worker presence. (Dames and Moore consulting Report on file at Kaibab National Forest.)

Haul route truck noise is expected to be well within the acceptable level (<65 decibels) based on measurements of existing traffic noise along State Highway 389. However, intermittent noise created by ore trucks can have a disturbing effect on wildlife during certain critical periods (wildlife impacts are further discussed in 4.2.3). Ore trucks on U.S. 89, I-40, state highway 64 and U.S. 160 would add insignificantly to the already heavy traffic of 2,870 - 10,155 vehicles per day.

The No Action Alternative would leave current noise levels unaffected by mine operations near the Canyon Mine site or ore truck traffic along the proposed haul routes.

Additional mines would not add to the noise created by the Canyon Mine. If common haul routes are used, the frequency of noise impacts from ore truck traffic would increase in proportion to the number of additional trucks.

4.1.9 Recreation

Recreation that is dependent upon solitude will be adversely impacted as a result of the noise, truck traffic, and increased activity at the mine site and along the haulage route. Improving the road system to transport the ore to the mill will increase accessibility and recreational opportunities for the general public. For some people who fear radiation or covet solitude, the existence of a uranium mine may change their attitude and beliefs regarding the project area.

Those alternatives which involve new road construction or major road improvements (Alternatives 2, 3 and 4) within the Forest will allow increased accessibility and traffic into previously remote areas. The impacts of increased access and use are both positive and negative. The improved transportation routes would allow greater recreational use of the area for hiking, hunting, sightseeing and camping. However, those currently attracted to the area by the opportunities for solitude will be disrupted by more traffic and use. If several mines utilize haul routes across the Forest, opportunities for solitude or primitive recreation near each route will be diminished.

Cumulative impacts are not expected from the use of the Preferred Alternative since it utilizes existing roads and highways largely outside the forest. Implementation of the Preferred Alternative is not expected to appreciably alter the general Forest environment on the Tusayan Ranger District.

4.1.10 Impacts on Mine Workers

Workers in the Canyon Mine can expect direct radiation levels to be on the order of 0.8 mrem/hr. The direct radiation limits, dosimetry and record keeping requirements are mandated by federal regulation (30 CFR 57). Theoretically, a miner can remain at or near the high grade ore body during an entire work period and not exceed the weekly guidelines (100 mrem) or the annual whole body limit (5,000 mrem).

Radon gas and progeny will be flushed from the mine with a 150,000 cubic foot per minute vent fan. Based on measurements atop the Hack Canyon Mine vent, radon gas concentrations will be on the order of 2,400 pico Curie Levels and 1,600

milliworking levels m(WL). Radon progeny will be present at approximately 10 percent of their potential equilibrium values. This means that much of the radon gas will be removed from the mine before it is able to decay to its hazardous decay products. The occupational radon progeny limit is 4 Working Level Months (WLM) per year. Miners at Hack Canyon are currently experiencing an average of about 2.2 WLM/yr. (See Appendix E and Glossary.)

Currently, uranium miners work an average of 10 years underground. The cumulative 10 to 25 WLM they may receive is well below the 100 WLM value where studies indicate possible increases in lung cancer might appear. Current data and standards support the conclusion that increases in lung cancer among mine workers are not expected at levels lower than 100 WLM. However, EPA has suggested that the risk of lung cancer may increase at exposure levels in the range of 20-100 WLM.

4.1.11 Cultural Resources

No impacts upon cultural resources are expected under the No Action Alternative. The construction and operation of the mine would have essentially similar impacts on cultural resources under Alternative 2-5. Site AZ-H-4-3, 4 and 5 (inclusive) would not be directly impacted by construction or operation as it is out of the area of operations. However, indirect impacts from construction activities or greater use of the mine area could result in the disturbance to this area. During the process of evaluating this site, virtually all surface artifacts were collected and analyzed. Archeological testing revealed no subsurface material. The site was determined to contain no significant information and was thus found to be ineligible for the National Register. Any disturbance to the site area will not result in loss of important data.

Site AZ-H-4-6 and 7 (inclusive) is also outside the area of direct mining impact but is close enough that it could be impacted indirectly by activity around the mine. The site was excavated through an approved data recovery program, which was designed to recover information important to the prehistory of the region. Since it was the information potential of the site that made it eligible for the National Register, and the information has been recovered through an approved program, the spot where the site was located no longer has archeological value. Thus future disturbance of this location will not result in loss of important data.

Impacts on cultural resources associated with road construction, improvement or maintenance, powerline construction or wildlife mitigation activities can only be

estimated qualitatively based on cursory field surveys (see Table 2.4). No detailed site specific inspection of the potentially impacted areas has occurred. However, prior to any construction or improvement of any road or line, or construction associated with wildlife mitigation, a site specific investigation of any affected area will be conducted for evidence of cultural resources. Any resources found will be avoided by realignment of the road. If avoidance is not practical, sites will be evaluated for National Register eligibility. If any are found eligible, a program of mitigation will be developed through consultation between the Forest Service, the Arizona State Historic Preservation Officer and the Advisory Council in accordance with the National Historic Preservation Act of 1966 and 36 CFR 800.

4.2 ISSUES AND CONCERNS

This section is primarily directed to those issues and concerns which were considered of major importance, or which surfaced as significant issues during the scoping process. Impacts of the four alternatives have been displayed in Chapter 2, as well as here, so the relative resolution of each issue and concern can be distinguished.

The No Action Alternative represents the existing environment with no mining activities on the Tusayan Ranger District and provides a baseline against which all other alternatives can be measured.

4.2.1 IC #1 What Social and Economic Impacts Will the Uranium Mine Have on the Local Communities and Coconino County

A computer impact model called IMPLAN was used to estimate the number of jobs created or lost by implementing each alternative. The model takes a regional area, in this case Coconino County, and estimates the dollars generated in the area, the amount of money brought into the County and the ripple effect of new money through the region. The model assigns jobs in each of several hundred industry sectors. These industry sectors were grouped into nine general categories to coincide with available employment data. The IMPLAN Model is not suitable for use on a small subsection of a regional area, so it was not used to predict the number of jobs generated specifically in Williams or Tusayan. Changes in job numbers for these two areas were estimated by looking at the change in the total number of jobs in an industry sector on a county-wide basis.

The various project alternatives evaluated in this EIS will not have any different effect on employment levels at the mine or development costs associated with the mine. Consequently, the estimated economic changes will apply to all project alternatives.

The following projected 10-year estimates of wages, capital investments, taxes, etc., derived from the mine, were used to drive the IMPLAN economic model and to predict the secondary changes in the employment, salaries and Total Gross Outputs for Coconino County.

1.	Wages and Fringe Benefits	$10,000,000
2.	Plant and Equipment	$ 3,000,000
3.	Mining Supplies	$15,000,000
4.	Haulage to Blanding, Utah	$ 4,000,000
5.	Transaction Privilege (sales and use taxes)	$ 600,000
6.	Mineral Severance Taxes	$ 1,700,000
7.	Property Taxes	$ 1,275,000
8.	Energy Usage	
	Electricity	$ 2,000,000
	Diesel Fuel	$ 450,000

In addition to the above estimated expenditures, there will be income taxes generated at both the state and federal levels throughout the life of the mine. Additional tax revenues generated from mining activities will include license fees, motor vehicle taxes, motor carrier taxes, fuel taxes and local retail transaction privilege taxes incurred by mine workers, mine suppliers and other contractors.

Some assumptions have been made in developing Table 4.1, "Estimated Employment Change by Sector for Alternatives 2-5," which warrant explanation.

The Community of Williams may initially receive the most direct economic impacts from the development of the mine for several reasons. The lack of available water, housing and a labor pool in Tusayan, sufficient to meet employment needs of the mine, may limit the economic effects in the Tusayan area. The Williams area has both a labor pool and housing sufficient to meet the immediate employment needs of the additional 10-35 personnel required at the mine. However, it is not clear that

a sufficient pool of qualified miners will be available in the Coconino County area, and accordingly, this assumption may not prove to be completely accurate.

Over time, the secondary economic impacts of the mine will be dispersed over Coconino County.

(1) Alternative 1 - No Action, disapproval of the operating plan.

This alternative represents the current economic and social situation in Coconino County. Alternative 1 will have little effect on the lifestyle, attitude, beliefs and economy of Williams and Coconino County. Coconino County would be expected to continue to grow at its present rate while Williams would be expected to continue to experience a general economic and population downward trend.

(2) Alternatives 2-5 - All of these project alternatives include development of the mine.

Social and economic impacts will likely be felt most in the community of Williams and are considered to be beneficial because of increased employment. Population increases or other development in Tusayan should be discouraged by lack of housing, a limited water supply and a small existing work force. However, because the resources of the town are limited, even small increases in population will result in noticeable impacts.

TABLE 4.1 -- Estimated Employment Change By Sector
For Alternatives 2-5

WILLIAMS

Employment Sectors	Number of Jobs Current[1]	Predicted	Percent Change
Ag & Mining	134	164	+22
Construction	76	79	4
Manufacturing	71	71	0
Trans, Comm & Util	104	111	7
Wholesale Trade	16	17	6
Retail Trade	273	294	8
Finance, Insurance & Real Estate	13	13	0
Services	265	270	2
Public Admin	103	103	0
TOTAL	1,055	1,113	5

COCONINO COUNTY
(includes Flagstaff & Tusayan)

Employment Sectors	Number of Jobs Current[2]	Predicted	Percent Change
Ag & Mining	1,825	1,860	<1
Construction	1,125	1,128	<1
Manufacturing	2,625	2,628	<1
Trans, Comm & Util	2,225	2,235	<1
Wholesale Trade	982	985	<1
Retail Trade	6,168	6,196	<1
Finance, Insurance & Real Estate	600	602	<1
Services	7,975	7,992	<1
Public Admin	8,925	8,925	0
TOTAL	32,450	32,552	<1

[1]Williams Chamber of Commerce and Arizona Department of Commerce, May, 1985.
[2]Arizona Statistical Review, 40th Ed., Sept., 1984, Valley National Bank of Arizona.

If there is no population increase, development of the Canyon Mine should not appreciably affect the existing economic and social structure of Tusayan. Nor should it significantly impact any employment sector for Coconino County as a whole, given the 33,000 job base which already exists.

On a County-wide basis, it is estimated that a total of approximately 100 jobs may be created. The net effect of these additional jobs plus the expenditures associated with the operation of the mine could increase the total annual income in Coconino County by three million dollars or one-half percent.

The Williams area may receive a larger proportionate share of the project employment and subsequent income given its relatively small base of 1,000 jobs compared to the nearly 33,000 jobs in Coconino County. It is possible that upwards of 58 jobs may be created in the Williams area, or a 5 percent increase in the present work force, when the proposed mine reaches its full production capacity.

Most of the jobs would be attributed to direct employment of 10-25 people at the mine. Additional employment might also occur in the transportation, wholesale and retail sectors.

It is not expected that there will be any significant population changes in Williams because the available labor pool is now present. Small population increases could be readily accommodated by existing City facilities such as schools and other support facilities. These facilities have not operated at capacity for many years.

Given the relatively small potential for a significant population increase there should be little, if any, change in the social structure and lifestyle now present in Williams. Overall, any changes which might occur would have to be considered as being positive given the increased levels of employment and the associated improvement in the relative standards of living.

4.2.1.1 Cumulative Impacts

Additional mines located in Coconino County south of the Grand Canyon will create impacts roughly equivalent to those projected for the Canyon Mine, though the ultimate distribution of impacts within the area will depend on the location of any mine site.

One additional mine located in the Tusayan area will add approximately 58 jobs in the Williams area and 102 jobs in Coconino County. Total income in the County should increase by about $3 million, or 0.5 percent of the current level. One additional mine would have no significant effect on the services needed in Williams. However, as the number of mines increases, new government and private services may be required.

Three additional mines in the County south of the Grand Canyon would increase employment by approximately 306 new jobs and total income by about $9.2 million. Total County population would not increase significantly.

4.2.2 IC #3 Proponent-Incurred Project Costs

Project implementation, rehabilitation and mitigation costs were considered for comparison, if they could potentially vary by alternative. The cost of mining would be the same for all project alternatives, and were not used as part of the comparison (e.g. shaft sinking, building construction, energy requirements, etc.). Cost estimates were based on data from contractors, trade journals, etc., and are for comparison only. Actual costs could vary significantly from these estimates.

(1) Alternative 1 - No Action

The No Action Alternative would impose no additional construction or development costs on EFN. However, the costs of exploration and environmental review would be lost and could not be recovered.

(2) Alternative 2 - Proposed Plan of Operation, using Hull Cabin Haul Route #1.

Implementation of this alternative would have a 7-year Net Discounted Cost (NDC) of $3,398,000 and based solely on economics is the most cost effective alternative to EFN. Project costs are almost 15 percent lower for this alternative than for the next lowest cost alternative. The lower cost results from the absence of monitoring and wildlife mitigation costs, along with decreased powerline costs. Worker transportation costs are high under this alternative because of the expense of company-owned vans.

(3) Alternative 3 - Proposed Plan of Operation with monitoring of air, soil and water; equivalent wildlife habitat replacement; cross country overhead powerlines; parking lot; and using either Hull Cabin haul route #1 or #2.

With an NDC of $3,761,000 (when using haul route #2), this alternative is the most cost effective to EFN of the three modified alternatives that provide for additional mitigation measures. Wildlife habitat replacement expenditures are highest under this alternative. Worker transportation costs are lower in this alternative because company transportation is not included. A parking lot for private vehicles, in lieu of Company vans, is provided.

(4) Alternative 4 - Proposed Plan of Operation with monitoring of air, soil and water; equivalent wildlife habitat replacement; overhead powerline along access road; coordinated worker transportation; and use of haul route #5.

This alternative has the highest NDC ($4,786,000) of the four project alternatives because of the high cost of constructing the haul road off the Coconino Rim escarpment. The overhead powerline along the access road also adds appreciably to the project cost.

This alternative has the potential of being the most cost effective route to EFN in the event another mine should be developed in the eastern quadrant of the Tusayan District, and if construction and maintenance costs are spread over both projects. Some wildlife mitigation costs are incurred, but are

considerably less than wildlife costs in Alternative 3, because transportation route #5 avoids most of the important wildlife habitat on the Tusayan District.

(5) Alternative 5 - Preferred Alternative - Proposed Plan of Operation with monitoring of air, soil and water; equivalent wildlife habitat replacement, overhead powerline along access road; pooled worker transportation; and use of either haul route #6 or #7, to minimize haul road impacts. Implementation of this alternative would result in the least amount of new road construction. The alternative is designed to utilize existing road systems.

Because of increased haul distances and associated costs, this alternative is more costly than Alternatives 2 and 3 but less costly than Alternative 4. Initial capital investment is less than half that required in the other project alternatives. The net discounted cost of this alternative is $4,242,000 with haul route #6, and $4,103,000 using haul route #7.

Terms, conditions and purchase price for the acquisition of a right-of-way across State and private lands for haul route #7 would have to be negotiated by EFN.

Wildlife habitat replacement costs are the least of the three modified project alternatives.

4.2.3 IC #4 Wildlife

4.2.3.1 Threatened and endangered species

A biological evaluation documenting the impacts of the proposed Canyon Mine on threatened, endangered and sensitive species is included in Appendix C. No adverse effects to threatened, endangered or sensitive wildlife species have been identified.

4.2.3.2 Other wildlife impacts

(1) Alternative 1 - No Action

The No Action Alternative would have no impact on the existing wildlife population or wildlife habitat. The mine site would remain available as a big game foraging area and there would be no ore transport, road construction or improvement associated with mine development. Any beneficial impacts associated with the mitigation measures in the Preferred Alternative --

replacement of habitat and water sources -- would be lost. Wildlife populations would be expected to grow at current rates until limited by habitat availability or other factors.

(2) Alternative 2 - Proposed Plan of Operations using Hull Cabin Haul route #1.

Removal of the topsoil layer within the mine site will eliminate approximately 17 acres of grassland habitat. This will have the greatest adverse effect on small mammals and reptiles whose home ranges are mostly or entirely within the mine site. It is expected that the majority of these animals will be eliminated as their habitat is destroyed. This reduction in local nongame species will not threaten population viability on a region-wide basis, and is considered to be of little consequence in light of total populations and available habitat of non-game species.

Mining activities are expected to disrupt elk use of the grassland opening encompassing the mine site. Elk will avoid foraging in the opening during active mining operations. Approximately 32 acres will be reduced in effectiveness. This represents a loss of about 0.14 percent of the available grassland type on the Tusayan District.

Haul route 1 will require 3.6 miles of new road construction. This equates to approximately 9 acres of vegetation clearing within a 20-foot wide road corridor. This habitat loss will reduce local nongame species that reside within the corridor but will not adversely affect population viability on the Tusayan Ranger District.

Noise and disturbance from ore trucks and increased recreational traffic on haul route 1 are expected to disrupt elk use within one half mile of the road. Use of the habitat will not be denied, but it will not be as effective as it was prior to road upgrading. This loss in habitat utilization will impact an estimated 228 acres of important elk calving habitat. The resultant reduction in habitat carrying capacity is expected to reduce the currently rapid growth rate of the elk population.

Haul route traffic is likely to disrupt the use of adjacent wildlife water sources. Trash Dam, Twin Tanks and Sand Tank are three important water sources that will be affected. 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.

Haul Route 1 travels in close proximity to antelope and deer fawning areas, and turkey nesting areas. Available research and literature concerning the impacts of traffic on the use of these habitats is inconclusive. With no monitoring program, the extent of possible impacts to these wildlife populations will not be known until changes in population size and viability have already occurred. Even with a monitoring program it will be difficult to establish a cause and effect relationship for population changes.

Assuming a 20-foot right-of-way would be completely cleared of vegetation for the powerline, 4.1 acres of habitat would be eliminated. This would have minimal effects on resident wildlife populations due to the narrow configuration of the disturbed area. The powerline poles would provide additional hunting and roosting perches for raptors.

(3) Alternative 3 - Proposed Plan of Operation with monitoring of of air, soil and water; equivalent wildlife habitat replacement; cross country overhead powerline; parking lot; and using either Hull Cabin haul route #1 or #2.

Mine site impacts are the same for this alternative as those for Alternative 2. Impacts to wildlife associated with the use of haul route 1 are discussed under Alternative 2 as well.

Environmental consequences resulting from the upgrading and use of haul route 2 are very similar to haul route 1. Route 2 will affect the use of two important wildlife waters, Trash Dam and Sand Tank. Increased traffic flows will discourage the use of these water sources by wildlife. An estimated 55 acres of elk calving habitat will be disrupted by haul route traffic. Ten acres of habitat will be eliminated through new road construction. The ultimate effect of these habitat losses is an overall reduction in habitat carrying capacity.

With a specified 60-inch separation of phase wires, the risk of raptor electrocution would be minimized, and the poles would provide additional hunting and roosting perches.

Under haul route option #2, the total loss in utilization of the various habitat types should be partially offset through the construction of 3 water sources.

(4) Alternative 4 - Proposed Plan of Operation with monitoring of air, soil and water; equivalent wildlife habitat replacement; overhead powerline along access road; coordinated worker transportation; and use of haul route #5.

This alternative will have the same mine site impacts on wildlife as Alternatives 2 and 3. Haul route #5 differs markedly from routes 1 and 2 in its effect on big game habitat.

Assuming that the powerline would be erected within the existing road clearing, no additional loss of vegetation or habitat would occur.

Route 5 bypasses all known deer and antelope fawning areas, elk calving areas and turkey nesting areas. It travels primarily through big game winter range which is not considered to be in limited supply.

Haul route #5 will, however, have some impacts on several important wildlife water sources. Owl Tank, Antelope Tank and Woodbridge Tank are expected to decline in effectiveness due to traffic disturbance. The loss of these tanks represents a 13 percent reduction in reliable waters within the affected area. It also results in an overall reduction in habitat carrying capacity. The loss in utilization of the three affected water sources should be entirely offset through the construction of three new water sources, in areas having suitable habitat characteristics except for a lack of reliable water.

(5) Alternative 5 - Preferred Alternative - Proposed Plan of Operation with monitoring of air, soil and water; equivalent wildlife habitat replacement; overhead powerline along access road; coordinated worker transportation; and use of haul routes #6 or #7.

Mine site impacts are the same for this alternative as for Alternatives 2, 3 and 4. The buried cable powerline that parallels the access road, should have little or no effect on vegetation and wildlife. Note that the Preferred Alternative adopts Alternative 5, but substitutes an overhead powerline. The impacts of an above ground line are discussed under Alternative 2.

Using haul route #7, the most greatest impact could result from unrestricted haul-route use during the winter months. An estimated 11 percent of the Game Management Unit 7 elk population crosses within two miles of Cedar Ranch during seasonal migrations (Appendix C). The increased recreational and ore traffic use during the winter months could disrupt traditional elk migration patterns.

Maximizing the use of existing State and Federal highways in haul route #6 will result in minimal impacts to wildlife and wildlife habitat. No new road construction will be required and development of a new water source to replace the loss of Owl Tank will further reduce potential impacts to wildlife.

4.2.3.3 Cumulative impacts

Impacts on wildlife resources will generally be localized to the mine site and haul routes. The level of impacts will depend on the location of mines and roads relative to important habitat. Each additional mine and any new road construction will displace some additional habitat in the area and impact nearby habitat. For example, each mine site, if comparable to the Canyon Mine, would displace 15-20 acres of habitat near the mine site.

Similarly, wildlife habitat will be impacted by construction of new ore haul routes. The impact will be reduced if common haul routes are used or if road-use is restricted during the elk calving period.

Wildlife impacts will also depend on the mitigation measures required at each mine. With proper mitigation, the impacts of one additional mine in the Tusayan area or three additional mines in Coconino County south of the Grand Canyon would not be expected to be significant unless mining operations and haul routes are concentrated in critical habitat.

4.2.4 IC #6 Visual Impacts

For evaluation purposes, visual impacts are broken into two categories, impacts at the mine site and impacts along haul routes. Alternative 1, the No Action Alternative, would have no impact on visual quality near the mine site as no structures would be constructed. No impacts from road construction or improvement associated with the mine would be expected.

Impacts at the mine site are identical for Alternatives 2-5. Visual impacts would consist primarily of short-term reversible alterations of the natural character and overall scenic quality of the viewed landscape. These impacts are related to changes in vegetation, topography, intrusion of project related equipment and machinery at the mine site, and vehicle traffic along the respective haul routes.

4.2.4.1 Mine site visual impacts

Visual quality associated with the Grand Canyon will not be affected with the development of the Canyon Mine regardless of the alternative selected for implementation. Alternatives 2-5

will alter the short term visual quality at the mine site. Reclamation measures should effectively restore the area to its present characteristic landscape.

The mine site will be visible from the road adjacent to the mine and from aircraft. The headframe of the mine will not be visible from State Highway 64, Forest roads 688, 305, 302 or the Grand Canyon National Park.

The most visible intrusion will be the mine headframe which will be approximately 100 feet in height. It will be visible only from Forest roads 305A and 308, but then only within one-half mile of the mine site. The minor visual impact of the headframe and surrounding structures will be mitigated to some extent by selecting an appropriate paint color that blends with the characteristic landscape.

Changes in vegetation and topography at the mine site will result from clearing grass, bushes, and a few small trees from the project area and will be generally limited to the duration of the mine. Reclamation of the disturbed area following mining will return the visual characteristics of the mine site to something approaching its present nature.

Impacts on visual quality will be site specific and no cumulative impacts are expected from the potential development of additional mines.

4.2.4.2 Haul route visual impacts

Haul route selection will have a limited effect on the scenic qualities on the Tusayan Ranger District. Implementation of Alternative 4 would have the greatest effect by constructing a road off the Coconino Rim in a location that would be visible to travelers going to and from the Grand Canyon by the east Highway 64 entrance.

Along the haul corridors, an average of 10 to 20 ore trucks each day will intrude upon the relatively untraveled natural landscape. Road improvement necessary to ore haulage may indirectly result in some increased local or tourist traffic along the same route, creating a proportionately greater visual intrusion.

(1) <u>Alternatives 2, 3, and 5</u>

Under these alternatives, the Forest visual quality objectives will be met. Visual characteristics adjacent to haul routes will not be appreciably altered. Utilization of haul route #6

(existing State Highways) in Alternative 5 will have the least visual impacts on scenic qualities by avoiding the need for additional road construction.

(2) Alternative 4

This alternative achieves Forest guidelines for the assigned visual quality objective but will result in a road scar on the Coconino Rim escarpment which will be visible from State Highway 64 near the east entrance to Grand Canyon National Park.

4.2.5 IC #7 Air Quality Impacts - Dust and Radon Gas

Changes in air quality may result from the mine construction, operation and transportation of ore. Dispersion models were used to calculate the maximum TSP concentrations possible from the Canyon Mine site and the proposed haul routes. The Industrial Source Code (ISC) was used to calculate the annual average and highest 24-hour Total Suspended Particulates (TSP) concentration that could result from operations at the mine. CALINE-3 was used to calculate maximum short-term particulate concentrations from ore truck traffic on the haul roads. Extreme meteorological data were specified to provide an estimate of potential ground level TSP concentrations.

No significant air quality impacts will occur in the Grand Canyon National Park as a result of the proposed Canyon Mine, even under the most extreme conditions.

No Action

Under Alternative 1, the No Action Alternative, levels of particulates and radon gas in the area would remain at current levels. Naturally occuring radiation would still be present in varying levels and traffic along forest roads would generate temporary increases in particulate levels. The air quality impacts associated with development of the Canyon Mine and transportation of ore would not occur.

4.2.5.1 Particulates

The National Ambient Air Quality Standards (NAAQS..)for particulates are 260 ug/m^3 for the 24-hour average and 75 ug/m^3 for the annual geometric mean. The State of Arizona

has adopted the same standards. The Federal Prevention of Significant Deterioration (PSD) regulations will not apply to the Canyon Mine because emissions will be fugitive dust which is not subject to PSD requirements under either Federal or State of Arizona regulations. However, the allowable particulate increments for PSD Class I areas (National Parks and Wilderness Areas) are referenced for the purpose of analyzing potential impacts on the Grand Canyon National Park. The PSD increments established for Class I areas are 5 ug/m^3 for the 24-hour average and 1 ug/m^3 for the annual average.

(1) Mine Site Impacts - <u>Alternatives 2-5</u>

The only nonradiological pollutant to be released in any measurable amount from the construction and operation of the Canyon Mine will be particulate matter, emitted as fugitive dust and measured as Total Suspended Particulates (TSP). Particulate matter emissions can be expected from land clearing, earth moving, and shaft and haul road construction. Operational fugitive dust will result from ore and waste rock removal, transport, storage activities and wind erosion of exposed surfaces.

Particulate data have been collected by the Park Service at Hopi Point in Grand Canyon National Park for a number of years. The Hopi Point TSP station is located approximately 16 miles northwest of the Project Area. Because of the close proximity of this monitoring station to the Project area, the similarities in climatology and the absence of nearby major industrial sources, these data are representative of the Project Area. The expected TSP baseline of the Project Area are estimated to range from 5 to 16 micrograms per cubic meter (ug/m^3) on an annual basis, with maximum 24-hour concentrations in the range of 47 to 58 ug/m^3.

An emissions inventory for the mining project at maximum production was developed to assess potential air quality impacts. The inventory quantified all operations and activities associated with the Canyon Mine that could potentially result in the atmospheric release of pollutants. In order to establish an upper limit on potential air quality impacts, no emission controls or mitigation techniques were assumed to be in effect on any potential source.

During a full production year, absent emission controls, a total of 34.4 tons per year of TSP emissions could potentially be released by operation of the Canyon Mine. The primary source of TSP emissions within the project area will be wind erosion of disturbed areas and ore stockpiles. These emissions account for approximately one-half of all TSP emissions. Since haul trucks will be tightly covered with tarpaulins, haul road

emissions will result exclusively from natural dust from the road surface. TSP emissions from haul roads are dependent upon the number of haul trucks, their speed, the silt content of the road surface and precipitation. Based on the factors expected for the proposed activity, the resultant dust emissions from each mile of unpaved road is calculated to be 9.68 tons per year. Total emissions will depend on the length of the haul road selected.

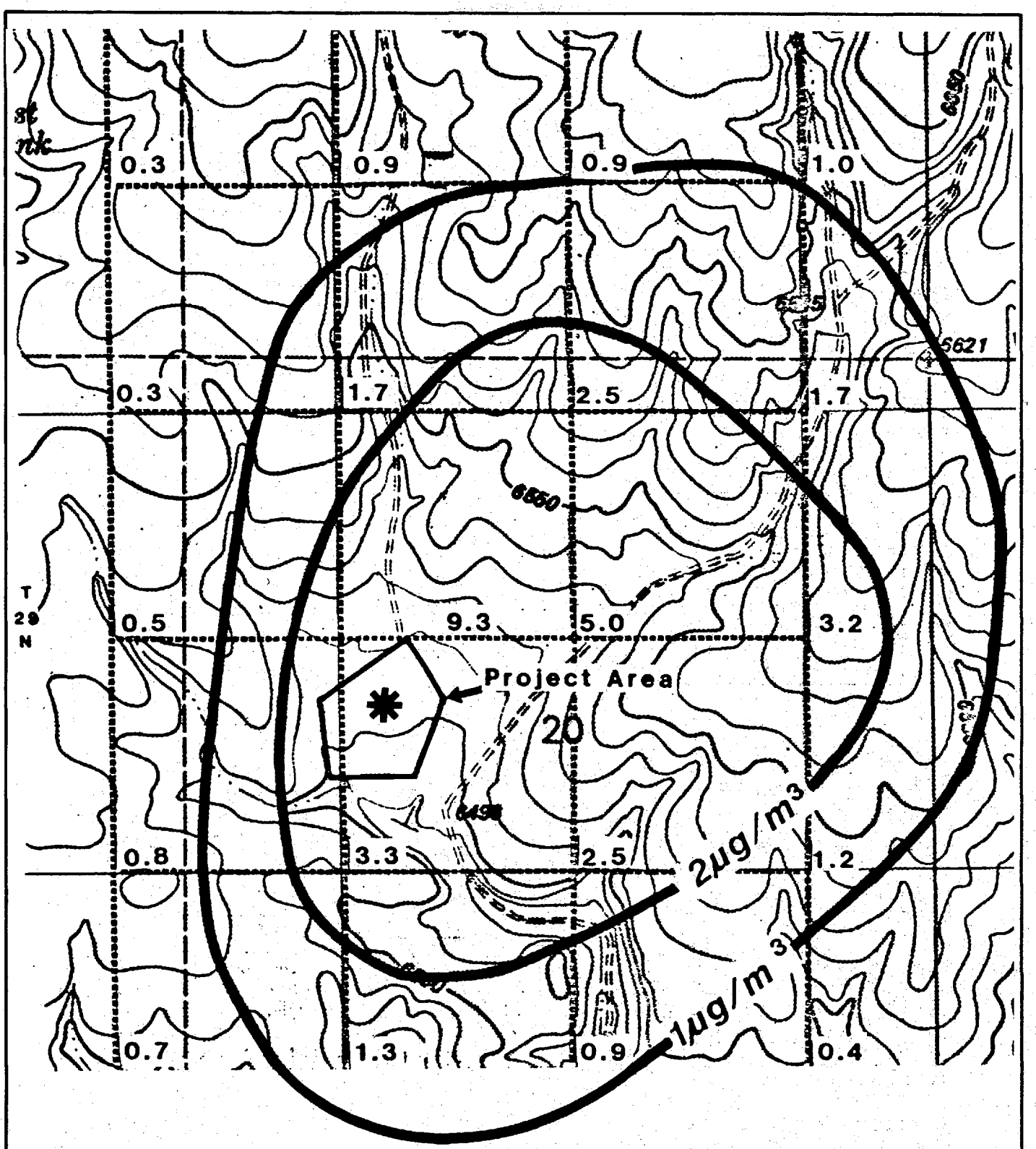
The results of the annual Industrial Source Code (ISC) modeling are shown in Figure 4.1. Predicted particulate concentrations resulting from mine operations are shown as lines of constant concentration or isopleths. All concentrations are well below both National Ambient Air Quality Standards (NAAQS) and Federal Prevention of Significant Deterioration (PSD) standards. The maximum off-site 24-hour particulate concentration reflecting extreme meteorological conditions, was 26 ug/m^3. The annual particulate background in the vicinity of the mine site is, at a maximum, 16 ug/m^3. Even adding this background concentration to the modeled impact, the resulting concentrations are predicted to be quite low, with a average maximum impact of 42 ug/m^3. Figure 4.1 also shows that the 1 ug/m^3 significance level isopleth, at its furthest distance, extends only 1,200 to 1,500 meters from the Project Area. Thus, there should be no impact from the proposed Canyon Mine on Grand Canyon National Park.

(2) Haul Route Impacts - Alternatives 2-5

To assess the maximum potential impact from haul road routes, the CALINE-3 model was used assuming a perpendicular wind direction for most haul road segments and a parallel wind direction for any road segment which subsequently makes a sharp, near 90 degree turn. Extreme meteorological conditions were also assumed where associated risks would be the greatest. All projected concentrations are well below the NAAQS.

The Federal Clean Air Act establishes goals for the protection of visibility within Federal Class I areas, including the Grand Canyon National Park. Release of light-scattering particulates may affect visual range, thus the projected emissions of particulate from ore haulage activities were analyzed to determine potential impacts on visibility in the Park.

Results of the CALINE-3 modeling of the road segment closest to the Park boundary and under extreme meteorological conditions show that the projected 24-hour particulate concentration at the boundary would be 3.0 ug/m^3, well below the Class I PSD standard of 5 ug/m^3 level of significance.



✱ CANYON MINE SITE	N 1" = 2000 FT.	ANNUAL AVERAGE TOTAL SUSPENDED PARTICULATE (TSP) CONCENTRATION	FIGURE 4.1

Ore haulage near the Park may result in particulates being transported into a small section of the Park. Under worst-case meteorological conditions, a small reduction in visibility could occur if an observer were looking through this area when haul route traffic was present. Any visibility reduction should be short-lived as traffic would pass the area in less than 5 minutes. Haul routes #5, #6 and #7 are so far removed from the Grand Canyon as to preclude the possibility of any visibility impairment to the Grand Canyon because of increased particulate concentrations derived from unpaved road surfaces.

The use of haul route #6 (existing State Highways) virtually eliminates any potential increase of additional particulates to the atmosphere because of the paved road surfaces.

4.2.5.2 Airborne radiation

(1) Radon Gas Emissions - Alternative 2 - 5

Radon gas will diffuse from the ore piles and be exhausted from the mine vent. Once airborne, the gas will be transported away from the area by prevailing winds and will decay. Radon progeny also will be exhausted from the mine vent. Radon progeny, however, have rapid decay rates and quickly become of no concern.

Uranium and all progeny will be present in dust blown off the ore piles and in dust released from the mine vent. The potential impact from these radionuclides may be determined based on the magnitude of each release and the prevailing meteorological conditions. Dispersion models were used to project the concentrations of released radionuclides.

The annual radon gas release from the high-grade ore stockpile and lowgrade material storage pile was calculated to be 764 Ci. An end release of 4,300 Ci was determined by measuring the actual radon emission from the vent at the Hack Canyon Mine. The MILDOS Code modeled the dispersion of these radon sources using the generic wind rose for normal conditions. In addition, the code modeled radon concentrations for extreme meteorological conditions. For this case hypothetical meteorology and wind conditions were established to provide maximum radon at the locations of interest. Basically, the wind rose was rotated so that the prevailing winds carried the radon directly to each location of interest. Results for the normal and extreme situations are presented in the following tabulation:

Projected Increases in Radon Concentrations
at Specific Locations

Location	Distance from Site (km)	Radon (pCi/L) Normal Conditions	Radon (pCi/L) Worst Case
Owl Tank	2.2 SSE	0.019	0.120
House (Old Grand Canyon Airport)	3.4 SSE	0.011	0.061
U.S. Highway	3.2 W	0.028	0.068
Tusayan	9.9 NW	0.005	0.020

For the residents of Tusayan, the most extreme potential increase in radon concentration of 0.02 pCi/L results in an increased lung dose of only 12.5 mrem/yr. This may be compared against the normal background outdoor Rn-222 concentrations for this area which have been measured in the range of 0.2 to 0.8 pCi/L, providing a lung dose of about 125 to 500 mrem/yr. However, since individuals spend time indoors where radon levels are higher, or may even reside in energy-efficient dwellings which typically have higher radon concentrations, lung doses from sources unrelated to the proposed mining activities may increase measurably. If the winds behave as predicted by the generic wind rose, then the mine radon which reaches Tusayan will be on the order of 0.005 pCi/L and would contribute an additional dose of only 3 mrem/yr. Therefore, when compared to normal outdoor concentrations, radon doses to residents of Tusayan might increase about 10 percent assuming an extreme risk scenario and realistically will increase about 2 percent or less. None of these potential increases could be distinguished from normal fluctuations of the natural radon environment.

(2) Radioactive Dust - Alternatives 2 - 5

Radioactivity in dust emissions from the ore piles and mine vent was analyzed using the Industrial Source Code (ISC) dispersion model. Thus, dispersion of radioactive materials is equal to the dispersion of particulate matter analyzed in Section 4.2.5.1. If all of the potentially radioactive particulate matter includes 1 percent uranium, the 1 ug/m^3 particulate isopleth of Figure 4.1 represents a natural uranium concentration of 0.01 ug/m^3. For purposes of comparison, the Nuclear Regulatory Commission limits natural airborne uranium releases from federally licensed uranium processing facilities

to 3.0 ug/m^3. The Canyon Mine is not subject to these regulations, but they provide a useful comparison as releases from mine operations are approximately 300 times less than permissible releases from licensed milling facilities. The radiological impacts of Alternatives 2-5 are considered to be indistinguishable.

4.2.5.3 Cumulative impacts

Each additional mine can be expected to contribute 25 to 30 tons of TSP per year and each additional mile of haul road would add 35 to 40 tons of TSP per year. Cumulative impacts will be limited however, as particulates settle quickly near the site and haul roads.

There would be no cumulative impact from one additional mine in the Tusayan area unless it and the Canyon Mine were within a few miles of each other. No violation of air quality standards would be expected. If both mines used the same haul route, transportation related emissions would increase. If the Hull Cabin route were selected, the frequency of potential visibility impacts on the Grand Canyon National Park would also increase.

Three additional mines in the County should produce no cumulative impacts with the Canyon Mine unless common haul routes are used. If several mines use the same haul route, additional mitigation measures including paving or watering might be required to limit TSP emissions.

The radiation impacts from the mine operations are largely site specific. Airborne radioactivity will disperse within a short distance of the mine site and specific impacts will depend on meteorological conditions in the site area. One additional mine near Tusayan might add an additional 3 mrem/yr to the annual lung dose at Tusayan if it were located such that meteorological conditions would add its radiation contribution to that of the Canyon Mine. That increase would be insignificant when compared with existing background levels. Three additional mines in Coconino County south of the Grand Canyon would not make a significant contribution to cumulative levels of radiation in the county. Impacts would be localized near the mine sites.

4.2.6 IC #8 Transportaion Routes

Traffic counts have been taken on several roads on the Tusayan Ranger District. Traffic varies considerably along any

specific road segment (Fig. 3 in Appendix B), but is generally considered low over most of the District. Fluctuations are due to various resource activities in a specific area, such as timber and range projects. With the exception of certain private lands with residences, there are no major attractions within the Tusayan Ranger District to create a continuous or high level of travel.

Past studies have shown that when roads similar in nature to the proposed haul routes are improved, the volume of casual traffic will increase approximately 20 percent. This increased use is a combination of traffic from other roads and new users taking advantage of the improved access.

The selected uranium ore haul route across the Forest will be upgraded to a single-lane (14 ft. wide) route with good grade and alignment, ditched and culverted for drainage and surfaced with 6 inches of aggregate. This same standard applies to haul route #7 across State and private land. All road grades are based on a maximum of 8 percent. Clearing would be restricted to a minimum width necessary to safely accommodate the traffic while allowing for snow removal and snow storage.

In the Proposed Plan of Operations, ore haulage rates are given as 200 tons of ore per day (10 loaded vehicles). The described 14-foot standard will provide for this use except during spring snowmelt or other short periods of adverse weather (heavy snow, prolonged rainy spells, etc.) during which time the haul route subgrade would not support the loads.

Ore Truck Accidents

The possibility of an ore truck accident resulting in a spill of uranium ore exists along all haul route alternatives. Data from EFN indicates that ore transport for their mines in northern Arizona has resulted in five ore spills in approximately 6,600,000 miles of ore transportation. Only in one case was more than 2 tons of ore spilled and in all five cases, all spilled ore was recovered. Mitigation measures require that appropriate federal and state authorities be notified and that any spilled ore be cleaned up immediately. Tribal authorities will be notified of any spills on Indian lands. (See Section 2.5.5.) Existing response plans and mitigation measures appear to be effective -- every ore spill has been cleaned up with no residual contamination. Thus, should an accident occur, the potential for exposure to low level radiation from uranium ore is limited in duration.

In the event of a spill, traffic and wildlife passing the immediate vicinity of the spill would be temporarily exposed to extremely low levels of radiation until the spill is removed.

Normal spill removal techniques may not be effective for an accident which spills ore into flowing surface water. Ore which cannot be removed from the stream will create a temporary increase in stream particulates and extremely low-level radioactivity. (See Appendix E, pp. 27 and 28.)

Wildlife impacts resulting from a specific haul route alternative are described in 4.2.3.

(1) Alternative 1 - No Action

If the Plan of Operations were not approved, traffic along all of the haul route options utilizing existing roads or highways would remain at current levels, subject to increases associated with other uses including mineral exploration, timber harvesting or recreation. Use of Forest roads on the Kaibab National Forest is discussed in the DEIS on the Kaibab Forest Management Plan, July, 1986.

(2) Alternative 2 - Proposed Plan of Operation using Hull Cabin Haul Route #1.

Short sections of new construction would be required on this haul route to connect the mine to Road 302 and for an improved access off the Coconino Rim escarpment near Hull Cabin. Reconstruction will be minor, consisting mainly of gravel or cinder surfacing, with some widening of the travelway and corridor clearing. This route uses existing Forest arterial roads except for some minor realignment south of Hull Cabin, which would improve the road grade and move the road further south and away from the stock tank. Upgrading this road system would improve access to lands on the Tusayan District that are classified as suitable for commercial timber production.

A total of 3.6 miles of new road construction and 23.9 miles of reconstruction will be required using haul route #1. Approximately 40.3 thousand board feet (MBF) of timber will be removed as a result of the road work. Cattle grazing capacity would be reduced by about 8 animal-unit-months (AUM's). This represents only 0.05 percent of the District's total grazing capacity.

Since haul route #1 traverses the portion of the Tusayan Ranger District where archeological site density is low, the potential for inadvertent site damage is minimal. Only minor realignment would be needed or very few site excavations required to mitigate impacts to cultural resource sites.

This haul route would be subject to seasonal closures due to snow accumulations in the winter and wet road conditions during spring thaws.

(3) Alternative 3 - Proposed Plan of Operation with modifications, and use of either transportation route #1 or #2 along the northern boundary of the Tusayan Ranger District.

This alternative uses either haul route #1 (discussed above) or haul route #2. Haul route #2 is a modification of route #1, designed to shorten the haul distance and improve the road grade and alignment off the Coconino Rim escarpment. These modifications would increase initial costs, but shorten the haul distance by 2.1 miles. There would be 4.1 miles of new construction, and 21.3 miles of reconstruction consisting primarily of road widening and resurfacing with cinders or gravel. Although haul route #2 requires the largest amount of timber removal (76.5 MBF), this represents only 0.016 percent of the District's total commercial timber.

The potential impacts to cultural resources from haul route #2 are very similar to haul route #1. Under haul route #2, grazing capacity would be reduced by 8 AUM's.

(4) Alternative 4 - Proposed Plan of Operations with modifications, and construction of haul route #5 off the Coconino Rim escarpment.

Haul route #5 was designed to reduce the impacts of ore hauling on wildlife. It uses Road 320 and requires new construction off the east end of the Coconino Rim near Upper Cabin Tank. Haul route #5 would be the most cost effective of the routes considered if future mines are developed in the southeast quadrant of the Tusayan Ranger District. However the construction costs of this haul route are the highest of the haul options because of the steep topography of the Coconino Rim. Haul route #5 would require 2.9 miles of new construction and 30.6 miles of reconstruction. Very little timber would be removed (10.1 MBF), but cultural resource site densities are high (>25 sites/mi^2), which could require costly site excavation if roads could not be relocated to avoid the sites. About 7 AUM's would be lost which equates to 0.04 percent of the District's total grazing capacity.

(5) Alternative 5 - Preferred Alternative - Proposed Plan of Operation with modifications, and use of haul route #6 (all highway) or route #7 near SP Crater (pending right-of-way acquisition across 20 miles of State and private land).

Haul route #6 uses State Highway 64 south to I-40, east to U.S. 89, north to U.S. 160 and north again on U.S. 191 to Blanding. Total haul distance is increased by 35 percent, but no investment in new road construction is required. Only 4.8 miles of Forest road would require reconstruction and maintenance.

This route has the least environmental impacts of any of the routes considered. Accidental spills of uranium ore from haul trucks may occur on routes having 100-250 times the volume of traffic as on the other described routes, thereby briefly exposing passing traffic to low levels of radiation emitted from the uranium ore until such time the spill was cleaned up.

Haul route #7 incorporates State Highway 64 to Valle, US 180 to the Coconino Forest Road 417, and 417 and an unnamed extension across State and private property to intersect US 89.

Potential impacts to wildlife along this route are minimal since no key habitat is intersected. It does however cross an elk migration route which is used during the period from late December through mid February. No new road construction would be required, but 29.8 miles of minor reconstruction is needed.

Route #7 passes within a few hundred yards of the Cedar Ranch Headquarters. Other than one seasonal occupied dwelling this is the only residence on this route.

Only 900 board feet of timber would be removed for the widened road corridor along Roads 305 and 305A.

Cultural resource site densities vary from low to moderate along this haul route option.

Five AUM's of grazing capacity would be lost, or about 0.03 percent of the District's total grazing capacity.

Route #7 greatly increases haul costs while significantly reducing initial investment. Failure to negotiate acquisition of a right-of-way across State and private land would preclude this alternative from being implemented.

4.2.7 IC #9 Impacts on Soil and Water Resources

The proposed mine site is subject to shallow flooding during extreme runoff events. Alternative methods have been proposed to divert storm runoff away from the mine site.

The mine may require 8 acre-feet of potable water from the Williams water supply if a water source is not developed at the mine. This additional use is considered insignificant, given the available supply of 2,750 acre feet and the annual consumption of 350 acre feet in Williams.

4.2.7.1 Surface water

(1) Alternative 1 - No Action

If the Canyon Mine is not developed, the mine site will remain subject to surface flooding. Uranium occurring at or near the surface may be eroded and washed into drainages in the area. However, there will be no ore or waste piles. The naturally occurring uranium in the Canyon Mine breccia pipe will remain subject to leaching into subsurface waters. Perched aquifers at the mine site, if any, would be affected only by natural processes. Impacts on seeps and springs are considered indistinguishable from the operational alternatives.

(2) Alternative 2 - Proposed Plan of Operation using Hull Cabin Haul Route #1.

The proposed diversion channels will be of sufficient size to carry runoff from a 100-year, 1-hour storm event. During runoff from larger events, channel capacity might be exceeded and flood control would depend on the effectiveness of the dikes along the water course. It is estimated that the channels would be only partially effective in controlling storms larger than the 100-year event. If the diversion structure is not fully effective, contaminants from the ore or low grade stockpiles could be released into surface water drainages near the site.

Construction of the diversion channels would require considerable site disturbance, including earth moving and removal of natural vegetation. The steep gradients of the artificial channels and the concentration of the flow might cause increased erosion and channel instability unless the bed and banks of the channel are heavily enforced.

(3) Alternatives 3-5

An altered storm control plan is proposed as a part of all modified project alternatives. From stockpiled top soil and borrow material within the mine yard, a dike will be constructed around the perimeter of the mine site. The borrow area will be later filled with waste rock generated during shaft sinking. This would confine flows to existing natural channels, cause the least amount of site and channel disturbance, and should have the capacity to handle the volume of water expected in flood events on the order of at least a 500-year recurrence interval (Table 4.2). A concept plan for surface-water control system is shown in Figure 4.2.

As seen in this Figure, perimeter geometry would be modified slightly from the original mine plan to take maximum advantage of high ground and existing channel capacity. Another important feature of this concept plan is the reduction in perimeter width at the south end of the site, which provides additional flow capacity for the channels that merge together in this area. The ford crossing and approach ramps into the site, would efficiently control overland flow near the southwest corner of the mine site.

Diking of the mine site perimeter would involve less surface disturbance and create less potential for erosion or soil instability than the construction of diversion channels as proposed in Alternative 2. In the unlikely event that the storm control measures fail or runoff exceeds design capacity, the potential downstream effect of a release from the mine site was analyzed. Any release would be quickly diluted by storm runoff (Fig. 4.3).

The potential downstream impacts were analyzed for two watershed antecedent moisture conditions (AMC). The first, designated AMC I, assumes the storm occurs when the watershed is initially dry. A second condition, designated AMC III, assumes the watershed is wet before the rainfall begins.

Figure 4.3 summarizes percent of initial impact (concentration or load) as a function of distance downstream for the AMC I thunderstorm and AMC III general storm. Both scenarios show considerable reduction of initial impact (either concentration or load) in the first 2 miles. Just below Owl Tank at Node 2, the reduction of initial impact would be 70 percent for the AMC III general storm and 90 percent for the AMC I thunderstorm.

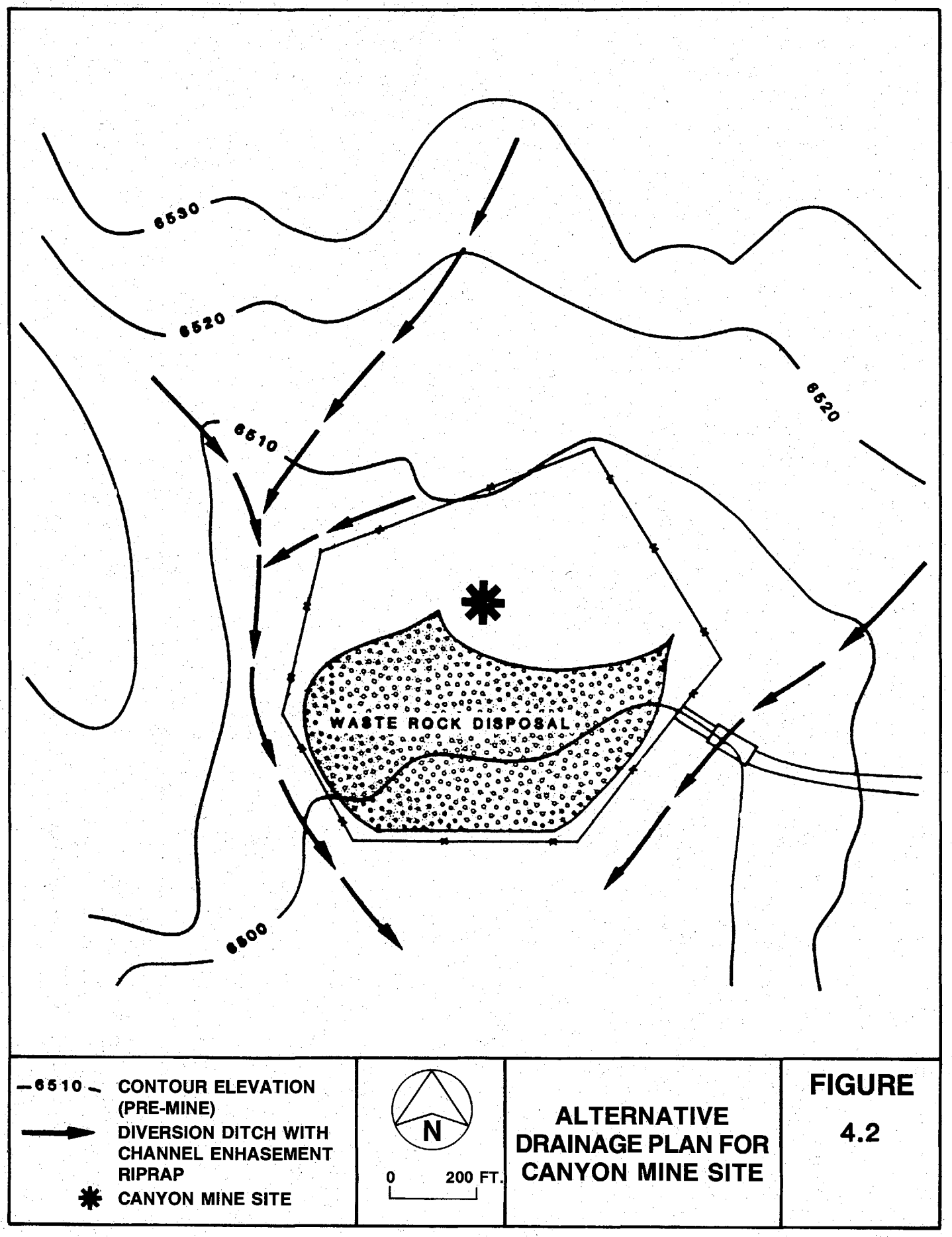
Impacts from any sediment or leacheate introduced at the mine rapidly diminish with distance downstream. At the confluence of Little Red Horse Wash with Red Horse Wash some 13.5 miles downstream, it is estimated that initial impact would be diminished by approximately 98 percent for both general and local thunderstorm flood occurrences that exceed diversion channel capacities.

Groundwater underflow in the channel alluvium in this reach of the drainage does not occur except during, and for a short time after, flood flow in the channel. If contaminants are released and enter the Kaibab Limestone, the water containing the contaminants will percolate downward until it meets a confining rock layer with sufficiently small permeability to detain the flow. Where the water is detained, a saturated zone forms above the confining layer, and lateral groundwater movement begins. This saturated zone may comprise a perched groundwater

TABLE 4.2 - Summary of Peak Discharge
and Runoff Volume for Various Recurrence Interval Storms.

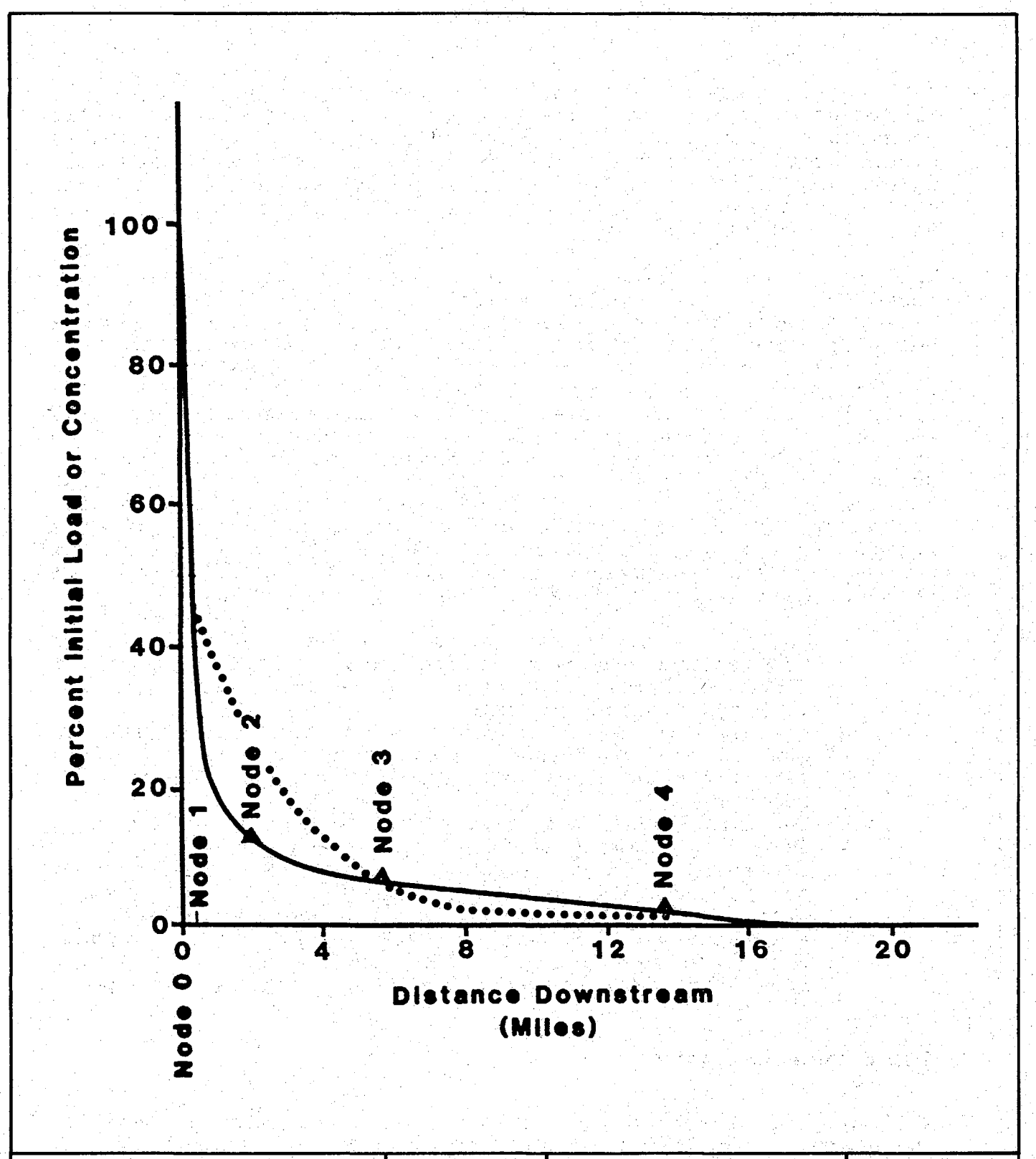
Storm Analyzed	NODE 0		1		2		3		4	
	Peak (cfs)	Vol. (a-f)	Peak (cfs)	Vol. (a-f)	Peak (cfs)	Vol. (a-f)	Peak (cfs)	Vol. (a-f)	Peak (cfs)	Vol. (a-f)
AMC* I Thunderstorm										
2-yr.	41	5.6	67	12.3	77	18.7	340	121.1		
10	124	16.8	200	36.8	232	56.2	1021	363.2		
25	187	25.2	300	55.2	309	74.9	1362	484.3		
50	207	28.0	333	61.3	386	93.6	1702	605.3		
100	249	33.6	400	73.6	502	121.7	2213	786.9		
500	352	47.6	567	104.3	695	168.5	3064	1089.6		
AMC* III General Storm										
2-yr.	228		367	67.5	425	103.0	1873	665.9	2014	926
10	664		1067	196.3	1235	299.5	5448	1937.1	8055	3704
25	767		1234	226.9	1429	346.3	6299	2239.7	9062	4166
50	829		1334	245.3	1544	374.4	6810	2421.3	10572	4861
100	954		1534	282.1	1776	430.6	7831	2784.5	11076	5092
500	1120		1801	331.2	2085	505.4	9193	3268.8	13593	6250
Roeske (1978)										
2-yr.	20		33		44		124		229	
10	131		203		258		743		1073	
25	259		392		491		1327		1873	
50	403		601		746		1932		2688	
100	598		878		1080		2697		3705	
500	1329		1893		2290		5315		7119	
Est. Flood of Aug. 14, 1984	106		908		1350		2447			

* Antecedent Moisture Condition (Class I = dry; Class III = wet)



ALTERNATIVE DRAINAGE PLAN FOR CANYON MINE SITE

FIGURE 4.2



——— ANTECEDENT MOISTURE CONDITION I (THUNDERSTORM) •••••• ANTECEDENT MOISTURE CONDITION II (GENERAL STORM)		ESTIMATED DOWNSTREAM EFFECTS OF INTRODUCED SEDIMENT OR LEACHEATE FROM PROPOSED CANYON MINE FOR FLOOD OCCURRENCES	**FIGURE 4.3**

reservoir. Because the confining layers are not completely impermeable, part of the perched water eventually leaks downward through the confining layer. The remaining groundwater will move laterally until it encounters fractures which permit the water to move downward and bypass and the confining layer, or until the water discharges along canyon walls at seeps and springs.

The report on potential surface water impacts, (Appendix D), indicates that the preferred drainage plan at the mine site would be effective for diverting floods from storms with a 500-year recurrence interval. The report indicates that the largest floods observed in the Canyon Mine watershed have not flowed beyond 18 miles from the mine site. (Appendix D) The analysis of surface water impacts investigated potential impacts of transport of ore-bearing sediments downstream from the mine site after failure of the proposed drainage controls during extreme floods. Much of the runoff would be lost through evaporation and most of the remaining diluted fraction would infiltrate. Suspended sediment would be removed from the runoff by natural filtration. Surface water runoff at the proposed mining operations would have little or no impact on chemical quality of groundwater because of the following:

- Due to dilution, concentrations of dissolved radioactive minerals in the runoff would be small in floods sufficiently large to cause failure of the proposed drainage controls;
- The initial low concentrations of radioactive minerals would be decreased significantly via chemical precipitation and hydrodynamic dispersion in the subsurface;
- The probability is small that a flood sufficiently large to cause failure of the proposed drainage controls would occur during the approximate 10-year period from the first intersection of ore by mine openings to the end of reclamation operations; and
- According to the Plan of Operations, retention ponds for localized on-site storm runoff and for captured mine shaft drainage will be lined to prevent seepage.

4.2.7.2 Subsurface water

All project alternatives employ the same mining methods, therefore the possible effects on ground water would be the same for all operational alternatives (Appendix F).

(1) Perched Aquifers - Alternatives 2 - 5

If perched aquifers are not encountered at the site, mining operations will have no effect on circulation and storage of groundwater. If perched groundwater is encountered, the water will drain into the various mine openings. This drainage may remove small amounts of water from storage in the local system, but since the perched groundwater zones are commonly thin and discontinuous, the drainage would not be expected to affect adjacent groundwater resources.

Because data do not exist to specifically define groundwater flow in perched fractured rock aquifers near the mine, and because pumping from a discontinuous perched groundwater reservoir would not typically be expected to influence pumping conditions from a nearby discontinuous perched reservoir, drawdown effects on springs and wells of draining a perched aquifer were predicted utilizing the following extremely conservative assumptions (Appendix F, pages 34-35):

- The perched aquifer is continuous rather than discontinuous;
- Saturated thickness is 100 feet rather than a few feet;
- Aquifer permeability and coefficient of storage would be about 50 gallons per day per square foot and 0.05, respectively, as at the municipal wells at Flagstaff;
- Time of continuous pumping is 50 years rather than 10 years;
- Pumping rate is 20 gallons per minute rather than five gallons per minute; and
- The aquifer conditions can be analyzed using the Theis equation.

The effect of using these conservative assumptions is to overestimate drawdown impact. Under these extremely conservative assumptions, theoretical drawdown impact at the nearest well of record outside the mine site would be 0.6 feet. This well is an abandoned mineral exploration borehole located about 2-1/2 miles southwest from the mine site. Records indicate that the nearest water supply wells completed in perched aquifers occur near Tusayan, located six miles northwest from the mine site. Theoretical drawdown at these wells would be about 0.1 foot. Inspection of the Tusayan wells in June 1977 and interviews with well owners in June 1986 indicate that the wells are abandoned. Pumping rates of less than one gallon per minute for short periods resulted in excessive water level drawdown in most of these wells. All water supply for Tusayan is trucked from reliable water sources at Williams, Grand Canyon, or Flagstaff, Arizona. Because the perched aquifers are thin, discontinuous, and ephemeral, the drawdown effect of drainage of perched groundwater into the

mine would be negligible or nonexistent at seeps and springs in the vicinity of Cataract Canyon, located more than 20 miles west from the mine site, or along the south wall of the Grand Canyon, located more than 10 miles north from the mine site.

In view of the data on groundwater conditions and the analysis discussed above, it appears that the proposed mining operations at the Canyon Mine site will have little or no impact on groundwater circulation and storage in perched aquifers (other than any perched aquifer drained by the mine), and will have negligible or no impact on springs and wells that yield groundwater from perched aquifers.

Sinyella Spring, a major spring on the Havasupai Reservation, is located about 25 miles west from the mine site. Cataract Canyon separates Sinyella Spring from the mine site and the distance between the spring and the mine site is large. The source of water for Sinyella Spring is a perched aquifer on the west side of Cataract Canyon. Perched aquifers in the area, particularly aquifers on opposite sides of large canyons, are discontinuous. Adverse impacts on Sinyella Spring do not appear to be possible.

(2) Redwall-Muav Aquifer - Alternatives 2 - 5

Impacts on the Redwall-Muav aquifer are considered separately since the discharge from the aquifer exceeds 100,000 gpm at Blue Springs, Havasu Spring and Indian Garden Springs, and groundwater storage is relatively large.

Construction and operation of the Canyon mine will not impact the Redwall-Muav aquifer which is well below the shaft depth. EFN will construct a test well at the mine site. If groundwater yield is sufficient, the well will be completed as a water supply and ground water monitoring well. Total requirements for water use at the mine are projected to be approximately five gpm. No water wells currently produce from the Redwall-Muav aquifer within 20 miles of the mine site, therefore, withdrawal of five gpm at the mine site, will have no impact on existing wells or springs.

Recharge to the Redwall-Muav aquifer in the Canyon Mine site area occurs via infiltration of rainfall and snowmelt through the rocks which underlie the plateau south of the Grand Canyon. Under natural conditions, a fraction of this recharge water passes through mineralized breccia pipes. Small quantities of native minerals, including radioactive minerals, are continuously leached from the breccia pipes and travel in solution in the water. During mining operations, the mine workings will be ventilated and much of the water that

percolates into the mine will evaporate. Excess water will be collected and used for industrial purposes.

Since the quantity of recharge water passing through the breccia pipe during mining operations will be reduced, the potential for movement of dissolved minerals will also be reduced. After mining operations are complete and the natural recharge system at the mine site is reestablished, native material, including radioactive minerals, will continue to be leached and move to points of discharge with the groundwater. Because groundwater discharge is small, no measurable impacts are expected.

If a perched groundwater reservoir is intercepted by the mine shaft, the shaft will function as a drain for the reservoir. The rate of water discharge to the shaft will decrease as the perched reservoir is depleted, until it is approximately equal to the recharge for that individual perched reservoir. If drainage of perched groundwater into the mine shaft occurs during mining operations, much of the groundwater will evaporate via mine ventilation. If drainage to the mine shaft continues after mining operations stop, a fraction of the groundwater will collect and be stored in some of the underground mine openings in the firmly cemented rocks of the breccia pipe, a fraction of the groundwater will evaporate, and the remainder of the groundwater may percolate slowly downward from the mine openings. If perched groundwater reservoirs occur at or below the level of water stored in the mine openings, seepage from the mine openings may mix and be diluted with water in the local perched reservoirs and continue to percolate slowly downward, where it may eventually mix and be diluted further with groundwater in the Redwall-Muav aquifer.

Studies of groundwater contamination in shallow aquifers near uranium mill tailings in Colorado and New Mexico indicate that concentration of total uranium is commonly about one milligram per liter in groundwater at the mill tailings, and is in the magnitude of 0.1 milligram per liter approximately one mile down-gradient from the tailings. If perched groundwater drains into the Canyon Mine shaft after reclamation operations, concentrations of radioactive minerals in the mine drainage are anticipated to be small.

The following extremely conservative conditions were assumed to provide a estimate for maximum impacts from water drainage to the mine shaft, if perched groundwater is encountered at the mine site:

- All of the groundwater recharge to the Redwall-Muav aquifer over 160 acres of land surrounding the area of mine operations (17.4 acres), drains to the mine shaft;

- o Average groundwater recharge in the mine site area is 0.3 inch per year (Metzger, 1961);
- o Concentration of total uranium in water seeping downward from the mine is 3.5 milligrams per liter, which is 100 times the Arizona Department of Health Services recommended drinking water standard of 0.035 milligrams per liter, and more than three times the concentration detected in groundwater at uranium mine tailings studies in Colorado and New Mexico;
- o Decrease in concentrations of radioactive minerals in groundwater with distance from the shaft, via chemical precipitation and hydrodynamic dispersion, is neglected.

The effect of these conservative assumptions is to overestimate the quantity of drainage of perched groundwater to the mine shaft, to overestimate concentrations of radioactive minerals in groundwater seepage in the mine shaft, and to overestimate concentrations of radioactive minerals in mine shaft seepage at large distances from the mine shaft.

Under these assumptions, calculated long-term drainage to the mine shaft would occur at the rate of 2.5 gallons per minute. This hypothetical estimate of maximum drainage is equivalent to about 0.008 percent of the discharge from Havasu Spring, 0.8 percent of the discharge from Indian Gardens Spring, and 0.003 percent of the discharge from Blue Spring. Using the conservative assumptions noted above, the resulting concentration of total uranium at each of these springs, including background concentrations measured for each spring, would be less than the recommended drinking water limit of 0.035 milligrams per liter. The hypothetical maximum increase in concentration of total uranium in groundwater discharge at Havasu and Blue Springs would be less than 10 percent of the standard deviation reported for laboratory measurements for the May and December 1985 sampling rounds and, therefore, would not be discernible.

If perched groundwater drains into the mine shaft after reclamation operations, it may leach some of the residual native radioactive minerals and seep downward. If downward seepage occurs, the path of the mineralized water would roughly resemble the shape of an inverted cone distorted by lateral flow at perching layers and by concentration of flow along fractures. The mine shaft would be at the apex of the cone. Therefore, the area over which the mineralized water would encounter groundwater in the Redwall-Muav aquifer would be larger than the area near the bottom of the mine shaft. Because the proposed monitor well will also serve as a water supply well, a radially inward groundwater gradient will be created around the well by pumping operations, if groundwater

is present. Therefore, the monitor well will continually capture groundwater at the site during mining operations and will serve as a down or inward gradient monitoring system.

With implementation of planned mitigation measures to seal the mine after mining operations are completed, the possibility for significant deterioration of water quality at any discharge is very small. Any deterioration in the water quality of the Redwall-Muav aquifer will be detected by the monitoring program.

4.2.7.3 Soils

No radiological impacts are expected on the soil resource near the mine or along haul routes. A monitoring plan will be active throughout the life of the mine to detect dispersal of radioactive materials. These materials could be easily cleaned up and pose no health threat.

Implementation of any of the project alternatives will result in disturbance of the surface soil at the 17-acre mine site. This area will be rehabilitated after mining operations cease, and should be near premining productivity levels within 3-5 years after reclamation.

4.2.7.4 Cumulative impacts

As noted in Section 4.2.7.1, surface water control features at each mine site would be designed to prevent ore and waste stockpiles from contaminating surface waters, even in extreme storm events. Additional mines should create no cumulative impacts on surface water or groundwater quality. Impacts would be limited to the mine site. One additional mine in the Tusayan area would create the potential for impact on surface waters only if both mines were located in the same drainage system. If the surface water control features at both mines were simultaneously breached by a probable maximum flood, approximately 100 Ci of uranium and decay products (progeny) might be released. Such a release would result in a gross alpha concentration and an Ra-226 concentration much greater than EPA drinking water standards. However, the concentrations would dissipate rapidly and any remaining radioactivity in the soil would be cleaned up by the mine operators immediately following the discharge.

Three additional mines in Coconino County south of the Grand Canyon would not increase the impact which may result from a release of radioactivity into the surface waters, but may increase the risk that such an accident could occur.

Potential radiological impacts on groundwater would be localized near the mine site. Mitigation measures, including wells or pumping from the mine shaft, would be taken to insure no increase in groundwater radioactivity at any site.

4.2.8 IC #10 Impacts on Indian Religious Concerns

(1) Alternative 1

Implementation of the No Action Alternative would create no additional impacts on the religious sites or practices of American Indians. Indian concerns about potential impacts on unidentified sacred sites, sacred springs and hunting and gathering, and conflicts with traditional beliefs would be alleviated for the Canyon Mine proposal, but not for other activities in the region.

(2) Alternatives 2-5

Construction and operation of the Canyon Mine will have no impact on Indian lands in northern Arizona. Traffic on U.S. Highway 89 across the Navajo Reservation will increase by approximately 20 ore truck trips per day, but given existing traffic levels, that increase is insignificant. (See Table 2.11.)

The Hopi and Havasupai Tribes have expressed concern about possible water quality impacts at Blue Spring and Havasu Springs. (See Section 4.2.7.) Both springs discharge from the Redwall-Muav aquifer which is located below the mine site. The aquifer is well below mine shaft depth and no impacts are expected. In addition, movement of subsurface water to and in the Redwall-Muav aquifer and toward the springs is extremely slow and significant dilution over time and distance is anticipated. Finally, Alternatives 3-5 include a groundwater quality monitoring well which is expected to identify any contamination and allow mitigation, thus preventing any threat to either Blue Spring or Havasu Spring. (See Section 4.2.7.)

After communications and consultation with Hopi and Havasupai Tribal leaders and experts on Indian religious sites and practices as well as an archeological investigation of the mine

site, no specific Indian sacred or religious sites have been identified near the mine site. The Tribes maintain that Indian religious interests will be adversely affected but have not identified specific sites which are threatened. In addition, a review by an expert in Indian religious sites and practices has failed to identify sites that would be affected by the proposed action. Consultation with tribal leaders will continue.

Certain sites and areas with religious significance have been identified and evaluated. (See Section 3.1.11.) The area near Tusayan has been historically used by the Hopi to gather turkey feathers and sacred herbs for religious and ceremonial purposes. The loss of the mine site and the additional traffic and activity in the area will reduce the area available for these practices but should not impose a significant burden on these occasional uses and will not prevent the Hopi from continuing these practices on National Forest lands. Mine development will not affect Indian access to the area nor materially restrict the present level of religious activities. The mine site is only one small part of a large area available for Indian religious activities, and development of the mine will not burden traditional Indian religious beliefs.

Some areas near the haul routes are also used for gathering purposes, including the Little Colorado River near the bridge on U.S. Highway 89. These areas are used for gathering golden eagles and feathers to be used in religious ceremonies. The additional truck traffic along these well-traveled highways would not impair Indian access to the area or affect the current level of religious activity. Arizona Highway Department figures show an average daily traffic count of 7600 and 3100 vehicles along U.S. 89 and U.S. 160, respectively. An additional 20 trucks/day would be virtually unnoticed.

Other sites have been identified in the area including Blue Springs and the Sipapu and Salt Trails. (See Section 3.1.11.) These areas will not be affected by mine operations or ore transport.

Finally, in comments regarding other proposed actions on the Kaibab National Forest, the Hopi Tribe has expressed a belief that the earth is sacred and that it should not be subjected to digging, tearing or commercial exploitation. While this conflict has not been raised directly in relation to the Canyon Mine, it is acknowledged that commercial use of the Forest within the area of Hopi ancestral occupancy is inconsistent with these stated religious beliefs.

Cumulative Impacts

Indian religious sites and practices are sensitive to increased mineral and industrial activity and thus may be adversely affected by additional mines or other activities that intrude upon land utilized by the Indians. The precise impacts of additional mines, if any, can only be determined on a site specific basis following consultation with the affected Tribes. Tribal leaders must be consulted and included in the decision making process for any proposed mine. Sites of religious significance to the Indians must be identified and avoided or mitigated. However, the Forest Service is not required to protect Tribal religious practices to the exclusion of all other land uses.

Because of the nature of Indian beliefs and the religious importance of all lands of Hopi ancestral occupancy in northern Arizona any mining activity or ore transport is expected to conflict with stated traditional beliefs that the earth is sacred and not to be developed and is believed by the Hopi to diminish the availability of the land for sacred and religious purposes. This is true of the hunting and gathering activities of the Hopi in the Tusayan area. While each additional mine will only marginally affect these occasional religious uses, the loss of any land is considered significant by the Hopi and each new activity impacts the general environmental setting of such areas and detracts from their religious significance.

CHAPTER 5

LIST OF PREPARERS

CONSULTANTS

The following individuals had a major direct role during the past year in the collecting of background data and evaluations which formed a basis for the preparation of the Environmental Impact Statement on the Canyon Uranium Mining Proposal.

Charles F. Leaf - Consulting Hydrologist. Dr. Leaf is a registered Professional Engineer in Colorado, Montana and New Mexico. He is a private consultant with 20 years of experience that includes working for USGS, USFS, and as a consulting meteorologist in private practice. His expertise includes such fields as: streamflow forecasting, avalanche hazard evaluation, design and construction of surface water management and control systems, and snowpack management. Dr. Leaf has authored more than 40 technical publications and hydrologic impact analyses. He was awarded a PhD in 1969 from Colorado State University.

John W. McKlveen - Consulting Radiological Engineer. Dr. McKlveen is Professor of Engineering and Radiation Protection Officer at Arizona State University. He is in charge of the Radiation Research Laboratory, which he created. He teaches nuclear engineering and health physics. He has 15 years of research and teaching experience. Dr. McKlveen has authored more than 55 technical publications and one book. He was awarded a PhD from the University of Virginia in 1973.

Errol L. Montgomery - Consulting Hydrogeologist. Dr. Montgomery heads his own consulting firm, Errol L. Montgomery and Associates, Inc. He has 20 years experience in groundwater geology including the design and construction of water wells. As Assistant Professor of Geology at NAU for seven years, he taught classes in hydrogeology, applied geophysics and engineering geology. Dr. Montgomery has authored more than 16 technical publications. He was awarded a PhD in 1971 from the University of Arizona.

Barry L. Stewart - Consulting Atmospheric Scientist. Mr. Stewart is senior atmospheric scientist with the consulting firm of EnecoTech. He has 13 years of experience in air quality and meteorological monitoring, modeling and permitting studies, and EA and EIS support. Mr. Stewart has managed

and/or participated in more than 50 air quality and meteorological studies for industry and government. He holds an MS in meteorology from Texas A&M University.

INTERDISCIPLINARY TEAM MEMBERS

The following people shared the responsibility for bringing the data together and writing the EIS:

Daniel W. Baertlein - Civil Engineer. Mr. Baertlein has been employed by the Forest Service for 25 years. He has 16 years experience on the Kaibab NF in staff work related to operations in the engineering section. He holds a Bachelor of Science Degree in Civil Engineering. Mr. Baertlein's major responsibility was in the engineering costs and feasibility aspects, but he also worked on the outline and overall content of the document.

Thomas R. Cartledge - Archeologist. Dr. Cartledge has been employed by the Forest Service for 10 years. He has 9 years experience on the Kaibab NF in staff work related to archaeology. He holds a Doctor of Philosophy Degree in Archeology. Dr. Cartledge's major responsibility was related to surveys to determine historic occupation of the site.

Thomas F. Gillett - Assistant Recreation and Lands Staff. Mr. Gillett has been employed by the Forest Service for 11 years. He has 7 years experience on the Kaibab NF in staff work related to recreation planning and development. He holds a Bachelor of Science Degree in Forest Management from Northern Arizona University. Mr. Gillett worked on the outline and overall content of the document.

R. Dennis Lund - Recreation, Lands and Minerals Staff. Mr. Lund has been employed by the Forest Service for 23 years. He has 9 years experience on the Kaibab NF in staff work related to recreation, land ownership and minerals planning and development. He holds a Bachelor of Science Degree in Forestry from the University of California at Berkeley. Mr. Lund had major responsibility for the overall prepaparation of the EIS. He served as leader of the Interdisciplinary Team.

Katherine A. Peckham - Wildlife Biologist. Ms. Peckham has been employed by the Forest Service for 6 years. She has 5-1/2 years experience on the Kaibab NF, Williams and Tusayan Ranger Districts, in staff work relating to wildlife management. She holds a Bachelor of Science Degree in Wildlife Management. Ms. Peckham was responsible for coordinating all wildlife input to the EIS.

Jesse R. Thompson - Consulting Hydrologist. Mr. Thompson had been employed by the Forest Service for 25 years when he retired in 1982. He has 21 years experience in research and one year of experience on the Kaibab NF in staff work related to Hydrology. He holds a Bachelor of Science in Watershed Management from CSU. Mr. Thompson's major responsibility was in assembling and editing the overall document starting with input from Interdisciplinary Team members and consultants. He has authored 20 technical publications.

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Andy Lincoff - Environmental Protection Agency, San Francisco.

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Ralph M. Stout - Tusayan District Recreation and Lands Staff, Kaibab National Forest.

Chris A. Ortega - Civil Engineer, Kaibab National Forest.

CHAPTER 6

CIRCULATION OF THE EIS

The following lists include the agencies, organizations and individuals who responded to the "Notice of Intent to Publish an EIS," the Scoping Letter, or have otherwise expressed an interest in receiving the document.

Copies of the Appendices were sent to all Forest offices, libraries, organizations, State Agencies, Native American groups, news media and elected officials on the following lists.

1. Federal Agencies

1) U.S. Forest Service, Washington Office
2) Kaibab National Forest
3) Chalender RD
4) Williams RD
5) Tusayan RD
6) North Kaibab RD
7) Coconino National Forest
8) Beaver Creek RD
9) Long Valley RD
10) Sedona RD
11) Blue Ridge RD
12) Mormon Lake RD
13) Elden RD
14) Flagstaff RD
15) Tonto National Forest
16) Mesa RD
17) Cave Creek RD
18) Globe RD
19) Payson RD
20) Pleasant Valley RD
21) Tonto Basin RD
22) Coronado National Forest
23) Santa Catalina RD
24) Douglas RD
25) Nogales Rd
26) Sierra Vista RD
27) Safford RD
28) Apache-Sitgreaves National Forest
29) Alpine RD
30) Springerville RD
31) Heber RD
32) Clifton
33) Chevelon RD
34) Lakeside RD
35) Prescott National Forest
36) Chino Valley RD
37) Bradshaw RD
38) Verde RD

39) U.S. Bureau of Land Management
40) Arizona Strip District Office
41) U.S. Bureau of Indian Affairs
42) U.S. Department of Interior
43) U.S. Department of Commerce
45) U.S. Environmental Protection Agency
46) U.S. Fish and Wildlife Service
47) U.S. Mine Safety and Health Admin
48) USPHS Indian Health Center
49) U.S. Park Service, Grand Canyon National Park
50) U. of A. College of Business
51) Colo. State University

2. State and Local Agencies

1) Arizona Game and Fish Department
2) Arizona State Clearinghouse
3) Arizona Outdoor Recreation Coordinating Commission
4) Arizona Department of Transportation
5) Arizona State Land Department
6) Arizona Dept. of Revenue
7) Arizona Public Service, EA
8) Arizona State Environmental Planning
9) Arizona State Parks
10) Arizona Dept. of Water Resources
11) Arizona State Mine Inspector
12) Arizona Dept. of Health Services
13) City of Williams
14) Northern Arizona Council of Governments
15) Salt River Project
16) Coconino County Building Inspector
17) Coconino County Board of Supervisors
18) Coconino County Health Inspector

3. Native Americans

1) Hopi Tribal Council
2) Hualapai Tribal Council
3) Navajo Tribal Council
4) Havasupai Tribal Council
5) Havasupai Tribal Planners Office
6) Hopi Office Natural Resources
7) Navajo Tribe Div. of Resources

4. News Media

1) Arizona Daily Star
2) Arizona Daily Sun
3) Arizona Republic
4) Williams News
5) Holbrook Tribune-News
6) Indian Arizona News
7) Lake Havasu City Herald
8) Lake Powell Chronicle
9) Prescott Courier
10) Phoenix Gazzett

11) KTVK - TV 3
12) Red Rock News
13) Mesa Tribune
14) Southern Utah News
15) Paydirt

5. Elected Officials

1) Governor Bruce Babbitt
2) U.S. Senator Dennis DeConcini
3) U.S. Senator Barry Goldwater
4) Congressman John McCain
5) Congressman Eldon Rudd
6) Congressman Bob Stump
7) Congressman Morris K. Udall
8) Congressman Jim Kolbe
9) State Senator Tony Gabaldon
10) State Representative John Wettaw
11) State Representative Sam McConnell
12) County Supervisor Dennis Wells
13) County Manager Kathy Eden

6. Mining Companies

1) Energy Fuels Nuclear, Inc.
2) Pathfinders Mine Corp.
3) Rocky Mountain Energy
4) Uranerz USA, Inc.
5) Western Nuclear, Inc.
6) Santa Fe Mining Co.

7. Organizations

1) Arizona Wildlife Federation
2) National Parks and Conservation Association
3) Sierra Club Plateau Group
4) Audubon Society
5) Williams Chamber of Commerce
6) Circle of Friends
7) Friends of the River
8) Coconino Sportsmen
9) Four Corners Wilderness Workshop
10) Nat. Parks & Consc. Assoc.
11) Southwest Resource Council
12) Arizona Wildlife Federation
13) The Wilderness Society
14) Nature Conservancy
15) Animal Defense Council
16) Garkane Power Assoc.

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CHAPTER 7

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CHAPTER 8

GLOSSARY

ALPHA PARTICLE - Alpha particles are the nuclei of helium atoms (two protons and two neutrons). They possess large amounts of kinetic energy, but may be stopped by nothing more than a sheet of paper. Because of the large amount of localized biological damage to the absorbing tissue, alpha particles are considered to be the greatest hazard when ingested or inhaled.

ANNUAL GEOMETRIC MEAN - The mean value of data points (n) collected over a year obtained by taking the nth root of the product of the data points.

ANTECEDENT MOISTURE CONDITIONS (AMC) - An index of the amount of soil moisture on a watershed just prior to a given rainfall event. Antecedent soil moisture has a significant effect on runoff volume. Three AMC conditions are defined as follows:

Condition I:	soils are relatively dry with little or no rainfall during the previous 5 days.
Condition II:	average soil moisture conditions.
Condition III:	soils are saturated due to significant rainfall during the previous 5 days.

BETA PARTICLES - High speed electrons which have been ejected from the nucleus of a radioactive atom.

BRECCIA PIPE - Cylindrical or conical collapse features in sedimentary rocks believed to be the result of the collapse of roof rocks over solution cavities in the Redwall limestone, creating a favorable environment for mineral deposition.

CALINE 3 - A computerized steady state Gaussian dispersion model which is used to assess concentrations of pollutants from roadway traffic sources.

CFS - Cubic feet per second. Example: 1 cfs of streamflow equals one cubic foot of water flowing past a given reference point every second.

COSMIC RADIATION - Radiation from space which interacts with the atmosphere to produce ionizing radiation. Cosmic radiation and the earth's natural radioactivity are the components of the natural background radiation environment.

CURIE - Unit of radio-activity which is equivalent to 37 billion decays (disintegrations) each second.

DRAINAGEWAY - Any route or course along which water flows or may flow.

FLOOD - Any relatively high water flow that overtops the natural artificial banks in any reach of a stream or drainageway.

FUGITIVE DUST - Particulates, usually soil, suspended in the air, that were not released through a stack, vent or chimney. Examples include wind erosion of exposed ground and particulates generated from traffic on unpaved roads.

GAMMA RADIATION - Waves or photons of energy emitted from the nucleus of an atom. X-rays are of lower energy and are emitted as atomic electrons transition from one orbit to another.

IONIZING RADIATION - Radiation with sufficient kinetic energy to release electrons which are normally bound to an atom or molecule. Examples of ionizing radiation include alpha, beta and gamma radiation.

ISC - Industrial Source Complex model. A steady state Gaussian dispersion computer model which can be used to assess pollutant concentrations from a wide variety of sources associated with an industrial facility and/or operation.

MANDATORY CLASS I AREA - Under PSD requirements, all National Parks over 6000 acres in size and all National Wilderness areas over 5000 acres existing as of August 1977, were mandatorily designated Class I areas - which have the most restrictive pollution increments for sulfur dioxide and particulates.

MeV - Million Electron Volts. A unit which describes the amount of kinetic energy possessed by ionizing radiation.

MICRO-ROENTGEN - One millionth of a Roentgen (uR).

MILLI-ROENTGEN - One thousandth of a Roentgen (mR).

NODE - A reference point along the stream channel referenced by distance upstream or downstream from the proposed Canyon Mine and by drainage area (see map, Figure 1). With respect to each Node, all upstream runoff from the respective watershed must pass the identified Node.

NON-IONIZING RADIATION - Waves or photons of energy which do not have sufficient energy to cause ionization of matter. Examples of non-ionizing radiation include ultrasound, radio-frequencies, microwaves, infrared and visible light.

PARTICULATE INCREMENT - Under PSD, the allowable increase of particulate concentrations in a designated area. For class I areas this increment is 5 ug/m3 expressed as a 24-hour average, and 1 ug/m3 as an annual average.

PARTICULATES - Any material, except water in uncombined form, that is or has been airborne, and exists as a liquid of solid at standard conditions.

PSD - Prevention of Significant Deterioration. A part of the Clean Air Act Amendments of 1977 (PL95-95) which established limits to the increases of particulate and sulfur dioxide concentrations which would be allowed into areas where the air quality was cleaner than the national ambient air quality standards. The intent was to prevent further air quality degradation of these clean areas.

RADIATION - Radiation is energy traveling in the form of waves, particles or bundles of energy called photons. Radiation may be classified as ionizing or non-ionizing.

RADIOACTIVITY - The natural and spontaneous process by which the unstable atoms of an element emit or radiate the excess energy of their nuclei as particles or photons and change (or decay) to atoms of a different element or to a lower energy form of the original element.

RADON PROGENY - Daughter products from the decay of radon gas which are also radioactive.

RECURRENCE INTERVAL - The average length of time in years between events of a given magnitude. This is not to say that having experienced a 100-year flood, another flood of an equal magnitude will not occur again for 100 years.

ROENTGEN - A unit of radiation exposure. Other units of exposure and dose are rad and rem. Each has a specific application and use. For simplification the terms are often considered synonymous.

TSP - Total Suspended Particulates or all particles suspended in the air.

ug/m_3 - Micrograms (10^{-6} grams) per cubic meter.

WORKING LEVEL - A standard measure of radon daughter concentration in air. It is an expression of potential alpha energy. One "working level" (WL) is any combination of radon daughters per liter of air that will result in the emission of 130,000 MeV of alpha energy in their decay through Po-214 (a radon progeny).

WORKING LEVEL MONTH - A standard measurement of cumulative exposure. A "working level month" (WLM) is an exposure equivalent to working in an atmosphere containing one WL of radon progeny for 173 hours (sometimes rounded to 170 hours).

CHAPTER 9

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APPENDIX G

PUBLIC COMMENT AND FOREST SERVICE RESPONSE

The Forest Service received 238 letters in response to the Draft Environmental Impact Statement (DEIS) on the proposed Canyon Uranium Mine (a complete list of respondents follows this discussion). These came from a cross-section of local and out-of-state residents, city and county government, public officials, state and federal agencies, private organizations and other groups and institutions. One hundred and fifty of these responses were supportive of the mining development, with an additional 15 asking for further clarification with a more or less neutral comment. Seventy-four letters, including some with multiple signatures, were opposed to all of the mining alternatives, preferring the No Action Alternative.

All unique letters are printed here, together with the Forest Service response. Similarly, examples of all identical letters are reprinted together with the Forest Service response. Many responses are identical and are therefore not repeated. Instead, the reader is referred to the appropriate Forest Service response for comments that received that response.

The major concerns expressed in these letters fell mainly into the following broad categories:

1. Proximity of the proposed mine to Grand Canyon National Park, including the perception that the mine was located within the boundaries of the Park.
2. Cumulative impacts of several uranium mines.
3. Potential for groundwater contamination.
4. The "valuable mineral" test under the 1872 mining law.
5. Radioactive dust exposure along haul routes.
6. Potential human health effects.
7. Effects on wildlife and wildlife habitat.

8. Heavy truck traffic (disrupting Park visitors, hazard to road-side residents, spill clean-up, etc).

9. Opposition to the proposed mine because of social issues and controversy associated with the use of uranium.

The EIS has been revised to reflect the comments received on the DEIS. Important changes include:

1. Addition of Indian religious concerns as an issue and concern.

The potential impact of the Canyon Mine on Indian religious sites and practices was considered in the DEIS in conjunction with a general analysis of impacts on American Indians. Comments on the DEIS by the Hopi and Havasupai Tribes alleged that religious sites and practices would be adversely affected by the Canyon Mine, a concern which was not raised by the Tribes during scoping or earlier consultation with the Tribes. Based on those comments and continuing consultation with the affected Tribes, the Forest Service has added Indian religious concerns to the list of issues evaluated in detail by the EIS. The text of the FEIS includes an expanded discussion of Indian religious sites and practices in the affected area. The Forest Service has also requested a meeting with tribal representatives at the proposed mine site to identify any specific sacred sites that might be disturbed by mining activity. To date, neither Tribe has committed to a visit to the mine site. Consultation with the Tribes regarding religious concerns will continue beyond completion of the NEPA process.

2. Expanded discussion of potential groundwater impacts.

Several comments expressed concern about potential depletion or contamination of groundwater resources in the area, including potential impacts on seeps and springs which flow from underground aquifers. The DEIS evaluated the impacts on surface and subsurface water as a major issue and concern. The DEIS concluded that adverse impacts either during or after mining operations were extremely unlikely. In response to public comments, the FEIS includes an expanded discussion and analysis of groundwater conditions and potential impacts. The additional analysis confirms the conclusion of the DEIS that no adverse impacts are expected. The Preferred Alternative includes a monitoring well at the mine site. If groundwater is present at the site, the well will disclose any unanticipated changes in water quality resulting from mine operations.

LIST OF RESPONDENTS

* These letters were not printed. They are identical to letters which were printed with responses.

SIERRA CLUB

Grand Canyon Chapter · Arizona

Route 4 Box 886

Flagstaff, Arizona 86001

June 2, 1986

Supervisor Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

The Grand Canyon Chapter of the Sierra Club would like to submit these comments to the Canyon Mine DEIS.

Cumulative Effects

1-1 The DEIS fails to fully consider the cumulative impacts of the proposed Canyon Uranium Mine and foreseeable future mining operations. Although no uranium mines currently exist in the area, extensive exploration is underway and as the DEIS readily admits, it is "reasonably foreseeable" that additional mines will be located in the area. The Council on Environmental Quality (CEA) regulations require that actions having cumulatively significant impacts shall be discussed in the same impact statement. 40 C.F.R. 1508.25(a)(2). Cumulative impacts are defined as incremental impacts of "past, present, and reasonably foreseeable" actions. 40 C.F.R. 1508.7. To comply with these regulations, the EIS must fully consider the cumulative impact of the proposed and other contemplated actions on the environmental and economic resources of the area.

1-2 The cumulative analysis of the DEIS should more fully develop potential impacts on a wide range of environmental values. The Kaibab National Forest and Grand Canyon National Park are major recreational attractions and numerous mines in the area could have enormous impact on their recreational character. These effects include reduced opportunity for solitude, disruption of the visual environment, and increased accessibility and traffic to previously remote areas. The DEIS fails to adequately consider these and other cumulative impacts, and the effect on recreation and other resource values.

1-3 The DEIS further fails to examine the cumulative impact of high level use along the haul corridors. The proposed hypothetical of three additional mines in the area could result in traffic of up to 80 ore trucks per day. Cumulatively, this traffic is highly significant and must be explored in the EIS. The DEIS

1-4 also fails to adequately discuss the potentially significant effects of foreseeable operations on subsurface aquifers and the subsequent contamination of Havasu Springs and Blue Spring. We are not familiar enough with the mining procedures and local geology to articulate specific arguments, but it seems the cumulative risks would be substantial. The DEIS gives no detailed analysis of these risks.

Mining Operations May Be More Appropriately Considered in a Regional Programmatic Planning Document.

1-5 The Forest Service should consider incorporating the Canyon Mine DEIS into a planning document for uranium mining operations on the entire Coconino Plateau and Arizona Strip. Typically, when various proposed federal actions will have cumulative or synergistic environmental impacts within a region, these consequences must be considered together in a regional environmental impact statement. No comprehensive federal plan for uranium development exists in this region. However, numerous mines are currently operating and others will likely be developed. Existing sites are at Kanab North, Pigeon, and Hacks Canyon on the Arizona Strip. Other proposed sites are Pinenut and the Canyon Mine, as well as thousands of mining claims filed in the Tusayan area. The inadequacy of individual planning documents for each of these sites is further complicated by the fact that the affected lands are administered by different agencies. Forest Service, BLM, and National Park Service lands are all significantly affected by uranium development in the region.

Range of Alternatives Considered

NEPA requires the federal agency to consider alternatives to the proposed action which would either reduce the environmental damage, or make the action unnecessary. The CEQ regulations further provide that "[t]he primary purpose of an environmental impact statement is to . . . inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the environment." 40 C.F.R. 1502.1 (emphasis added). The DEIS fails to fulfill these requirements. Not only is the range of alternatives inadequate but the no-action alternative is insufficiently analyzed.

1-6 To properly evaluate the environmental impact of the proposed Canyon Mine, a wide range of alternatives must be considered. Although the DEIS offers numerous alternatives in haul routes and mitigating factors, it fails to consider the obvious alternative of selecting a different mine site. Failure to discuss such critical alternatives is not in compliance with the "full disclosure" impact statement required by NEPA. California v. Block, 690 F.2d 753 (9th Cir. 1982); Natural Resources Defense Council, Inc. v. Grant, 355 F.Supp. 280 (E.D.N.C. 1973). Undoubtedly, other potential mine sites exist which would result in significantly lower impact on resource values of the Grand Canyon area. Reasons for not selecting these alternatives must be clearly identified.

1-7 The DEIS also fails to adequately consider the no-action alternative. Instead, the DEIS recognizes that the proposed plan of operations could be denied, but summarily rejects this alternative. The statement should more fully explore

SIERRA CLUB

Grand Canyon Chapter · Arizona

this possibility. The statement asserts that general mining law precludes the Forest Service from approving a "reasonable operating plan." However, it fails to support or analyze this statement. The right to enter upon the lands proposed in the Canyon Mine project depends upon the authority of the 1872 Mining Act. The Act opens to exploration and occupation only those lands on which "valuable mineral deposits" exist. For a mineral deposit to be considered valuable it must meet the marketability test of United States v. Coleman, 390 U.S. 599, 20 L.Ed.2d 170 (1968). This test requires the mineral deposit be capable of extraction, removal, and marketing at a profit. United States v. Winegar, 4 ELR 20005 (1974). Additional costs of mitigation and reclamation measures necessary to protect the resource values must also be considered. In the unstable uranium market it is not clear that the Canyon Mine site is a "valuable mineral deposit." Thus, the DEIS must more fully explore this opportunity to accept the no-action alternative.

1-8

Greater Detail is Required in the Discussion of Alternatives.

1-9

Although the DEIS examines various alternatives, it fails to adequately address potential environmental consequences of all these acitons. Certainly there exists very real hazards of ground and surface water contamination, radon gas emissions, and radiation from ore, both on site and during transportation. The statement cites a few studies and concludes the risks are insignificant.

Consideration of "Worse-Case" Scenario.

1-10

For several years, NEPA regs have required the agency to prepare a worse case analysis when data is missing or unknown and there is a chance of a significant adverse effect. New, revised regs require an agency to disclose the fact that information is missing or incomplete when there is a reasonably foreseeable significant adverse impact, and to obtain that info if the cost is not high. If the cost is high or the means to obtain missing info are not known, the agency must (1) disclose that the info is missing, (2) explain its relevance, (3) summarize the existing relevant evidence, and (4) evaluate the impacts based on what is known. There is no more worst-case analysis requirement.

Thank you for this opportunity to comment on the Canyon Mine DEIS.

Sincerely,

Sharon Galbreath

Sharon Galbreath
Chairperson
Grand Canyon Chapter
Rt. 4, Box 886
Flagstaff, Az. 86001

10

Forest Service Response

1-1

Although no other mines have been proposed in Coconino County south of the Grand Canyon, the EIS assumes that additional mines are possible and considers potential cumulative impacts of two mine development scenarios: one additional mine in the Tusayan area and three additional mines in Coconino County south of the Grand Canyon. Projected cumulative impacts of these scenarios may be found throughout Chapter 4. Minor changes in the text have been made to reflect comments and refinements in data or analysis. (See also response 78-2.)

1-2

The scoping process did not identify recreation (outside of Grand Canyon National Park) as a major issue or concern, thus impacts on recreational uses of the Forest were not analyzed in detail. The area of the Forest near the mine site and haul route alternatives is not heavily used for recreational purposes. However, the text has been revised to reflect the impacts suggested by this comment.

1-3

The cumulative impact of several mines on issues and concerns related to haul routes is discussed in the EIS. (See e.g., Section 4.2.5, Air Quality and Section 4.2.3, Wildlife.) In the absence of specific locations for subsequent mines, it is not possible to determine which portions of which haul route alternatives might see increased use. We believe that no further analysis is required. We acknowledge that 80 trucks per day over a route not presently traveled would have proportionately greater impacts than those noted in the EIS. However, the preferred haul route alternative utilizes existing roads largely outside the Forest. This alternative allows reconsideration of cumulative impacts at a later date when another mine proposal, if any, is made. Subsequent environmental analyses of proposed ore transportation can consider consolidating ore haul routes to minimize environmental impacts and transport costs.

1-4

Cumulative impacts on subsurface water resources are not expected for two reasons. First, the mitigation measures discussed in Section 2.5.11 are designed to identify and mitigate any subsurface contamination. It is assumed that similar, equally effective mitigation measures would apply to any additional mines. Second, the area of discernible

subsurface impacts is very localized. Only those perched aquifers present at the mine site, if any, may potentially be adversely impacted. Movement of subsurface water to and in the Redwall-Muav aquifer between mine sites (or toward springs) is extremely slow due to geologic conditions and significant dilution over time and distances is anticipated. Therefore, reasonably foreseeable cumulative impacts of up to three mines on subsurface water resources, if any, are expected to be negligible. That conclusion is stated in the EIS. (See also responses 61-5 to 61-9.)

1-5

The option of preparing a regional EIS for uranium mining was considered and rejected in the decision to prepare this EIS. The number of firm mining proposals and the interrelationship of impacts between mines does not presently support such an elaborate analysis. (See responses 2-3 and 78-2.)

The Canyon Mine EIS provides a basis for addressing the impacts, both site specific and cumulative, of future mining proposals and the preferred alternative allows for maximum flexibility in regional transportation planning.

1-6

The alternative of a different mine site was considered and rejected. No reasonable alternative mine site was identified in scoping or in consultation with the applicant. (See responses 61-12 and 78-2 and Section 2.3.)

The U.S. mining laws allow for the exploration and development of mineral resources. The Forest Service cannot prohibit the development of a confirmed mineral deposit that meets the requirements of these laws. Samples taken from the Canyon deposit during exploration support a reasonable belief on the part of EFN that the mine can be profitably developed. Thus, even though the alternative of a different mine site was considered, implementing such a decision is not presently within the legal authority of the Forest Service.

The primary responsibility of the Forest Service is to review, and where necessary, modify proposed plans of operations for the development of a mine. Review and modification of plans ensures that the mining operations will be conducted in a manner which minimizes or prevents, mitigates and repairs adverse environmental impacts. The EIS concludes that impacts from the Canyon Mine can be mitigated to avoid significant impacts.

1-7

The discussion in the EIS has been expanded to reflect this comment. The EIS also recognizes the rights of a mining claimant and some limitations on Forest Service discretion when reviewing a Plan of Operations.

1-8

The Forest Service does not generally conduct mineral examinations in conjunction with NEPA review for an approval of a plan of operations on Forest lands. The Forest Service is satisfied, based upon drilling data presented to it and EFN's success with comparable deposits north of the Grand Canyon, that EFN is proceeding in good faith to continue to explore and develop its claims and that it reasonably believes that it can develop a successful mine.

The No Action Alternative is considered in the EIS. Further efforts to investigate the economics of the mine would not result in a different analysis of the comparative environmental impacts of implementing that alternative.

1-9

This comment fails to specify any areas where the discussion of potential impacts is inadequate. The Forest Service believes that the EIS thoroughly analyzes potential impacts in detail relative to their significance and that the analysis and studies cited by the EIS, including those published in the Appendices, are valid and thoroughly documented.

1-10

This comment does not suggest any area of the EIS where either version of the CEQ regulation is applicable. (See response 61-12.)

Sierra Club

Plateau Group • P.O. Box 3189 • Flagstaff, AZ 86003

Comments on the Draft EIS for the Canyon Uranium Mine

June 1, 1986

DEIS Too Limited in Perspective

2-1 As I sit down to write my comments on this project, I'm reminded of the old fable about a group of blind men trying to describe an elephant. For the same reason that their limited ability to inspect all of such a large beast at once made it difficult for them to give an accurate description of the elephant, I feel unable to comment accurately on the environmental impacts of this mine. There's a lot more at stake here than this DEIS would have us believe. It is common knowledge that thousands of other claims have been filed on the Kaibab National Forest south of the Grand Canyon and tens of thousands more just north of the it. That there will almost assuredly be many other mines just like the one addressed in this DEIS soon to follow seems certain. With that in mind, as we look at this study with our perspective limited by blinders thrust upon us in the form of restrictions that require us to address this one project alone, it is difficult to remain silent about the rumble of an impending stampede that echoes all to clearly through the remote lands that surround the Grand Canyon and its National Park.

Development Pressure Mounting

2-2 Even as we continue the study of this mine, applications have been filed with the Arizona State Land Department for two more mines in the same drainage, that of Cataract Canyon or as it is more popularly known Havasu Canyon. Also an EA has just been approved for the Pine Nut mine on the North Rim of the Grand Canyon just 3.6 miles from the National Park boundary which will bring to four the number of mines opened in that region since 1980. Still there are tens of thousands of other claims pending in the area that have been filed over that same time span. Rumors continue regularly about new plans of operations in any number of different locations. As a matter of fact, one plan was filed for a site as close as 200 yards to the Canyon's rim which at that point serves as the Park boundary. It was later withdrawn under pressure from GCNP. Clearly this is not a matter of a few isolated, insignificant projects.

Area Wide EIS Needed

2-3 With that in mind, I would like to call once again for an area wide environmental impact statement, a study that would address the full scope of impending uranium developments on the lands adjacent to Grand Canyon National Park. The situation calls for such a study not only due to fact that these developments will most assuredly have an effect on the Park itself but also due to the unique character of the lands immediately involved. These lands are remote, extensive and for the most part rarely visited. As such they are a valuable part of a resource that is quickly diminishing within our nation's borders, a resource that serves as a valuable reminder of our rich natural heritage and an irreplacable connection to it.

Previous requests for such a study have been met with the objection, mostly offered by the mining company involved Energy Fuels Nuclear, that until the plans have been finalized there is no way of knowing where future mines will be located. Without that information we are told any study would be useless. However, we do know where many of the other resources of the area are located; ones that would, after all, be of the most interest to their owners, the American people. The most valuable result that could come from this study would be a deliniation of those resources (wildlife, archaeological sites, groundwater aquifers, etc.) where known and a discovery(inventory) of them where previously they were unknown. Beyond that, scenarios could be developed that would insure the maximum protection of those resources in light of what mining activity could be most accurately projected. If the study were conducted in the manner just described and the alternative actions it proposed developed similarly there would be less need for an absolutely accurate predetermination of all future mine sites.

1872 Mining Law

2-4 The situation as it exists sounds dangerous and the remedies sound complex, but it wouldn't have been created at all if it weren't for an old legal relic that is long overdue for retirement. Along with a lot of other old ideas that have outlived their usefulness, if it ever had any, the General Mining Law of 1872 should be spending the latter half of the twentieth century in a wax museum beside the slaughterers of the buffalo instead of creating problems for the flagship of our National Park system.

No Guarantees

2-5 The Canyon Mine according to this DEIS, would have no environmental impacts that could not be mitigated. That's what we are told even though it is obvious that not all probable impacts have even been acknowleged. But let's assume for a moment that such is really the case, that the effects could be mitigated. What guarantee do we have that they will be?

Just a few days before I wrote this report, an Energy Fuel's truck hauling uranium ore to the company's Blanding, Utah mill overturned and spilled some of its payload. The truck's operators tried to cover up the spill by throwing sand over it. Yet the DEIS tells us that "EFN will take immediate, aggressive action to: 1. notify Arizona or Utah Department of Transportation, and 2. clean up any spilled material."(P. 2.18) Will they pursue all other mitigation measures as "aggressively and effectively" as this?

Cultural Resources

2-6 With regard to cultural resources, a very narrow view is taken in this document. However, it has been observed by GCNP Superintendent Richard Marks in his comments on the North Rim Pine Nut Mine that increased mining associated activity in that area has resulted in widespread looting of cultural sites. That problem is not addressed in this study nor is its mitigation.

The Wildlife Shuffle

2-7 We are told that destroyed wildlife habitat, specifically elk calving grounds, will be replaced. But what about the other habitat which will in turn be destroyed to make room for the elk? Is this a mitigation measure or the old shell game? Are we solving a problem or just shuffling it around? What happens when the next mine is proposed; where will you move the elk then? What other animals will you displace to do it?

Coveting Solitude from Radiation

2-8 With regard to the factor of radiation danger, the DEIS tells us that "For some people who fear radiation or covet solitude, the existence of a uranium mine may change their attitudes and beliefs about the area." (P. 4.5) A legal demonstration held by a coalition of environmental groups at Grand Canyon National Park in 1985 proved that there are more than just a few people who "fear radiation". What is the mitigation measure for the problems that could arise from this?

Haul Routes

2-9 The major difference between the alternatives presented is in the different routes that the ore would follow on its way to the Blanding mill. Alternatives 3, 4, and 5 contain the same provisions for monitoring and mitigating effects of the mine but each proposes a different haul route. Alternative 2 does not contain monitoring and mitigating procedures and is therefore unacceptable. The route that would have the least impact on the environment of the Kaibab National Forest would be Haul Rt # 5 included in Alternative# 4. Since all truck traffic would be directed over already

constructed roads almost all outside the forest's sensitive habitat, that is the route most appropriate. There would be less dust to find its way into GCNP and less wildlife would be disrupted. Also, there would be no new construction and very little reconstruction of roads in the forest having as a result a much smaller increase in incidental traffic and the disruptions it brings.

No Hot Roads

2-10 All road reconstruction and maintenance that does occur should be done without use of materials taken from the mine shaft. That would seem to be the only way to insure that no radioactive materials ended up being used as a road surface.

Old Growth

2-11 Perhaps I missed it but I didn't see any listing of road or powerline impacts on old growth habitat. Both activities should avoid any destruction of that already diminshed habitat type.

No Water Discharge

2-12 According to the Plan of Operations water may be discharged from the site "only in exceptional circumstances" and would be done so only in accordance with an NPDES permit issued for this mine. Considering that the overturning of the ore truck mentioned earlier in this report was probably an "exceptional circumstance" it would probably seem more prudent to require that no water be discharged from the site at all. NPDES standards are self monitored, we have only EFN's guarantee that they will be effectively observed. In this case that's not enough. All water that needs to be removed from the site should be transported to an appropriate low level radioactive waste facility and disposed of there.

Reclamation of the Site

2-13 Reclamation should be performed so that all materials extracted from the shaft and not hauled away should be backfilled into the shaft. Standards for reclamation should guarantee that the site be "substantially unnoticeable" after reclamation is complete. Other than that the reclamation plan for the site seems adequate as written given that sufficient monitoring is performed to assure that all measures are really completed.

Reclamation of Roads

2-14 One of the most lasting effects of this project as proposed will be a pronounced and long term increase in access to the eastern half of the Tusayan Ranger District. This will alter the character of that area

increasing management problems and stressing wildlife and other resources. Efforts should be made throughout the life of the Canyon Mine to keep those deleterious effects to a minimum. Several measures are already included in the plan which would achieve that end, i. e. using a van to transport workers to the site and utilizing haul route # 5 that would minimize changes to the Forest road system.

However, additional measures should be included in the reclamation plan to make sure that after the cessation of mining operations, the environment will be returned to conditions as they existed previous to those operations. This is especially important if another alternative besides # 4 is selected requiring more exensive road building and reconstruction.

All road improvements that result from the operation of the Canyon Mine should be reclaimed to the same "substantially unnoticeable" standards recommended herein for the mine site itself. Roads that are improved should be returned to their pre-mine status and new roads that are constructed should be reclaimed using the same procedures as described in the DEIS for the half mile of road between the Area of Operation and Forest Road 305-A.

Finis

In closing I would like to thank the Kaibab National Forest and Dennis Lund in paricular for being so responsive to community concerns regarding this development. Hopefully we will soon be cooperating on a more comprehensive document.

Respectfully submitted,

Dan Dagget

14

5

Forest Service Response

2-1

The question of cumulative impacts and a regional assessment of uranium mining is discussed in detail in responses 1-1 and 78-2.

2-2

The EIS projects cumulative impacts from additional mines and discusses those impacts in Chapter 4.

Discussions with EFN indicate that the applications filed with the state of Arizona are not proposals for "two more mines." The applications were for new uranium leases in anticipation of exploration rather than for new mines. The applications were filed by Energy Fuels Exploration Company, an exploration affiliate of EFN. The applications contemplate the proposed drilling of a maximum of 12 exploration holes on each of two proposed leases as part of a "first phase" exploration program. The Plans of Operations filed by Energy Fuels Exploration company are required by Arizona law prior to initiating exploration activities. EFN indicates that the two sites in question are just two of several dozen exploration prospects or targets in the area. Although promising as targets, based on available information, the two sites can not, according to EFN, presently be said to have any reasonable prospect of becoming mines in the near term. The characterization of the lease applications as "pending mining proposals" was not by EFN or its affiliates but rather by the Arizona State Land Department.

The Forest Service has not analyzed the state lease applications as specific additional mine sites for its cumulative impact analysis because EFN has advised the Forest Service that such sites are no more or less likely than other exploration targets or prospects being evaluated by EFN in the area and that it has no proposal for additional mines south of the Grand Canyon at this time.

2-3

The Forest Service land management planning process is the agency's primary source of inventory data.

Special resource values and uses that could be affected by exploration and mining have been identified in the proposed Forest Land Management Plan. Standards and guidelines in the proposed Plan specify restrictions and mineral withdrawals to protect these special resources. Thus, while it does not focus on uranium mining, the proposed Plan is, to some extent, comparable to an "area wide" EIS for the entire Kaibab National

Forest, which includes Forest lands both north and south of the Grand Canyon.

One of the reasons the Forest Service determined to prepare an EIS on the Canyon Mine was to obtain and refine additional baseline data on the potential effects of mineral development on wildlife, cultural resources, water quality, etc. We believe that the EIS serves this purpose and will improve the decision making process for any future mines. (See response 78-2.)

2-4

This comment is noted. Revision of the mining law is not within the authority of the Forest Service. (See Section 1.1.1.)

2-5

A. We believe that all probable impacts have been acknowledged and discussed.

B. Mitigation measures will be written into the approval of the Plan of Operations and other operating permits for the mine. Those measures can then be enforced by the Forest Service and/or appropriate state or federal agencies.

C. We have investigated the incident described in the comment. The ore spill did not result from the initial accident, but when the ore truck was being manipulated and returned to the road. The circumstances created confusion as to the occurrence of a "spill." However, after the initial confusion, the spill was immediately cleaned up and proper authorities were notified. According to our communication with EFN, their education and training programs have been reevaluated to assure that drivers under contract to EFN understand the procedures to be followed in the event of an accident or spill.

2-6

The EIS indicates that increased use of the area could result in disturbance of cultural sites. (See Section 4.1.11.) Additional use of the area, both by workers and recreational users, could result in looting or other damage to cultural sites. Looting has been perceived by some as a problem associated with mineral development north of the Grand Canyon. EFN has expressed a willingness to work with federal agencies and state authorities to develop an education and prevention program for mine employees.

2-7

The Preferred Alternative avoids the identified impacts on elk calving areas, thus most of the concerns expressed by this comment have been avoided.

Concerning the mine site, the wildlife evaluation (Appendix C, pp. 9 and 10) notes that the grassland opening provides a foraging area for elk, antelope, and deer and a hunting area for raptors. We believe that the loss of this area should be mitigated by the creation of another forage opening. The site for this new opening will be selected in consultation with State of Arizona wildlife officials to avoid areas with existing habitat values. Careful selection of the site for mitigation will avoid the "shuffle" suggested by your comment.

2-8

Changes in attitudes resulting from the fear of radiation cannot be fully mitigated. However, we believe that the extensive monitoring and mitigation measures included in the Preferred Alternative should relieve most fears of radioactive impacts from the Canyon Mine.

2-9

This comment has been considered in the selection of the Preferred Alternative.

2-10

The Plan of Operations will allow only barren rock to be used in the construction of roads or other mine structures.

2-11

The EIS projects no impacts on old growth habitat.

2-12

The Plan of Operations assumes that no water will be discharged from the site. However, the EIS notes the possibility of exceptional discharges and the requirements of the NPDES permit.

2-13

We believe that the reclamation plan accomplishes the objectives stated in your comment. The EIS states that the mine site will be returned to "as near a natural condition as possible." (See Section 2.5.2.)

2-14

Roads which are part of the mine site will be reclaimed to as "near a natural condition as possible." (See Appendix B, pp. 14-15.) However, other road improvements or new construction for ore transportation will not necessarily be removed. We believe that certain improvements in the Forest road system may serve other management needs. However, the Preferred Alternative eliminates this concern because only limited construction and improvements are required. No roads will be constructed into previously remote areas.

16

5/27/86

To the reader.
Dear sirs,

I'm late to study the findings the Forest Service has compiled concerning the environmental empact by the purposed Uranium Mining. But, am I not correct in stating that the issue is not about environment empact but rather money? We know the mining will have a bad effect on the environment, we just arent aware of how much. And will it be worth it? If there turns out to be a minimum of damage to the area, then it will be worth it, correct?

3-1

3-2

I encourage the forest service to make a broader survey of the mining empact on the area; that is covering more territory. I plead to your conscience and ethics, which I hope are still in you as individuals and as a group guarding the forests of the United States of America.

3-3

It's absurd for this type of evacuation to be going on so near a national monument the magnitude of the Grand Canyon.

3-4

over →

I do appeal to your conscience in my ignorance of the politics and information concerning this subject. For my closing remarks ~~let~~ I ~~will~~ quote from a passage of "The Revelation of John" taken from the New American Standard Version of the New Testament.

"And the nations were enraged, and Thy wrath came, and the time came for the dead to be judged, and the time to give their reward to Thy bond-servants the prophets and to the saints and to those who fear Thy name, the small and the great, and to destroy those who destroy the earth." Revelation 11:18

In ignorance and sincerity

Stephen Almquist

Forest Service Response

3-1

Money was one issue considered in Section 4.2.1 in order to estimate wages, capital investment, taxes, etc., derived from the mine, and thus enable a prediction of changes in employment, salaries and total gross outputs for Coconino County. Social and economic impacts are part of the overall factors to be assessed in any EIS but carry no more weight than other environmental considerations.

3-2

We do not agree that "mining will have a bad effect on the environment." As summarized on pages iii - vii of the EIS, adverse impacts are substantially minimized by the implementation of the mitigation measures specified in the Plan of Operations and other environmental stipulations specified as part of the Preferred Alternative.

3-3

The breadth of the "survey" and analysis was dictated by scoping and the extent of likely impacts. All potential impacts have been analyzed in the EIS, including haul routes, downstream runoff, the Grand Canyon National Park and Coconino County. (See also responses 1-5 and 78-2).

3-4

The proposed mine is approximately 13 air miles south of the Grand Canyon rim. The mine is expected to have no effect on the Grand Canyon and can not be seen or heard from the Park or from the highway leading to the Park. Nor do we expect any environmental impacts that can not be substantially mitigated by the measures included in the Preferred Alternative. (See responses 5-1 and 7-1.)

May 22, 1986

Mr. Dennis Lund
Kaibab National Forest
800 S. 6
Williams, Arizona

Dear Mr. Lund,

This letter is in reference to the proposed canyon uranium mine. I feel several issues need to be addressed.

4-1 First of all, given the apparent demand for uranium it would seem that mining companies would be actively involved in establishing a number of sites for future mining in and around the proposed site. Because of this likely sequence of events a more comprehensive study of the environmental impact, regionally, is in order. If each proposed mining site is considered individually, the full scope is never assessed. This is extremely important in light of the close proximity to Grand Canyon National Park and the Kaibab National Forest, both major recreational areas. The impact of this proposed mining site and future mines must be studied further. I feel the following specific issues are important:

4-2
1. Number and location of roads: Roads should be minimal and should be located in areas that are not primary locals for wildlife habitat.

2. Impact on flora and fauna: Living conditions should not be disrupted and safety should be stressed regarding the human population in and around the area.

3. Contamination of underground water tables and surface runoff. In an area where water is a valuable resource we must protect it.

4. Impact on the recreational value: Such things as more traffic, visual impact and noise pollution are included.

5. Cost to the Forest Service in administration and loss of timber in the mine area. These costs are impacting on the taxpayer.

4-3 I recommend further study of a regional nature regarding environmental impact. In addition, it is my impression that the Mining Law of 1872 needs to be revised. Thank you for your attention.

Sincerely,
Karen Applequist
Karen Applequist

18

L-4

Forest Service Response

4-1

As part of the EIS the cumulative effects of three additional mines were generally estimated. Ultimately the level of these impacts will depend on the mine and haul route locations relative to other mines, water courses and important wildlife habitat and migration corridors. At present there are no known proposed mines other than the Canyon Mine south of the Grand Canyon. If in the future additional mines are proposed in this general area, data gathered through the monitoring program at the Canyon Mine will greatly facilitate the estimation of site specific and cumulative impacts directly related to any new proposals. Please see Section 1.2.2 for a more complete discussion of "Cumulative Effects." (See responses 1-1, 1-3, 1-4, and 78-2.)

4-2

Your comments are noted and have been considered in detail in the EIS. A summary of the alternatives and their effects on the issues and concerns, can be found in Tables 2.4 through 2.13 of the EIS.

4-3

Please refer to response 2-4.

Supervisor
Kaibab National Forest
Williams Arizona

May 27, 1986

Dear Sir:

We are very concerned about the prospect of uranium mining at sites near the Grand Canyon and in other areas of Kaibab National Forest. Uranium mining is incompatible with the whole idea of the Grand Canyon, and to allow it would be to start down a trail of exploitation that would very rapidly destroy the Canyon and similar pristine environments. The aspects of safety and health problems should be considered along with aesthetic considerations, and lead us, as American people concerned with both the present and future good, to the conclusion that activities such as mining should be strictly forbidden in the fragile environment of Kaibab National Forest.

In keeping Kaibab National Forest free of commercial activities such as uranium mining, we have the now unique opportunity of passing on to those who follow us a relatively untouched example of the world as it once was - wild, and unmarked by man. We would like to be able to give this gift to our son.

Thank you,

Patricia G. Shawhotter
S.J. Hopkins
30 Hano Ovi
Flagstaff AZ 86001

5-1
5-2
5-3
5-4

19

Forest Service Response

5-1

We agree. No development will be allowed in the Park.

5-2

Health and safety of mine workers was considered in Section 4.1.10. Public health and safety has been considered throughout the document (see Tables 2.10, 2.11 and 2.12). Aesthetic considerations are included in Tables 2.5, 2.7, 2.8 and 2.9.

5-3

Although we disagree with the term "fragile," we do agree that all aspects of environmental impact must be fully considered and mitigated where possible, before mining can proceed.

5-4

As part of our Congressional charter, the Kaibab National Forest must generally be managed for multiple use. This includes various commercial activities such as timber harvesting, recreation, (including skiing, boating, hiking, etc.) livestock grazing, mining and wood gathering.

EFN has the statutory right under the federal mining law to enter on open National Forest System lands for the purpose of conducting exploration and mining activities. The Forest Service does not have the authority to categorically deny operations proposed under the mining laws. Development of a mine is subject to approval of a Plan of Operations and the Forest Service must adhere to the provisions of NEPA and mining regulations in the review of plans of operations. Review and modification of such plans ensures that the mining operations will be conducted in a manner which minimizes or prevents, mitigates and repairs environmental impacts.

Michael A. Brown
P.O. Box 482
Flagstaff, Az 86002

May 7, 1984
Re: Draft EIS Canyon Uranium Mine
Leonard Linquist
Kaibab National Forest
800 S. 6th Street
Williams, Az. 86046

Dear sirs:

I submitted a letter commenting on the Canyon Uranium Mine EIS on April 19, 1984. Since the comment period has been extended; I would like to submit further comments in addition to what I have already sent.

6-1 First, I would like to request a public hearing on this matter. I believe that only at a public forum can some of the serious concerns be brought to the surface and face the scrutiny of public debate.

Secondly, I would like to add some information to my comments on Union Carbide Corporation. Union Carbide owns or is responsible for 6 1/4 million tons of unstabilized abandoned mill tailings in Utah and Colorado. These piles are in

6-2 Rifle, Maybell, and Slickrock Colorado, and Green River Utah. Most had completed operations in the early '60's and milling ceased in Rifle in 1972. The point here is after 14 years in one case and after more than 25 years in two of the cases nothing has been done to clean up these health hazards.

So, I would like to reiterate - Why, Should we the public believe that Union Carbide's Blanding White Mesa operations will not be a continuation of the same? The courts have so far found that damages to health by these uranium companies is not compensable, ig. the case of the Navajo Uranium miners.

Thank you again for your time and consideration!

Yours truly,
Michael A. Brown

Forest Service Response

6-1

Several public meetings, both formal and informal, were held prior to the preparation of the DEIS and the FEIS, including a scoping meeting held pursuant to CEQ regulations. Public involvement included several meetings held in Flagstaff, Tusayan and Williams, widespread media coverage and distribution of over 2000 scoping letters and 700 copies of the DEIS to federal, state and local government agencies, Indian Tribes, news media, organizations, libraries and individuals. Additional meetings were held with various special interest groups, as well as state and federal agencies prior to the preparation of the FEIS.

6-2

There will not be any ore piles left at the Canyon Mine site at the end of mining operations. This is guaranteed by the Reclamation Plan and the performance bond (see Section 2.5.2). The reclamation of mill tailings by Union Carbide is strictly regulated by federal law but, in any event, has been determined to be beyond the scope of this analysis.

Route 1, Box 250
Staunton, Virginia 24401
May 25, 1986

Mr Leonard Lindquist
Supervisor
Kaibab National Forest
800 S 6th St.
Williams, Arizona 86046

RECEIVED
MAY 30 1986
KAIBAB N.F.

Dear Mr Lindquist:

I tis disgraceful that
you would consider allowing uranium
mining in the Grand Canyon area. How
can you so blatantly give in to the wiles
special interests - to defile natural wonders for
to further this death star technology?
It confirms that your behavior is endemic
in the Forest Service - a most corrupt public
agency that needs to be eliminated to
make way for one with ecological perspective!

Sincerely yours,
Robert F. Mueller
Robert F. Mueller

7-1

22

Forest Service Response

7-1

The proposed Canyon Mine is 13 air miles south of the Grand Canyon rim. The EIS concluded that the Canyon Mine is expected to have no adverse effect on the Grand Canyon. Nor do we expect any environmental impacts that can not be substantially mitigated by the measures included in the Preferred Alternative. (See responses 3-4, 5-1, and 8-2.)

May 13, 1986
6342 East Hillcrest
Scottsdale, Arizona 85251

Kaibab National Forest
800 S. Sixth Street
Williams, Arizona 86046

Dear Sirs:

8-1 I am strongly opposed to the development of a proposed uranium mine on National Forest Lands and areas adjacent to those lands. It would be a blight on truly one of the greatest Arizona and National monuments in these United States. Not only would it mar the beauty of our greatest national tourist attraction, but one must consider the contamination
8-2 of the surrounding river, wildlife, watershed and route along which the radioactive material would be transported.

8-3 One must remember to, as we have seen in the past, no matter how "safe" such a project may seem, one must take into account human error and accidents that could have a tremendous negative impact in the area.

These are some of the main reasons that I as a concerned citizen and taxpayer am opposed to such a mine.

Sincerely,

Lori Furcini

Lori Furcini

Forest Service Response

8-1

Please refer to responses 3-4 and 5-1.

8-2

We urge you to read the EIS. Copies are available at your library or local Forest office. All possible environmental impacts have been analyzed and mitigation measures have been incorporated into the Preferred Alternative.

8-3

An EIS need not consider remote, speculative or conjectural impacts. The one accident that appears reasonably foreseeable is an ore truck accident. The probability of such an event is discussed in Appendix E, Section 5.5, pp. 27 and 28. Notification of appropriate agencies and the immediate clean-up requirements if an ore spill does occur, are discussed in the EIS Summary as well as Sections 2.5.5, 2.5.10, and 4.2.6. (See also response 60-1.)

April 29, 1986

Dear Mr. Lindquist,

9-1 I have reviewed the "Draft E.I.S. Canyon Uranium Mine." I am totally against any proposed mining activity in the area. I strongly urge you to help protect this area from such activities. Please stop the mine!

Thank you.

Sincerely,

Lynn Jacobs

P.O. Box 2243
Cottonwood, Arizona
86326

L-9

Forest Service Response

9-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

Kaibab National Forest
800 South 6th St.
Williams, AZ 86046

April 16, 1986

To the Kaibab National Forest:

10-1 I would like to state my unequivocal opposition to uranium mines within or near Grand Canyon National Park (I am including the one proposed three miles from the northern boundary). The park belongs to all Americans -- indeed the world -- and preservation of the integrity of the canyon should be the overwhelming consideration. The proposal to exploit the park for uranium is unthinkable.

Sincerely,

Bruce Berger

Bruce Berger
7575 Ironwood
Paradise Valley, AZ 85253

L-10

Forest Service Response

10-1

Please refer to responses 3-4, 5-1 and 8-2.

Charlotte A. Neyland
2019 Polk
Great Bend, Kansas 67530

April 7, 1986

Forest Supervisor
Kaibab National Forest
800 South 6th St.
Williams, Arizona 86046

Dear Sir:

I am writing to oppose the proposed Grand Canyon Uranium mine. I grew up in the Williams area and the land is a much needed habitat for wildlife and plants of that region. So much destruction of wildlife and land has already taken place in and around the Kaibab National Forest. Look at what happened to the Mountain Lion and bear in that area? Stop this land rape!

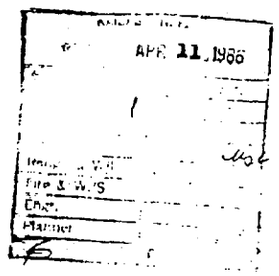
11-1

Sincerely,

Charlotte A. Neyland

Charlotte A. Neyland
KANSAS EARTH FIRST!

25



Forest Service Response

11-1

Potential impacts to wildlife are summarized in Table 2.7 of the EIS. In addition, please refer to response 8-2.

Patricia Wermeling
PO Box 1730
Prescott Az 86302

Forest Supervisor
Kaibab Nat'l Forest
800 S. 6th St.
Williams, Az 86046

Greetings,

In regards to the DEIS for the Canyon Mine I support Alternative 1 - No action alternative. I feel the mine is to close to grand Canyon Nat'l Park + would destroy the integrity of the Nat'l Park. We do not need mines so close to our national parks Let's preserve and protect what we have!

12-1

Thank you.

Patricia Wermeling

26

Forest Service Response

12-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

May 7, 1986
% [redacted]
Greenearth Forestry
Box 222
Crestone Co 81131

Forest Supervisor

13-1 I am writing to express my opposition to the proposed Grand Canyon Uranium mine. The Parks are for the people an their natural inhabitants (flora + fauna) not coporations!

Sincerely
Paul L. Andrade

Forest Service Response

13-1

Please refer to responses 3-4, 5-1 and 8-2.

4/28

To Whom it May Concern:

I am writing to express opposition to the proposed Grand Canyon Uranium Mine in Kaibab National Forest.

It will cause massive damage to the rim of the canyon's ecosystem & destroy the tranquility of the area. And, it will leave a radioactive mess wherever tailings are put.

Most importantly, the mine would support the dangerous nuclear power industry and the nuclear weapons programs that could destroy the entire planet. Today a horrible accident occurred in the Soviet Union at a nuclear power plant. The proposed mine would support exactly that type of foul and disgusting possibility.

NO MINING! SAVE THE GRAND CANYON ECOSYSTEM AND PROTECT THE WORLD FROM RADIOACTIVE DESTRUCTION.

Sincerely,
Eric Seth Johnson

ERIC JOHNSON
2137 GROVE
BOULDER, CO 80302

14-1

28

Forest Service Response

14-1

Please refer to responses 3-4, 5-1, 5-4, 6-2 and 8-2.

20 Hummingbird Lane
Sedona AZ 86336
May 2, 1986

Mr. R. Dennis Lund
Kaibab Nat'l Forest
800 S. 6th Street
Williams AZ 86046

Re: uranium mine proposal near Tusayan, 2 miles S of 64

Dear Mr. Lund:

To construct a mine in the Kaibab National Forest would be adding potential disaster to known disaster.

In view of the most recent "accident" in the Soviet Union at the Chernobyl reactor area, and the unclean history of the United States' nuclear power industry and weaponry testing, our government reaps "power beyond power to control". 15-1

It would be wise to review the tapes of the June 6, 1985, ABC TV documentary, "The Fire Unleashed", a 3-hour view of "incredible cost and mismanagement" in nuclear production. The four-part story included: (1) proliferation of nuclear weaponry, (2) the lethal legacy of radioactive wastes, (3) the nuclear power industry, (4) U.S.-Soviet arms race.

PLEASE STOP THE ADMINISTRATION'S WASTING THIS WORLD AND ITS INHABITANTS

Sincerely,

Betty Sue Kay

29

Copies sent to Senators DeConcini & Gabladon & Gov. Babbitt

Forest Service Response

15-1

The scope of the Canyon Mine EIS and the Forest Service jurisdiction is outlined in Sections 1.1 and 1.2. Please refer also to the response to comment 8-3 for a discussion of EIS consideration of accidents.

Dear Sir/Madam:

I am writing to you to express my strong
feeling of opposition to the proposed
16-1 Grand Canyon Uranium Mine. My husband
Works for a large travel agency here in
Tokyo. We shall send no more tourists
to Arizona if you go through with this
insane proposal. Thank you.

Ms. L.J. Elletson

Forest Service Response

16-1

Please refer to responses 3-4, 5-1 and 8-2.

HELLO!

THIS LETTER IS EXPRESSED OPPOSITION TO THE PROPOSED GRAND CANYON URANIUM MINE.

I WON'T BORE YOU WITH A SHORT REVIEW OF THE FACTS, TRANSPORTATION ROUTES, NEARNESS TO THE CANYON, PRECEDENT SETTING FOR URANIUM MINES NEAR THE CANYON, ETC.

I'LL JUST SAY, NO URANIUM MINE! PLEASE

17-1

Forest Service Response

17-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

Earth First!

Supervisor,

Writing as a representative of Earth First!, I call on you to halt 2 of the biggest threats to our spectacular Grand Canyon area -- the Canyon uranium mine, and logging on the North Rim. No mining or logging should be allowed anywhere near the Canyon. Earth First! rejects your Canyon Mine DEIS and your logging plans for many reasons -- their fundamental inadequacy being your implicit assumption that the Kaibab forest exists to serve humans. You should reevaluate all plans for the Kaibab from a biocentric -- rather than anthropocentric -- perspective.

18-1

Sincerely,
John Davis
Earth First! managing editor.

PO Box 5871 · Tucson, Arizona · 85703 · 602-622-1371 (Voice)

Forest Service Response

18-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

6/20/86

Dear Mr. Lindquist,

I am writing to oppose your willingness to allow the Grand Canyon Uranium Mine. Your support of this environmental nightmare is a disgrace?! You have shown an utter lack of respect or regard for the wishes of the American people who pay your salary.

Your limiting of the scope of the comment period to haul routes, the powerline corridor, keeping things hidden from tourists is a parody of the legal process. The real issues were not allowed to be addressed

33

-2-

Uranium mine tailings, radioactive contamination of air, land, water, disruption of habitat, need for the uranium in the first place, etc, these are some of the real issues. Tell me how the local economy will benefit from an increased cancer rate in workers, contamination of aquifers, radioactive transport accidents, etc.

What are your purported "reasons" for allowing this catastrophe in America's greatest treasure? How can you uphold your duty to preserve the natural order and allow an uranium mine? Will you let Grand Canyon get the way of Black Mesa? I await your reply.

Jon Price,
Gregory Price
1971 Green Hill Rd.
Sebastopol, CA 95472

Forest Service Response

19-1

Please refer to responses 3-4, 5-1, 6-2 and 8-2.

Supervisor Leonard Lindquist
Kaibab National Forest
800 S. 6th St.
Williams, AZ 86046

May 12,1986

To the Supervisor:

20-1 In reviewing the DeIS for the proposed Canyon uranium mine, several issues have surfaced as concerns. At the heart of the mining issue lies the obsolescense of the General Mining Laws. In the 1800's the policy of government lands being "free and open" to exploration was more appropriate to the west as it was: sparsley populated and relatively unexplored. Today the RIGHT to pursue mining operations on public lands regardless of their proximity to natural wonders, population centers or sites or cultural importance should be reevaluated. The public must lean too heavily on government officials entrusted to protect resources from adverse environmental impact. In the history of uranium mining
20-2 many hardships have been allowed to people of the Four Corners and much degradation of the land. What other uranium mines has EFNI operated in the U.S.? What is their environmental track record?

On page 1.6 the statement is made that "comments which deal with the desireability of nuclear power... or the disposal of high level nuclear wastes would not be addressed in this document because the impact of this proposal on such issues is too far removed for meaningful analysis." For many of us concerned over the environmental impact of uranium mining at the Canyon it is precisely these issues which generate concern. The government policies which allow such development to continue are beyond the scope of this report but, because such operations are allowed, this does not allow mining operations such as EFN to
20-3 be absolved of responsibility to future generations. Why, if the domestic uranium market is "depressed", has EFN decided to mine at the Canyon? Why does this DEIS "analyse potential cumulative impacts by hypothesizing the addition of several new mines in the area developed concurrently with the Canyon mine?" They must be considering many more mining operations since their mill has a
20-4 design capacity far exceeding current production and the addition of the Canyon mine could add only 10% to present capacity. What is the regional impact of this increased uranium mining on the northern Arizona and Four Corners areas?

20-5 A third area of concern is the impact of the Canyon mine on the Native cultures of the area. By law, consultation should have been made with the Havasupai and Hopi Tribes in an "attempt to protect such resources from theft, vandalism, removal or other direct or indirect adverse impacts, by data recovery, site recovery or avoidance." My concern here is not with archaeology but with living people, with the current use of the Redwall Aquifer by these tribes including traditional uses and the sacredness of this local source of pure water in an arid region. There are traditional Native people of the Havasupai and Hopi Nations who do not want this water supply endangered at any cost.

20-6 This brings up my fourth and final concern: the contamination of surface and groundwater. In section 2.5.5 under ore haulage control EFN is charged with taking immediate action to clean up any spills "unless the appropriate agencies deem that such action is prevented by conditions beyond the control of EFN." In all of the scenarios presented, the ore hauling route stops at Cameron. What are the road conditions north of Cameron? Which communities will be impacted by 10 twenty ton ore trucks full of uranium driving through? Are the roads and bridges to Blanding capable of bearing the additional stress? In the assessment of surface water impacts were the dry washes to be crossed included or did the assessment include only running water adjacent to the haul road?

There appears to be a contradiction in paragraph 4, page iv, concerning groundwater contamination. The statement contends that contamination is remote because the Redwall Aquifer is 1,000 ft below the mine yet, on page 2.10, #6, it is"hoped the drilling of the mine shaft may generate a flow... from the base of the Coconino Formation at a depth of 1,000 ft." What about testing from the Coconino Formation? I also have concern about possible fractures in the rock below the mine shaft and the breccia formation. Are verticle cracks possible in these formations? If they are, are not chances for contamination greatly increased because of much quicker flow to the Redwall Aquifer? It is also stated that this area is a "moderate seismic activity zone and that major faults "have not been carefully studied."

It is of further concern to me that the DEIS reads "additional mines should create no cumulative impacts on surface water or groundwater quality." Then it goes on to say that if two mines drained into the same area and a flood were to occur, there would be a dangerous release of radioactivity. Promises of "rapid dissipation" and "immediate cleanup" do not allay my fears. Are these cleanup costs included in projections? Has a bond been furnished by EFN to cover such costs?

Thank you for your concern regarding this critical issue. Reply may be sent to me at: 3213 N. Alta Vista B
Flagstaff, AZ 86001

Sincerely,
Janice
Janice Kerata

Forest Service Response

20-1

See Section 1.1.1 and response 2-4.

20-2

EFN is presently operating three uranium mines in the Arizona strip (north of the Grand Canyon) and have operated uranium mines in Colorado and Wyoming in the past. Public comment and interagency discussions suggests that their track record appears very good.

20-3

Please refer to response 1-8 and 5-4.

20-4

Please refer to response 78-2.

20-5

As noted in Sections 3.1.11 and 4.1.12, consultation with the Havasupai and Hopi Tribes began when the proposed Plan of Operations was submitted by Energy Fuels and is continuing. The text of the EIS has been revised to include additional information from the Tribes. (See also responses 60-2 and 61-1.

20-6

For a discussion of potential groundwater impacts, please refer to the responses to letter 61.

R.D. 1, Box 15[illegible]
Alpine, NY 1430[illegible]
April 23, 1986

Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist,

Thank you for the copy of the Draft Environmental Impact Statement on the Canyon Uranium Mine. While I find a great deal of useful information in this statement, I have even more questions and concerns regarding the mine. Following are discussions of just a few of my concerns, which I hope you will consider in drafting the final EIS.

1. Impacts on Mine Workers

21-1 While your report (Section 4.1.10) states that "uranium miners work an average of 10 years underground," many workers may be employed much longer, thus increasing their exposure to cancer-causing radon gas. Enclosed is an excerpt from National Citizens Hearings for Radiation Victims, April 10-14, 1980, which quotes 2 Navajo miners who have, along with their families, suffered from the effects of mining uranium for 29 and 30 years respectively. It would seem that we ought to be taking into account long-term mining workers rather than simply speaking of statistical "averages."

In the same paragraph of the DEIS, the possibility of dangerous exposure to radon gas on the part of miners is apparently satisfied by the conclusion that "The cumulative 10 to 25 WLM is well below the 100 WLM value where studies indicate possible increases in lung cancer might appear." However, there is disagreement as to whether the 100 WLM value represents a truly safe exposure level to radon gas. In the enclosed article by Dr. Weiss, the suggestion is made that the current standard is far too high, "perhaps by a factor of 10." If this is true, then the 10 to 25 WLM would still be far too high. "It now appears that there may be no threshold effect for radon daughter induced cancers," Dr. Weiss continues. If so, (and we may not have the answer for years to come), then we are doing nothing less than playing with peoples lives if we are willing to open another nuclear mine.

2. Low-level Radiation Exposure to Nearby Populations

21-2 The proposed Canyon Uranium Mine is very close to Native American lands whose inhabitants have already suffered from mining operations in the area. Please see the article enclosed on radiation and birth defects by Evelyn Oden. She emphasizes that we must consider total exposure from all sources; fallout, contaminated water, plants, etc. While we do not yet have all the answers regarding low-level radiation effects, there is significant evidence that it causes birth defects, and other serious illness. I think the evidence is sufficient to very strongly question the opening of another uranium mine.

3. Radiation Exposure to Grand Canyon Visitors

21-3 The proposed mine is very close to the Grand Canyon, one of the most popular parks in the United States. While I understand that uranium mines are in operation near the park at the North Rim, still most visitors gather at the South Rim, in the area of the proposed mine. Aside from the obvious detractions the mine would cause vacationers, thousands of people may be exposed to low-level radiation from everyday mine operations, and in the case of a major accident, thousands may suffer serious illness as a result. As we all are aware, accidents will happen, even in the best of circumstances. Are we willing to take these risks?

I very strongly feel that we cannot. The very high risks to miners, the as-yet unknown effects of low-level radiation, birth defects, long-term genetic damage, pollution of the Grand Canyon; I think are enough reasons to say no, we must not allow this to happen.

We must, first of all, respect the health and well-being of all miners, residents, and visitors, before bowing to the interests of the mining companies.

Thank you for considering my views; I look forward to hearing from you.

Sincerely,

Lynn Rose

Lynn Rose

Enc. (3)

Forest Service Response

21-1

EPA has also suggested the possibility that effects may be associated with lower exposure levels. The text has been revised to reflect these differing opinions. (See response 87-12.)

21-2

The EIS models the potential exposure to radon gas and concludes that exposures will be within the natural fluctuations of radon in the environment (see section 4.2.5.2). We believe this issue is adequately discussed in the EIS.

21-3

While the site of the Canyon Mine is relatively near the Park boundary, the distance is sufficient that any emissions will be dissipated well before they reach the Park. In addition, those areas with significant visitor use are even more distant. Park visitors will experience no additional radiation exposure due to operation of the Canyon Mine. (See Section 4.2.5.2.)

Michael A. Brown
P. O. Bx 482
Flagstaff, Az. 86002

April 19, 1986

Re: Draft EIS Canyon Uranium Mine
Leonard A. Linquist, R. Dennis Lund, et. al.
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Sirs:

This letter is in response to the Draft EIS Canyon Uranium Mine issued Feb. 28, 1986. The first part of this response is "beyond the scope" of the EIS document and process. I found it necessary to discuss such material anyway, inorder to allow the F.S. the opportunity and possibility of perceiving the kinds and levels of alienation that some individuals have as a result of F.S. policy, procedure and process. This alienation does not, however, preclude reasonable relations with certain F.S. personnel, but only the F.S. as a whole, as an entity and arm of the U.S. corporate military machine. While I can and do respect F.S. employees, I do not respect the U.S. governmental entity as it manifests in thugs threatening me because of my views.

I have experienced the U.S. corporate machine on a personal level as spiritual war in an effort to preserve the human form as a vehicle for conscious evolution. With the F.S. in Arizona I have so far lost the war. I have failed to influence it in halting the cutting of pinon pines for Christmas trees, cable logging of virgin canyon tree stands, chaining of junipers, limitations on ORVS, protection of the San Francisco Peaks, to cite a few concerns. So I am under no illusions in regard to preventing uranium mining activity on F.S. lands.

Americans failed to learn a lesson from the Challenger disaster- that we need to create beauty in our earthly nest before we can go elsewhere. Similarly, the F.S. cannot see beyond the scope of Canyon EIS and perceive the entire U.S. nuclear program. Only individuals will be able to do this. Only individuals can change the agenda. So I appeal to the individual who reads this. You may not be able to do anything about the F.S. machine, but no one can make you agree with it inside yourself.

I believe that the U.S. nuclear program is the hidden agenda in F.S. decision-making on this. This program is beyond all public input at any level of government. It is an evil force and until it sees the light of day of public scrutiny it will continue to threaten us all. It is for this reason that I believe that to date there are no laws pertaining specifically to clean-up of uranium mines. As to the 1978 Mill Tailing Control Act, not one private abandoned mill tailings pile has been cleaned up. Also, the 25 millirem standard for maximum permissable radiation dosages to the public specifically excludes radon daughters.

It is for this knowledge and humanistic concerns I have pertaining to these issues that my mail has been extensively interfered with and considerable surveillance has been conducted against me. What is also beyond the scope of the F.S. is that this is not a free country.

22-1 The Draft EIS states on page iv -"... the apparent lack of any environmental degradation (other than visual) caused by the operation of the Orphan". This statement is not only misleading, it demonstrates the continuing criminal negligence and conspiracy of the U.S. government to perpetuate harm via the U.S. nuclear program on the American public, while evading public input and attempts to rectify some of the serious problems with this unbeknownst program.

Using two fairly sensitive scintillators I spent several hours at the Orphan Mine site counting blips per minute and averaging them. At Powell Monument and near the parking lot counts per minute averaged about 1½ times natural background - 37 counts per minute. At the mine site outside of the fenced-off area, readings of ambient radiation ranged as high as 1.2 to 2 millirems per hour, setting off the radiation alert on the set and pinning the needle on the lower scale. Unknown numbers (in the thousands) of tourists walk past this place on the rim every year. They are subjected to a definite hazard. Upon cursory investigation via interviewing several passers-by, at least 90% were unaware of the hazard they were being subjected to. If an interview with one pregnant woman is any indication of the level of awareness of the hazard, the

(3)

F.S. facile conclusion of "apparent lack of any environmental degradation" has been a very successful campaign in hiding the problem.

If a park ranger on tour were to stop at Powell Memorial 5 times a day for 10 minute talks, it is conceivable that he/she could receive more than the 25 millirem fuel cycle standard set by 40 CFR 190 over a 1 year period on the job.

That 40 CFR 190 specifically exempts radon daughters is a fault with the law, not with the serious nature of the problem. Also, in light of the National Academy of Sciences claim that all increases in exposure to radiation carry with it increased risks in terms of adverse health effects, the Orphan Mine could be considered a health hazard and tourists might be excluded from the area or at least warned of the risk of approaching the vicinity.

22-2 Also, the entire uranium ore haulage route to the Tuba City abandoned mill site has an average radiation level that is augmented about 20% over natural background (27 counts per minute), presumably from dust blown out of uncovered urnaium ore trucks and deposited by the side of the road in the past.

This augmentation was found by measuring clips per minute next to the road and comparing it to levels found 100 ft. distant from the road (averaging 23 counts per minute) in a half dozen places alone the route.

So since the Forest Service nor any other U.S. agency seems willing to investigate this matter as to problems presented by the old Orphan Mine, and since the government has yet to institue any laws pertaining to uranium mine clean-up, this author finds it doubtful that Energy Fuels or the government will clean up the future mess created by the Tusayan Mine.

History speaks louder than F.S. gyration in this EIS process. If the U.S. and private uranium industry has failed to clean up any of the past uranium mess, why should we, the public, believe they will do anything about it in the future?

In considering ore haulage road options: One blaring option presents itself to me that the F.S. does not ever consider

(4)

22-3 or discuss in the Draft EIS. Why taking F.S. road 302 to F.S. road 310 North to Highway 64 was not considered in the road haulage options is a mystery. It is obvious that this route would involve the least impact on the environment and minimum amount of road work and expense. Why the F.S. avoids discussing this option; I think the public at least deserves an explanation.

The Union Carbide White Mesa Mill is another issue beyond the scope of the EIS. Union Carbide is a corporation who's dealings with hazardous substances is not particularly reputable. When added to the fact that they possess several abandoned mills in Colorado who's likelihood and potential for disaster similar to the magnitude of the 1979 United Nuclear Churchrock, N.M. spill might be characterized as inevitable; the F.S. nondiscussion of the"licensed mill" at White Mesa is disconcerting. United Nuclear was licensed at Churchrock before and after the 1979 mill tailings pond spill. They violated state and federal water standards more times than not with their mine dewatering and mill wastes after the 1979 spill. They finally shut down for good in 1983 leaving behind a considerably contaminated Rio Puerco. Also, as mentioned earler the Uranium Mill Tailings Control Act of 1978has failed to produce any results in terms of cleanup of private industry uranium mill tailing wastes after 8 years.

So, the concerned public believe the federal government should come up with a comprehensive program of dealing with uranium wastes. The problem is of such an extent that a moratorium on uranium mining should be considered. This moratorium should remain in place at least until past uranium wastes hazards have been mitigated up to the present state of the art of uranium waste control technology. A schedule of dealing with wastes and allocations to meet these clean up costs should be provided by industry and government according to responsibility before uranium mining operations continue. Union Carbide should clean up their mess in Colorado and South Dakota before they are allowed to proceed with milling operations in Utah.

Thank you for your time and consideration of these matters.

yours truly,

Michael A. Brown

Michael A. Brown

Forest Service Response

22-1

While radiation levels near the Orphan Mine site may be above background levels in other areas due to naturally occurring radiation, there is no evidence that those levels are harmful or that any hazard exists. We have made the National Park Service aware of your comment so that it may review the radiation exposure to Park employees and visitors.

We believe the potential radiation impacts of the Canyon Mine are properly described in the EIS. (See Section 4.2.5.)

22-2

We have no evidence to indicate that radiation along the proposed haul routes has been increased by past ore hauling practices. Furthermore, ore trucks from the Canyon Mine will be covered.

22-3

The haul route option suggested was considered, but eliminated from detailed consideration for two reasons. First, following Highway 64 as suggested is significantly longer than other haul route options in the same area. Second, this alternative would require ore hauling for over 13 miles within Grand Canyon National Park. We see no reason to consider hauling through the Park when other, environmentally superior, haul routes are available.

May 4, 1986

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South 6th St.
Williams, Arizona 86046

Dear Mr. Lindquist:

This letter is in response to the DEIS Statement issued to all of us Feb. 28-'86. It is in response to the proposed plan of operations submitted in October, 1984 by Energy Fuels, Inc. for the development of a Uranium Mine 13 miles south of the rim of the Grand Canyon on the Tusayan Ranger District of the Kaibab National Forest.

Last spring on May 15, 1985 many citizens wrote letters of concern and attended the Canyon Mine Public Scoping Meeting on the NAU Campus. Many profound and meaningful questions were asked regarding potentially dangerous hazards to the Canyon area should this Mining project be established. All of us, I am sure..can understand the issues that can be monitored within the Forest Service boundary lines.. such as the potential impacts on wildlife, vegetation, local economies, transportation systems and the general management of the National Forest and Grand Canyon. We appreciate the work done by the specialists and consultants who were chosen to assist in the evaluation of issues relating to radiation, air quality, surface and ground water.

The third paragraph in your letter, however, to all of us..and attached on top of the copy of the DEIS-Feb. 28-'86..concerns me deeply. I quote:

> "During the public involvement process, several other issues surfaced which are outside the scope of this analysis. Comments pertaining to the desirability of nuclear power or other uses of processed uranium, or disposal of high level nuclear wastes are not addressed in the DEIS because the impact of a mine proposal on these issues is too far removed for meaningful analysis. Similarly, detailed consideration of issues related to the consequences of past Uranium mining in other areas in northern New Mexico and Arizona are also beyond the scope of this DEIS."

The phrase..'disposal of high level nuclear wastes are not addressed in the DEIS because the impact of a mine proposal on these issues is too far removed for meaningful analysis'..leads me to believe you are by-passing one of the most serious and acute factors that could have the potential of affecting not only the entire environment and health concerns in the Kaibab National Forest but to the Navajo and Hopi Indian lands northeasward across state hiways leading into Blanding Utah.

The issue and potentially grave factor in this matter is the trace element-SELENIUM.

To define what Selenium is...is difficult. I have chosen to enclose many articles and copies of publications defining it and regarding the very latest of investigations and research on it..stemming basically from the findings in the San Joaquin Valley and perpetrating the closing of the Kesterson Wild Game Refuge..in spring-'85. I must tell you that I am the daughter of the late Dr. O. A. Beath..a University of Wyoming professor who dedicated most of his professional life in Research Chemistry, Plant Pathology and toxic Selenium as it related to livestock poisoning in Wyoming and the West. His early pioneer research on Selenium was referred to in the California/Kesterson probe, proving out in certain factors, what he discovered 50 years ago. He was very well aware of various species of 'Indicator' plants-(Astragalus species)..indicating highly seliniferous areas in northern Arizona. A unique indicator plant..named after him..Astragalus Beathii.. was discovered by him 10 miles south of Cameron on the Moenkopi formation on hiway 99. Many times he took renowned geologists with him to identify highly seleniferous beds in Arizona. The enclosed pages from his book SELENIUM/1964/Rosenfeld & Beath/Academic Press..indicate that certain Supai and Hermit shales are seleniferous. These shales are the ones that you indicate in your diagram/page 3.3-Fig.3.1-depicting the core that Nuclear Fuels will be drilling into for Uranium ore. It is very well known that Uranium is generally associated, and synergistically reactive, with Selenium.

In this year 1986..and during this past decade..very meaningful and phenomenal discoveries have been made with regards to environmental matters..both from the standpoint of improvements and hazards that were unknown a few decades back. We must recognize that one of these acutely hazardous discoveries..is the power of Selenium as it synergistically becomes reactive with Uranium..turns toxic from its inorganic stage to organic as it emerges to the soil thru the means of water and joins the forces of nature..sun..rain and wind. The issue and the power of Selenium contamination and poisoning to all forms of life emerged acutely last spring-'85 in the San Joaquin Valley to the point where it was researched by astute reporters on the Sacramento Bee Newspaper..with Mr. Tom Harris, lead reporter. Eventually it led to a full-fledged investigation by the Department of Interior under Mr. Hodel's direction and 3.7 million dollars was allocated to confirm the Bee's findings. I enclose the condensation of the three papers written by highly backgrounded reporters on the Sacramento Bee-- Sept. 8-9-10-'85. Also copies of articles that appeared spontaneously throughout the fall in California cities. You can see that the Dept. of Interior is still continuing to probe and identify the fact that the study of Selenium is being intensified in many more of the Wild Game Refuges and areas in the West where little was known before.

What would be the situation in the Grand Canyon?

I ask: How technically and deeply have your Specialists and Consultants probed into this matter of the possible poisoning emenating from Selenium in its toxic state? Have you contacted any researchers from the Dept. of Interior who could affirm or re-assess the possibility of a wide-spread danger? How can you assure us that this will not happen?

41

Tho very different from the Kesterson and San Joaquin environment with its farm lands, marshes, canals and drainage systems as contrasted with the Colorado Plateau's forest lands, meadows, streams, springs, grazing areas, arid regions and flood plain runoffs..we question and fear the same lethal transformation might occur as Selenium emerges into toxicity thru water and the forces of nature that are apt to occur in any mining operation..and no doubt in the Nuclear Fuels Uranium mine 13 miles south of the rim of the Grand Canyon...of all places. What are the problems that would be likely in radio-active waste water that would evaporate from open, on-site holding ponds and in the dust carried by wind..as the transport trucks make their way thru the forest across Arizona arid lands and state hiways to Utah?

Last spring, Reverand Gary Lee from the First United Methodist Church in Tucson..a former resident of Tusayan..and an adament traveler and admirer of every segment of the Grand Canyon..wrote to you..(Copy/letter enclosed)..on June 13, 1985..after he had actively attended the Public Scoping Meeting in Flagstaff..May 15-'85. He again addressed the issue of Selenium..but apparently it has been by-passed..to his chagrin...and mine.

The fact that the proposal of this mining company (with more to follow?) ..has been defined and <u>would</u> be allowed (thru the old mining law of 1872)...to occur in such a unique place as the Grand Canyon...is incredible. The dangers that loom as potential with such an enterprise with 'today's scene' in the Canyon with its ever increasing populace and multiple forest uses, would not only be contained within the boundaries of the Kaibab..but in the whole northern part of Arizona.. to say nothing of the processing that would go on in Blanding, Utah.

What kind of Final Environmental Impact Statement could be drawn up which would include the entire spread of areas..both national and state.. that would be affected? I, for one, feel that only part of the issue has been rightfully addressed.

I do believe that we as citizens have the right to know <u>WHY</u> the establishment of Uranium Mining in the Grand Canyon when every single Uranium Mine is now closed down in Wyoming and many more in its neighboring states..where evidence points to the fact that the source of this ore is still readily available and certainly in formations far more accessible than the Grand Canyon. This question, however, is probably more one to be addressed by our legislators and the Dept. of Interior.

This is a cause for those of us who must speak up at this time..and reach for the assistance of our Federal Congressmen who represent us. It is a factor that not only affects national but state lands as well. I have already referred this issue in person to the office of U. S. Representative Morris K. Udall/Tucson Office/% Mr. Dan Oneill..on 4/22/86. I have been assured that they are now looking into this matter.

In order to contribute to the Final EIS at the Grand Canyon, I recommend..along with the help of our legislators and concerned groups of citizens..that additional, experienced and 'well traveled' experts or researchers in the field of Selenium as it would pertain to Uranium Mining..should be contacted to lend their expertise in giving valuable pointers or in-put in assessing the situation.

Your very profound consideration and that of your present specialists and consultants on the DEIS..would be very much appreciated by many of us.

Sincerely,

Mary E. Beath

Mary E. Beath
Royal Palms Apartments--# A-21
5201 East 2nd St.
Tucson, Arizona 85711

cc: Secretary Donald Hodel, Department of Interior
Honorable Dennis DeConcini, United States Senator
Honorable Barry Goldwater, United States Senator
United States Representative Morris K. Udall
Mr. R. Dennis Lund, Recreation & Lands Staff, U. S. Forest Service
Mr. Tom Harris, Reporter, The Sacramento Bee
Ms. Sharon Galbreath, Sierra Plateau Group-Flagstaff
Mr. Paul Hirt, Sierra Club, Legislative Action-Tucson
Reverand Garrison Lee, First United Methodist Church-Tucson
Mr. Dan Oneill, Office of Morris K. Udall-Tucson
Mr. John McCain, United States Representative

May 12, 1986

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South 6th St.
Williams, Arizona 86046

Dear Mr. Lindquist:

Enclosed are my letters addressed to you, Arizona Congressmen and concerned citizens concerning the DEIS. I hope the articles enclosed from California Newspapers (1985)..concerning the latest in Selenium findings and in addition to certain pages from my father's former publications-(whose specialization was Selenium poisoning)-should lead you to a concern that was not rightfully probed or addressed in the DEIS.

Many of us will deeply appreciate your profound consideration and attention.

Sincerely,
Mary E. Beath

Mary E. Beath
Royal Palms Apts.-# A-21
5201 East 2nd St.
Tucson, Arizona 85711

May 12, 1986

Honorable Dennis DeConcini
United States Senator
United States Senate--SH-328
Washington, D. C. 20510

Dear Senator DeConcini:

Enclosed is a copy of my letter of comment addressed to Mr. Leonard A. Lindquist, Forest Supervisor-Kaibab National Forest, regarding the Draft Environmental Impact Statement issued to you and all of us on Feb. 28, 1986 and pertaining to the Nuclear Fuels, Inc. Plan of Operations for development of a Uranium Mine 13 miles south of the rim of the Grand Canyon.

You can clearly see from my letter with the articles enclosed that I am gravely concerned over one of the issues..the potential problems of Selenium poisoning as it relates to Uranium Mining.

Looming in this whole enterprise are questions that rightfully need to be addressed to you and your fellow Congressmen who know and cherish all areas of Arizona and in this case..the Grand Canyon with the Navajo/Hopi lands to the north and east. I ask the following:

1. WHY...is Uranium Mining allowed in this very special and highly impacted place..of all places..the Grand Canyon of Arizona?

2. WHY...are Nuclear Fuels, Inc.....(and other Mining Companies?)..proposing to drill for Uranium in Grand Canyon areas when Uranium sources are still very plentiful in far more accessible regions and states such as Wyoming.. when in this past year..every single mine has closed down?

3. AT THIS TIME..is the need for domestic Energy Resources in the U. S. so dire that it necessitates such an enterprise in unique and treasured areas?

4. HOW LONG..do we, as caring, supporting citizens of our National Park and Forest systems have to worry and be acutely concerned about the harmful effects that modern Mining and Drilling Industries impose on our natural and national ecosystems?

5. WHAT CAN WE..as concerned citizens of Arizona do to aid in legislation that would change the long established Mining law of 1872...and create a new law that is fitting for today's complicated 'scene' of environmental structures?

6. IN TODAY'S WORLD...do not completely different types of Environmental Impact Statements have to be drawn up in order to cope with modern technology and encompass the entire scope of state and public lands that would be involved in and affected by any one, single Mining enterprise..such as the one for Nuclear Fuels, Inc.?

   I feel that in this case..only half of the issue has been addressed. At this time, should there not be re-assessment and evaluation done to include the entire scope of areas affected in such a mining process? We realize that in the present DEIS, the Forest Service can only be involved with issues within its boundary lines.

For us all to enjoy and cherish our National Lands, it becomes increasingly paramount that we must all join together to preserve them.

We appreciate your consideration and attention. We need your help. Many of us are here to support you.

Sincerely yours,

Mary E. Beath
Royal Palms Apts.--# A-21
5201 East 2nd St.
Tucson, Arizona 85711

cc: Secretary Donald D. Hodel, Dept. of Interior, Washington, D. C.
Mr. Leonard A. Lindquist, Forest Supervisor, Kaibab National Forest

**: This same letter is also being addressed to and sent to the following Congressmen:

Honorable Barry Goldwater, United States Senator
Morris K. Udall, U. S. Representative/Arizona
John McCain, U. S. Representative/Arizona

Forest Service Response

23-1

In response to your comments we have evaluated the information submitted with your letter and reviewed a detailed study of selenium at the mine site commissioned by EFN. Generally, our review shows that selenium impacts are not anticipated at the Canyon Mine. Specifically, we have concluded that (1) selenium is not present in significant amounts at the Canyon Mine site; (2) selenium levels below the surface are not significantly higher than soil levels, thus mining operations will not create higher surface levels of selenium; and (3) the critical factor for leaching selenium in dangerous form and quantity -- alkaline water -- is not present at the site. Our additional analysis is summarized below. The complete report is available for review at the Kaibab National Forest.

Soil and sediment samples were taken from the mine site and surrounding area in June 1986. The samples were analyzed for selenium levels with a detection limit of 0.1 ug Se g^{-1}. The global average of selenium concentration in surface soils is 0.4 ug Se g^{-1}. The results of the eleven soil samples analyzed ranged from 0.2 to 0.4 ug Se g^{-1} -- comparable to the world average. In addition to soil samples, sediment samples were taken from areas where water would flow during rainfall periods. The selenium values in the sediment samples were comparable to the soil samples.

Material from deep core drill holes at the site was analyzed to determine selenium values in the ore and waste rock from the mine. The selenium values for the subsurface samples were not significantly different from the reported surface background levels. The measurements indicate that there will not be a significant introduction of selenium into the surface environment during mining and waste storage.

The movement of selenium can be by aerosol, water or dust. The aerosol is an organic selenide which is given off by selenium accumulator plants such as astragalus. An examination of the area around the mine site disclosed no known selenium accumulator plants.

Water transport of selenium occurs when natural selenium is dissolved by alkaline waters. The solubility of selenium appears to be controlled by the pH of the aqueous environment. In fact, the unifying thread of the selenium contamination in the western U.S. was the irrigation of arid to semi-arid areas

that brought alkali selenium salts to the surface and flushed them into drainage systems that ultimately accumulated in closed basin lakes or reservoirs.

These conditions will not exist at the Canyon Mine site. The only water introduced to the waste piles will be rainwater, which is naturally slightly acidic. Furthermore, the waste rock from the mining operation will add slightly to the acidic environment due to the presence of pyrite and other minor sulfides available for oxidation. These conditions will preclude dissolution of significant selenium from the waste pile.

Dust transportation of selenium can be mitigated by controlling the cover of the waste piles. This would preclude the availability of fine particulates that may contain selenium from being removed by winds.

Since natural levels of selenium at the mine site are low and the conditions created in the ore and waste piles are not conducive to leaching and accumulation of selenium, we believe that selenium contamination at the Canyon Mine is not a significant issue and that no further analysis or revisions to the EIS are necessary.

Rec'd 5/1/86

Forest Supervisor Leonard Liniquist,

24-1 Sir, after reading about the possible abominable mine being approved, I need to question the logic of the proposal.

I am a science educator and ecology/land use instructor. My students are constantly dismayed and angry at the Forest Service and the lack of wisdom and vision in resource decisions. A recent letter to Max Peterson concerning old growth to a student question, came back with a reply of management for destruction!!! These kids see through many agency scams and can't swallow its vote. I believe their letters are already having effects.

Recently, San Jacinto D.A. Doug Bomphrey (S.B.V.F.) held on its 1st positive conviction of not letting a school district build on sensitive species land. I believe this happened because of students letters and presenting their feelings at F.S. meetings.

24-2 We have had field trips around the planned pit in the Wasatch. We will continue to visit the area if you take some futuristic and value-oriented steps and quash this fiasco. The students need positive adult and government reinforcement. We hope you will highly regard this letter in your decision. Reply if possible.

Gratefully,
Albert J. Kelley
Science Curriculum Coordinator

Serrano Intermediate School
3131 Piedmont Drive
Highland, CA 92346

Forest Service Response

24-1

We urge you to read the EIS. Please refer to response 8-2.

24-2

We sincerely hope that you will continue to have field trips to the Grand Canyon and northern Arizona. If and when the Canyon Mine is developed, it might be enlightening for your students to tour at least the surface facilities.

April 4, 1986

Dear Forest Supervisor,

I am vehemently opposed to the proposed Grand Canyon Uranium Mine — this is not what our National Parks, Forests, + Monuments are for! It is your duty to protect the ecological health and beauty of the Grand Canyon, not to degrade and poison its ecosystem with radioactivity and multiple unnecessary human intrusive developments. Already this unique canyon is being spoiled by helicopter flights (at a rate of one every few minutes in some areas), its visibility and majesty spoiled by dense air pollution from Four Corners coal-burning plants, its long term wildlife and wild plant production threatened by adjacent air nuclear power plants, this uranium mine (+ any others) and irreplaceable water diversions.

Act now to reverse these injustices and prevent the operation of a uranium mine and helicopter flights in the Grand Canyon, while also acting to improve Canyon air quality and stop excessive water diversions from the Colorado River and its tributaries.

Sincerely,

[signature]

Box 3
McNeal, AZ 85617

RECEIVED
APR 7 1986
KAIBAB N.F.

25-1

47

Forest Service Response

25-1

Please refer to response 3-4. See also the response to letter 32.

R. Dennis Lund
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lund,

What you are reading is a grass roots chain letter. This is a sincere effort on our part to mobilize great numbers of concerned citizens, to make our voices heard on this issue: the Canyon Uranium Mine project.

If Energy Fuels Nuclear, Inc. is given permission to go ahead with this project, as well as with future mines near the Grand Canyon--mines alluded to in the Draft EIS--reprehensible damages to the environment are sure to result: the release of toxic Radon gas from the mineshafts and uranium ore stockpiles; percolation of radioactive particles into the earth through totally inadequate stockpile pads and holding ponds; the possibility of flash floods breaching E.F.N.'s dikes and dams, carrying potentially deadly, dangerous materials deeper into the watershed of Havasu Canyon; disruption and displacement of major elk, deer and antelope calving areas due to mine and haulage-road construction and operation; despoilment and devaluation of vital domestic livestock, and wildlife water sources from major new road construction and extented industrial use; for 365 days a year, for the 10 to 15 year life of this mine, there exists the constant threat of high-grade uranium ore being dumped along National Forest roads, heavily travelled state highways and Navajo reservation roads, as a result of vehicular negligence involving E.F.N. ore trucks and their 20 ton cargoes of radioactivity; further, any short-term financial reward obtained by a small number of locally hired miners and laborers could easily be negated by the long run horrors of the terminal diseases they risk contracting.

The monitoring and mitigation measures outlined in the Draft EIS bespeak of the risk and chances for levels of radioactive contamination great and small: of the soil, the air, the watershed, the wildlife, the miners, and the innocent human population in the path of this project. Based upon these truths alone we demand that the U.S. Forest Service execute it's duty as caretaker and guardian of our natural heritage. With regards to the Canyon Uranium Mine Project there is only one responsible and honorable alternative--the No-Action Alternative.

48

26-1 Please use your good sense and Human Compassion and don't let this happen —

Thank you

Marie L. Bates
539 Hutton Ranch Rd
Flagstaff, AZ 86001

Forest Service Response

26-1

Please refer to the response to letter 32.

R. Dennis Lund
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lund,

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27-1 Permission for construction of these mines must not be granted

Sincerely Sarah Mechler
Cave Creek, AZ.

Forest Service Response

27-1

Please refer to the response to letter 32. See also response 1-6.

4/25/86

R. Dennis Lund
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lund,

What you are reading is a grass roots chain letter. This is a sincere effort on our part to mobilize great numbers of concerned citizens, to make our voices heard on this issue: the Canyon Uranium Mine project.

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The monitoring and mitigation measures outlined in the Draft EIS bespeak of the risk and chances for levels of radioactive contamination great and small: of the soil, the air, the watershed, the wildlife, the miners, and the innocent human population in the path of this project. Based upon these truths alone we demand that the U.S. Forest Service execute it's duty as caretaker and guardian of our natural heritage. With regards to the Canyon Uranium Mine Project there is only one responsible and honorable alternative--the No-Action Alternative.

28-1 Please don't allow this destruction to happen in such a treasured area.

Thank you very much,

Cheryl L. Kile
[illegible]

50

Forest Service Response

28-1

Please refer to the response to letter 32.

R. Dennis Lund
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lund,

What you are reading is a grass roots chain letter. This is a sincere effort on our part to mobilize great numbers of concerned citizens, to make our voices heard on this issue: the Canyon Uranium Mine project.

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The monitoring and mitigation measures outlined in the Draft EIS bespeak of the risk and chances for levels of radioactive contamination great and small: of the soil, the air, the watershed, the wildlife, the miners, and the innocent human population in the path of this project. Based upon those truths alone we demand that the U.S. Forest Service execute it's duty as caretaker and guardian of our natural heritage. With regards to the Canyon Uranium Mine Project there is only one responsible and honorable alternative--the No-Action Alternative.

Do you realize how CRITICAL this issue is? How many thousands of people would be exposed to the contaminated air and water at the G.C.! Most of those people are our guests to one of the most sacred places on the earth. 29-1

This is just the beginning if EFN is given permission. You must refuse their request!

Peace, Ellen Weissman

91

Forest Service Response

29-1

Please refer to responses 1-6 and 3-4. See also the response to letter 32.

R. Dennis Lund
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lund,

What you are reading is a grass roots chain letter. This is a sincere effort on our part to mobilize great numbers of concerned citizens, to make our voices heard on this issue: the Canyon Uranium Mine project.

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Please help stop this Mine, How long must Corporate greed Continue to ruin the lives of innocent [redacted] people and animals? 30-1

Thank you,

Steve Mahoney
General Delivery, Flagstaff, Az. 8600[illegible]

Forest Service Response

30-1

Please refer to the response to letter 32.

R. Dennis Lund
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lund,

What you are reading is a grass roots chain letter. This is a sincere effort on our part to mobilize great numbers of concerned citizens, to make our voices heard on this issue: the Canyon Uranium Mine project.

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The monitoring and mitigation measures outlined in the Draft EIS bespeak of the risk and chances for levels of radioactive contamination great and small: of the soil, the air, the watershed, the wildlife, the miners, and the innocent human population in the path of this project. Based upon these truths alone we demand that the U.S. Forest Service execute it's duty as caretaker and guardian of our natural heritage. With regards to the Canyon Uranium Mine Project there is only one responsible and honorable alternative--the No-Action Alternative.

31-1 Please — We need your help on this important issue!

Sincerely,
Jennifer L Gillidean

Forest Service Response

31-1

Please refer to the response to letter 32.

R. Dennis Lund
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lund,

What you are reading is a grass roots chain letter. This is a sincere effort on our part to mobilize great numbers of concerned citizens, to make our voices heard on this issue: the Canyon Uranium Mine project.

32-1 If Energy Fuels Nuclear, Inc. is given permission to go ahead with this project, as well as with future mines near the Grand Canyon--mines alluded to in the Draft EIS--reprehensible damages to the environment are sure to result: the
32-2 release of toxic Radon gas from the mineshafts and uranium ore stockpiles;
32-3 percolation of radioactive particles into the earth through totally inadequate stockpile pads and holding ponds; the possibility of flash floods breaching
32-4 E.F.N.'s dikes and dams, carrying potentially deadly, dangerous materials deeper into the watershed of Havasu Canyon; disruption and displacement of major elk,
32-5 deer and antelope calving areas due to mine and haulage-road construction and
32-6 operation; despoilment and devaluation of vital domestic livestock, and wildlife water sources from major new road construction and extented industrial use; for
32-7 365 days a year, for the 10 to 15 year life of this mine, there exists the constant threat of high-grade uranium ore being dumped along National Forest roads, heavily travelled state highways and Navajo reservation roads, as a result of vehicular negligence involving E.F.N. ore trucks and their 20 ton cargoes of
32-8 radioactivity; further, any short-term financial reward obtained by a small number of locally hired miners and laborers could easily be negated by the long run horrors of the terminal diseases they risk contracting.

32-9 The monitoring and mitigation measures outlined in the Draft EIS bespeak of the risk and chances for levels of radioactive contamination great and small: of the soil, the air, the watershed, the wildlife, the miners, and the innocent human population in the path of this project. Based upon these truths alone we demand that the U.S. Forest Service execute it's duty as caretaker and guardian of our natural heritage. With regards to the Canyon Uranium Mine Project there is only one responsible and honorable alternative--the No-Action Alternative.

With environmental concern,

Diedre L. Muns
3040 W. Becker Ln.
Phoenix, Az. 85029

54

Forest Service Response

We recieved 23 letters that were identical to letter 32 (see letters 32 to 54). The common response to this letter is as follows:

32-1

We do not agree that the Canyon Mine would result in "reprehensible damages to the environment." As summarized on pages iii - vii in the EIS, our analysis indicates that adverse impacts are minimized by the implementation of the mitigation measures specified in the Plan of Operations and Preferred Alternative.

32-2

Section 4.2.5.2 of the EIS discusses potential radon gas emissions in detail. The final analysis is that, compared to normal outdoor concentrations, radon concentrations in Tusayan might increase about 10% under extreme meteorological conditions and would be more likely to increase about 2% or less as a result of the Canyon Mine. However, none of these potential increases are large enough to be distinguishable from the normal fluctuations in the natural radon environment.

32-3

The one-foot thick ore pads are adequate to prevent solution percolation into the subsoil. Also, the mine-site ponds are designed to hold normal annual precipitation runoff, plus an extreme (100-year, 24-hr.) rainfall event, plus water pumped from the mine, if any. (See Appendix B, pp. 8-9 and Appendix D, p. 17.)

32-4

The possibility of flash floods breaching the mine-yard perimeter dikes is extremely remote. Most federal regulations require that facilities be designed and constructed to withstand a 100-year recurrence interval storm. The Preferred Alternative is designed to accommodate a larger, 500-year storm event. Thus, the diversion facilities will likely prevent flooding of ore or waste piles even under extraordinary conditions.

32-5

Under the Preferred Alternative, there will be no demonstrable unmitigated impacts to wildlife calving or fawning areas as a result of the Canyon Mine or ore transportation. (See Table 2.7 and response 2-7.)

32-6

The Preferred Alternative will impact one water tank; therefore, we have required that a replacement water be constructed by EFN as a mitigation measure. The new water source will be constructed at a site designated by the Forest Service after consultation with the Arizona Game and Fish Department. (See Section 2.5.14 and response 2-7.)

32-7

See response 60-1.

32-8

The available information on health risk to uranium miners indicates that increases in lung cancer are possible for miners exposed to a cumulative radon dose of 100 WLM. Assuming current WL exposures found in the mine environment and an average of 10 years spent in the mine, a miner may face a 0.5% increase in the risk of developing lung cancer. (See Appendix E, pp. 15-17, and response 87-11.)

32-9

The Forest Service is obligated to assure that any planned actions within the Forest do not detrimentally affect the natural environment without appropriate mitigation measures to minimize any possible impacts. The NEPA process provides a framework for considering and mitigating those impacts. We believe that the EIS demonstrates that no significant adverse impacts will occur as a result of the Canyon Mine, so long as the mitigation measures required by the Plan of Operations and Preferred Alternative are implemented.

Letters identical to letter 32 were received from:

LeAnne and Tom Hines-Wurtz
Janet Braun
Michael M. Retimer
James and Gayle Mahoney
John F. Orr
Amy Hammerschlag
Jay McCormick
Constance McKenzie
Beth Trepper
Carolyn J. Young
Mary P. Goldberg
Deborah Conely and Howell D. Asbie
Elson Miles
Joan Martin
Lisa Pedersen
Christine J. Besally
James S. Mills
Steve and Paula Nelson
Serene Supped
Lucinda A. Yazzie
Randy Rohrig
Barbara Fox

Mary Sojourner
Oak Creek Star Rte.
Box 14
Flagstaff, Az. 86001

May 4. 1986

Supervisor Leonard Lindquist
Kaibab National Forest
800 S. 6th Street
Williams, Az 86046

Dear Supervisor Lindquist:

Thank you for your thorough response to our request for public hearings on the proposed Tusayan uranium mine (DEIS. December 1985); and, thank you for sending your representative to our jointly-sponsored meeting April 30, 1986. He was both attentive and responsive; we appreciated his presence.

55-1 While I understand your inability to enforce Alternative 1 - No Action Alternative, I still wish to formally state my preference for that alternative, based on my research and concerns about the inadvisibility of continuing to mine, use and consider uranium as an appropriate energy source, either for nuclear weaponry or nuclear power plants. I think the recent melt-down in the Soviet Union, the fiscal failure of many nuclear power plants in this country; the on-going effects of radiation exposure, from tests and occupational exposure, to the Native American populations and other peoples of the Southwest (see Downwind from the Bomb. N.Y. Times. Feb. 9, 1986); the clearly stated concerns of the Hopi traditional elders provide ample ammunition for our battle with nuclear power. I also understand that 55-2 you have chosen not to consider the social cost/social benefit equation re: uranium use in this DEIS. I would urge you to do so.

55-3 Given the above, I would like to support the least offensive remaining alternative, Alternative 5, provided that Route #6, all highway, is chosen. I believe that this alternative provides the least wildlife impact; though it still routes the ore-trucks through the Navajo reservation, on poorly built roads, through flash-flood areas and residential and school neighborhoods...I do not support the section of the route that passes through the reservation, nor through Mexican Hat and Bluff, based on the hazardous conditions of the roads and bridges in the Utah segment.

55-4 I encourage the use of common transportation for employees. I would also expect EFN, Inc. to use accepted government quotas in their hiring practices, with highest consideration being given to residents of the immediate area.

55-5 I support the use of buried powerline, though I have reservations about the wild-life impact of the installation process. I feel that Alternative 5 provides the strongest mitigation measures.

I would propose two additional areas of exploration prior to the completion of the final EIS: 1. To comply with the "valuable minerals"

55-6 stipulation in the 1872 Mining Law, I would request that EFN. Inc. be required to provide a "guesstimate" of profits to be made on this mine site. Given the present uranium market and the cost of Alternative 5 mitigation measures, I would like to see their profit measured against a falling market, mitigation costs and the estimated costs of social, health and cost-over-run deficits caused by the current use and mis-use of nuclear power.

55-7 2. I request that you meet with the Hopi traditional elders, perhaps Thomas Banyacya, David Monongye, Marilyn Harris (P.O. Box 54. Hotevilla, Arizona, 86030). to tour, survey and consider the mine site in terms of Hopi religious and spiritual concerns. I know they will welcome your interest.

I urge you to perform a "bold stroke" and deny Energy Fuels Nuclear. Inc.'s proposal for the Tusayan uranium mine: both as a tax-payer and. therefore, your employer, I ask you to respond to my wishes. Should you not respond with a "bold stroke". I request that you record my reluctant recommendation for Alternative 5. Route 6.

Thank you,

Mary Sojourner

Mary Sojourner

cc: Hotevilla
Earth First!
Friends of the River
Plateau Group/Sierra Club

56

Mary Sojourner
Oak Creek Star Route
Box 14
Flagstaff, Az. 86001

June 2, 1986

Leonard Lindquist
Kaibab National Forest
800 S. 6th St.
Williams, Az. 86046

Dear Supervisor Lindquist;

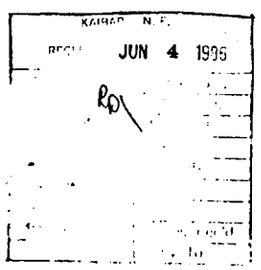
In addition to my previous comments on the DEIS for the proposed Tusayan uranium mine, I would like to add my urging that you decide for an area-wide EIS on uranium mining on both rims of the Grand Canyon. Given the uranium-rich breccia pipes and the potential for a proliferation of mines, with mushrooming environmental negative consequences, we need to plan for the future.

Thank you.

Sincerely,

Mary Sojourner

Mary Sojourner
Canyon Under Siege
Earth First!



Forest Service Response

55-1

Your preference for the No Action Alternative has been noted.

55-2

During the scoping process, we considered including a cost benefit analysis in the EIS. The decision was made not to prepare such an analysis for several reasons. First, Council on Environmental Quality regulations governing the preparation of EIS's state that the merits and drawbacks of alternatives should "not be displayed in a monetary cost-benefit analysis . . . when there are important qualitative considerations." 40 C.F.R. 1502.23. Several important environmental factors considered by the EIS -- wildlife, the Grand Canyon, Indian religious freedoms and water supplies -- are qualitative. Second, due to the nature of the environmental factors evaluated, any assignment of costs and benefits would be uncertain and subjective. In short, we believe that a cost benefit analysis would not aid the decision maker or the public in the evaluation of alternatives.

55-3

Your comment on haul route alternatives has been noted and considered in the selection of the Preferred Alternative.

55-4

The Preferred Alternative includes common transportation for employees and although we may not impose any hiring quotas, EFN has expressed a policy to hire qualified local residents.

55-5

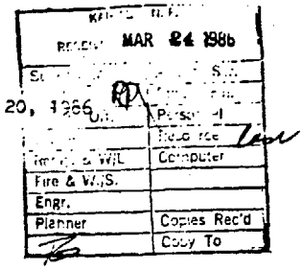
Your preference is noted, however, the Preferred Alternative does not include a buried power line. (See Section 2.4.)

55-6

Please refer to response 1-8.

55-7

We have conducted an intensive site specific archeological investigation of the proposed mine site. In addition, we have requested that religious leaders from both the Hopi and Havasupai Tribes meet with us at the mine site to identify specific sites of religious significance and discuss tribal concerns. To date, neither Tribe has been able to participate in a visit to the site. We continue to consult with Tribal leaders and hope that they will agree to an on-site evaluation. In any event, we will continue to consider the concerns expressed by the Hopi elders during the construction and operation of the Canyon Mine.



March 20, 1986

Leonard Lindquist
Forest Supervisor
Kaibab National Forest

Dear Mr. Lindquist,

56-1 I have just finished reading the draft EIS for Canyon Uranium Mine and I am disappointed to see that you refuse to consider the only sensible Alternative- number One.

As for the haul route options- 1,2,3,4,5,& 7 are all bad choices because of their effect on wildlife. In addition, option 5 is a poor choice because of the unsightly new road off the Coconino Rim that it requires. But regardless of the haul route that is selected, the mine itself will be bad news

56-2 for wildlife. Figure 3.3 shows the mine site right in the middle of a deer fawning area- one of only five such fawning areas in the region. Considering that there are thousands of other mining claims in the Grand Canyon area just waiting for this one to set a precedent, it may not be long before the only deer in the Kaibab National Forest is the one on the cover of your EIS.

56-3 In section 1.1.1 you refer to the multiple use principle on public lands. Be serious here- do you really believe that anyone is going to camp next to a pile of uranium ore? How many families are going to picnic beside a road where 20 ton ore trucks are screaming past? What sane animal will venture near that noisy human occupied clearing? Face it- when you're talking about a uranium mine there is no such thing as multiple use.

56-4 If you absolutely insist on putting a mine in the Forest, may I suggest another alternative? First create the new habitat that you claim will mitigate any adverse effects on wildlife. Study it for three to five years. Then, only after you are certain that a new fawning area has been established, that wildlife is accepting the new meadow and catchment ponds, permit a closely monitored operation to proceed. The ecology of the Coconino Plateau is too fragile for development to proceed at any faster pace than that.

Sincerely,

Jim Hasbargen

Jim Hasbargen
4610 E. 26th St.
Tucson, Arizona 85711

Forest Service Response

56-1

Your comment has been considered and the discussion of the No Action Alternative has been expanded in the final EIS. (See response 1-7.)

56-2

Two wildlife mitigation measures (the construction of a 32-acre replacement foraging area and a new wildlife water tank) are included in the Preferred Alternative. These measures will offset the impact of the mining operation on current wildlife use of the mine site. (See Section 2.5.14, Table 2.7 and Appendix C.)

56-3

All uranium ore piles will be within the mine yard security fence. (See Section 2.5.4 and Appendix A.) The increase in traffic caused by 20 ore trucks along all but a few miles of routes #6 and #7, which are part of the Preferred Alternative, is considered to be insignificant. (See Table 2.11.) On the sections of road where the trucks constitute a significant increase in traffic (Forest Service roads 305 and 305A from the mine to U.S. 180 and across the SP Crater road from U.S. 180 to U.S. 89) they will be travelling at reduced speeds.

56-4

The game habitat on the Tusayan Ranger District is considered marginal. Its overall carrying capacity is low, relative to other game management units in northern Arizona. Scarcity of reliable water sources is considered to be a major factor in this low productivity. By constructing a new water source, the overall habitat should be improved, since the original water source is still available, and will probably be used periodically despite the presence of the mine. (See Appendix B.)

April 29,1986

Dear Mr. Lindquist,

After reviewing the DEIS for the Canyon Uranium Mine, I feel obligated to express my concerns on this issue.

57-1 I am disappointed that Alternative 1 (no action) cannot be considered a viable option due to federal mining laws which were enacted in the last century.

57-2 I'm not as confident as the Forest Service appears to be that there will be no adverse impacts as a result of this mine. Accidents and the unexpected do happen in this world even in the most well laid plans.

57-3 There have been numerous tragedies in the Southwest concerning uranium mining (Tuba City, Grants, Navajo uranium workers, and so on). The problems in these areas were not apparent for decades, when it was far too late to do a thing about it. Will we someday find out that the "state of the art" in 1986 was just not aware of the problem at the time.

57-4 With the choice of alternatives that we are given; Alt. 5, Haul Route # 6 seems the least evil of the bunch. The route is already there. It requires no new construction and has the least impact on wildlife which certainly can't be said about Alt. 3. Alternative 4 assumes that additional mines will be built and

57-5 even attempts to predict where they will be located. I think that this is an inappropriate assumption and should be beyond the scope of this DEIS.

If the mine is going to be built, the monitoring program is essential, and I would like to be assured that Energy Fuels Nuclear will be held liable for any adverse impact incurred as a result of any of their mines, no matter when it is discovered.

Sincerely,

Lawrence M. Lesko
PO Box 802
Williams, AZ 86046

69

Forest Service Response

57-1

Please refer to response 2-4.

57-2

Please refer to responses 8-3 and 60-1.

57-3

Section 1.3 lists the federal, state and local regulatory requirements that apply to the Canyon Mine. Nearly all of these requirements were not in effect when the uranium mining and milling took place in Tuba City and Grants. The monitoring requirements associated with the Canyon Mine will promptly disclose any environmental impacts.

57-4

Your comment was considered in the selection of the Preferred Alternative. Alternative 5 has been selected as the Preferred Alternative by the interdisciplinary team. (See Section 2.4)

57-5

We do not agree. Predicting cumulative impacts at this time is extremely speculative. However, although we do not know when, where or if any future mines will be developed, we feel an effort to generally project possible future mines is useful in the projection of potential impacts. See the discussion of potential cumulative impacts throughout Chapter 4 of the EIS.

PO Box 802
Williams, AZ 86046
30 April 1986

Dear Mr. Lindquist,

58-1 It is with a heavy heart that I write this letter in response to the DEIS for the Canyon Mine. I know that because of an anachronistic law there is nothing I can do to stop the destruction of yet another part of our forest, but I am incredulous that this action can still take place despite

58-2 abundant evidence that radioactive debris is a plague on the land and to our health. I can only hope that the nuclear energy industry goes broke in light of recent incidents in the Soviet Union and elsewhere.

58-3 If the mine must go through, I have to choose Alternative 5, Haul Route 6. This would involve the least amount of disturbance to the natural and cultural resources of the area. I am strongly opposed to any alternative which would route trucks past Hull Cabin, a National Register of Historic Places District of interest to recreationists and home to seasonal employees. Any route through the Forest would be devastating for wildlife and archaeological sites and represents an unnecessary expense. Keep the trucks on the main highway, so that everyone can see and appreciate the benefits of nuclear energy.

Sincerely yours,

Teri Cleeland

Ms. Teri Cleeland

58

Forest Service Response

58-1

Please refer to response 2-4.

58-2

Please refer to response 8-3.

58-3

Your comment was considered in the selection the Preferred Alternative. Alternative 5 has been selected as the Preferred Alternative by the interdisciplinary team. (See Section 2.4.)

Dear Mr. Lindquist, April 29, 1986

59-1 Let me begin by saying I am totally opposed to all mining in the environs of the Grand Canyon; this nation could never need uranium-or anything-that bad. However, given the reality of the existing statutory freedom bestowed upon all mining activities, my opposition to the proposed EFN Canyon Mine becomes a moot point. Suffice it to say, I will work hard in the ensuing years to attack this environmental plague at its heart: in the antiquated mining laws which allow anyone with a shovel to start digging wherever he stakes a claim.

59-2

In the meantime , I am forced to choose between the lesser of four evils proposed in the DEIS. I strongly urge the USFS to select Alternative 5 & Haul Route 6.

The compilers of the DEIS have made it clear that the Forest Service has narrowed the viable alternatives down to numbers 3, 4, & 5. And in terms of mitigation factors which have been attached to EFN's proposed plan of operations, there is little or no difference between the three alternatives.

61

The differences arise when the haul route options are matched with their corresponding alternatives as compiled by the draft study team. I might add that these pairs selections should not necessarily be carved in stone. For instance, I could live with Alternatives 3 & 4 if they were to use Haul Route 6; but under the present pairing arrangement I can not possibly support either option. Alternative 3 should be scratched because the Haul Routes 1 & 2 option will drastically and detrimentally impact wildlife while at the same time depend upon over twenty miles of reconstruction and four miles of new construction within the forest. Alternative 4 should also be eliminated from consideration because of the fact that Haul Route 5 involves the most

59-3 devastating impact to the environment, scenic qualities, & cultural resources while calling for thirty-one miles of reconstruction of forest roads and three miles of new construction off of the Coconino Rim escarpment. All haul routes which will entail the construction of a new road off the east end of the rim should be forever shelved as an unnecessary scar on the land and an insult to the neighboring Navajos and millions of visitors to the Grand Canyon. As for the argument that Haul Route 5 might best incorporate possible mine operations in the future, I would respond that we are dealing at this point with one proposed mine, and that if there should in fact prove to be additional mines proposed along this route then there is nothing to preclude them from backtracking down roads 310, 316, 320, 305 & ending at Highway 64. Haul Route 6 remains the only sensible choice because it would impact wildlife and cultural resources the least while minimizing road work by utilizing existing roads and highways. Each haul route option entails a minimum of 25 miles of reconstruction road work, and five out of seven of the options would propose at least 3 miles of new construction. Haul Route 6 would mean only 5 miles of easy reconstruction on forest roads 305 & 305A. And as for that 5 miles of reconstruction, I would assume the two roads would have to be at least moderately upgraded regardless of which option is chosen,due to the fact that they will serve as the only access route for the mine workers on their way to and from work each day. It would be sensible to utilize the same route to both haul the ore and the mine workers because it would minimize cost and impact. During the 5 year life expectancy of the Canyon Mine, the highway haul route will end up saving EFN over $600,000 when matched against Haul Route 5, and only $100,000 more than the forest routes which rely heavily on habitat damage and massive road work. Surely the Forest Service would not be imposing too severe or prohibitively expensive restrictions by choosing the path which has the least overall impact on the area. The DEIS states that the purpose of the document and entire mitigation process is to "ensure that adverse environmental impacts are avoided and minimized during construction and operation of the project." This being the first south rim mining endeavor since the Orphan Mine, the Forest Service would undoubtedly best be able to follow its own designated goals and legal responsibilities by ensuring that this entire uranium mining process move slowly at first so as to ensure that a reliable data base of workable information may be accumulated so that the total impact of such an activity can be carefully assessed. Haul Route 6 fits this careful approach better than any other option. Which only leaves Haul Route 7 to deal with. I am hesitant to go along with that idea because it could easily end up in litigation limbo as right of ways from the state and private land are negotiated.

The Forest Service's role in this whole process has primarily been one of mediating safety. And with the drafting of this document you are now assuring the general public that this entire project proposed by EFN is as safe as mother's milk. Okay fine, today's "state of the art" data forces me to accept your written word in the matter; and so, let's run those ore trucks right down the state highways and through the very heart of Flagstaff. Let's let the people see Multiple Use in action. It would be completely unjustifiable to spend big bucks to hide this operation in the woods and route ore trucks all over the forest. Let the tax taxpayer see the valuable uranium go zooming by so that EFN can sell it to the French, who in turn can sell it to Iraq, who in turn can...

2

Ah well, so be it. And if by some "act of god" there is an accident-you know, like the tragedy which just took place in the Soviet Union-then it should be made perfectly clear in precise legal language that EFN will be responsible for any damage which they are responsible, and that liability should last in perpetuity. The $100,000 reclamation bond does not come close to covering the cleanup of a major nuclear accident. It should be clearly stipulated that EFN can-and will-voluntarily come forward now or in the future with the big league bucks that it would take to clean up a hazardously contaminated area.

59-4

And while we are on the subject of accidents with EFN projects, perhaps you could shed some light on the incident which occurred at their Hack Canyon Mine, on the north side of the Grand Canyon, where an evaporation pond designed to withstand a 500 year flooding event somehow was overrun by a minor summer thunderstorm?

59-5

My experience with this sort of thing tells me that the issue will soon be forgotten-until EFN screws up. Then they will get a hand slap fine and continue merrily & dangerously onward. And all so we can put about 25 people to work. And that might look good on paper, but then so does an obituary..

Sincerely, Stephen B. Carr

Stephen B. Carr
DeMotte, Arizona

92

Forest Service Response

59-1

Please refer to responses 3-4, 5-1 and 5-4.

59-2

Please refer to response 2-4.

59-3

Your comments were considered in the selection of the Preferred Alternative. Alternative 5 has been selected as the Preferred Alternative by the interdisciplinary team. (See Section 2.4.)

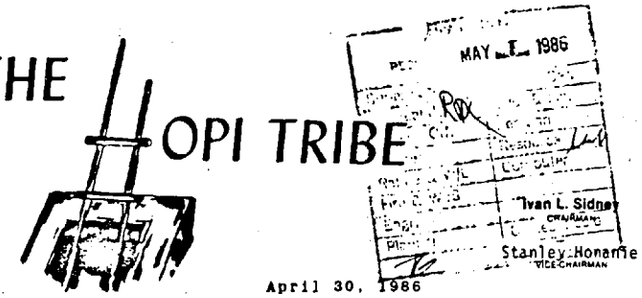
59-4

EFN will be responsible for the timely clean-up of accidental ore spills (see response 60-1) and site clean-up and reclamation after mining ceases. (See Sections 1.7, 1.11, 2.15, 2.17, 2.37 and 4.3.) The Canyon Mine proposal does not contemplate any use of processed uranium. No "major nuclear accident" is possible.

59-5

The incident referred to in your comment occurred in August, 1984. It did not involve an evaporation pond, but did involve an overflow of water from a surface water diversion structure at the Hack Canyon Mine as a result of a 120-year, 3-hour storm event. Full details of the event are on file with EPA. The incident was immediately and completely cleaned up and it was determined by an independent engineering evaluation that no contamination of surface water resulted. See response 32-4.

THE HOPI TRIBE



In reply refer to:

April 30, 1986

Leonard A. Lindquist, Supervisor
Kaibab National Forest
800 S. 6th Street
Williams, AZ 86046

Dear Mr. Lindquist:

The Hopi Tribe would like to issue a statement of concern over the proposed Canyon Uranium Mine and the associated Draft Environmental Impact Statement (DEIS). The Hopi Tribe is opposed to uranium mining south of the Grand Canyon and prefers the no action alternative be adopted because of the impacts to Hopi culture and interests created by the proposal. The Hopi Tribe wishes to advise the U.S. Forest Service that it vigorously supports the Havasupai Tribe's position against uranium mining south of the Grand Canyon in areas historically used by both tribes.

If the no action alternative is not legally feasible, then the Hopi Tribe favors Alternative 5, using Haul Route 6, subject to the comments in this letter.

The Hopi Tribe reserves the right to submit further comments as necessary pending the receipt of additional information.

The following discussion covers two (2) major areas of concern to the Hopi Tribe. Included to supplement the discussion are two affidaits identifying areas of cultural and religious significance to the Hopi Tribe. Subsequent to this discussion are a number of general and specific comments on the Canyon Uranium Mine and the associated DEIS.

P.O. BOX 123 — KYKOTSMOVI, ARIZONA — 86039 — (602) 734-2441

60-1

Truck Transportation Hazards At U.S. 89A Bridge
Over The Little Colorado River

The Draft EIS does not evaluate environmental impacts of a truck transport accident. The possibility of a spill of uranium ore into the Little Colorado River at the bridge crossing on U.S. 89A North or the impacts of spills at other location north of the bridge must be considered and evaluated. At least ten 20 ton haul trucks transporting the hazardous uranium ore will pass this bridge each day for the next 5-10 years. Critically important Hopi religious sites are located downstream from the U.S. 89 bridge on the Little Colorado River. The existing bridge is narrow, and trucks over ten tons are required to use an older bridge to cross the Little Colorado River Canyon. Not only is the main bridge hazardous, but truck traffic leaving or reentering U.S. 89A in connection with the alternate bridge truck route create special accident hazards. An accident resulting in a spill into the Little Colorado River would result in water transport of hazardous materials downstream before any emergency clean up could be effected. These hazardous materials would contaminate sites along the downstream river, including Blue Springs, Sipapu, and the Hopi Salt Trail. These hazardous materials would then enter the main stem Colorado River and Grand Canyon National Park. Not only would sacred Hopi religious sites be severly damaged, but Hopis visiting these sites and Hopis in villages using contaminated materials gathered from these sacred sites would potentially be exposed to unreasonable radiation risks. Also, golden eagles from both above and below the U.S. 89A bridge may consume contaminated food sources, and in turn when they are gathered by Hopis may expose their Hopi religious guardians to unreasonable radiation risks. Hopi eagle gathering areas downstream from the U.S. 89A bridge or in the area of Echo Cliffs, to the north along U.S. 89A, will be directly exposed to unreasonable radiation risks, in the event of an accidental spill.

There are also risks both to Grand Canyon National Park and the resident bald eagles from an accident at or near the U.S. 89 bridge over the Little Colorado River. Water from the Little Colorado River enter the mainstem Colorado River and Grand Canyon National Park. Accidental deposition of hazardous materials into the Little Colorado River from the haul truck traffic passing over this bridge over a 5-10 year period, is more than a remote statistical possibility. Dangerous crosswinds in the canyon and throughout the proposed haul route magnifies this potential introduction of these hazardous materials into the Grand Canyon National Park as a result constitutes a risk that should be evaluated. Moreover, this same risk impacts bald eagles which nest in or use the National Park. If they feed on fish or other food contaminated with hazardous materials, what impact would this have on this endangered species?

Other spills in the area of Cameron or northward in the 1934 Executive Order Reservation (Bennett Freeze area) along U.S. 89A could result in wind transport of hazardous nuclear wastes to the Hopi village of Moencopi. The area along U.S. 89A is subject to

seasonally strong winds and these winds could trasport hazardous wastes to Moencopi before any emergency clean-up could occur. The Draft EIS does not describe in any detail the clean-up procedures that have been developed by the project proponent to deal with various clean-up scenerios. None of the foregoing risks were evaluated in the DEIS. These risks require careful evaluation of possible alternative transport routes or modes of transport. Additional measures to prevent or mitigate the effects of an accidental spill, are a necessary part of this evaluation. State and federal guidelines authorizing truck transport of hazardous materials across the Little Colorado River Bridge, and throughout the proposed transport route must be specifically addressed.

60-2

Religious And Cultural Interests Of The Hopi Tribe
At Or Near The Mine Site

Deer, elk, turkey, spruce boughs, pinon nuts, and sacred herbs are gathered by Hopis in areas near the proposed mine site and along the various haul route alternatives through the national forest. These plants and animals have been gahtered from this area by the Hopis both historically and in present times for ceremonial, religious, and food purposes. Accidents or uranium dust blowing off transport vehicles could contaminate this area. Impacts from the mine site and various proposed road alternatives will make it impossible or impractical for Hopis to continue historic religious and food gathering activities. Incremental cumulative actions by federal agencies may result in eventual or practical denial of Hopi rights. This becomes especially serious when religious rights are effected on a step-by-step basis. In those cases where central and indispensable religious rights may not be at stake, but where freedom of religious rights are effected, careful mitigation measures to overcome any infringement on those religious rights should be taken so that the net effect of governmental action is neutral in its effect on religious rights. Traditional Indian food gathering activities, as part of the multiple-use sustained-yield concept, should also be preserved against undue interference by other governmentally approved actions.

Cultural resources of Hopi ancestors including ruins and burial sites are found throughout the proposed mine, site and road alternative area. The DEIS does not state that Hopi of other affected Indian tribes will be directly involved or even consulted in resource decision making. Decision making by federal and state authorities that directly and immediately affect Indian tribes, but where the affected Tribes are outside the decision making loop, is likely to lead to inaccurate decision making and will create suspicion and distrust.

Religious and cultural impacts of the proposed action upon Indian Tribes fall under the category of social and economic impacts and must be included in the DEIS. Tribes must have the opportunity to have their interests properly considered in the EIS process and in all levels of federal decision making.

GENERAL COMMENTS

60-3 1) A discussion of uranium ore transportation across the Hopi and Navajo Reservations and any potential health and environmental impacts must be included in the Environmental Impact Statement (EIS).

60-4 2) The discussion of the cumulative impacts of numerous uranium mines on the groundwater resources is inadequate. A detailed analyses, including modeling, is necessary to adequately predict potential impacts.

60-5 3) A complete archeological report must be available for review and comment prior to issuance of a final EIS and any mining permits.

60-6 4) All archeological sites located along potential haul routes must be inventoried, their significance analyzed and results made available prior to issuance of a final EIS and any mining permits.

60-7 5) Figures 1 and 3 of Appendix F, Groundwater Conditions, must be distributed to DEIS reviewers so that a complete understanding of this section is possible. Without these figures the ability to comment on this section is limited.

60-8 6) Haul route options 1, 2, 5, and 7 should be eliminated as alternatives because of their potentially severe adverse effects on archeological sites and wildlife populations and habitat located along these haul routes. This position is supported by the letter from the Arizona Game and Fish Department located in Appendix C.

SPECIFIC COMMENTS

Pg. 2.13 - Alternatives Considered In Detail

6-09 The DEIS states that all uranium ore which is uneconomical to process will be hauled from the site to a previously approved location, or disposed of underground in the mined-out workings. The location off the off-site area and its suitability for the disposal of low grade uranium ore must be discussed. The Hopi Tribe does not approve of the creation of abandoned uranium ore piles because of the problems associated with them.

Pg. 2.17 - Reclamation Plan

The reclamation plan states that topsoil will be salvaged from the mine yard and stockpiled at the nothern end of the yard in the form of a dike. Use of this material for dike material could result in the loss of topsoil because of erosion by precipitation and surface water run-off. The potential for contamination by radioactive materials exists because of the topsoil dike's proximity to the ore stockpiles and its location downward of the ore stockpiles. Also, an event rainstorm may result in radioactive runoff coming in contact with the stockpiled topsoil. Because of the potential for degradation or loss, topsoil should not be used for dike material. It should be stockpiled in a location where the potential for degredation or loss is eliminated.

60-10 The plan of operations also states that six (6) inches of topsoil will be salvaged. The soil in the mine yard area are classified as fine-loamy, mixed Cumulic Haploborolls ranging from 20 to 60 inches deep. Extensive research on mineland reclamation clearly indicates that revegetation success increases with increased topsoil application. Based on these studies and available depths of topsoil, a minimum of 12 inches should be salvaged.

What will be done to reduce compaction in the mine yard area following the cessation of mining of prior to topsoil application? Failure to alleviate compaction could adversly impact revegetation success.

What criteria were used to determine the bond amount?

Pg. 2.18 - Ore Haulage

60-11 This section states that in the event ore spillage occurs the State of Arizona or Utah will be notified and the spill will be cleaned up. Most of the routes used by the EFN for transporting the uranium ore to Blanding, Utah, crosses the Hopi and Navajo Reservations. Therefore, Hopi and Navajo Tribal governments must be notified of any spills on or near the reservations.

This section also states that all spilled uranium ore will be cleaned up in two (2) working days. Given the climate of the region, with the high winds and event rainstorms, considerable uranium ore could be lost from the spill area during the two (2) day period. A temporary, emergency stabilization plan for spilled uranium ore must be included to protect public health and safety.

What are the State and Federal cleanup standards relating to the spillage of uranium ore that will be strictly adhered to?

All applicable Hopi and Navajo Tribal regulations must also be adhered to.

Pg. 2.19 - Erosion Control and Pg. 3.17 IC#4 Wildlife

60-12 The recommended seed mixture for use in erosion control and site reclamation is composed of three introduced grasses. Native grass species present at the site include western wheatgrass and blue grama. Both of these species are well adapted to the area and are available as seed. These species should be used for erosion control and revegetation because of their adaptation to the area. Their use will also result in a better blending in of the disturbed area with the surrounding undisturbed areas.

Pg. 2.22 - Radiological Monitoring

60-13 The EIS states that soil and water samples will be collected until such time as sufficient data is availabe to delineate possible radionuclide increases from accidental releases and to insure that groundwater, if present, will not be adversly impacted. Thereafter, only mine well water and soil from the survey location downwash will be sampled. However, on page 4.17 the DEIS states that the primary source of TSP emissions within the project area will be wind erosion of the disturbed area and ore stockpiles. The wind erosion of the high grade uranium ore stockpile could result in contamination of washes and soils located downwind of the mine yard. Routine monitoring of downwind areas must be continued to insure that contamination of water or soil is detected and remediated.

All haulage accident radiological reports must also be submitted to the tribes.

Pg. 2.22 - Groundwater Monitoring

60-14 In the section on potable water, page 2.10, the DEIS states that it is hoped that water will be encountered at the base of the Coconino Formation for use in sanitation and drilling. If an aquifer is encountered in this formation, or any other, it must also be

monitored for routine constituents, trace elements grass alpha and beta radiation, uranium and radium 226. Failure to do so may result in contamination of a perched aquifer, local springs and seeps or Redwall-Muav aquifer because of the general downward movement of water in the area.

Pg. 2.24 - Wildlife Mitigation

60-15 Throughout the DEIS important wildlife water tanks are discussed. Nowhere in the DEIS is the source of water for these tanks given. This must be discussed.

Also, the DEIS states that impacted water tanks will be relocated. Where will they be relocated and what will be the source of water for these new tanks?

Pg 2.22, Table 2.12 - Impacts On Water and Soil Resources

60-17 No mention is made of continued monitoring of Blue Springs. Because of the cultural importance of Blue Springs to the Hopi Tribe, EFN must continue to monitor the springs for potential contamination.

Pg. 4.10 - Proponent-Incurred Project Costs

60-16 Under Alternative 2 it is stated that that project costs for this alternative are almost 30 percent lower than the next lowest cost alternative. This appears incorrect. Alternative 3 is only 10 percent more expensive than alternative 2. This must be corrected.

Pg. 9 - Appendix F

The Groundwater report states that the Toroweap Formation is considered a minor aquifer and yields small quantities of groundwater to wells in the Canyon Mine site area. If this is the case, these wells must be monitored to assure they do not become contaminated because of mining by EFN.

60-17

Pg. 11 - Appendix F

The Groundwater Hydrology report states that the upper part of the Supai Group yields small quanities of groundwater to wells to the Canyon Mine site area. If this is the case, these wells must be monitored to assure they do not become contaminated because of mining by EFN.

Pg. 20 - Appendix F

The discussion on yield from perched aquifer springs is inadequate. All springs mentioned and all springs located on the Havasupai Reservation must be located, the stratigraphic unit discharging the water identified and the discharge rate and water quality quantified.

Also, the alluvium along Red Horse Wash and Cataract Creek must be studied to identifiy any potential alluvial aquifers. If alluvial aquifers are present, monitoring wells must be established so that any potential contamination by surface water can be identified and remediated.

Pg. 38 - Appendix F

The Hydrologic report states that while the opening could function as a conduit and tend to concentrate movement of recharge water through the lower unmined breccia pipe after mining this will mitigated by sealing the mine opening at the land surface. The following paragraph states that while exposure of minerals in the mine walls to strong oxidizing conditions results in increased mobility of radioactive minerals, the rate of leaching of these minerals will be mitigated by sealing the mine. Nowhere is the potential for lateral movement of water from surrounding areas into the mine shaft and potential leaching of uranium minerals discussed. This must be discussed in light of proceeding statements regarding perched aquifers draining into the mine.

Pg. 39 - Appendix F

60-18 Because of possible contamination of the Redwall-Muav aquifer caused by leaching of uranium minerals following closure of the mine groundwater monitoring must be continued beyond the period of mining operations.

These are the comments and concerns of the Hopi Tribe. We appreciate the opportunity to provide comments on this proposal. Please feel free to call for further discussion if necessary.

Sincerely,

IVAN L. SIDNEY, Chairman
The Hopi Tribe

67

THE HOPI TRIBE

Ivan L. Sidney
CHAIRMAN

Stanley Honanie
VICE-CHAIRMAN

In reply refer to:

May 06, 1986

Leonard A. Lindquist, Supervisor
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 68046

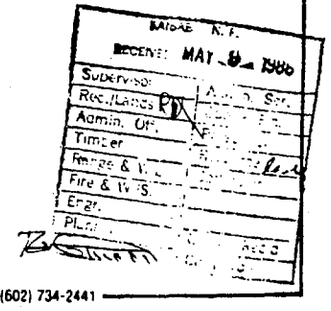
Dear Mr. Lindquist,

Enclosed please find an affidavit by Mr. Walter Hamana. The affidavit was inadvertantly omitted from the Hopi Tribe's comments on the Canyon Uranium Mine Draft EIS. Please included this affidavit with the tribes comments which wre submited on May 1, 1986.

Please feel free to call me at 734-2441, Ext. 506 if more information is needed.

Sincerely,

Robert C. Postle,
Reclamation Specialist
Division of MIning &
Reclamation Enforcement



P.O. BOX 123 — KYKOTSMOVI, ARIZONA — 86039 — (602) 734-2441

88

AFFIDAVIT

I, Walter Hamana, declare the following to be true under penalty of perjury. I am over the age of eighteen 18 and am competent to testify to the matters set forth in this affadavit.

I am employed by the Hopi Tribe. Part of my responsibilities include factual documentation of Hopi eagle gathering areas. Based on my research, the following areas have numerous active eagle gathering areas: Little Colorado River upriver from bridge on U.S. 89 at Cameron; Little Colorado River downriver from bridge on U.S. 89 at Cameron; along U.S. 89 in the area known as Echo Cliffs between an area north of the junction of U.S. 89 and U.S. 160 and from there along U.S. 89 past the turnoff to Page, Arizona and on past the bridge over the Colorado River near Lee's Ferry.

Golden eagles are gathered by members of the Hopi Tribe for extremely important religious purposes. The feathers of golden eagles are used in making "pahos" or prayer feather sticks which convey the prayers of Hopis to the Creator.

Golden eagles are very sensitive to their environment. Introduction of nonbackground radioactive materials into golden eagle living and nesting areas would endanger the lives of golden eagles and of Hopis who might enter contaminated areas for the religious purpose of gathering sacred golden eagles.

As part of my responsibilities with the Hopi Tribe as well as my experiences as a practitioner of the Hopi religion, I know that the area of the Little Colorado River downstream from the U.S. 89 bridge at Cameron has very important significance for the Hopi religion. In addition to Blue Springs, this area also includes at least two other sites held to be extremely sacred by the Hopi. These are the Sipapu and the Salt Trail. The Sipapu is the place of emergence of the Hopi into this world and is one of the most important religious places for the Hopi. Also, the Salt Trail is a religious pilgrammage of very great importance to the Hopi. Both Sipapu and the Salt Trail are in the floor of the Little Colorado River near its confluence with the Colorado River.

If the bed of the Little Colorado River were contaminated by uranium ore spilled into the River by an accident at the bridge on U.S. 89, critically important Hopi religious places would be contaminated. Hopis performing some of the most important religious duties of Hopi religion visiting these areas would thus also be subjected to nonbackground radiation exposure.

I declare the foregoing to be true under penalty of perjury.

Walter Hamana

Notary Public My commission expires March 6, 1989

AFFIDAVIT

I, Radford Quamahongnewa declare the following to be true under penalty of perjury. I am over the age of eighteen (18) and am competent to testify to the matters set forth in this affidavit.

I am a member of the Hopi Tribe, practice the Hopi religion, and am a member of the Snake Society, which is a religious society of the Hopi religion. My responsibilities as a member of the Snake Society require that I accompany and protect the other members of the Tribe in the performance of various religious duties. In the course of carrying out my religious reponsibilities, I have visited and am familiar with Hopi religious sites near the village of Tusayan. I have examined maps included in the Appendix to the Draft Environmemntal Impact Statement for the Canyon Uranium Mine. In areas generally around Twin Lakes, Skinner Ridge, and Red Butte, Hopis gather Turkeys. Peathers of Turkeys are used in many religious ceremonies. Hopis also hunt deer in this area. Deer are used both for ceremonial and food purposes. Likeswise, Hopis gather pinon nuts and sacred herbs in this area which are used both for ceremonial and food purposes. On trips to this area, Hopis visit ruins of Hopi ancestors near Tusayon where prayers are offered and sacred corn meal is left in respect for our ancestors. There are probably other ruins and Hopi graves in this area.

I declare the foregoing to be true under penalty of perjuring.

RADFORD QUAMAHONGNEWA

SUBSCRIBED & SWORN to before me this 01 day of MAY, 1986.

Edith Letseoma, Notary

My Commission Expires: July 12, 1986

Forest Service Response

60-1

Radioactive releases from ore spills resulting from ore truck accidents are discussed in the EIS. (See Section 4.2.6.) Appendix F, the Radiological Assessment, also discusses the probability of an ore truck accident. Additional language has been added to the text to respond to this comment and clarify potential impacts.

Mitigation measures applicable to all haul route alternatives are described in Section 2.5.5 and require that any spilled ore be immediately removed. Operating experience with Energy Fuels' ore trucks in northern Arizona indicates that these mitigation measures are effective for normal accidents and that spilled ore can be removed, leaving no residual radioactivity. In addition, training programs have been reevaluated to assure that drivers understand the procedures to be followed in the event of an accident or spill. (See response 2-5.)

The potential effects of ore spills at individual sites along the haul routes were not analyzed as there is no evidence to indicate that spills would be significantly more likely at any particular location. Additional language has been added to the text in Section 4.2.6 to discuss the possibility of an ore spill into flowing surface water.

There is no evidence that the bridge crossing the Little Colorado River on U.S. Highway 89 is more dangerous or a more likely site of an accident than any other location along the proposed haul routes. Consultation with the Arizona Department of Transportation indicates there have been no accidents reported in the area of the Cameron Bridge during the past three and one-half years. The comment that the main bridge is limited to haul trucks under ten tons is incorrect; in fact, the limit is 40 tons. Ore trucks from the Canyon Mine will use the main bridge and an inspection of the site and consultation with the Arizona Department of Transportation have disclosed no identifiable hazards.

The possibility of an accident near the bridge is extremely remote and contamination of surface water or downstream springs is even less likely since the Little Colorado River is frequently dry at this point. Finally, any ore spilled and not immediately cleaned up would be diluted below measurable levels before reaching any sensitive areas. Because any spills will be cleaned up, there will be no contaminated areas which could threaten Hopi religious gathering activities. (See text additions to Section 4.2.6.)

60-2

We agree that "religious and cultural impacts . . . upon Indian Tribes . . . must be included in the EIS." Any sites of religious significance should be identified and avoided or mitigated. Accordingly, the Forest Service has consulted with tribal leaders, attempted to meet with Tribal representatives at the mine site, and consulted with experts on Indian religious sites and practices. Those areas which have been identified, e.g., Blue Springs, are discussed in the text. Until the Tribe is able to identify additional specific potential sites, further analysis or mitigation is impossible. The text has been revised to reflect the information provided by the tribal comments, and the general Tribal concerns. Consultation efforts will continue in the consideration of the Plan of Operations for the Canyon Mine. See also response 61-1.

60-3

Please refer to the response to Comment 1 and EIS Appendix E.

60-4

The Grand Canyon region is hydrogeologically and structurally complex. Uranium mines north or east of the Grand Canyon do not create cumulative effects for areas south of the Grand Canyon.

The EIS analysis concludes that the potential groundwater impacts are localized near the mine site. (See responses 61-3 and 61-5.) Cumulative impacts are not expected unless two mines are operated very close together. No potential mine site has been identified near the Canyon Mine. The EIS text has been revised to provide a more complete discussion of potential groundwater impacts.

60-5

A complete inventory and analysis of cultural resources has been completed for the mine site. The report has been reviewed and approved by the State Historic Preservation Officer (SHPO), and the results are reflected in the EIS. (See Section 3.1.14.) Two sites were identified and evaluated. For haul route impacts, see comment 6.

60-6

A complete inventory and analysis of cultural resources impacted by improvements or construction along the haul routes will be completed and approved by the SHPO before any surface

disturbance is allowed. Possible impacts on archeological sites were considered in the selection of the Preferred Alternative which requires relatively little road improvement or construction.

60-7

We do not believe that Figures 1 and 3 are essential for review and comment on the groundwater analysis in the EIS. The DEIS explained that they were available for review at the Kaibab National Forest. The maps were supplied to those few parties requesting them. Following receipt of your letter, copies of these maps were sent to you.

60-8

This comment has been considered in the selection of the Preferred Alternative. In addition, the Arizona Game and Fish Department now recommends haul route option 7.

60-9

If off-site waste disposal is necessary, it will require an amendment to the Plan of Operations which is subject to review under NEPA and the substantive requirements of applicable environmental laws and regulations. No site on federal land can be selected without consultation with affected Indian Tribes and other parties. Because the amount of waste ore cannot be determined until mining begins, it is not possible to determine if a site is necessary or select a site at this time. EFN indicates that the possibility of off-site disposal is extremely unlikely.

60-10

Because the stockpiled topsoil will be used for construction of the northern (upstream) portion of the perimeter dike, any possible contaminated storm runoff from within the mine yard would flow away (down gradient) from the dike into holding ponds. Because the dike is riprapped, it should be protected from any contamination resulting from storm events or rainfall erosion. (See Section 2.5.12.)

We have considered this comment and have determined that 6 inches of topsoil is adequate to ensure success of revegetation.

The amount of the performance and reclamation bond was determined by using reclamation cost estimates adjusted for inflation and estimation errors and discounted over a seven-year planning horizon.

60-11

Tribal governments will be notified of any ore spills on reservation lands. The text has been modified to reflect this change.

EFN has committed in the Plan of Operations that cleanup of ore spills will occur immediately. (See Appendix A, p. 21.) Two working days is the maximum time period allowed before EFN is subject to a notice of violation.

Uranium ore is not generally considered a hazardous material. Therefore, its handling and transport are not generally regulated by state or federal authorities apart from the cleanup standards established by the Plan of Operations. In addition, State of Arizona regulations require that any spill of radioactive material be immediately reported to the Arizona Department of Public Safety, Phoenix Duty Officer. As noted in the EIS, the Plan of Operations requires that all spilled ore be removed.

60-12

Native browse species are used for wildlife, but the recommended grasses are more successful in speedy reclamation of disturbed areas. These species have been widely introduced on the Forest.

60-13

The constant radon measurements and monitoring discussed in Section 2.5.10 are sufficient to identify the need for any extraordinary soil and water sampling. (See Section 4.2.5.)

60-14

As indicated in the text of the EIS, if the proposed well at the mine site yields groundwater, monitoring of that well for possible contamination will be required as a mitigation measure. If contamination is detected, the Forest Service may require pumping of that well as further mitigation.

Records indicate that the nearest existing wells available for monitoring chemical quality of groundwater in the Toroweap Formation occur near Tusayan, located six miles northwest from the mine site. Inspection of the Tusayan wells in June 1977 and interviews with well owners in June 1986 indicate that the wells are abandoned. Pumping rates of less than one gallon per minute for short periods resulted in excessive water level drawdown in most of these wells. All water supply for Tusayan

is trucked from reliable water sources at Williams, Grand Canyon, or Flagstaff, Arizona.

Records indicate that the nearest wells which could be available for monitoring chemical quality of groundwater in the Supai Group are two wells located about 15 miles southeast from the mine site, and one well located about 16 miles south from the mine site. These wells are presently abandoned.

If perched groundwater is encountered in the Toroweap Formation or the Supai Group by the mine shaft, changes in chemical quality of the perched groundwater at the mine site would have negligible or no impact on groundwater quality in wells of record completed in these rock units because the reservoirs are thin, discontinuous, and often ephemeral, and the distance from these wells to the mine site is great.

Blue Springs is presently monitored to document chemical quality prior to mining operations at the Canyon Mine site. Although the groundwater monitoring program at the mine will continue during mining operations, longer term monitoring operations at Blue Springs are not contemplated. Results of water quality monitoring for the on-site monitor well (Appendix F, page 32) is expected to provide early detection of changes in water quality in the Redwall-Muav aquifer and will be the basis for requiring additional monitoring operations at Blue Springs. However, Blue Springs is too far from the mine site to provide any useful data on contamination in time to take corrective action. (See responses 78-3 and 78-14.)

Based upon the extremely remote possibility that the proposal, as mitigated, will adversely affect groundwater, the monitoring and pumping measures described above, and the cost of extensive chemical sampling activities, the Forest Service does not choose to require that EFN regularly monitor all wells and springs in the area. Monitoring of the on-site well will continue after closure of the mine if, in the opinion of the Forest Service, conditions at that time warrant.

60-15

Water tanks for wildlife are constructed to be fed and maintained by natural precipitation. Sites for relocation of disturbed tanks will be determined by the Forest Service in consultation with the Arizona Game and Fish Department wildlife specialists. Impacts on cultural resources and potential Indian religious sites will be considered in the selection of mitigation areas.

60-16

The text has been revised to reflect this comment.

60-17

All available reports for springs along the south wall of the Grand Canyon were reviewed in preparation of Appendix F of the EIS. Data for discharge and source rock for springs are given in Table 2 of Appendix F. All available existing water quality data for Havasu, Indian Gardens, and Blue Springs are given in Table 4 of Appendix F. The large discharge rate from Havasu and Blue Springs has caused hydrologists to conclude that essentially all groundwater in the Redwall-Muav aquifer in the region along the south rim of the Grand Canyon issues from these two springs. Published water quality data for other springs along the south rim of the Grand Canyon were also reviewed for the report and are summarized on pages 24 through 28 of Appendix F.

This data is sufficient to analyze potential impacts and to design effective mitigation measures. Groundwater contamination from surface flooding is considered highly unlikely. (See response 61-9.)

60-18

The potential for post-mining groundwater contamination is extremely small, even under extremely conservative assumptions. (See response 61-4.)

The potential for lateral movement of water from surrounding areas into the mine shaft and the potential for leaching of uranium minerals is discussed on pages 14, 16, 19, 20, and 34 through 39 of Appendix F.

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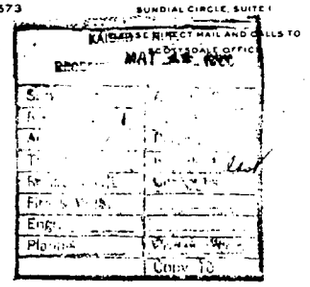
May 12, 1986



Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, AZ 86046

Re: Comments on Draft Environmental Impact Statement
Canyon Uranium Mining Proposal-Coconino County, Arizona

Dear Mr. Lindquist:

On behalf of the Havasupai Tribe we are presenting the following comments regarding the draft Environmental Impact Statement for the Canyon Uranium Mine proposed by Energy Fuels Nuclear.

The comments are grouped in the following major categories:

A. Cultural and Religious significance of the site.

B. Report on groundwater conditions, Canyon Mine Region.

C. Surface Water Run-off.

D. Consultation with Federal Agencies with special expertise.

E. Blasting at the Mine Site.

F. Authority of the Forest Service to implement the "No Action" Alternative.

61-1 A. Cultural and Religious significance of the site.

Section 4.1.12 states that "no Indian sacred or religious sites have been identified near the mine site or any of the proposed ore haul routes."

The Havasupai people have used and occupied the land at the mine site since time immemorial. Archeological proof exists to substantiate this claim back to approximately 1200 A.D. Traditional camps and burial sites are located within the proposed mine area which are sacred to the Supai.

Detailed identification of the religious, cultural and ceremonial significance of the site would be considered sacrilege by the Tribe. However, in the Tribe's efforts to protect this site they have authorized us to disclose the following information.

The proposed mine site lies in the path of the Cohonino Kachina who is sacred to the Supai and is the Guardian of the Canyon for the Hopi.

The mine site also lies across the Red Paint and Salt Trails which are sacred to the Supai and which were recognized as such by Congress in the Grand Canyon Enlargement Act, 16 U.S.C.A. §228; (c).

> "Nothing in [the Grand Canyon Enlargement Act] shall be construed to prohibit access by any members of the Tribe to any sacred or religious places or burial grounds, native foods, paints, materials, and medicines located on public lands not otherwise covered in Sections 228a to 228j of this title.

In addition Title 42 of United States Code Section 1996, the Indian Religious Freedom Act, provides that:

61-2 > "on and after August 11, 1978, it shall be the policy of the United States to protect and preserve for American Indians the inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian . . ., including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional sites." 42 U.S.C.A. § 1996.

Based on this Congressional policy respecting the right of religious freedom of the Havasupai Tribe, the Forest Service should implement the No Action Alternative and disapprove the plan of operations for this site.

61-3 B. Inadequate Report on Groundwater Conditions Canyon Mine Region.

The Report on Groundwater Conditions, Canyon Mine Site prepared by Errol L. Montgomery & Associates, Inc. dated July 17, 1985 ("Groundwater Report") does not include figures 1 and 3 to which numerous references are made in the text. A thorough evaluation of the Groundwater Report is not possible without these references.

Furthermore, the conclusions reached in the Groundwater Report are not supported by the factual information contained in the report and therefore, cannot support the findings in the Draft EIS that there do not appear to be any significant radiological impacts on the environment from the Canyon Mine Project.

The first conclusion in the Groundwater Report states:

> 1. The proposed mining operations at the Canyon Mine site will have little or no impact on groundwater circulation and storage in perched aquifers, and will have negligible or no impact on yield from springs and wells which yield groundwater from perched aquifers.

The Groundwater Report does not contain any information on the flow of groundwater in the perched aquifers at the mine site other than the general statements that the groundwater flows downward. The report contains no information on the size and capacity of the perched aquifer.

Without any specific information on location, size, transmissivity and porosity of the perched aquifers it is not possible to make the general conclusion that there will be little or no impact for groundwater circulation and storage in perched aquifers.

The Groundwater Report states that "[i]f the groundwater stored in these perched aquifers is not replenished annually by rainfall and snowmelt, wells and springs which yield from the perched aquifers may fail."

If one year's rainfall or snowmelt affects the flow from these aquifers the conclusion that a mine shaft siphoning off these perched aquifers will not affect the springs and wells appears implausible.

All of the springs and seeps on the Havasupai Reservation and on the Traditional Use Lands bordering the Reservation are sacred and necessary to the Tribe. They are all essential to the preservation of the religion, culture of the Tribe and livestock and wildlife on the Reservation. The fact that a spring may yield less than one gallon per minute does not diminish its importance in this arid region. The loss of one spring or seep could mean the loss of hundreds of acres of

grazing land because no other water sources are available. It would also mean the loss of a site sacred to the Tribe, which could extinguish the foundation of specific portions of their religion.

Sinyella Springs, approximately 30 miles south of the Village of Supai appears to be particularly susceptible to contamination and depletion because it is closest to the mine site and the supporting aquifer is in the strata closest to the surface.

61-4 The Groundwater Report at page 20 indicates that the springs issue from the Toroweap Formation, Coconino Sandstone, and the Supai Group. These strata will all be intercepted by the mine.

The Plan of Operations submitted by Energy Fuels Nuclear indicates that it is hoped that groundwater will be encountered when the shaft is sunk. The Groundwater Report does not adequately address what effect the drainage into the mine shaft will have on the supply at the numerous seeps and springs used by the Tribe.

The second conclusion states that:

> 2. The proposed mining operations will have little or no impact on chemical quality of groundwater in perched aquifers.

This is a very broad statement which cannot be supported by the limited factual information contained in the report.

As stated previously, there is no information on rate or direction of groundwater flows, transmissivity rates, porosity or permeability of confining layers and without this factual basis the conclusion is unfounded.

61-5 The Groundwater Report ignores the fact that the proposed reclamation plan calls for the mine ore and contaminated materials to be dumped into the mine shaft after mining operations cease. There is no information on the effects from leaching from these contaminated materials, nor is there any information on the flow of contaminated water between aquifers after mining operations cease and pumping from the mine shaft is stopped.

Without this minimum information the conclusion is unfounded.

The third conclusion states:

61-6

> 3. The proposed mining operations will have negligible impact on groundwater circulation and storage in the Redwall-Muav aquifer, and will have negligible impact on yield from springs which issue from the Redwall-Muav aquifer.

This conclusion is presumably premised on an assumption that the mine shaft will not penetrate the Redwall-Muav aquifer. However, there are no depth restrictions contained in the Plan of Operations nor are any proposed in the Draft EIS.

The Plan of Operations states at page 9 that:

> "since surface drilling has disclosed limited mineralization to a depth of 2,100 feet, further drilling from underground stations will be undertaken after the shaft is driven to the 1,400 foot depth to further define and delineate the uranium ore deposit."

The Groundwater Report states at page 22 that the top of the Redwall-Muav aquifer is projected to be about 900 feet below the base of the mine openings.

There are two glaring inaccuracies with this statement; (1) The Plan of Operations does not specify the base of mine openings and (2) the Groundwater Report indicates that the top of the Redwall-Muav aquifer may be as high as 2,300 feet below the Canyon mine site.

The EIS must consider the impact of a mine shaft which penetrates the Redwall-Muav aquifer. This is a very real possibility since mineralization is known to be present 2100 feet below the surface.

The fourth and last conclusion of the Groundwater Report states:

> 4. With the implementation of planned mitigation actions, the possibility for deterioration of chemical quality of groundwater in the Redwall-Mauv aquifer due to proposed mining operations is small. Any deterioration of chemical quality of groundwater in the Redwall-Muav aquifer would be detected by the groundwater monitoring program.

The detection of deterioration of the chemical quality of the groundwater does nothing to rid the aquifer of contamination nor does it prevent contamination from ocurring during any monitoring program or after such program is terminated.

61-7 It is not likely that contaminants will be detected at the springs during the mining operations. Havasu Spring is 42 miles from the mine site, Indian Gardens is 14 miles and Blue Springs is 28 miles away. Assuming a very fast transmissivity rate for groundwater it will be years after mining operations have ceased before contamination is likely to be detected at the springs.

If contamination is detected at the springs which will be monitored as proposed in the mitigation action, the contaminants will

have permeated the aquifer. Remedial action to remove radioactive contaminants from the entire aquifer will not be be possible since the contamination will have permeated miles of the aquifer before it is detected. The result is catastophic and irreversible.

The proposed construction of one monitoring well at the mine site is not adequate to detect potential contamination. The direction of groundwater flow at the mine site is not known. If the flow is away from the one well, the contamination may not be detected. It will require numerous wells surrounding the entire mine site to detect contamination. Those wells would, of necessity, have to be maintained and monitored forever, to detect contamination from the surface, interstrata contamination from the shaft, and waste materials from the reclamation effort. None is proposed, and is not reasonable to presume that it will be conducted.

Even monitoring of several wells may not be sufficient, as the contaminated water may travel laterally for miles before entering the aquifer, either above or below it through a fissure or crack in the confining layer.

The Groundwater Report fails to discuss the increased possibility for contamination to the Redwall-Muav aquifer after all of the ore and contaminated materials are dumped into the mine shaft as part of the site reclamation. Based on the information in the report that the oxidizing of the ore in the mine shaft increases the mobility of radiation, it is reasonable to assume that leaching from the exposed ore and contaminated materials will also increase.

61-8 The Groundwater Report suggests sealing the mine shaft, however, this may be difficult or insufficient if the mine shaft penetrates the Redwell-Muav aquifer and water from perched aquifers continue to drain into the shaft. Even though this is suggested in the Groundwater Report the mitigation measures proposed in the alternatives in the Draft EIS do not require sealing the mine shaft.

61-9 C. Surface Water Runoff.

The Draft EIS and the Appendix D, Downstream Hydrological Impacts, prepared by Charles F. Leaf, P. E., and the Groundwater Report do not discuss the relationship between potential groundwater contamination due to surface water flooding.

The Environmental Statement for the Secretarial Land Use Plan for the Addition to the Havasupai Indian Reservation discusses the geohydrology of this region. The Environmental Statement contains the following:

> "The stream runoff in the Cataract Creek system may infiltrate into the channel alluvium, becoming the groundwater underflow of the Cataract Creek system. These waters may readily percolate into

the various underlying porous geologic formations which the Cataract drainage has eroded through to become recharge fo the multiple aquifer system.

Potential leaching of contaminated water into the groundwater aquifers is a major environmental consideration. However, the Draft EIS does not consider the possibility of contaminated surface water reaching the groundwater aquifers after or during flood conditions. There is no discussion of the impact of contaminated surface water reaching the perched aquifers or the Redwall-Muav aquifer. Without this information it is not possible for the Forest Service to fully evaluate the impact of flooding and surface run off.

61-10

D. Consultation with Federal and State Agencies.

The Draft Impact Statement in chapters 5 and 6 indicate those agencies which cooperated in the preparation of the report and those which have received copies of the Draft Environmental Impact Statement. The lists do not include any members of the Federal Nuclear Regulatory Commission or the Arizona Radiation Regulatory Agency.

The National Environmental Protection Act (42 U.S.C.A. §4332 (C) requires that "[p]rior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiciton by law or special expertise with respect to any environmental impact involved."

The Nuclear Regulatory Commission ("NRC") most certainly has jurisdiction by law and special expertise with respect to radioactive contamination from mining operations. The production, distribution and use of uranium is regulated through licensing procedures adopted by the N.R.C. pursuant to the authority established by Chapter 23, Title 42, United States Code.

The N.R.C. was not even sent a copy of the Draft EIS. This is a violation of the NEPA requirement of consultation with those Federal agencies with jurisdiction or expertise.

The Draft EIS further omits whether Energy Fuels Nuclear has obtained the required licenses from the NRC for the operation of the mine, the milling of the uranium ore, the transportation of the ore, and the reclamation of the mine site. (See 42 U.S.C.A. 2011 et seq., Development and Control of Atomic Energy and 42 U.S.C.A. 7901 et seq. Uranium Mill Tailings Radiation Control).

The Forest Service has also not consulted with the Arizona Radiation Regulatory Agency. This Agency has licensing and regulatory authority over all sources of radiation within the State. (A.R.S. §30-651 et seq.)

The brief summary of laws and regulations relevant to the proposed mining activity on pages 1.4 and 1.5 of the draft EIS does not even mention Arizona Revised Statute Section 30-651 et seq. regarding the Control of Ionizing Radiation nor does it mention 42 U.S.C.A. § 2011 et seq. regarding the Development and Control and Atomic energy.

The Forest Service cannot fully evaluate the environmental impact of a proposed uranium mine without contacting the federal and state agencies with the most knowledge and expertise regarding radioactive materials.

The proposed Plan of Operations does not specify whether EFN is a licensed operation or whether they have even applied for the necessary state and federal licenses to operate the uranium mine. The Forest Service must insist upon these federal and state licenses prior to approving any activities on the site.

61-11

E. Blasting at the Mine Site.

The Plan of Operations calls for the mine shaft to be sunk utilizing either surface drilling or by conventional sinking using drilling and blasting methods.

The Draft EIS does not discuss the potential effects of blasting on the acquifers surrounding the mine site. There is an intricate network of cracks, fissures and confining layers which allow water to reach the seeps and springs. Any subsurface disturbance creates the possibility for changing or blocking this flow of water in the aquifers.

The Draft EIS should address this possibility and prohibit blasting at the mine site.

61-12

F. Authority of the Forest Service to Implement the No Action Alternative.

The Forest Service has taken the position that they are limited to approving the Plan of Operations as submitted or approving the Plan of Operations as modified. The No Action Alternative, disapproving the Plan of Operations is not considered a true alternative and is included in the the report merely as baseline information.

The National Environment Policy Act (NEPA) requires that alternatives to the proposed Federal action be discussed in the EIS (42 U.S.C.A. 4332 E). The cases which have interpreted this section have imposed a "rule of reason" limiting the alternatives to those which are reasonable.

The rule-of-reason requires that Primary Alternatives, including total abandonment of the project be given considertion.

Reasonable Primary Alternatives to the proposed Canyon Mine which have not been considered in the Draft EIS include increased production at other mines owned and operated by EFN and mining uranium from alternate sites and claims available to EFN.

The range and choice of Alternatives required to be considered is not limited by perceived limits on the preparing agency's authority. The purpose of the Draft EIS is to fully inform decision-makers, including Congress and the President, of potential environmental impacts so action can be taken to prevent irreversible harm.

If the Forest Service maintains that they cannot disapprove a Plan of Operations for an activity which has the potential to contaminate the sole water supply for the entire Havasupai Tribe, then the NEPA requirements are rendered meaningless.

The EIS must include a worst case scenario and the potential environmental effect. This has not been done. The worst case scenario includes contamination of the perched aquifers and the Redwall-Muav aquifer from the mine shaft, from leaching from the stored ore, or from contaminated surface water percolation. If this occurs there are no alternate water supplies for the Havasupai.

If contamination is a certainty, or as we contend, of high probability the costs of the mining activity far outweigh the benefits, especially when Primary Alternatives are reasonable. Therefore, NEPA as interpreted in the Courts provides the statutory authority to disapprove the plan of operations.

The Forest Service must also consider the mandate of the American Indian Religious Freedom Act, 42 U.S.C.A. §1996, which states that it is the policy of the United States to protect and preserve access to religious and sacred sites and the freedom to worship through ceremonials and traditional rites. This will not be possible if mining is permitted at the proposed site.

Conclusion.

Very little is known in the scientific community about the long terms effect of radiation contamination, except that the risks to human health are certain, and in most cases irreversible, and clean up is virtually impossible.

The recent nuclear accident at Three Mile Island and in the Soviet Union have made it clear that even the most remote set of circumstances leading to disaster can and do occur with catastrophic results. The high incident of radiation associated illness of uranium mine workers also points out that exposures, once thought to be safe, are not.

Contamination of the water supply in Cataract Canyon, though not as large or affecting as many people as the Chernobyl accident will be

no less catastrophic. It will mean the destruction of the Havasupai culture and religion as it has existed for centuries, for there are no other sources of water for the Havasupai than those which will or could be affected by this mine.

The benefits to society from one more small, short-term mine are miniscule compared to this cost. The Supai and the environment of Cataract Canyon cannot be replaced. The plan of operation should not be approved.

Very truly yours,

SPARKS & SILER, P. C.

Joe P. Sparks

Enclosures

c: Wayne Sinyella

JOE P. SPARKS
E. DENNIS SILER
KEVIN T. TEHAN
MICHAEL C. SHIEL
MARGARET J. VICK
DONALD O. LOEB

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April 30, 1986

Mr. R. Dennis Lund
Recreation and Lands Staff
Kaibab National Forest
800 S. 6th Street
Williams, AZ 86046

Dear Dennis:

This will confirm our conversation on Tuesday April 29, 1986 in which you agreed to permit the Havasupai Tribe to submit their comments on the draft Environmental Impact Statement for the Canyon Uranium Mine during the week beginning May 5, 1986.

I will call you if the Tribe feels there is a need for us to meet with you while you are in Phoenix.

Thank you for your consideration.

Very truly yours,

SPARKS & SILER, P.C.

Margaret

Margaret J. Vick

c: Wayne Sinyella

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Forest Service Response

61-1

The Forest Service agrees that northern Arizona has a long history of Indian use and that certain religious hunting and gathering activities have taken place in the Tusayan area. The text of the EIS has been revised to reflect these comments. We acknowledge the comment that traditional camps and burial sites may exist in the general vicinity of the mine site. The text of the EIS has been revised to reflect your comment. However, an analysis and survey of the site performed by Abajo Archeology did not reveal evidence of any sites within the proposed area of disturbance. Occupancy sites were found outside and adjacent to the mine site and data recovered. However, no burial sites were found. (See Section 3.1.10 and response 60-2.) It is not possible to analyze or mitigate impacts on sacred sites which cannot be identified. Based on consultation with the Tribes and experts in Indian religious sites and practices, and the studies of Abajo Archeology, we have concluded that no specific sacred sites will be adversely affected by development at the mine site. The Forest Service has also concluded that development of the mine should not materially affect the current level of Indian religious practices in the area.

We acknowledge the comment that all springs and seeps on the Havasupai Reservation are sacred to the Tribe. An expanded discussion of groundwater quality and quantity has been included in the EIS, in part to address this comment.

We have reviewed the comments concerning the Cohonino Kachina and the location of Red Paint and Salt trails. Our analysis and consultation with experts shows that the latter trails do not cross the mine site. To this time, the Tribe has declined to provide further information concerning these impacts. All available data indicates that operation of the mine will not materially interfere with religious practices associated with those trails or the Cohonino Kachina. However, consultation efforts with the Havasupai will continue in the consideration of the Plan of Operations of the Canyon Mine.

61-2

We do not agree with your interpretation of the American Indian Religious Freedom Act (AIRFA).

AIRFA requires an awareness of Tribal beliefs and practices and consideration of these in formulating government policy. It does not mandate protection of Tribal religious practices to the exclusion of all other courses of action. It does require

that federal actions be evaluated with an aim toward protecting Tribal practices.

Courts that have reviewed AIRFA have agreed that the statute (1) requires federal officials to consult with Tribes with respect to actions which may affect traditional Indian religious practices, (2) requires federal officials to evaluate their policies with an aim toward protecting Tribal religious practices, and (3) does not require that federal officials protect Tribal religious practices to the exclusion of all other courses of federal action.

Further insight into the intent of AIRFA is included on p. 6 of Senate Report No. 95-709: "The clear intent of this section is to insure for traditional native religions the same rights of free exercise enjoyed by more powerful religions. However, it is in no way intended to provide Indian religion with a more favorable status than other religions, only to insure that the U.S. Government treats them equally."

We feel that the Preferred Alternative and the use of established transportation corridors to transport ore to the Blanding mill addresses, to the extent possible, the concerns raised by the Havasupai Tribe.

61-3

We do not believe that Figures 1 and 3 are essential for review and comment on the groundwater analysis in the EIS. The DEIS explained that they were available for review at the Kaibab National Forest. Maps were supplied to all parties requesting them. Following receipt of this comment copies of the maps were sent to the Havasupai.

The EIS has been revised to consider the comment concerning perched groundwater reservoirs. Such reservoirs are thin, discontinuous, and often ephemeral. The test well to be drilled by EFN will confirm the presence or absence of a perched aquifer at the site.

Because data do not presently exist to specifically define groundwater flow in perched fractured rock aquifers near the mine, and because pumping from a discontinuous perched groundwater reservoir would not typically be expected to influence pumping conditions from a nearby discontinuous perched reservoir, potential effects were predicted utilizing extremely conservative assumptions (Appendix F, pages 34-35). The effect of using such conservative assumptions is to overestimate drawdown impact. Even utilizing conservative assumptions, theoretical drawdown impact at the nearest well of record outside the mine site would be less than one foot. The drawdown effect would be negligible or nonexistent at seeps and springs in the vicinity of Cataract Canyon, located more than 20 miles west from the mine site, or along the south wall of the Grand Canyon, located more than 13 miles north from the mine site.

61-4

Cataract Canyon is a large, effective geographic and hydraulic barrier separating the mine site from Sinyella Spring. Cataract Canyon functions as a drain for the perched aquifers cut by it. The source of water for Sinyella Spring is one such perched aquifer, which drains perched groundwater from the western part of the drainage area of Cataract Canyon. The mine site occurs about 25 miles distant in the eastern part of the drainage area, and is not within the area that provides water for Sinyella Spring. Operations at the mine site will not affect the quantity or quality of discharge from Sinyella Spring because: Cataract Canyon separates Sinyella Spring from the mine site; the source of water for Sinyella Spring is a perched aquifer on the west side of Cataract Canyon; perched aquifers in the area are discontinuous, particularly aquifers on opposite sides of large canyons; and the distance between the spring and the mine site is great.

61-5

The comment that mine ore and contaminated materials will be dumped into the mine shaft after mining operations cease is not accurate. Much of the rock removed from the breccia pipe will be barren or slightly mineralized waste rock. Uranium ore will be removed and trucked to a distant processing plant. During post-mining reclamation operations, only the barren or slightly mineralized waste rock may be replaced into the mine. The result will be to replace native high-grade uranium ore with the native barren or relatively non-mineralized waste rock. Mining operations may promote oxidation and increase the potential mobility of radioactive minerals. However, the quantity of radioactive minerals remaining to be leached will be reduced significantly below pre-mining levels from the removal of high-grade ore. If perched groundwater recharge due to rainfall and snowmelt drains through the sealed Canyon Mine shaft after reclamation, concentrations of radioactive minerals from the waste rock are anticipated to be small, approaching the range of monitoring instrument error, even in the unlikely event that such minerals eventually reach the referenced springs. (See Section 4.2.7.2 for an expanded discussion of this issue in response to this comment.)

61-6

The top of the Redwall-Muav aquifer at the Canyon Mine site is projected to be about 2,300 feet below land surface. The proposed water well or further exploration drilling will confirm its exact location. The base of the mine opening is projected to be about 1,400 feet below land surface, or 900 feet above the top of the Redwall-Muav aquifer. Data presently available from exploration drilling at the mine site indicate that, although uranium mineralization occurs to a depth of 2,100 feet below land surface, the base of uranium ore which can be mined economically occurs about 1,400 feet below land surface. During mining operations, additional exploration drilling is commonly conducted to fully delineate zones of mineralization. However, based upon its mining experience with similar uranium deposits at mines on the North Rim of the Grand Canyon and on results of exploration drilling at the Canyon Mine site, EFN does not anticipate that the mine openings would extend significantly beyond the projected depth of 1,400 feet. Moreover, EFN indicates that mining operations in a large aquifer are neither planned nor feasible. Such a change in the Plan of Operations may require further evaluation under NEPA.

61-7

The discussion of the monitoring well in the EIS has been expanded to reflect this comment. The EIS indicates that adverse impacts on these springs is extremely unlikely. (See response to comment 4.) However, we agree that it would be years, if ever, before any contamination could be detected at the subject springs. These large springs occur northwest, north, and northeast from the mine site. The direction of groundwater flow from the mine site is expected to be within this range of directions. The monitoring well is proposed to be located about 400 feet north of the breccia pipe. Groundwater will be pumped from the well and is expected to create an inward gradient, capturing percolative water affected by the mine. The monitoring well is likely to detect the effect, if any, of the mine.

61-8

The mine shaft will not penetrate the Redwall-Muav aquifer. (See response to comment 5.) The sealing of the mine shaft is required in the proposed action as part of the Plan of Operations, and in all alternatives other than "no action."

61-9

Surface water flooding may result in infiltration into groundwater in rare circumstances, but groundwater underflow in the channel alluvium in this reach of the drainage does not occur except during, and for a short time after, flood flow in the channel. If contaminants are released and enter the Kaibab Limestone, little or no impact on the chemical quality of the groundwater is expected. In the unlikely event that surface drainage controls fail, much of the runoff would be lost through evaporation and most of the remaining diluted fraction would infiltrate. Suspended sediment would be removed from the runoff by natural filtration. The discussion of this issue was expanded in the EIS in response to this comment. (See Sections 3.2.7.1. and 4.2.7.1.)

61-10

Under applicable federal and state regulations (10 C.F.R. 40.13(b) and R12-1-302(B), respectively) both the Nuclear Regulatory Commission ("NRC") and the Arizona Radiation Regulatory Agency ("ARRA") have chosen to exempt uranium mining activities from their respective regulatory requirements. However, under the provisions of R12-1-1505 of the Arizona regulations, EFN is required to immediately report to the Arizona Department of Safety, Phoenix Duty Officer, any accident involving radioactive material. In the future, should EFN's mining activities become subject to NRC or ARRA regulations, EFN would be required to comply with those requirements.

61-11

Any blasting used to sink the mine shaft will be limited and have only localized impacts. Blasting at the mine site would not be expected to affect perched aquifers, if present, or the Redwall-Muav aquifer.

61-12

NEPA requires that an EIS "explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." 40 C.F.R. Section 1502.14(a) (1985). The alternatives suggested by this comment were considered and eliminated from detailed consideration. (See Section 2.3). It was determined, based on the issues and concerns identified through scoping and the discussions of the interdisciplinary team that consideration of expanding production at existing mines or alternative sites would not appreciably assist the decision making in reviewing the Plan of

Operations. First, for the relevant geographic area being analyzed, the environmental impacts of such an alternative are not sufficiently different from the No Action Alternative to aid the Forest Service analysis. As a practical matter, these alternatives are merely a variation of the No Action Alternative -- if the Plan of Operations is not approved, the applicant will be forced to accelerate exploration efforts and consider other mines or sites to meet its stated objectives. Second, EFN has advised us that a review of other EFN properties in northern Arizona or southern Utah disclosed no comparable ore body that would, at present, provide a reasonable alternative mine site. In addition, the environmental impacts of expanding production at unspecified existing mines or opening new mines at unspecified sites are too remote and conjectural for meaningful analysis. Finally, those alternatives fail to respond to the purposes and objectives of the applicant's Plan of Operations. EFN does not have existing mines which are amenable to significant increases in production and has not identified an alternative ore body with the development potential of the Canyon Mine. While the EIS may not properly be limited to the applicant's desires, CEQ has made it clear that the agency need not "disregard the applicant's purposes and needs and the common sense realities of a given situation in the development of alternatives." CEQ Guidance Memorandum, 48 Fed. Reg. 34,267 (1983). EFN's objectives are to develop the significant ore body discovered at the Canyon mine site, meet its contractual commitments to deliver ore to certain purchasers and provide adequate mill feed to its mill at Blanding, Utah. Increased production from its existing mines, even if possible, or production of ore from other sites will not meet these objectives.

We agree that the range of alternatives to be considered is not limited by the agency's authority. Thus, the EIS includes the No Action Alternative as well as haul route alternatives which require approval by the State of Arizona and private parties. The consideration of the No Action Alternative was expanded in the final EIS. However, it would be inaccurate if the EIS did not reflect to some extent the rights of a mining claimant under the General Mining Law and recognize some limits on Forest Service discretion when reviewing a Plan of Operations. The No Action Alternative is fully considered and evaluated. However, the EIS properly notes the limitations in implementing that alternative.

CEQ regulations effective at the time the DEIS was prepared required that an agency prepare a "worst case analysis" if there are gaps in relevant information or scientific uncertainty and the missing "information relevant to adverse impacts is essential to a reasoned choice among alternatives . . . and the overall costs of obtaining it are exorbitant." 40 C.F.R. 1502.22(b)(1) (1985).

On April 25, 1986, CEQ issued a new regulation concerning incomplete or unavailable information in environmental impact statements. See 51 Fed. Reg. 15,618 (1986). The new regulation eliminates the requirement for worst case analysis but requires the agency to (1) disclose the fact that relevant information is unavailable; (2) explain the relevance of the missing information; (3) summarize the existing credible scientific evidence relevant to the missing information; and (4) evaluate the impacts based upon theoretical approaches or research methods generally accepted in the scientific community. As with the prior version of the regulation, the new regulation applies only to missing information which is "essential to a reasoned choice among alternatives."

The new regulation also provides that, for EISs in progress on the effective date of the new regulation (May 27, 1986) the responsible agency may choose to comply with either version of the regulation.

We have carefully reviewed the EIS and the comments to determine if either version of the regulation concerning unavailable or incomplete information is applicable. We have concluded that the threshold requirement -- missing information essential to a reasoned choice among alternatives -- is not met. Your letter and others suggest that the data and analysis concerning potential impacts on groundwater resources requires a worst case analysis. This suggestion has been rejected for three reasons. First, the available data on groundwater resources near the proposed mine site is substantial. The groundwater report (Appendix F) cites five publications (p. 4) and evaluates data from more than 150 wells and exploration boreholes (Table 1). This data is sufficient to support a reasoned expert conclusion that it is very unlikely that any significant source of underground water will be encountered by mining at the mine site. A perched aquifer may be present, but perched aquifers in this area are thin, discontinuous and often ephemeral. If a perched aquifer is present, it may be drained, but there will be no resulting adverse impact on wells, seeps or springs which emanate from other aquifers. If groundwater in the Redwall-Muav aquifer is affected by leaching of uranium ore bearing waste rock, data concerning the general flow regime, concentration of leachate dilution and precipitation of radiological elements in the limestone host rock are sufficient to conclude that significant impacts will not occur.

Second, the Preferred Alternative requires that a monitoring well be drilled at the mine site. If groundwater resources are present, the well will provide water for mine operations and will also be used to monitor water quality. Should groundwater be adversely affected by mining, the well becomes a means of mitigation. (See section 2.5.11.) Water affected by mining will be pumped from the affected aquifer and pumping will be maintained until concentrations of the critical constituents are reduced to recommended primary drinking water standards or to within 10 percent of ambient concentrations, or to some comparable standard approved by the Forest Service.

Finally, the well to be drilled at the mine site will identify any perched aquifers or reservoirs and will determine the exact depth to the Redwall-Muav aquifer at the mine site. This data will be available before construction of the mine shaft begins, and, should the test well disclose that the geohydrology of the mine site is dramatically different from the surrounding area, supplemental analysis under NEPA may be required.

While the Forest Service has determined that the worst case requirement does not apply, it has concluded, based upon this comment and others, that additional text material in the EIS is necessary to fully explain the analysis of potential groundwater impacts. (See Sections 3.2.7.2. and 4.2.7.2.) That analysis was based on extremely conservative assumptions about the water resources of the area. In fact, the author of the groundwater report (Appendix F) suggests that these assumptions represent the worst case conditions for the Canyon Mine site. This analysis addresses two questions raised by commentors. First, the analysis considers the maximum depletion of wells and springs, under extremely unfavorable conditions. (See response to comment 2.) Second, the analysis projects potential maximum hypothetical impacts assuming that contaminants are leached from the mine shaft into the Redwall-Muav aquifer after mining operations cease. (See response to comment 4.)

With respect to the American Indian Religious Freedom Act see responses 60-2 and 61-2.

Wayne Ranney
823½ N. Aspen #5
Flagstaff, AZ 86001
May 13, 1986

Forest Supervisor
800 South 6th Street
Williams, AZ 86046

Dear Forest Supervisor:

I would like to comment on the draft EIS for the Canyon Uranium Mine near Tusayan, Arizona. I realize that the comment period ended May 1 but I have been out of town on business and hope that you will consider my comments at this time.

62-1 First let me say that I oppose the mining of uranium near Grand Canyon National Park. But as we all realize the antiquated Mining Act of 1872 leaves your agency without the authority to stop this potentially dangerous operation. Uranium should be left in the ground! The events in Chernobyl in the last 2 weeks testify that we are dealing with technology that we don't truely understand. I believe that we are slowly poisoning our environment on a global scale and that events such as Three Mile Island and Chernobyl are the "canaries in the coal mine". It is hard to argue these facts when there is so much easy money to be made. Time will tell.

So, realizing the predicament that we are in (residents of northern Arizona), I have reviewed the alternatives and feel that some are less harmful than others. Concerning haul routes, I am opposed to the transportation of ore through populated areas (Options 6 and 7). Routes 1,2, or 3 seem to have the least impact in the area. Route 5 is not a good choice because it calls for new road construction **62-2** and indirectly gives the okay to EFN to mine other areas as well. We should strive to lessen the impact of this project by using existing roads. Alternative 2 is unacceptable because it does not require monitoring of soil, air, and groundwater. This must be a requirement for anyone who wants to dig up potentially lethal substances in the Kaibab National Forest. For this reason, I favor **62-3** Alternative 3 for this project. Workers should be pooled to the work site as well.

It is very difficult for me to recommend any kind of uranium development for the Kaibab National Forest. In reality I favor Alternative 1, No Action. How many mine proposals will you accept before **62-4** determining that environmental degradation has occurred? Is one all there will be? Two? Twenty? Clearly there will come a time when you will need to decide that too many mines are an environmental hazard. Thank you for considering by comments.

Wayne Ranney

Wayne Ranney
P.S. [illegible]

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Forest Service Response

62-1

Please refer to responses 3-4, 5-1, 8-2, and 20-1.

62-2

Alternative 5 has been selected as the Preferred Alternative and provides the option of using either haul route #6 or #7. (See Section 2.4.) Use of existing roads will minimize environmental impacts while keeping all options open for future Tusayan District management needs. The 20 ore trucks/day represents an insigificant increase to existing traffic levels. (See Table 2.11 and responses 1-3 and 78-7.)

62-3

We agree that workers should be encouraged to use company provided transportation to and from the mine. The Preferred Alternative includes company transportation of mine workers.

62-4

No additional mines are presently proposed in Coconino County south of the Grand Canyon. The EIS discusses potential cumulative impacts of additional uranium mines in the region. The monitoring program included in the Preferred Alternative will also provide useful data in the analysis of any future mining proposals. (See responses 1-1 and 78-2.)

April 24, 1986

Mr. J. A. Lindquist, Forest Supv.
800 South 6th St.
Williams, Arizona

Dear Mr. Lindquist

The environmental impact statement is very informative, interesting and a well organized publication, I appreciate the effort and the talent that it took to put it together.

As a property owner, hunter, camper and hiker of the Grand Canyon area I am interested in its survival and the retention of its somewhat natural environment.

I recognize the needs of present commercial and security requirements and what mining can provide, but lets "dig" somewhere else until this supply is needed.

And when this supply is needed enforce the guidelines to preserve as much of the natural environment as we can.

Whatever occurs in this situation I am hopeful the forest service will keep a watchfull eye on what the mining interests does to the forest and its habitat.

Thanks for the impact statement.

Sincerely

Warner J. Johannessen

Forest Service Response

63-1

Please refer to responses 3-4, 5-1 and 5-4.

HAVASUPAI TRIBAL COUNCIL

P.O. BOX 10 • SUPAI, ARIZONA 86435 • (602) 448-2731

30 May 1986

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
US Forest Service, USDA
800 S. Sixth Street
Williams, Arizona 86046

RE: **EIS on Proposed Canyon Mine, Tusayan**

Dear Mr. Lindquist:

Havasu Baaja, the Havasupai Tribe wishes to extend our comments concerning the "Canyon Mine" near Tusayan proposed by Energy Fuels Nuclear, Inc. You have received a copy of Errol L. Montgomery and Associates' explanation of water test results from samples of Havasu Spring water pursuant to the Environmental Impact Statement on the proposed uranium mine. These water samples were taken to provide a base-line estimate of radiological parameters to compare against those of future samples. Three samples were taken from Havasu Spring in May, 1895. Samples were sent to three different analysis companies. One company, EAL, reported substantially higher levels than the other two.

64-1

Please note well that Montgomery and Associates states on page 4, "Measurement error for [the EAL] analysis was large and the result was not corroborated by results reported by CFEP and ASU", and that analyses of other parameters indicate that levels of all radiological levels are extremely low. These observations support the veracity of our conclusion that the radiological content of Havasu Spring water last May was neither significant nor even detectable. **If any radiological parameters become detectable after uranium mining activities start, all such content will have been due to these activities.**

64-2

64-3

Please also note that the report states, "Because radiological parameters are analyzed on a statistical basis, results of analyses for several samples from a water source must be obtained to evaluate the radiological content of the source." We reiterate our objection to the plainly insufficient number of water samples currently scheduled to be taken and analyzed before an operating permit is granted the mining company. At least **20** analyses should be completed in order to glean a truly statistically valid estimate of base-line radiological parameters of water from Havasu Spring, (by Central Limit Theorum). These tests will conclusively establish the extraordinary radiological purity of our water as it is now, before operation of the uranium mine.

64-4

We question the point of conducting water sampling at all if the results will not be scientifically valid. We request either that you arrange additional rounds of sampling or that we be granted funds to accomplish this additional necessary sampling, before any operating permit is issued.

Thank you again for your attention to our concerns. With best wishes.

Sincerely,

Alfred Hanna
Vice Chairman

Forest Service Response

64-1

We consulted with the author of the groundwater report (Appendix F) Dr. Errol Montgomery, to respond to your comments. Our responses reflect his input.

Water samples collected from Havasu Spring in May and December, 1985 were analyzed for radiological parameters by three laboratories: EAL (EAL Corporation), CFEP (Controls for Environmental Pollution, and ASU (Arizona State University). CFEP was selected by the Havasupai Tribe. For the May 1985 samples, EAL reported levels of gross alpha and gross beta radiation that were higher than levels reported by CFEP and ASU. Results of analyses by EAL for several other radioactive elements in these samples were corroborated by results from ASU and CFEP.

As explained in Section 3.2.7.3, analyses for gross alpha and gross beta activity may be affected by impurities in water, such as calcium, which increase the detection thresholds and self-absorption corrections and reduce detection efficiencies. Concentrations of calcium in water discharged from Havasu Spring are high. Gross beta analyses may also be affected by impurities in water, but to a lesser extent.

Gross alpha and gross beta analyses are generally used as an indicator in lieu of more extensive analyses; if the analyses indicate gross alpha and gross beta radiation is higher than recommended limits, further analyses must be conducted to identify the major radioactive elements. For Havasu Spring, comprehensive analyses for major radioactive elements (uranium, radium, and thorium) were conducted for each sampling round and results of these analyses were used to detect problematic results of gross alpha and gross beta analyses. Results of laboratory chemical analyses for the December 1985 sampling round at Havasu Spring indicate that prior problems associated with the gross alpha and gross beta analyses by EAL did not reoccur. The results of the December 1985 sampling round are included in the EIS. (See Tables 3.4, 3.5 and 3.6.)

Comparison of laboratory chemical results for the May 1985 water samples from Havasu Spring with results for the December 1985 samples indicates that, in general, there is good agreement of results between laboratories and between sampling rounds. The differences that occurred between laboratory results were not unusual because assay of such small amounts of radioactivity approaches the minimum detection limits of the laboratories.

64-2

This conclusion is not supported by the data gathered and analyzed for the Canyon Mine EIS.

Neither the reports prepared by Dr. Montgomery nor the results of laboratory analyses for water samples from Havasu Spring indicate that concentrations of radioactive elements in the samples are extremely low. It is more accurate to conclude that elevated concentrations of radioactive elements were not detected and that the laboratory chemical results do not indicate that water from Havasu Spring is unsafe to drink due to content of radioactive elements.

Results from laboratory chemical analyses for the May and December 1985 samples indicate that detectable concentrations of uranium and radium occur naturally in the groundwater discharged from Havasu Spring. The concentrations of total uranium reported by EAL for the May 1985 samples and by CFEP for the December 1985 samples from Havasu Spring were higher than the rate of concentrations reported by Peterson et al. (1977; U.S. Geological Survey Open-File Report 77-36) for six springs that discharge from the Redwall-Muav aquifer. Hem (1970; U.S. Geological Water Supply Paper 1473) indicates that uranium is present in amounts between 0.1 and 10 micrograms per liter in most natural water, and that amounts greater than this are somewhat unusual. Concentrations of total uranium detected in water samples collected from Havasu Spring in both May and December 1985 were as high as 10 micrograms per liter.

64-3

This comment is not supported by the data gathered and analyzed by the EIS.

Laboratory results indicate that several radiological parameters are presently detectable and occur naturally in water discharged from Havasu Spring.

Breccia pipes similar to the Canyon Mine breccia pipe and other types of mineral deposits are believed to be common in the Grand Canyon region. Although the locations, concentrations and depths of mineralization are not known, natural groundwater percolation occurs in these mineralized zones; soluble native minerals, including radioactive elements, are continually leached from the mineralized zones and slowly percolate downward to the Redwall-Muav aquifer. Recharge in the Grand Canyon region occurs chiefly via infiltration of rainfall and snow melt. Precipitation is a random event and may provide more recharge through some mineralized zones than others during a certain period. Where more recharge occurs during a certain period, leaching of native radioactive elements from the mineralized zones could be greater and contribution of radioactive elements from these zones to the Redwall-Muav aquifer could be greater than from other areas.

The relatively large discharge rate from Havasu and Blue Springs has caused hydrologists to conclude that essentially all groundwater in the Redwall-Muav aquifer in the region along the south rim of the Grand Canyon issues from these two springs. The area

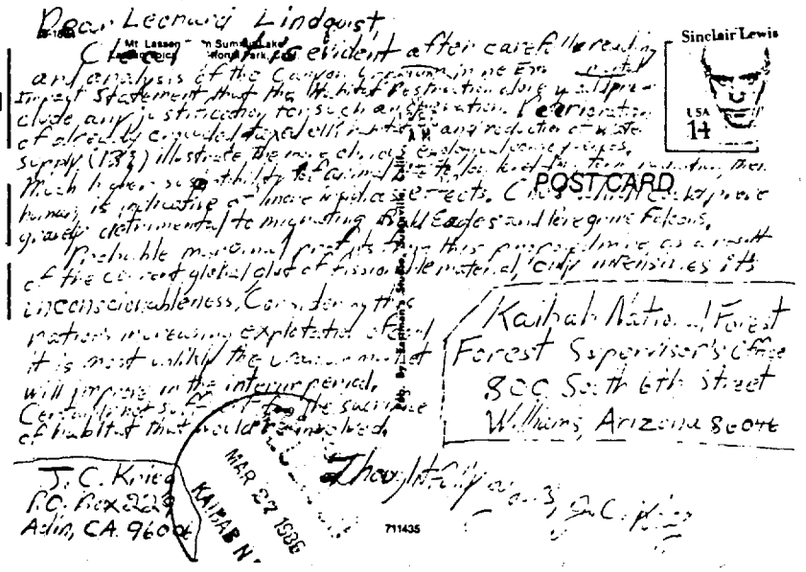
of groundwater drainage for Havasu Spring is large and breccia pipes and other mineralized zones, possibly including the Canyon Mine breccia pipe, occur within it. Slight increases and decreases in the content of naturally-occurring radioactive elements in water issuing from Havasu Spring may occur due to random changes in the rate of groundwater percolation through mineralized zones other than the Canyon Mine pipe. These changes would have no relation to mining activities at the Canyon Mine site.

64-4

Significant and scientifically valid estimates for baseline water quality data are commonly and routinely obtained from statistical treatment of results from fewer chemical analyses than would be required by use of the Central Limit Theorem. At the end of the second year of the monitoring program, 12 laboratory chemical analyses will have been conducted for water samples from Havasu Spring. Results of these analyses will be used to determine if modification of the monitoring program is necessary. Based on results of analyses received to date, data might be accumulated after the second year of the program to provide sufficient documentation of ambient water quality at the three springs prior to mining operations at the Canyon Mine site.

Results of laboratory chemical analyses indicate that water discharged from Havasu Spring is not extraordinarily pure with regard to content of radioactive elements. Concentrations of total uranium detected in water samples collected from Havasu Spring in May and December 1985 were as high as 10 micrograms per liter. With regard to drinking water quality, these relations indicate neither that the water from Havasu Spring is extraordinarily pure nor that it is unsafe to drink due to content of radioactive elements.

In addition we suggest that you review our responses to other comments concerning groundwater quality. (See responses 61-4 to 61-9.)



65-1

65-2

65-3

Forest Service Response

65-1

We disagree. As indicated in the EIS, there is no permanent habitat "destruction," only short-term impacts that are substantially mitigatable. (See Tables 2.7 and 2.8.) The mine site acreage will be lost to wildlife for approximately 10 years and then returned to near present conditions. This area represents much less than 1% of the habitat available on the Tusayan District. Possible losses in wildlife habitat will be mitigated by a replacement foraging area and a new water source to replace Owl Tank. (See response 56-4.)

65-2

Any increase in radiation resulting from the mine is expected to be undetectable within a few hundred meters of the mine site. (See Appendix E.) It is expected that wildlife will generally vacate this area due to the disturbance from mining operations.

65-3

The Forest Service is satisfied, based on available data and EFN's success with comparable deposits north of the Grand Canyon, that EFN has a reasonable belief that it can develop a successful mine at the Canyon Mine site.

April 8, 1986

Dear Mr Lindquist,

I feel that the only acceptable alternative concerning the proposed Canyon Mine is Alternative 1 - no action. My reasons are as follows:

66-1 The site is entirely too close to the Grand Canyon to allow any disturbance at all. Here we are sitting on the doorstep of one of the natural wonders of the world and seeking to "minimize the likehood of any adverse environmental impacts on the Grand Canyon National Park." EVERYTHING done that close will have impact!

66-2 You mention "varying degrees" of impact on wildlife habit, National Forest Resources, air & water quality, Visual impact of hauling to visitors at the Canyon, and "significant downstream contamination".

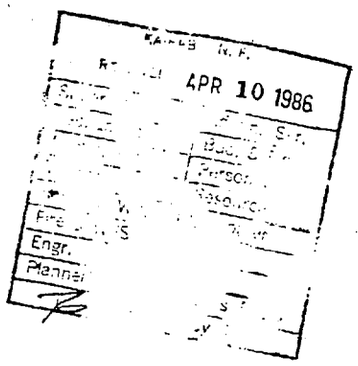
Mr Lindquist, we are morally obligated to the whole world to keep the Grand Canyon as pristine as possible. Whether the people of Williams have jobs in the late 1980s will not be given much thought by the people of 1999. (or later.) If there's anything left of the Canyon to visit by then.

The Orphan uranium mine at the South Rim is an embarassment to the entire country. How can a foreign visitor understand a system which allowed such degradation of scenic beauty? Why should any reason be good enough to create another such scar and allow more "minimal" impacts to the Grand Canyon Ecosystem?

Please do not allow the

Canyon mine!

Sincerely,
Betsy McKellar
Rt 9 Box 9
Flagstaff AZ
86001



Forest Service Response

66-1

Please refer to responses 3-4, 5-1 and 5-4.

66-2

Please refer to responses 60-4, 61-3, 61-5 and 61-7.

Tom Gelazen
Rt. 1 Box 20
Bayfield WI 54814
Ph. (715) 779-3254

June 8, 1986

A uranium mine in Kaibab National Forest? Come on guys. If you like cancer and destruction so much — go work for the petrochemical industry.

Make sure you keep the mining companies out. If you can't identify with a multiple use mandate - hit the road. There may be a place for you in industry.

For a sustainable earth,

Tom Gelazen

67-1

L-67

Forest Service Response

67-1

"Multiple-use" includes the use of both surface and subsurface resources as long as the environmental impacts are mitigated to the extent practicable. We urge you to review the EIS. (See response 8-2.)

Pat Mc Kinney
RD 4 Box 4062
Fleetwood, PA 19522

Leonard Lindquist Supervisor
Kaibab Nat. Forest
Williams AZ 86046

Dear Mr. Lindquist:

Having visited the Grand Canyon, I find the area a restful haven from the big city pressures as nearby Philadelphia. Recently, the draft EIS for the Grand Canyon Uranium Mine ended its public comment period. Please allow me to add my name to those opposing this project.

68-1 Not only would the mine disrupt wildlife habitat, but would be an eyesore for tourists (which is an industry itself).

Please for the benefit of future generations do not allow the mine in the area.

Thank you very much for your time and consideration of my views.

Sincerely,

Pat McKinney

16

Forest Service Response

68-1

Please refer to responses 2-7, 3-4 and 8-2.

Christine K. Lipscomb
P.O. Box 153
Unity, Oregon 97884

Supervisor Leonard Lindquist
Kaibab National Forest
800 S. 6th St.
Williams, Arizona 86046

69-1 We do not need a uranium mine in the Grand Canyon. I have seen the aftermath of mining. It is not a pretty sight. The Canyon shoud be protected from greedy people who do not see any beauty except in the greenback. There is a mine there already, TOURISM. The Canyon is too beautiful to ruin. I oppose this Uranium Mine with all my heart and soul.

Christine K. Lipscomb

92

L-69

Forest Service Response

69-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

June 3, 1986

Mr. Dennis Lund,

70-1 I am writing with great concern over the proposed uranium mining in the Grand Canyon area. Please help us save this sacred land from rape and destruction!

NO URANIUM MINING AT THE VERY GRAND CANYON!!

Dianne Oakley
PO Box 22513
Flagstaff AZ 86002

L-70

Forest Service Response

70-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

Gerald & Nancy Bakerink
182 Blevedere Street
San Rafael, CA 94901
June 7, 1986

Supervisor Leonard Lindquist
Kaibab National Forest
800 S 6th St
Williams, AZ 86046

Dear Mr. Lindquist;

71-1

We would like to express our opinion against any uranium mining on or near the Grand Canyon. This is such a special place that this would be a desecration. Please preserve this treasure for our children by not allowing it to be damaged or destroyed for something that we do not really need. Given recent events in connection with nuclear power we should be questioning our need for uranium products at all, not jeopardizing our national treasures in pursuit of them.

Thank you.

Nancy Bakerink
Gerald E. Bakerink

Forest Service Response

71-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

Dear sir,

I was angered when I heard of the plan to open the uranium mine just south of the rim of the Grand Canyon. The potential ecological damage is immense, from the mine, transportation, + use as nuclear fuel.

72-1

I just returned from 2 weeks in the Grand Canyon, and found it to be still well-preserved. Havasu Canyon was especially beautiful. I felt, however, that the area was threatened by too many helicopters, too much logging, and here was obvious air pollution dimming the beauty.

72-2

The uranium mine could contaminate groundwater. A heavy rain from an August cloudburst could sweep mine tailings down to Havasu Creek and destroy the closest place to paradise that I've ever found.

Please, do not allow the Grand Canyon Uranium Mine to go any further

Sincerely,
Kirk Dean
2538 Leith.
Ft Worth, Tx 76133

Forest Service Response

72-1

Please refer to responses 3-4, 5-1 and 8-2.

72-2

Please refer to response 32-4 and the responses to letter 61.

6/4/86
2041 Blue Mtn. Rd.
Saugerties, N.Y. 12477

Supervisor Leonard Lindquist
Kaibab National Forest
800 S. 6th St.
Williams, Arizona 86046

Dear Mr. Lindquist:

73-1 I am opposed to the Grand Canyon Uranium Mine because it would disturb wildlife habitat and wilderness quality.

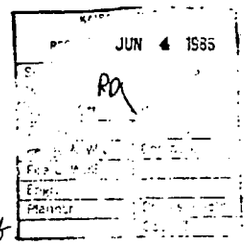
Sincerely,
Kate West

Forest Service Response

73-1

Please refer to response 2-7. There are no designated wilderness areas in the immediate vicinity of the Canyon Mine site. No impacts on wilderness qualities are projected.

HERB GREENE, ARCHITECT



May 6, 1986
R. Dennis Lund
Kaibab National Forest
Recreation & Lands staff

Dear Mr. Lunds—
As recent visitors to the Grand Canyon and to Canyon de Chelly, we would like to urge that no uranium mine be built in the Kaibab National Forest near Tusayan, as reported in the "Arizona Republic".

The National Parks, Monuments and Forests of Arizona are world treasures and nothing should be allowed in them that is inappropriate as a mine.

Please add our names to your list of americans who oppose the mine.

Thank you,
Janine & Herb Greene

P.S. Had to call & call Forest Service to get your address!

1918 QUEENS ROAD, BERKELEY, CA 94709 (415) 841-7818

74-1

Forest Service Response

74-1

Please refer to responses 3-4, 5-1, 5-4 and 8-2.

PETER K. SHIELDS
4507 E. VERMONT
PHOENIX, ARIZONA 85018

3-12-86

MR. LEONARD A. LINDQUIST
FOREST SUPERVISOR
KAIBAB NATIONAL FOREST
800 S. 6TH ST.
WILLIAMS, AZ. 86046

RE: DEIS FOR THE CANYON MINE

DEAR SIR-

97

75-1 I HAVE RECEIVED A COPY OF THE ABOVE & FIND IT MOST COMPLETE. I WOULD FAVOR THE MINE AS LONG AS THE HAUL WAS OVER PAVED ROADS.

75-2 I WOULD LIKE TO KNOW THE COST OF PREPARING THE DEIS AND WHO PAID FOR IT.

YOURS TRULY,
P. K. Shields

Forest Service Response

75-1

Your comment on haul route alternatives has been noted and considered in the selection of the Preferred Alternative.

75-2

The major costs (printing, consultants, etc.) in preparing the EIS were paid by the project sponsor, EFN. The input of Forest Service specialists (interdisciplinary team members, Regional review team, etc.) was included in the ordinary operational budget of the agency. The Forest Service has complete responsibility for the content of the document, the selection of experts and the decision on the Plan of Operations.

P.O. Box 758
Prescott, Az 86301
March 18, 1986

Leonard Lindquist
Supervisor
Kaibab National Forest
800 S. 6th St
Williams, Az 86046

Dear Mr Lindquist:

I have received and studied the Draft Environmental Impact Statement for the Canyon Uranium Mine.

76-1 I would urge you to consider alternative #5 using haul route #6, utilizing state & federal highways already in existence. As long as these roads are available why do further damage to the forest by building additional roads?

The common transportation for employees seems like an excellent idea and very plausible.

Thank you for considering my opinion.

Sincerely,

[illegible]

Forest Service Response

76-1

Your comment was considered in the selection of the Preferred Alternative.

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
206 South Seventeenth Avenue Phoenix, Arizona 85007

BRUCE BABBITT
Governor
CHARLES L. MILLER
Director

W. O. FORD
State Engineer

May 5, 1986

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, AZ 86046

Re: Draft EIS for Canyon Uranium Mine

Dear Mr. Lindquist:

The Arizona Department of Transportation, Environmental Planning Services, in conjunction with our Flagstaff District Office, has reviewed the Draft EIS for the Canyon Uranium Mine. Our comments are directed to the ore hauling operation over state highways in regard to public safety and maintenance of traffic flows.

77-1 In the Draft EIS, Section 1.3 Permitting Process, we would like to see the following regulations noted as all apply to the haulage of material over state and federal highways: Federal Motor Carrier Safety Regulations 49CFR, Parts 390-393, 395-397; Hazardous Materials Hauling Regulations 49CFR, Parts 171-173, 177, 178; and Arizona Motor Carrier Safety Regulations, Title 28, Section 2401-2405.

77-2 Section 2.5.5, Ore Haulage Control, reports ADOT to be contacted in case of an accidental spill. To assure the most effective response, the Department of Public Safety (DPS) should be contacted as well.

77-3 In the regard of route selection, the Arizona Department of Transportation would like to point out the disadvantages of the use of State Route 64 between the Grand Canyon Village and Cameron (Junction U.S. 89) and U.S. 180 from Valle to Flagstaff. These routes are narrow, winding roadways which carry the bulk of the Grand Canyon tourist traffic. The addition of presumably slower moving ore trucks may reduce the operational service of those highways. Additionally, in the event of an accidental spill, traffic rerouting, detouring, and cleanup will be more difficult in those highway segments. Any routing through Flagstaff should be limited to Interstate 40.

Any traffic control measures, such as signing for truck crossings, can be coordinated through our Flagstaff District Office.

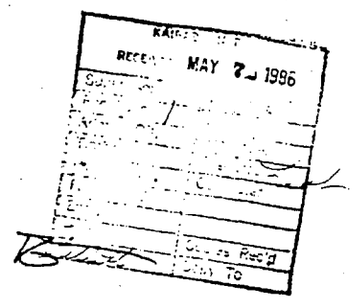
Thank you for the opportunity to review the Draft EIS. If we can be of any assistance, please call Mike Dawson of Environmental Planning Services at 255-8638 or Richard Genteman in the Flagstaff District Office at 645-2412.

Very truly yours,

for James L. Smith
PHILIP A. SHUCET, Manager
Environmental Planning Services

PAS:MRD:eh

cc: Ed Gentsch, Flagstaff



Forest Service Response

77-1

We have added these regulations to the Final EIS as you suggest. However, we add that uranium is not generally classified as a hazardous material for purposes of regulation. Only very limited portions of the federal and state regulations apply to the transportation of uranium ore.

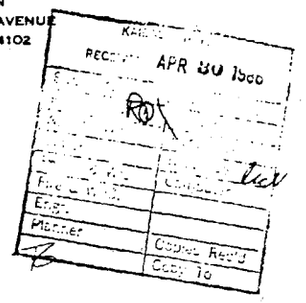
77-2

Your comment is noted and "DPS" has been added to section 2.5.5 of the Final EIS.

77-3

Your comment has been noted and considered in the selection of the Preferred Alternative.

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
PACIFIC SOUTHWEST REGION
BOX 36098 • 450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102
(415) 556-8200



April 28, 1986

ER86/351

Mr. Leonard A. Linquist
Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, AZ 85046

Dear Mr. Linquist:

The Department of the Interior has reviewed the Draft Environmental Impact Statement for the Canyon Uranium Mine and has the following comments.

General Comments

Recreation/Air Quality

A major concern with this proposed project is the air quality and possible noise impacts of the use of haul routes near the Grand Canyon National Park.

Haul route options 1 and 2 (Alternatives 2 and 3) would be located within three fourths of a mile of state highway 64 in the park, the major visitor route on the south rim, and within one mile of Grandview Point, one of the most visited viewpoints within the park (the park had 2,983,436 visitors in 1985). The sight and sound of 10 20-ton ore trucks traversing either of these unpaved routes every day for five to ten years would likely have an adverse impact on park visitors' experience.

78-1 The DEIS identifies alternatives 3, 4, or 5 as being acceptable to the Forest Service; however, it does not identify a preference for any one of the three. We feel alternative 3 would have the greatest impact on the park. Alternative 3 would route the haul road along an existing road within 1/2 mile of the park boundary. To accommodate ore trucks, it would have to be widened and upgraded to an all-weather road. This action would also increase ease of access to the park along approximately 3 miles of boundary, increasing hunting pressures and the potential for cultural site vandalism.

In order to avoid potential conflicts between the proposed project and the park values, we suggest that the project adopt one of the other haul route options described in the DEIS, particularly a route along paved roads away from the park, as its preferred haul route. Haul route options 6 and 7 (Alternative 5) would be least likely to adversely affect Grand Canyon National Park and its visitors.

Energy Fuels Nuclear, the major mining company in the area, has identified 30 to 40 potential ore deposits to date in the vicinity of the park. If these deposits are found to contain sufficient ore, they may be initiating development of a new mine every year well into the 21st century. The average life of a mine is estimated at 10 years, so they probably would not have more than 10 mines in operation at any one time.

In addition to the Canyon Mine on the south side of the park, there are currently four other mines on the north side of the park in various states of development and production. To date, the environmental impacts of each of these mines have been examined on an individual basis, with no effort to look at the cumulative effect of mining activity or to prepare any type of management plan to deal with it. We recommend that the Forest Service and the Bureau of Land Management develop a comprehensive management plan and a NEPA compliance document addressing the cumulative impacts of uranium mining. Without such plan and environmental document, the overall and interactive impacts of mining activities cannot fully be identified and evaluated (40 CFR Sections 1502.4 and 1508.25(a)(2).

78-2

The DEIS states that the proposed mining operations at the Canyon Mine site will have little or no impact on groundwater circulation and storage in perched aquifers and will have negligible or no impact on yield from springs and wells. These conclusions were based upon an analysis of hydrogeologic and hydrochemical data obtained during the Canyon Mine environmental impact investigations. Based upon the information in the document, we are in agreement with their findings.

78-3 As a part of mitigation of possible impacts, the document identifies an ongoing groundwater monitoring program. This program monitors water samples taken from Havasu, Indian Gardens, Blue Springs, and also at a monitoring well at the mine site. The document states that monitoring will be done at 6-month intervals during the first year of the sampling program, after which the frequency of collection will be modified. We feel that it is important that water sampling be continued on a 6-month frequency to provide an early warning of any possible contamination.

78-4 We would appreciate it if some arrangements could be made whereby Grand Canyon is furnished with the results of all monitoring data pertaining to the Canyon Mine on a yearly basis.

101

Wildlife

78-5 The three potentially acceptable alternatives call for mitigation of wildlife impacts. While the mitigation features would be adequate, it is preferable to avoid impacts rather than to mitigate for losses. Based on this concept, Alternative 5 is the most desirable. It maintains the present access to most of the District since a new or upgraded haul road is not part of the operation. It also has the smallest impacted acreage and fewest impacts to wildlife waters. This is, however, the most expensive transportation route for the ore and may not be feasible due to right-of-way constraints.

Of the remaining two alternatives, Alternative 4 would be preferable to Alternative 3 since it avoids the elk calving area, no additional acres are needed for the powerline, and it has company-provided transportation for workers.

Minerals

78-6 If other metals occur with the uranium, we suggest that future versions of the statement discuss recovery of the other metals to assure users of the document that all mineral resources have been considered. If minerals other than uranium do not occur, or do not occur in economic quantities, then subsequent versions of the document should so state.

Specific Comments

78-7 Page iii (Summary):
There are difficulties with the statement that "ore transport to the mill will not expose inhabitants along the haulage route to any measurable increase in radiation." What is the basis for this statement? The document presents an air quality impact analysis for areas near the mine site but does not address this issue relative to habitations along the haul route through the Navajo Indian Reservation. How will Navajo people living near the haul routes be affected?

78-8 Page 1.5: This is the first indication of the possible requirement for a bond to ensure the proper performance of rehabilitation. Bonding is also discussed on page 1.11 and page 2.17. The level of bonding under Alternatives 3, 4 and 5 is presented on page 2.28 at $100,000. There is no indication in the DEIS as to the basis for this bond amount. It is also not clear whether the costs for this level of bonding are included in the estimated $360,000 to $1,300,000 increased expenditures of the project under Alternative 3 through 5.

The haul road in Alternative 3 would have a minimum estimated daily traffic load of 20 ore trucks. This road at its closest point

78-9 would come within one mile of the east rim scenic drive. Although the DEIS states that the project will be designed and operated to minimize excessive dust and noise, there is concern that these two impacts cannot be reduced along this haul road to the point where they will not have an impact on the park. It appears that dust and noise from ore trucks will impact air quality and park aesthetics along approximately two to three miles of the park scenic road.

78-10 Page 2.15: It may be appropriate to include a discussion of the Groundwater Pollution Control Permit provisions under the Clean Water Act discussion.

78-11 Page 2.18: In the case of an accident causing ore spillage the Navajo Tribe and the Bureau of Indian Affairs, Navajo Area Office and Western Navajo Agency must also be notified.

78-12 Page 2.22 Section 25.11, Groundwater Monitoring. There is no indication of the proposed monitoring well in the Redwall - Mauv aquifer. The well should be located so that it is down gradient hydrologically from the mine. It is indicated in Appendix F that the Redwall - Temple Butte - Mauv sequence dips one-half to one and one-half degrees to the southwest. If no other information is available regarding direction of the hydrologic gradient in the Redwall - Mauv aquifer, it is suggested that the monitor well be placed southwest of the ore body at a distance of at lease 100 meters.

It is stated that that if contaminants are found during the monitoring program that the monitoring well will be pumped until all contaminants are removed. This may be physically impossible to accomplish. Increased pumping may change the local chemical environment of the aquifer making it impossible to achieve original chemical stability. The document should discuss the option that the aquifer be pumped until the critical chemical constituents are withn a reasonable percentage, perhaps 10 percent to 15 percent of the pre-mining analysis.

78-13 Page 2.24 Section 2.5.14, Wildlife Mitigation 1. The 32 acre foraging area represents less than 0.2 percent of the available grassland habitat. If wildlife species that use the habitat are experiencing up to 20 percent annual increases in population, what is the rationale for disturbing other types of habitat and creating other impacts for a loss of a resource that does not appear to be fully utilized?

78-14 Page 3.31: Section 3.2.7.2, Groundwater. If "it is unlikely that any significant groundwater resources or aquifers will be encountered by mine construction and operation," why is the applicant required to sample and analyze water from springs 13 or more miles from the

mine? If these potential aquifers - the Toroweap formation, the Coconino sandstone, the Kaibab limestone, and the Redwall - Mauv - are in an unsaturated condition at the mine site is it unlikely that possible contamination would reach the springs that are going to be sampled? Also, if the regional dip at the mine site of these formations is to the southwest, combined with an unsaturated or nonartesian condition in the potential aquifers, would it be extremely unlikely that possible contaminations would reach the springs along the Grand Canyon?

78-15 Page 4.6: The statement that "traffic on U.S. Highway 89 across the Navajo Reservation will increase by approximately 20 ore trucks per day, but given existing traffic levels, that increase is insignificant" poses some potential problems. Some highways across the Navajo Reservation (U.S. 89, 160 and 191) may not be designed or constructed for these kinds of traffic increases or loads and certainly the increase in traffic per day by the 20 trips of twenty-ton ore trucks will have significant impacts in terms of risks to health and safety of the Navajo people.

78-16 Page 4.24: The discussion of soil and water impacts should provide some mention of the ore stockpile pads which are constructed to prevent the leaching of uranium into the soil and near-surface waters. This part of the proposed plan of operations is discussed on page 20 of Appendix A.

Thank you for the opportunity to review and comment on this DEIS.

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

ccs: Director, OEPR (w/orig. incoming)
State Dir., BLM
Reg. Dir., NPS
Chief, BM
Reg. Dir., FWS
Area Dir., BIA

Forest Service Response

78-1

These comments have been considered in the selection of the Preferred Alternative.

78-2

When Energy Fuels submitted a Plan of Operations for the Canyon Mine in October, 1984, we carefully considered the appropriate level of review required by NEPA. Three alternatives were considered: an environmental assessment, a site specific environmental impact statement, and a regional environmental impact statement assessing the impacts of several mines on the Kaibab National Forest. Based on the size and potential impacts of the project, and the practice of BLM for reviewing similar proposals north of the Grand Canyon, it appeared that an environmental assessment might provide an adequate review. However, factors beyond the potential impacts of the project were also considered important. First, the Canyon Mine proposal represented the first plan for mining uranium in the area south of the Grand Canyon. Thus there was no appreciable background data or information related to mining in the area, nor were there any comparable projects in the area which could be used to project impacts from the Canyon Mine. In addition, public reaction to the Plan of Operations, sought by the Forest Service in 1984 and 1985, indicated a high level of concern. Given these concerns, we determined that an EIS was required for several reasons. First, the EIS process specifies a well-defined procedure for obtaining public input throughout the analysis. Thus, the EIS process generally provides greater opportunity for public input than the process required to complete an environmental assessment. NEPA requires federal agencies to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the human environment, a detailed statement" on the environmental consequences of that proposed action. Such a statement is known as an EIS. A critical question to federal agencies is to determine when an environmental impact is significant, triggering the EIS requirement. "Significantly," as used in NEPA, requires consideration of, among other factors, "the degree to which the effects on the quality of the human environment are likely to be controversial." Given the obvious controversial nature of the Canyon Mine proposal and the unknown magnitude of the impacts of uranium mining in the area south of the Grand Canyon, the preparation of an EIS was necessary to fulfill NEPA requirements.

The option of preparing a broader, regional analysis of uranium mining was also considered, but rejected. NEPA requires such an analysis in two instances: first, where there is a comprehensive federal plan for the development of a region and second where various federal actions have cumulative or synergistic environmental impacts in a region. The first requirement is clearly inapplicable. The second was analyzed in detail but rejected for two reasons. First, only one mining plan was pending before the agency. While other mine plans are possible, and perhaps even likely, only one federal decision in the region south of the Grand Canyon required NEPA analysis -- the review of the Canyon Mine Plan of Operations. Second, it was not clear that additional mines would have significant cumulative or synergistic environmental impacts. Such impacts were suggested, but the evidence from similar mines operating north of the Grand Canyon indicated that impacts were localized and that major synergistic impacts were unlikely. The distance between the two areas and the unique geology which separates them creates two distinct regions. We were also influenced by the practical problems of such a regional analysis. Since no other mine sites had been proposed, a regional analysis would have required us to hypothesize sites and development schedules for an unspecified number of future mines. Since the location and timing of the mines would determine whether cumulative or synergistic impacts existed, the outcome of the study would have been determined by the selection of mine sites. Such an artificial study did not appear to be valuable in the review of the Canyon Mine Plan of Operations.

While there was no basis for a regional environmental impact statement, the EIS does recognize the possibility of cumulative impacts from the development of additional mines in the area. (See Sections 1.2.2 and introduction to Chapter 4.) Potential cumulative impacts on the region were analyzed by considering two scenarios: first, one additional mine in the Tusayan area near the Canyon Mine and second, three additional mines in Coconino County south of the Grand Canyon. The conclusion of the EIS is that, apart from transportation and social and economic impacts, the impacts of development of mines such as the Canyon Mine are limited to a relatively small area near the mine site. While several commentors have asked for more detailed analysis of cumulative impacts, no comment challenges this conclusion or provides any evidence to the contrary.

This response explains in detail the considerations which led to the the scope and coverage of the Canyon Mine EIS. As noted, one of the goals of the EIS was to provide detailed analysis which would provide an accurate basis for assessing the impacts of similar projects in the future. If a subsequent mine is proposed in the area, the NEPA analysis of that decision will require an assessment of cumulative impacts, including the impacts of the Canyon Mine as well as any other mines proposed for the area. Subsequent decisions must also consider the decisions made on the Canyon Mine Plan of Operations, including the selected haul route. We believe that this approach best serves the objectives of NEPA and the needs of federal agencies which may be reviewing mining plans. While we are willing to consider proposals from other agencies for regional studies of uranium development, the current knowledge about potential mines and the limited impacts resulting from mine development do not appear to warrant such an undertaking. Because the impacts are so closely linked to the mine sites, any study which hypothesizes mine sites and does not forecast future sites accurately will be virtually useless for NEPA purposes. A complete analysis will still be required for each mining plan and committing the agencies' limited resources to a regional study may only complicate and delay review of specific proposals. (See also responses 1-5 and 2-3.)

78-3

We are pleased with the agreement on potential groundwater impacts. For an opposing viewpoint, see Comments from the Hopi and Havasupai Tribes and the Sierra Club.

The monitoring program began in May 1985 and the first year of the program has been completed. The six-month sampling interval has been continued for the second year of the program, and the sampling sites and parameters analyzed have not been modified. At the end of the second year, the results of the monitoring program will be evaluated and the program may be modified. We anticipate that the comprehensive laboratory and field chemical data obtained during the first two years of the program will be sufficient for documenting groundwater quality prior to mining operations at the Canyon Mine. If groundwater is present, the on-site monitor well will be sampled at six-month intervals prior to and during mining operations to provide early detection of changes in chemical groundwater quality in the Redwall-Muav aquifer. After the second year of the program, sampling frequency may be decreased at the springs and the parameters analyzed may be reduced to include appropriate "indicator" parameters.

The well to be drilled at the mine site (see Section 2.5.11) will provide the best early warning system for detecting any possible subsurface water contamination, as well as the means for removing any contaminants from the aquifer. Monitoring water samples at Havasu, Indian Gardens and Blue Springs will not serve the same purpose because 1) any contaminants detected may not be traceable to the Canyon Mine or any other specific source; and 2) if contaminants reach the springs before detection, mitigation will be very difficult.

78-4

All monitoring data will be furnished by the Forest Service to the Park Superintendent's office on a yearly basis.

78-5

This comment has been considered in the selection of the Preferred Alternative.

78-6

The text has been revised to indicate that minerals other than uranium do not occur in economic quantities at the Canyon Mine site.

78-7

The radiological assessment (see Appendix E) indicates that any radiation emitted by haul trucks along the haul routes will be negligible (p. 27). Thus Navajos, or others living near the haul route, will not be affected. The effects of additional traffic (up to 20 ore trucks per day) are deemed insignificant on state and federal highways. (See Section 4.2.6.)

The text has been revised to include more discussion of the possibility of accidental ore spills along the haul route. (See response 60-1.)

78-8

Please refer to response 60-10.

78-9

This comment is consistent with the analysis in the EIS. (See Section 4.2.5.1.) These impacts have been considered in the selection of the Preferred Alternative.

78-10

The discussion of the Clean Water Act has been revised to reflect the comments made by EPA.

78-11

The text has been revised to require notification of affected Tribes of any ore spills on the reservation. (See response 60-11.)

78-12

The proposed location for the on-site water supply and monitor well is shown on Plate 2 of the Plan Of Operations (Appendix A) prepared by EFN and dated October, 1984. This location is approximately 400 feet north of the breccia pipe.

The Grand Canyon and its tributary canyons provide a regional groundwater drain for the rock units which are cut by the canyons. Data do not exist to allow for an exact determination of the direction of groundwater flow in the Redwall-Muav aquifer at the mine site area. Groundwater movement in this aquifer is chiefly lateral from areas of principal recharge located generally south of the mine site toward large springs along the south wall of the Grand Canyon. These large springs occur northwest, north, and northeast from the mine site, and the direction of groundwater flow from the mine site can be expected to be within this range of directions. Because the proposed monitor well will also serve as a water supply well, a radially inward groundwater gradient will be created around the well by pumping operations, if groundwater is present. Therefore, the monitor well will continually capture groundwater at the site during mining operations and will serve as a down and/or inward gradient monitoring system.

If pumping for mitigation is required, the aquifer will be pumped until concentrations of the critical constituents are reduced to recommended primary drinking water standards or to within ten percent of ambient concentrations, or to some comparable standard approved by the Forest Service.

The discussion of the monitoring well in the EIS has been expanded to reflect this comment. (See Sections 3.2.7.2 and 4.2.7.2.)

78-13

The mitigation measures are suggested so that key big game populations can continue to grow at present rates.

78-14

We agree that the hydrological and geological conditions make it extremely unlikely that any of the springs will be affected by mining operations. However, scoping and consultation with affected Indian Tribes disclosed a great deal of concern about potential impacts to these springs. Accordingly, the springs were sampled to provide baseline data on water quality and mitigation strategies were designed to assure that the springs would not be affected.

Large perennial springs discharge from the aquifer in the Grand Canyon and the saturated zone in the aquifer is believed to be laterally continuous and areally extensive in the Grand Canyon region. The Grand Canyon and its tributary canyons provide a regional groundwater drain for the rock units which are cut by the canyons. Therefore, if mine drainage occurs and mixes with groundwater in the Redwall-Muav aquifer at the mine site, it may be possible for the mine drainage eventually to reach one or more of these springs in a highly diluted condition. These three springs are being monitored because:

- Indian tribes have expressed concern about potential contamination;
- The large discharge rate from these springs has caused hydrologists to conclude that essentially all groundwater in the region along the south rim of the Grand Canyon issues from them; and
- No wells or other springs presently exist that would be more appropriate as sites to obtain samples of groundwater from the Redwall-Muav aquifer down-gradient from the mine site.

78-15

Consultation with state transportation officials in Utah and Arizona has disclosed no concerns about the ability of any of these highways to accommodate the additional ore truck traffic. Furthermore, given existing traffic levels (2,900 ADT on SR64 and 7,700 ADT on U.S. 89), an additional 20 ore trucks per day is considered an insignificant increase in traffic. The text has been revised to include more discussion of possible ore spills (see response 60-1) but no further analysis of highway hazards is necessary.

78-16

The text has been revised to reflect this comment.

ARIZONA DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION
District 4
1801 South Milton Road, Flagstaff, Arizona 86001

BRUCE BABBITT
Governor
CHARLES L. MILLER
Director

W.O. FORD
State Engineer

May 13, 1986

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab Nat'l Forest
800 S. 6th Street
Williams, Az. (86046)

Ref.: Letter 05-05-86 from Philip A. Shucet, of ADOT's Environmental Planning Services.

Dear Mr. Lindquist:

If any clarification is needed of the referenced letter, please phone us at the District office. The correct phone number is 774-1491 (not 645-2412 as stated in the letter).

Also, our preference for routing of trucks hauling uranium ore would be State Route 64 south to I-40 at Williams; I-40 east to the junction of U.S. 89 at Flagstaff; U.S. 89 to Utah. This routing would keep the conflicts of the truck traffic with recreational vehicle traffic to a minimum, and would avoid most of the narrow, winding roadway in the area.

E. F. Gentsch
District Engineer

L-79

Forest Service Response

79-1

Your comment has been noted and considered in the selection of the Preferred Alternative.

ROCKY MOUNTAIN ENERGY
A Subsidiary of
Union Pacific Corporation

April 29, 1986

Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Sir:

Re: Comments on the DEIS, Canyon Uranium Mine

Rocky Mountain Energy (RME) appreciates the opportunity to comment on the Canyon DEIS. As the mining subsidiary of Union Pacific Corporation, RME is vitally interested in mineral development in Arizona. We have an ongoing exploration program in this region and hope to eventually develop some of the uranium deposits. Thus, while the Canyon EIS addresses a mine proposed by Energy Fuels, a similar analysis could be applied to an RME proposal in the future.

RME has carefully studied both the DEIS and the appendix. We wish to congratulate the Forest Service for a good work product. On the whole, the analysis appears to be a reasonable treatment of the several issues and alternatives.

80-1 However, we do have some concerns. We believe: 1) that the
80-2 conservative nature of the analysis should be clearly labeled in the final EIS, and 2) that the case for wildlife mitigation is overstated.

Conservative Analysis

Impact assessments throughout the DEIS are consistently based on worst-case assumptions. While this conservative approach may be warranted, the final EIS should clearly identify the worst-case nature of the assumptions. Even a casual reader should understand that the impacts

80-3 suggested in the EIS are worst-case scenarios.

One example of the very conservative nature of the assessment is the potential direct radiological impacts from ore stockpiled at mine site. The DEIS states (pg. iii and

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Appendix E) that "...the direct radiation from the ore piles will probably not be measurable at distances greater than a few hundred meters from the mine site." Unless large quantities of very high grade ore are accumulated, measurable radiation will likely not be detectable at even much closer distances. Energy Fuels certainly intends to haul the ore to a processing facility as soon as practical to recover its financial expenditures. The statement in the DEIS should perhaps be expanded to point out that only under a very conservative scenario (large, high grade stockpiles) would direct radiation be detectable.

Chapter 2, regarding the alternatives considered, also has several conservative steps proposed. Revegetation of access and haul roads disturbances is a logical measure to control erosion. Riprapping of the outside slopes of the

80-4 dikes surrounding the mine yard is an excessive requirement. The gentle topography at the mine site combined with the diversion channels and dikes presented in the Plan of Operations appear to be more than adequate assurance of erosion control. Obtaining acceptable riprap material and hauling it to the site for placement is likely to cause more impact than simply relying on the proposed system of channels and dikes.

A possible alternative for mitigating impacts by haulage trucks during the elk calving season is proposed to be a suspension of haulage for two months. If in fact truck traffic is expected to impact elk calving, the project operator must be allowed an opportunity to "make up" the lost haulage

80-5 time resulting from the proposed two-month closure. The DEIS generally refers to an average of ten ore trucks per day entering and leaving the site. If implementation of this alternative is necessary, additional truck traffic will need to be allowed to sustain the annual production rate.

Providing pooled transportation to the mine site may be acceptable to the operator, but it should not be required. Minimizing traffic in the Forest is desirable from a wildlife

80-6 impact viewpoint, but the traffic impacts from commuting workers will be minimal. The workers will likely "pool" of their own accord for economy reasons, but the work commute will be of short duration. Most of the work force will leave or arrive in a short-time period corresponding to shift changes.

The intermittent and random traffic by recreational Forest users will probably cause more total time of road activity than will occur due to worker commuting.

Wildlife

The wildlife section carries the conservative analysis theme to an extreme. The reader is left with the impression that because there is little quantitative data, the Forest Service is attempting to protect against all possible impacts. In some cases the "possible" impacts are highly unlikely.

80-7 A very small amount of wildlife habitat will be disturbed by the proposed mine. The insignificant nature of the disturbance is hidden among the details of the analysis. In fact the surface facilities will disturb about 17 acres of forest opening in a forest which has 13,551 acres of similar habitat. The disturbed area will equal 0.13 percent of the similar habitat which exists on the Kaibab Forest. It would take about eight mines of this size to disturb 1 percent of the forest opening habitats. It is difficult to establish a credible case that the loss of 0.13 percent of one habitat type will have a measurable, much less a significant, impact on the wildlife populations of the Kaibab Forest.

There are alternative methods of establishing forest openings. If forest openings are extremely valuable, the Forest Service can surely arrange timber sales or firewood cutting areas to create additional openings.

80-8 Some of the suggested mitigation measures appear to conflict. It is not immediately apparent, for example, why creating a new forest opening is suggested at the same time tree cutting along the proposed powerline is prohibited.

80-9 The effect of increased traffic on wildlife use of roadside habitats is overestimated. The DEIS suggests that habitat within one-half mile of a road must be replaced in another location. It is possible to disturb an elk one-half mile away, but it is unlikely that it would be disturbed at that distance by a passing vehicle. A consensus of the literature sources cited in the DEIS is that elk prefer to be one-half mile from people on foot but will use habitats within one-fourth mile of moving traffic.

Elk develop a higher tolerance for predictable disturbances, such as heavy traffic on roads. The DEIS overestimates the impact of roads by not considering the elks' adaptability.

80-10 The DEIS suggests mitigating for impact on wildlife use of water sources by developing additional water sources in another location. The need for water source mitigation should be evaluated on a case-by-case basis. An established water source near a road may continue to be valuable to wildlife. The effect of increased traffic may be minimized by visual screening or road realignment. Water sources may also be selectively managed so that those close to roads are available to livestock and those more isolated sources are reserved for wildlife.

80-11 We are troubled by the philosophy that this area must receive more intensive management because of low habitat potential or, stated another way, all forest lands must produce wildlife whether they are suited or not. It is a suspect logic that prohibits mining in this area because it is marginal wildlife habitat. In other areas, mining is prohibited because of valuable habitats. With proper planning, uranium mining in this area can be compatible with wildlife management goals.

The DEIS for the Canyon mine logically concludes that no significant environmental impacts are expected from the operation of the project. The Forest Service is to be commended for maintaining its focus on the issues at hand and not getting caught up in the emotional controversy that surrounds development of the project. Reiterating an earlier point, the final EIS should emphasize the "worst case" conservative nature of the evaluations presented in the DEIS.

Thank you for this opportunity to comment.

Sincerely,

ElRoy Taylor

ElRoy Taylor
Project Environmental
Specialist

ERT/asm

Forest Service Response

80-1

Your comment is noted and the text has been revised to reflect it.

80-2

The wildlife evaluation (Appendix C) notes that the grassland opening at the mine site provides a foraging area for elk, deer and antelope, as well as a possible fawning area for deer and a hunting area for raptors. In addition , the ore transportation routes analyzed potential impacts on wildlife habitats to varying degrees. We believe that those impacts should be mitigated.

80-3

We agree that many of the impacts are evaluated under extreme conditions, but believe that approach is warranted.

80-4

Riprapping is recommended to hold the stockpiled topsoil (used in construction of the dike) in place. The 3:1 slope of the dike is susceptible to erosion from high intensity rainstorms. We believe that it is important to hold the dike in place without seeding and vegetation, thereby also creating a peripheral firebreak during the life of the mine. Non-ore bearing material removed from the mine during shaft drilling can be used for riprap.

80-5

We agree.

80-6

We disagree. Pooled worker transportation should be made available daily by the operator and efforts made to encourage the workers to use it. This will reduce the size of the on-site parking lot, minimize wildlife, and other resource impacts from traffic along Forest roads and minimize possible traffic congestion along U.S. 180.

80-7

Very few grassland openings on the Tusayan District provide the same habitat values as the mine site opening. The opening represents 32 acres of Fair-rated foraging habitat on a district where range condition is generally Poor to Very Poor. The opening is located within a known deer fawning area and is in close proximity to Owl Tank, an important wildlife water source. The short-term loss of a foraging area with these habitat characteristics warrants mitigation.

80-8

There is no mitigation measure in the DEIS which prohibits cutting along the proposed powerline. However, the shape and size of an opening is an important factor affecting the value of an opening for wildlife. A narrow opening with great sight distances typical of a powerline corridor is not as beneficial as a small, undulating opening.

You are correct in stating that timber sales and firewood cutting areas can be used to create openings in the forest canopy for wildlife. These are the methods most commonly used by the Forest Service to create such openings. A portion of the direct habitat improvement projects planned each year include creating wildlife openings. This does not, however, negate the need to evaluate and mitigate the impacts of the Canyon Mine through the specified habitat replacement measures.

80-9

A fundamental factor in the assessment of impacts of vehicle traffic on wildlife is the volume and speed of the traffic, or its "predictability." Current research and literature show that elk are not tolerant of unpredictable disturbances. Traffic along haul routes, both from ore trucks and other forest recreation and commercial uses, is considered to be an unpredictable type of disturbance and therefore disruptive to elk.

We disagree that the predicted effect of increased traffic on wildlife use of roadside habitats is overestimated. The consensus opinion of the literature cited in the wildlife technical report (Appendix C) is that traffic on forest roads displaces elk anywhere from .25 to 1.8 miles from roads. The width of the area avoided by elk varied with each study depending on such factors as the amount and kind of traffic, quality of road, and density of cover adjacent to the road. A distance of .5 miles was considered a reasonable figure in the design of mitigation measures based on the habitat conditions along the road corridors identified as possible ore haul routes.

80-10

We agree. The need for water source mitigation was determined on a case-by-case basis depending on the reliability of each water source located adjacent to the road corridors identified as haul route options. Although an established reliable water source near a road may continue to be used by wildlife to some extent, water source replacement is a preferred mitigation measure because it is a highly effective yet relatively low cost measure to implement. Road realignment was also considered as a mitigation option but later discarded because of higher costs. These costs include archeological and sensitive plant clearances of the new road corridor, permanent closure of the old road, and new road construction. Furthermore, the effectiveness of road realignment, as compared to water source replacement, is questionably less. Selective management of waters exclusively for either livestock or wildlife does nothing to offset the need for reliable water sources for wildlife.

80-11

The statement referred to (Section 3.2.2, page 3.14 of the DEIS) was misinterpreted by several reviewers and thus deserves further explanation. The Forest Service generally places management emphasis on specific areas of the National Forest based on the biological potential or capability of the area. While the overall habitat value of the entire Tusayan District is relatively marginal, there are inventoried specific areas on the District that have the necessary combination of physical and biological features representative of quality wildlife habitat (see Figures 3.2, 3.3 and 3.4). Due to the relative scarcity of these quality habitats in relation to other areas of the Forest, their contribution to the overall habitat capability of the entire Tusayan District is disproportionately great. This demonstrates the need to manage the quality habitat areas intensively to protect their wildlife values. Potential wildlife impacts from the Canyon Mine and haul route options were evaluated based on these quality habitats. Mitigation measures were designed to offset impacts to these specific areas.

Elk management on the Tusayan District is somewhat of an exception. Despite the relatively marginal overall habitat conditions district-wide, the elk population is expanding. Game Management Unit 9 which encompasses the entire Tusayan District has been designated by the Arizona Game and Fish Department (AGFD) as one of only two trophy elk hunt areas in the state. The escalating public demand for quality elk hunting has prompted the AGFD and Forest Service to jointly agree to place management emphasis on the Tusayan elk population.

ARIZONA GAME & FISH DEPARTMENT
2222 West Greenway Road Phoenix, Arizona 85023 942-3000

April 16, 1986

Mr. Andy Lindquist
Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

The Arizona Game and Fish Department has reviewed the Draft Environmental Impact Statement/Appendix-Canyon Uranium Mine, and would offer the following comments and suggestions.

We greatly appreciate the extensive coordination over the past year, involving the Department in the scoping process and subsequent draft documents.

We feel the draft documents present a fair and accurate evaluation of the wildlife and habitat impacted by the proposed action; however, we do have two concerns: 1) The grouping of mitigative options into five separate alternatives, complicating the process of identifying a preferred alternative; and 2) the identification of key wildlife areas as depicted in Chapter 3, Figures 3.2 through 3.4, and Appendix C, Figures 4 through 6.

81-1 We believe the selection of a preferred alternative for each phase of the proposed operation would simplify the process and reduce the possibilities of a less desirable phase option being assimilated. A more favorable option, e.g. the inclusion of a less economically favorable powerline along the access road with a more wildlife oriented haul route (alternative 4), could negatively influence the preferred alternative against wildlife concerns. We do not have objections to a more cost effective direct powerline (option 1) route, as long as wildlife mitigative measures are considered in the construction of the powerline and corridor.

81-2 The key wildlife use areas delineated in the above-mentioned figures are areas positively identified by observed activity, as areas utilized by each particular species. Although only these areas have been positively identified, we estimate that areas of similar habitats, cover, and water sources would also promote key wildlife activities (e.g. young production, rearing, and roosting in the case of Merriam's turkey). Therefore, it would be logical to assume that any operational activity in areas of similar habitats, as those outlined in 3.2.2, Figures 3.2-3.4, can be expected to disrupt wildlife behavioral activities. At this time, however, data is not available to quantitatively assign acreages unit-wide.

81-3 For the purpose of selecting a preferred alternative, we will address the alternatives as presented in the Draft EIS, followed by comments on particular phases of the operation. The Department advocates Alternative 5, haul route 6, as the most preferred alternative of the project. The preferred "on district" haul route is outlined in Alternative 4.

Utility Corridor Options

81-4 The Department supports option 3 as the most favored alternative. If option 1 is chosen, we suggest the powerline access be closed to the public and only utilized for vehicular traffic by maintenance personnel of APS. This is necessary to reduce road densities and wildlife disturbance in the affected area.

Reclamation of Area of Operation

81-5 Following the completion of the mining operation, a degree of success to the establishment of replanted species, equal to or above present percentage of ground cover, should be insured.

81-6 In the event the on-site well does produce water, and once the project is completed, we suggest retention by the Forest Service as an additional water source for wildlife.

Haul Route Options

81-7 We believe Newt Lewis Tank is an important wildlife seasonal water, to species inhabiting the Coconino Rim. This water source should be included in Appendix C, Section 6, Page 3, and would be directly impacted by route options 3 and 4. We further believe that routes 3 and 4 will require an additional tank to be constructed, to replace the impacted Newt Lewis Tank.

If an "on district" haul route is chosen, we suggest the old road bed be ripped and seeded where new construction deviates from the old alignment. Once the mining operation has ceased, the upgraded haul route should be reduced in capacity to reflect current traffic levels.

The Department supports options 6 and 7, as the most favored haul routes. We feel option 5 would be the most favored "on district" route; therefore, we suggest some concessions be made in terms of powerline construction to favorably promote this route. 81-8

In view of the magnitude of wildlife impacts to critical areas, the Department cannot support haul route options 1 and 2. We feel the mitigation proposed would not be adequate to minimize potential wildlife losses.

The Department appreciates the opportunity to comment on the proposed Canyon Uranium Mine project. We hope our suggestions and comments are of use.

Sincerely,

Bud Bristow

Bud Bristow
Director

BB:GCD:TB:dlw

111

Forest Service Response

81-1

Although the EIS places certain operational components within each alternative (see Chapter 2), the selection of a Preferred Alternative and the Record of Decision by the responsible Forest Service official may modify the described alternatives. Similarly, mitigation measures may be modified, though we anticipate that they will closely follow those outlined in the EIS.

81-2

We agree. Other valuable habitats similar to those displayed in Figures 3.2 to 3.4 may exist in Game Management Unit 9.

81-3

Your comments on alternative selection have been noted and were considered in the selection of the Preferred Alternative.

81-4

Your comments were considered in the selection of the utility component in the Preferred Alternative.

81-5

EFN must provide a performance and reclamation bond to the Forest Service to ensure restoration of the mine site to required standards. The success of ground cover reestablishment cannot be guaranteed due to factors beyond EFN's control (e.g. weather conditions). However, the type of seed mix and rate and method of application recommended in Appendix B were tailored to the mine site and should increases the chances for successful revegetation.

81-6

The on-site well would not be sealed if water were discovered. The water would be available for Forest Service use at the termination of mining activities.

81-7

We agree that Newt Lewis Tank is seasonally important to wildlife on the District. Haul routes 3 and 4 were eliminated from consideration early in the analysis process and did not appear in any of the DEIS alternatives.

81-8

Your comments were considered in the selection of the Preferred Alternative.

ARIZONA WILDLIFE FEDERATION
4330 N. 62nd St. #102 • Scottsdale, AZ 85251 • (602) 946-8160

April 28, 1986

Leonard Lindquist, Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Sir:

The enclosed comments pertaining to the Draft E.I.S. for the Canyon Mine are submitted by the Arizona Wildlife Federation. These comments also are in conjunction with discussions involving our Affiliate, the Coconino Sportsmen of Flagstaff, Arizona.

82-1 We wish to draw a distinction between this DEIS, EFN's Plan of Operations and similar projects in the Arizona Strip near and in Kanab Canyon. Due to disimilar landscape descriptions, wildlife requirements, land use patterns and vegetation we believe any comparisons with existing projects should not be considered with exception of the mine site operation itself. The canyon mine involves significantly more critical habitat types and requirements, than those north of the Grand Canyon. Therefore, we appreciate the careful analysis presented in the DEIS and urge strict mitagation and compliance with other land use plans and requirements.

The mine site with exception of EFN's wildlife and habitat analysis, is apparently in line with previous projects. Operations, water diversions, site protection from floods along with reclamation is in line also with similar projects. We will not address the on site project except for reclamation and habitat mitigation. Also, the engineering data, radon, social, cultural and archeological impacts will not be discussed by the AWF, choosing rather to leave these areas of concern to other groups or individuals with more qualified expertise. As to radon monitoring we concur with D.E.I.S. data and recommend such further data be gathered to provide base line information.

82-2 Air Quality - Needs further input and resolution of potential violations of Class 1 airshed over Grand Canyon due to drilling and potential transportation routes. Direct and indirect soil disturbances could cause adverse air quality situations which may not be able to have adequate mitagation.

82-3 Powerline/Electrical Needs - Only alternatives B and C should be considered. Line construction in A would be long term as to visual and site disturbance factors. As USFS LMP's currently address existing corridor values, we recommend this philosophy be followed here. Either overhead

112

or underground line construction along F.S. Route 305 and 305-A is acceptable. The overhead line would offer easier construction but gives greater outage exposure during adverse weather conditions. The underground gives better outage protection in some situations, is more esthetically acceptable, and offers less impacts to raptors. During fault conditions this type of line would offer longer outages due to longer repair times if the cable itself were faulted. During reclamation, the underground cable could be abandoned with less cost and environmental concerns; the overhead line removal gives higher costs, perhaps ERN could expore salvage value credits with Arizona Public Service if EFN has to pay cost of removal.

82-4 Site Reclamation - Adequately address in Plan and DEIS. We request site reclamation to include reintroduction of existing on site grasses, furs and shrubs. Such reclamation is not to be considered complete until adequate vegetative cover has existed on it's own merits over at least a two year cycle.

82-5 Reclamation Bond - The figure in the DEIS is not adequate factoring inflation and cummulative impacts to the project site, and potential alternatives offered. This bond should be $250,000, posted up front and secured, deposited to accumulate interest. These monies then can be allocated to rehabilitation, reclamation, and mitigation measures if not used in the interim period.

Mitigation Measures - In assessing mitigation it is probably correct to assume there will be some intangibles which cannot effectively be mitiagted such as visual, noise and social impacts. As to landscape, vegetative, wildlife and habitat project impacts are tangible and must either be avoided by alternative selection and modification or effective and adequate mitigation.

82-6
A. Mitigation Costs - all mitigation costs must be considered an entity of the project. The costs therefore must be borne by the project corporation, in this particular case, EFN. These costs either predetermined or projected must be factored into the total and appropriate project economic analysis and budgetary line item.

82-7
B. Habitat Values - it must be accepted that certain wildlife will increase in numbers in various portions of the district. The potential increases will also require adequate habitat requirements for all phases of their life cycle. The habitat within the Tusayan District is marginal and must be managed and monitored intensively. Impacts which are direct, indirect as well as predictable and unpredictable must be adequately considered and mitigated. Those losses of waters, cover, forage, calving and fawning areas must be relocated. In this case openings, waters, and cover requirements must be created elsewhere within the district. Again, this cost should be charged to EFN. Roadways which reduce effective wildlife habitat must be regained in the district by an intensive road closure program. Timber which is removed must then be credited to future timber sales reducing the volumes of those cuts, if alternatives are selected with high timber values.

82-8 C. Airshed - depending upon the routes selected and the numbers of potential mines, dust and particulate matter could impact to some degree the Class I Airshed over Grand Canyon National Park. This will require adequate effective and non-toxic (oils etc.) methods for dust abatement. This maintenance over miles of dirt road (depending upon alternative selected) must be part of EFN's project agreement and expense.

82-9 D. Watershed - This topic is addressed in the mine documents, however, we urge adequate, timely, and effective testing of any potential flood or man created water spills for toxic metals etc. which would collect in downstream pools. This request is to address consumptive uses of these waters by wildlife populations.

82-10 E. Waters - each identifiable wildlife water will be contructed elsewhere on the district which becomes impacted by the project. These relocated waters must be in areas which are used by wildlife. These shall be fenced to exclude livestock.

82-11 F. Openings/Meadows - These should be of size and configuration to maximize wildlife potential. These should have seed mixes of palatable species for deer, elk and antelope. These shall also be fenced to exclude livestock. Include in the mine project costs.

82-12 G. Haul Routes - In examing the potential haul routes in the Plan, we find that wildlife impacts cannot be successfully mitigated, except for road options 6 and 7. The other road options will significantly impact wildlife habitat and these impacts both direct and indirect would continue long after the project closes. The effective habitat reductions also are speculative as to mitiagtion. These include haul traffic, hunters, and incidental traffic. Removal of vegetation while being credited to other timber sales may not be adequately adoressed due to past timber sale activities.

113

In review and discussion of the alternatives presented, the Arizona Wildlife Federation selects Alternative 5 and urges the USDA Forest Service to also select this as the preferred alternative. We believe based upon the data presented this alternative presents the most viable solutions to the impacts of the project. This also addresses most of the wildlife impacts and mitigation measures associated with the project. The statements concerning project costs including the mitigation are still pertinent to this alternative.

82-13 We further select haul routes 6 or 7 as the preferred options for project ore transportation. Route option 7 would seem to benefit EFN in this scenerio if access is obtained and proper mitigation and maintenance are considered. The AWF would prefer option 6, and would suggest that this route offers the most viable route considering weather, maintenance, mitigation costs over the proposed life of the project. We realize option 6 does add time and mileage to the Canyon Mine Project, but considering the concerns and potential problems of the other options and alternatives, this may be the most economical in the long term.

The Arizona Wildlife Federation appreciates the opportunity to present input and alternative selection to the Canyon Mine D.E.I.S. We urge the most careful analysis of this project and selection of criteria in view of potential cummulative effects and impacts. At some point in time (perhaps now is the time) the USDA Forest Service must arrive at a decision of how much mining activity can be allowed without reaching irreversable and significant impacts to the Tusayan District.

82-14 We suggest a cummulative impact study be considered which displays the total spectrum of the issues and concerns along with data gamed both for and from the Canyon Mine Project.

Sincerely,

Ace H. Peterson
Arizona Wildlife Federation

AHP/sv

cc: AWF Board of Directors
Bud Bristow, Director, Arizona Game and Fish Department
Tom Britt, Regional Supervisor, Arizona Game and Fish Department
Arizona Game and Fish Commissioners
Dale Gaskill, NWF Western Regional Executive
Sheldon Eppich, NWF Region 10 Director
Bill Howard, NWF Senior Vice President
Tom Lustig, NWF Legal Counsel

Forest Service Response

82-1

Your comment has been noted. Comparison with similar projects is a valid analytical tool but the analysis of wildlife impacts in the EIS is very specific to the proposed project and the species and habitat affected.

82-2

The air quality analysis (see Section 4.2.5) reflects worst case meteorological conditions and soil disturbance. We do not believe that any air quality standards will be violated, particularly in light of the Preferred Alternative. Haul routes #6 and #7 are "so far removed from the Grand Canyon as to preclude the possibility of visibility impairment." (See Section 4.2.5.1.).

82-3

This comment has been considered in the selection of the Preferred Alternative.

82-4

Native grasses are not always available or desirable for site reclamation. The best possible seed mixture has been selected to assure reclamation of this particular site and to meet the needs of wildlife. The wildlife browse species are native and the grass species recommended in the reclamation plan have been widely introduced on the Tusayan District.

82-5

Please refer to response 60-10.

82-6

The costs of monitoring and mitigation are included in project costs. (See Table 2.6.).

82-7

The Forest Service believes that the EIS fully discusses potential impacts on wildlife. This comment has been considered in the selection of the Preferred Alternative.

82-8

The EIS notes the potential impacts and the need for additional mitigation measures should haul route traffic increase beyond estimated levels (See Section 4.2.5.).

82-9

Releases of contaminated water or toxic materials are not expected. If a release of contaminated water occurs as a result of the failure of surface drainage controls, immediate cleanup of contaminated soil is required.

82-10

Where conflicts with livestock will diminish the effectiveness of the new water source, fencing will be required.

82-11

The mitigation requirements imposed by the Preferred Alternative are consistent with this comment.

82-12

We believe that the wildlife impacts of any of the haul route alternatives can be successfully mitigated. However, this comment has been considered in the selection of the Preferred Alternative.

82-13

These comments have been considered in the selection of the Preferred Alternative.

82-14

Please refer to responses 1-1 and 78-2.

energy fuels nuclear, inc.
one tabor center • suite 2500
1200 seventeenth street • denver, colorado 80202
(303) 623-8317
twx 910-931-2561

1200 17th St. DENVER CO

April 24, 1986

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

This letter provides the comments of Energy Fuels Nuclear, Inc. on the Draft Environmental Impact Statement ("DEIS") for the proposed Canyon Uranium Mine. As the proponent of the Canyon Mine, we have obviously followed the environmental review process under the National Environmental Policy Act ("NEPA") with great interest and have carefully reviewed the DEIS. We hope that our comments will be useful as you prepare a final EIS and determine the appropriate modifications, if any, to the Plan of Operations which we have submitted.

General Comments

83-1 First, we agree with the general conclusion (p. iii) of the DEIS that there are no adverse environmental impacts identified which cannot be minimized through the implementation of the suggested monitoring and mitigation measures. Accordingly, while we believe that the EIS process has been useful in informing the public about the impacts of the Canyon Mine and that the work which has been done will be extremely useful should the Forest Service be faced with similar proposals in the future, the analysis shows quite clearly that the NEPA requirements for the Canyon Mine could have been met by the preparation of an Environmental Assessment ("EA") and a subsequent Finding of No Significant Impact ("FONSI"). Thus, the fact that an EIS was prepared for the Canyon Mine should not determine the level of NEPA review in the future for other proposals, if any, with similar impacts.

Second, as a general matter, we wish to express our support for the objectives of the mitigation measures identified by the DEIS, even though we may have some disagreement over the factual basis for those measures (see comments below). For example, we believe the the nature of the Canyon Mine site, coupled with the

operating measures incorporated in the Plan of Operations, will preclude any radiological impacts. However, we intend to comply with the extensive monitoring requirements proposed by the Forest Service because we believe that the monitoring will (1) confirm the absence of impacts, and (2) provide for prompt and effective mitigation should any unexpected impacts occur. We anticipate no problems in complying with the mitigation measures which might be imposed though, of course, we anticipate working closely with the Forest Service on the details and schedule for implementing those measures.

Specific Comments

83-2 1. Cumulative Effects (p.7) -- The DEIS concludes, correctly, that the impacts of small, breccia pipe mines are extremely localized and site-specific. We would add only that while we are continuing to seek developable uranium prospects in the Tusayan area, we have no immediate mining plans in this area. In addition, considering the long lead time required to identify, plan, permit and develop a mine such as the Canyon Mine and the short lifespan (full production averaging five years) of breccia pipe mines, it is not reasonably foreseeable that more than two additional mines would be operating at full production simultaneously in the South Kaibab National Forest. Thus, the scenario suggested for cumulative analysis of mine impacts considers the upper limits of reasonably foreseeable mine activity.

83-3 2. Alternatives (p. 2.11 - 2.14) -- The operational component analysis of the DEIS properly identifies the realistic and reasonable alternatives for development of the Canyon Mine deposit.

83-4 3. Mitigation measures (p. 2.15) -- The heading of Section 2.5: "Mitigation Measures for Alternatives 3-5" is misleading. It suggests that important mitigating measures are not applicable to Alternative 2, the Plan of Operations as submitted. While Table 2.3 (p. 2.25) correctly indicates that most of the requirements were incorporated into the Plan of Operations which we submitted, the heading could create confusion. Please add language which clarifies that many of the described mitigation measures are included in Alternative 2 and that the other measures suggested could also be applied to any of the action alternatives.

83-5 4. Cultural Resources (p. 3.6) -- The DEIS indicates that the selected haul route will be surveyed for cultural resource sites before any construction is allowed. It should also be

FLAG 774-0609
FREDONIA 643-7321

303-623-8317

noted that the same procedure will be followed for the proposed power line. See, for example, p. 4.6 which correctly notes that surveys will precede power line construction.

5. Wildlife (p. 3.14) -- While the wildlife impacts are important, we believe that the emphasis and impacts are overstated. Our experience with mining and wildlife habitat impacts leads us to question the basic assumption of the wildlife analysis: "The fact that the habitat is relatively marginal and sensitive to adverse environmental changes points out the need to manage it intensively. Project impacts that would have little or no effect under optimum habitat conditions may have a significant effect under less favorable conditions." (p. 3.14.) It seems incongruous to suggest that the loss of poor habitat is more significant than the loss of good habitat. To the contrary, our experience indicates that federal and state wildlife agencies and private wildlife groups would prefer that mineral development proceed where wildlife is scarce and that the most significant impacts result where development is introduced into areas with good habitat and large wildlife populations. The assumption that poor habitat is more important, coupled with extremely conservative assumptions about the effects of mining and haul road traffic, has produced an analysis which exaggerates the potential adverse impacts on wildlife.

83-6

The mitigation measures suggested by the DEIS will do much more than offset potential impacts to existing wildlife near the Canyon Mine and possible haul routes. We are willing to provide these mitigation measures; however, the final EIS should recognize that our investments will substantially improve the wildlife habitat in the Tusayan District.

83-7

6. Groundwater quality (p. 3.33) -- Additional sampling of water quality and background radiation have been performed by our consultants in these areas. That data has been forwarded directly to the Forest Service for your review and analysis. Naturally, any new data, should be reflected in the final EIS. In addition, at page 4.30 of the DEIS it should be noted that any groundwater which is encountered during mining must travel vertically more than 750 feet through substantial limestone formations before it reaches a known potential aquifer. Because limestone causes any uranium values in the groundwater to fall out of solution, it should be observed that even in the highly unlikely event that groundwater is encountered, the geologic formations in the area will prevent, or at least greatly reduce, any potential contamination to the groundwater of the area caused by the proposed mining activities.

83-8

7. Surface water diversion (p. 4.25) -- The alternative surface water diversion plan is obviously an improvement over the earlier proposal in the Plan of Operations as originally submitted (see p. 4.24). The final EIS should note that the alternative diversion plan was developed by Energy Fuels Nuclear, Inc., and will be incorporated into our plans for the Canyon Mine.

83-9

8. Surface water, cumulative impacts (p. 4.29) -- The discussion of cumulative impacts should include a statement that cumulative impacts on surface water are possible only if additional mines are located within the same drainage.

83-10

9. Soils (p. 4.30) -- The cumulative impacts discussion mixes discussion of soil and water impacts. This section should be reorganized for clarification.

If you have any questions about our comments, please feel free to contact me.

Very truly yours,

Brad L. Doores

Brad L. Doores
Vice President - Legal
and Regulatory Affairs

BLD:kd

FEDERAL EXPRESS

Forest Service Response

83-1

Please refer to response 78-2.

83-2

We believe that the monitoring program required by the Preferred Alternative will provide useful information for assessing cumulative impacts of any future mining proposals. (See also responses 1-1, 1-3, 2-1 and 78-2.)

83-3

We agree.

83-4

We agree and are revising the text to reflect your comment.

83-5

Cultural resource surveys and clearances precede any surface disturbing activities on the Forest if it is deemed by the responsible official that such activity could be damaging to cultural resources.

83-6

Please refer to response 80-11.

83-7

Wildlife mitigation measures were designed to offset potential impacts to wildlife at the mine site and along the ore transportation routes. After mining has ceased, habitats provided through replacement mitigation will still exist. These created habitats will increase total available habitat at some future date, assuming wildlife use patterns will eventually adjust to pre-mining levels for areas impacted by the Canyon Mine proposal. The magnitude of this increase is unknown and difficult to predict.

83-8

The text of the EIS has been revised to provide a more complete discussion of groundwater impacts. (See responses 61-3 through 61-9 and Sections 3.2.7 and 4.2.7.)

83-9

We disagree with the comment that EFN developed the alternative diversion plan. EFN paid for the consultant who made the recommendations, but he was selected by the Forest Service and charged by the Interdisciplinary Team to accomplish the analysis found in Appendix D. We appreciate your cooperation in this and all other matters pertaining to the EIS. However, we retain control over the content of the EIS and the selection of the Preferred Alternative and appropriate mitigation measures (including the modified diversion plan).

83-10

This statement (concerning cumulative impacts on surface waters) appears under the discussion of cumulative impacts on p. 4.30 of the DEIS. In the Final EIS, this section has been moved to Section 4.2.7.4, which should clarify the potential for cumulative impacts on soil and water resources.

Arizona Department of Commerce

Beth S. Jarman, Ph.D. · Director

Bruce Babbitt · Governor

MEMORANDUM

TO: Forest Service

FROM: Arizona State Clearinghouse

DATE: May 02, 1986

RE: Forest Service
Draft Environmental Impact Statement-Canyon Uranium Mine
Kaibab National Forest
SAI NO: AZ 86-80-0012

This memorandum is in response to the above project submitted to the Arizona State Clearinghouse for review.

The project has been reviewed pursuant to the Executive Order 12372 by certain Arizona State officials and Regional Councils of Government.

The Standard Form 424 is attached along with any comments that were received for submission with the project. The comments are advisory.

Attachments

cc: Arizona State Clearinghouse
Applicant

State Capitol Tower · 1700 W. Washington · Phoenix, Arizona 85007 · (602) 255-5371

NOFF

EXHIBIT 47

FEDERAL ASSISTANCE

1. TYPE OF SUBMISSION	☐ NOTICE OF INTENT (OPTIONAL) ☐ PREAPPLICATION ☐ APPLICATION
2. APPLICANT'S APPLICATION IDENTIFIER	
3. STATE APPLICATION IDENTIFIER	
4. NUMBER	86800012
5. DATE ASSIGNED	MAR 12
Leave Blank	MAY 02 1986

6. LEGAL APPLICANT/RECIPIENT
a. Applicant Name: Forest Service
b. Organizational Unit: Kaibab National Forest
c. Street/P.O. Box: 800 South 6th Street
d. City: Williams
e. County:
f. State: Arizona
g. ZIP Code: 86046
h. Contact Person (Name & Telephone No.): Forest Supervisor

7. EMPLOYER IDENTIFICATION NUMBER (EIN): USDA, FS

8. PROGRAM: a. NUMBER 10.919; MULTIPLE ☐; b. TITLE

7. TITLE OF APPLICANT'S PROJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) CANYON URANIUM MINE-IN RESPONSE TO A PROPOSED PLAN OF OPERATIONS SUBMITTED IN OCT. '84 BY ENERGY FUELS, INC. FOR THE DEVELOPMENT OF A URANIUM MINE 13 MILES S. OF THE GRAND CANYON ON THE TUSAYAN RANGER DIST. OF THE KAIBAB N.F. THE DEIS EVALUATES THREE OTHER PROJ. ALTERNATIVES THAT PROPOSE VARIOUS MODIFICATIONS TO THE PLAN OF OPERATIONS FOR THE CANYON MINE.

8. TYPE OF APPLICANT/RECIPIENT: FEDERAL AGENCY

9. AREA OF PROJECT IMPACT: Williams, Arizona

10. ESTIMATED NUMBER OF PERSONS BENEFITTING

11. TYPE OF ASSISTANCE

12. PROPOSED FUNDING

a. FEDERAL	$ .00
b. APPLICANT	.00
c. STATE	.00
d. LOCAL	.00
e. OTHER	.00
f. Total	$ .00

13. CONGRESSIONAL DISTRICTS OF: a. APPLICANT; b. PROJECT

14. TYPE OF APPLICATION: A

15. PROJECT START DATE: Year month day, 19

16. PROJECT DURATION: Months

17. TYPE OF CHANGE (For Item 4): Enter appropriate letter(s)

16. DATE DUE TO FEDERAL AGENCY: Year month day, 19

18. FEDERAL AGENCY TO RECEIVE REQUEST

a. ORGANIZATIONAL UNIT (IF APPROPRIATE)

b. ADMINISTRATIVE CONTACT (IF KNOWN)

c. ADDRESS: Same as above

20. EXISTING FEDERAL GRANT IDENTIFICATION NUMBER

21. REMARKS ADDED: ☐ Yes ☐ No

SECTION II—CERTIFICATION

22. THE APPLICANT CERTIFIES THAT: To the best of my knowledge and belief, data in this preapplication/application are true and correct, the document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurances if the assistance is approved.

a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON. DATE

b. NO. PROGRAM IS NOT COVERED BY E.O. 12372 ☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW ☐

23. CERTIFYING REPRESENTATIVE: a. TYPED NAME AND TITLE; b. SIGNATURE

24. APPLICATION RECEIVED: Year month day, 19

25. FEDERAL APPLICATION IDENTIFICATION NUMBER

26. FEDERAL GRANT IDENTIFICATION

SECTION III—FEDERAL ASSISTANCE

27. ACTION TAKEN: ☐ a. AWARDED; ☐ b. REJECTED; ☐ c. RETURNED FOR AMENDMENT; ☐ d. RETURNED FOR E.O. 12372 SUBMISSION BY APPLICANT TO STATE; ☐ e. DEFERRED; ☐ f. WITHDRAWN

28. FUNDING

a. FEDERAL	$ .00
b. APPLICANT	.00
c. STATE	.00
d. LOCAL	.00
e. OTHER	.00
f. TOTAL	$ .00

29. ACTION DATE: Year month day, 19

30. STARTING DATE: Year month day, 19

31. CONTACT FOR ADDITIONAL INFORMATION (Name and telephone number)

32. ENDING DATE: Year month day, 19

33. REMARKS ADDED: ☐ Yes ☐ No

NSN 7540-01-008-8162 PREVIOUS EDITION IS NOT USABLE

424-102

STANDARD FORM 424 PAGE 1 (Rev. 4-88) Prescribed by OMB Circular A-102

TO:

Dr. James Becker
Center for Public Affairs
Arizona State University
Tempe, AZ 85281

State Application Iden.)(SAI)
MAR 12
State A2 : 86 000012

Transportation
Game & Fish
Health
Water
Parks
Land

Region III

FROM: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

This project is referred to you for review and comment. Please evaluate as to the following questions. After completion, return THIS FORM AND ONE XEROX COPY to the Clearinghouse no later than 17 WORKING DAYS from the date noted above. Please contact the Clearinghouse at 255-5004 if you need further information or additional time for review.

☐ No comment on this project ☐ Proposal is supported as written ☒ Comments as indicated below

1. Is project consistent with your agency goals and objectives? ☐ Yes ☐ No ☐ Not Relative to this agency
2. Does project contribute to statewide and/or areawide goals and objectives of which you are familiar? ☐ Yes ☐ No
3. Is there overlap or duplication with other state agency or local responsibilities and/or goals and objectives? ☐ Yes ☐ No
4. Will project have an adverse effect on existing programs with your agency or within project impact area? ☐ Yes ☐ No
5. Does project violate any rules or regulations of your agency? ☐ Yes ☐ No
6. Does project adequately address the intended effects on target population? ☐ Yes ☐ No
7. Is project in accord with existing applicable laws, rules or regulations with which you are familiar? ☐ Yes ☐ No

Additional Comments (Use back of sheet, if necessary)

84-1 p. iii. changes of radiation and radon gas are probably not distinguishable from natural variat THE CUMULATIVE RELEASES WILL BE GREATER.

84-2 p. iv. Increased employment is cited as benefit. What comment re: mine closure in 5-10 years? iv. Will ore haul trucks be marked as such? p. 22. Any radioactive

84-3 materials present at closure will be removed. What disposition will be made of

84-4 the material? Provisions for the various monitoring needed are not presented.

84-5

Reviewers Signature R. J. Becker Date 4-23-86

Title Mgr Telephone 965-1073

TO:

BHPD
Arizona State Parks Board
1688 W. Adams, Rm. 109
Phoenix, AZ 85007

State A2 : 86 000012
MAR 12

Transportation
Game & Fish
Health
Water
Parks
Land

Region III

FROM: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

This project is referred to you for review and comment. Please evaluate as to the following questions. After completion, return THIS FORM AND ONE XEROX COPY to the Clearinghouse no later than 17 WORKING DAYS from the date noted above. Please contact the Clearinghouse at 255-5004 if you need further information or additional time for review.

☐ No comment on this project ☒ Proposal is supported as written ☐ Comments as indicated below

1. Is project consistent with your agency goals and objectives? ☐ Yes ☐ No ☐ Not Relative to this agency
2. Does project contribute to statewide and/or areawide goals and objectives of which you are familiar? ☐ Yes ☐ No
3. Is there overlap or duplication with other state agency or local responsibilities and/or goals and objectives? ☐ Yes ☐ No
4. Will project have an adverse effect on existing programs with your agency or within project impact area? ☐ Yes ☐ No
5. Does project violate any rules or regulations of your agency? ☐ Yes ☐ No
6. Does project adequately address the intended effects on target population? ☐ Yes ☐ No
7. Is project in accord with existing applicable laws, rules or regulations with which you are familiar? ☐ Yes ☐ No

Additional Comments (Use back of sheet, if necessary)

Reviewers Signature Jerry H. Hillman (for 255-5004) Date 3-27-86

Title Environmental Engineer II Telephone 255-4174

Forest Service Response

84-1

We agree that the sum of the radiation and radon gas releases from the mine and the natural background will be greater than current background levels. But because the increase is so small and the variation in natural background levels is so great it will be impossible to distinguish the increase attributable to the mine a few hundred meters from the ore piles and mine shaft.

84-2

Because the increased employment attributable to the mine is small (five percent in Williams and less than one percent in other areas in Coconino County), no significant increase in population is expected and therefore only minor impacts are anticipated at the time of mine closure. (See Section 4.2.1.)

84-3

It is not a requirement or practice to mark uranium ore trucks.

84-4

As stated in Appendix A, reclamation of the mine site will include a radiometric survey of the site. Any material which exceeds regulatory requirements will be removed from the site or backfilled into the mine shaft. Radiation levels will be returned to approximate pre-mining levels.

84-5

Please refer to Sections 2.5.10 and 2.5.11.

COCONINO COUNTY BOARD OF SUPERVISORS

COCONINO ADMINISTRATIVE CENTER • 218 E. CHERRY • FLAGSTAFF, ARIZONA 86001 • 779-6693

April 24, 1986

Mr. Andy Lindquist, Supervisor
Kaibab National Forest
501 W. Bill Williams
Williams, Az. 86046

Dear Mr. Lindquist:

Concerning the proposed uranium mine near the South rim of the Grand Canyon, I have no problem with the mine itself, Nuclear Fields Energy has proven a sensitivity to the environment in their various mining operations. They leave mining sites in good condition when they complete a mining probject.

85-1 My one concern with the project is with the mining haul road departing the project East through the forest. I hope that the Forest Service will find a way to keep the impact to a bear minimum with respect to wild life in particular. One suggestion might be to down-grade the road once the hauling has been completed and the mine has shut down.

Sincerely,

Dennis

J. Dennis Wells
Supervisor, District #3

JDW/eu

Forest Service Response

85-1

Your comment has been considered in the selection of the Preferred Alternative.

ARIZONA STATE PARKS

1688 WEST ADAMS STREET
PHOENIX, ARIZONA 85007
TELEPHONE 602-255-4174

BRUCE BABBITT
GOVERNOR

STATE PARKS
BOARD MEMBERS

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JOHN BOCH
PHOENIX

ROBERT K. LANE
STATE LAND COMMISSIONER

DON CHARPIO, Ed.D.
EXECUTIVE DIRECTOR

KEN TRAVOUS
DEPUTY DIRECTOR

July 18, 1986

Mr. Leonard Lindquist
Forest Supervisor
Kaibab National Forest
800 S. 6th St.
Williams, AZ. 86046

RE: EFN Canyon Mine Archaeological Data Recovery, DOA-FS/Kaibab

Dear Mr. Lindquist:

I have reviewed the final report on the data recovery program for site AR-03-07-04-587, undertaken for the EFN Canyon Mine project. The data recovery program appears to have mitigated the adverse effect of the proposed project to this archaeological site (pursuant to 36 CFR Part 800).

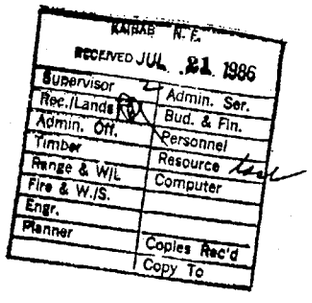
We appreciate the continued cooperation of the Forest Service in ensuring the historic preservation requirements for Federal projects are carried out. If you have any questions, please contact me.

Sincerely,

Shereen Lerner

Shereen Lerner, Ph.D.
Deputy SHPO, Archaeology and Compliance

for Donna J. Schober
State Historic Preservation Officer



121

Forest Service Response

86-1

Your comment is noted and your cooperation is appreciated.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

1 MAY 1986

Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South Sixth Street
Williams, Arizona 86046

Dear Mr. Lindquist:

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) titled CANYON URANIUM MINE, COCONINO COUNTY, ARIZONA. In order for this EIS to support EPA's permitting action, we request that the enclosed description of the Clean Water Act application be included in the Final Environmental Impact Statement (FEIS). We also have enclosed comments regarding surface water quality and radiation. Our ground water comments will follow under separate cover.

87-1 We have classified this DEIS as Category EC-2, Environmental Concerns - Insufficient Information (see attached "Summary of Rating Definitions and Follow-Up Action"). This DEIS is rated EC-2 because it should more completely describe the provisions to prevent contamination from storm water runoff and mine abandonment. Portions of the radiation discussion also require clarification. The classification and date of EPA's comments will be published in the Federal Register in accordance with our public disclosure responsibilities under Section 309 of the Clean Air Act.

We appreciate the opportunity to review this DEIS. Please send five copies of the FEIS to this office at the same time it is officially filed with our Washington, D.C. office. If you have questions, contact Juli Jessen, Federal Activities Branch, at (415) 974-8193 or FTS 454-8193.

Sincerely yours,

Charles W. Murray, Jr.
Assistant Regional Administrator
for Policy and Management

Enclosure (5 pages)

WATER QUALITY COMMENTS

87-2 NPDES Permit

In order for the FEIS to provide adequate support for EPA's permitting action, the following discussion must be included under "Clean Water Act" (p. 2.15):

> The federal Clean Water Act regulates the discharge of pollutants into surface waters. The Canyon Mine must receive a National Pollutant Discharge Elimination System (NPDES) permit from the EPA in order to release any water from the mine site. Although Energy Fuels Nuclear does not anticipate encountering significant quantities of ground water at the Canyon Mine site, the company applied for an NPDES permit on December 20, 1984, for the possible discharge of mine drainage water.
>
> The proposed mine is a "new source" under EPA regulations. Pursuant to Section 511 of the Clean Water Act, the issuance of an NPDES permit to a new source is subject to the environmental review requirements of the National Environmental Policy Act (NEPA). EPA is meeting its obligations under NEPA by cooperating with the U. S. Forest Service in the preparation of this EIS. A final NPDES permit for the Canyon Mine cannot be issued until at least 30 days after the date of issuance of the FEIS. Prior to issuing an NPDES permit, EPA must also make a proposed permit available for public review and comment, and provide the opportunity for a public hearing if there is significant public interest.
>
> An NPDES permit for the discharge of mine drainage from a uranium mine must contain effluent limitations established under national EPA guidelines for the Ore Mining and Dre ssing Point Source Category at 40 CFR Part 440, Subpart C. These guidelines contain limitations on carbonaceous oxygen demand, zinc, dissolved radium 226, total radium 226, uranium, pH, and total suspended solids. In addition, all NPDES permits must contain any more stringent limitations necessary for achieving compliance with State Water Quality Standards.
>
> The applicable Arizona State Water Quality Standards are those radiochemical standards which apply to all Arizona surface waters, and specific standards for trace substances which are based upon the protected uses of the receiving waters. The radiochemical standards are found at A.C.R.R. 9-21-204.B, and are based on federal drinking water standards. The protected uses of the receiving waters are those which are designated for the nearest downstream surface water segment listed in Appendix A of R9-21208. The nearest designated surface water segment downstream of the proposed discharge point is Cataract

Creek (tributary to Havasu Creek). The protected uses of this segment are: Aquatic and Wildlife (cold water fishery), Full Body Contact, Agricultural Irrigation, and Agricultural Livestock Watering. As no discharges will be permitted which do not meet these standards, authorized discharges will have no adverse environmental impact, and it is recommended that a permit be issued.

Under NPDES permits, facilities are required to sample their discharges and report pollutant concentrations to EPA and the Arizona Department of Health Services (ADHS). Such reports are public information. Permitted facilities are inspected regularly for compliance with the Clean Water Act. NPDES permits give EPA and ADHS personnel right of entry for inspection and sampling. Violations of the Clean Water Act are subject to civil penalties of up to $10,000 per day, with higher penalties for willful or negligent violations.

Floodwater Control

87-3 EPA recommends that floodwater control alternative 2 (Appendix D) be implemented to prevent contamination of surface water. The design elements discussed below should be clarified in the FEIS.

87-4 1. Appendix D states (p. 17) that the ore pad will "be graded so that all runoff immediately flows into the retention pond." From the diagram in Appendix A it appears that the retention pond is uphill from the ore pads. This pond also will be surrounded by a 3' berm. Given these barriers, the DEIS should show how all runoff from the ore pad will be directed to the retention pond.

87-5 2. The FEIS should identify the "previously approved location" (p. 2.13) for disposal of uneconomical uranium ore. (See radiation general comment #1.)

87-6 3. The FEIS or Appendices should give the design specifications for the heavy riprap which will protect the dike proposed by Alternative 2, Appendix B.

87-7 4. According to the DEIS (p. iv), an extremely severe flood could overflow the mine diversion structures and release several Curies of radioactivity downstream. The DEIS states that "residual contamination would be removed and returned to the mine yard." The FEIS should define residual contamination and present a plan for removing it.

123

87-8 5. On page 2.23, the DEIS indicates that holding ponds will be adequate to receive local runoff from a 100-year thunderstorm event. The FEIS should state the duration of the 100-year storm which the ponds are designed to contain.

RADIATION COMMENTS

87-9 NESHAPS Permit

1. EPA has received an application from EFN for a National Emission Standards for Hazardous Air Pollutants (NESHAPS) Permit to Construct. The information described below is required for EPA to evaluate the permit application. It would be appropriate to include this in the FEIS or its appendices as well.

   The FEIS should discuss the steps planned to achieve compliance with the requirements of 40 CFR 61.22 (a)(3). This discussion should include a diagram of the mine as it is expected to be developed, the number of planned bulkheads and their locations, and a description of the ventilation system. It also should discuss plans to facilitate isolation of the mined-out area, the type of bulkhead that would be installed, any perceived need to maintain negative pressures behind the bulkheads, and the plan that would be used to determine when and where bulkheads will be installed.

2. The NESHAPS Permit to Construct requires that EPA be contacted thirty to sixty days prior to beginning construction. Because the mine construction is contingent upon issuance of a Record of Decision (ROD) by the Forest Service, EPA will accept the ROD as notification that construction is planned within thirty to sixty days. However, EFN should directly notify EPA when construction actually begins, as required by NESHAPS. EFN should realize that, according to 40 CFR 61.08(e)(1) and (2), the applicant must comply with the radon gas standard even in the case that EPA does not respond to the permit application within the designated time period.

General Comments

87-10 1. The DEIS suggests (p. 2.9) that waste rock could be used for road construction or dike maintenance. As defined in Appendix A (p. 13), waste rock is "rock moved in mining with less than 0.03% uranium." While the uranium concentration (0.03% U_3O_8) is low compared to that of ore, it could have up to 85 pCi/g of Ra-226 (0.01% ≅ 28 pCi/g). EPA recommends careful evaluation of proposed uses for this material. Although there currently

are no requirements for uranium mine cleanup, the surface cleanup concentration is 5 pCi/g for uranium mills and tailings piles. Use of waste rock off the mine site, such as for road construction, is strongly discouraged, as this could require a future clean-up.

2. EPA discourages conversion from Working Level (WL) to lung dose (mrem). The Agency maintains that health risks can be adequately stated using the Working Level concept and that conversion to mrem can be confusing to the public.

Table 3.2 (p. 3.25) is misleading because it lists both WL and mrem concentrations. The standards and exposures are correctly expressed in WL units and are appropriate for use in this table. The mrem units, however, should be listed elsewhere because they are not part of the standard and are based on many assumptions. Table 3.2 should be referenced where possible. This comment also applies to Table 3.3 (Appendix E, p. 14).

87-11

The text gives (p. 3.25) the EPA occupational standard as 20,000 mrem/yr. This figure should be expressed in WL. It is correctly stated in the table as 4 WLM/y, based on a 0.3 WL atmosphere (maximum).

3. The DEIS states (p. 4.5) that increases in lung cancer are possible for miners exposed to a cumulative radon dose of 100 WLM. EPA maintains that lung cancer risk doubles in the range of 20-100 WLM. The normal risk is 3%. The "Impacts on Mine Workers" section should be revised to reflect a greater risk.

87-12

124

4. Appendix E states (p. 8) that "Limits on permissible doses to the public from regulated sources . . . are reduced by a factor of 30." This could be construed to be true, but we believe it is not appropriate for your general discussion. We suggest that the discussion be modified to reflect that population exposure limits are even lower than occupational limits to provide greater protection of health and welfare.

87-13

SUMMARY OF VTING DEFINITIONS AND FOLLOW-UP CTION* DUPLICATE

Environmental Impact of the Action

LO—Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC—Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO—Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU—Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1—Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2—Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3—Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

14 JUL 1986

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 South Sixth Street
Williams, Arizona 86046

Dear Mr. Lindquist:

The Environmental Protection Agency (EPA) submitted comments on May 1, 1986 regarding the Draft Environmental Impact Statement (DEIS) titled CANYON URANIUM MINE, COCONINO COUNTY, ARIZONA. In this letter, EPA indicated that comments on ground water issues would be sent separately.

The concerns which EPA expressed to you in our letter of December 5, 1985, regarding the hydrogeologic report titled "Groundwater Conditions, Canyon Mine Region" have been adequately resolved. Therefore, we have no comments to offer regarding the ground water portions of the DEIS. The correspondence which led to this conclusion is enclosed.

We look forward to reviewing the Final Environmental Impact Statement. If you have questions, please contact David Powers, Federal Activities Branch, (415) 974-8193 or FTS 454-8193.

Sincerely yours,

for Charles W. Murray, Jr.
Assistant Regional Administrator
for Policy and Management

enclosures (11 pages)

cc: Bill Victor, Montgomery & Associates

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Forest Service Response

87-1

In light of the recent letter from EPA indicating satisfaction with the groundwater analysis and rescinding the need to comment further, we disagree with the EC-2 rating on the DEIS. EPA has not identified substantive information deficiencies concerning "provisions to prevent contamination from storm water runoff and mine abandonment." The Forest Service believes that the DEIS thoroughly analyses potential impacts in detail relative to their significance and that the analysis and studies cited by the EIS, including those published in the Appendices, are valid and thoroughly documented.

87-2

The text has been revised to include the suggested language.

87-3

EPA's recommendation has been considered and followed in the selection of the Preferred Alternative.

87-4

The ore pad will be elevated and the site graded to direct flows from the ore pile to the retention pond. An appropriately located inlet will be constructed in the berm to allow water to pass through. The figure in Appendix B (p.9) fails to show an inlet.

87-5

The EIS indicates off-site disposal of uneconomic ore or waste rock is not likely. It would be considered under NEPA and Forest Service regulations as a revision to the Plan of Operations before it is permitted. No potential site for off-site disposal has been identified and the need for off-site disposal cannot be confirmed until mining operations near completion as the amount of waste rock requiring disposal cannot be determined until that time. Disposal of rock insufficiently mineralized to be taken to a mill, i.e., containing less than 0.03%, is not a regulated activity. However, in the context of the required amendment to the Plan of Operations, affected parties would be consulted and any applicable federal, state and local siting regulations would be adhered to.

87-6

Riprap material will come from barren rock fragments taken from the mine during shaft sinking. Those fragments should exceed six inches on any one face. The text has been revised to include this information. (See Section 2.5.8.)

87-7

The text has been revised to respond to this comment.

87-8

The lined mine-site ponds will be sized to hold a 100-yr., 24-hr. storm event, (three inches of rain in a 24-hour period) plus the water pumped from the mine (if any), plus normal annual precipitation runoff. (See, Appendix B, p. 8 and Appendix D, p. 17.)

87-9

EFN submitted its Application for Approval to Construct an Underground Uranium Mine to EPA pursuant to the requirements of 40 C.F.R. 61.07 on July 8, 1985. Although the formal NESHAPS permit has not yet been issued, recently EPA advised EFN that the application was complete and that the NESHAPS permit from EPA would likely be issued in the near future. Since issuance of the permit will show that EFN has complied with all requirements, we do not believe that the detailed information suggested is necessary for the EIS.

87-10

Waste rock from the mine that contains even a minimal amount of uranium, i.e., more than .01%, will not be used in the construction of any mine site facilities but will be stored for later processing or disposal at the end of mining operations. However, barren rock removed from the mine shaft may be used for road construction or dike maintenance. Use of barren rock from the mine shaft will be evaluated to ensure that the surface clean up concentration for mills and tailings piles is not violated.

87-11

EPA's comment is noted and reflected by a note in the text. However, since both measures are commonly used and the use of mrem allows comparison to other common sources of radiation exposure, the EIS retains both measures.

87-12

We have reviewed the available literature concerning the level at which impacts on mine workers may occur and have consulted with the author of the radiological assessment (Appendix E). Based on that review and consultation, we believe that the EIS correctly states that increases in lung cancer are possible for miners exposed to a cumulative radon dose of 100 WLM. However, the text now reflects EPA's comment.

87-13

This comment is acknowledged as correct. However, the Forest Service is not revising the Appendices of the DEIS for republication.

CAMPUS CRISTIAN C. 'ER
715 NORTH PARK AVE
TUCSON AZ 85719 30AM

Western Union Mailgram

4-0425068120 04/30/86 ICS IPMRNCZ CSP PHXB
6026237575 MGMB TDRN TUCSON AZ 156 04-30 0644P EST

LEONARD LINDQUIST
KAIBAB NATIONAL FOREST
800 SOUTH 6TH STREET
WILLIAMS AZ 86046

88-1 RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT CANYON URANIUM MINE
I FAVOR ALTERNATIVE NUMBER 5 WITH HAUL ROUTE NUMBER 7 EFNIS PROPOSAL.
ALTERNATIVE 2, IS NOT ADEQUATE SAFEGUARD.
I AM DISTURBED THAT POTENTIAL EFFECTS OF SELENIUM CONTAMINATION IN
THIS AREA OF HIGH SELENIUM CONCENTRATION ISNIT MENTIONED IN DEIS,
ALTHOUGH IT WAS CLEARLY RAISED BY MYSELF AND OTHERS AND RECORDED
DURING SCOPING PROCESS. AT FOREST SERVICE REQUEST, I SUPPLIED YOUR
OFFICE, WITH BACKGROUND ARTICLES, REFERENCES, AND NAMES OF HIGHLY
QUALIFIED SCIENTISTS WORKING ON EFFECTS OF SELENIUM CONTAMINATION IN
88-2 PROBLEM AREAS OF US, NONE OF THESE NAMES APPEAR AS DEIS CONSULTANTS.
A PROBLEM WITH SELENIUM CREATED BY MINING OPERATIONS COULD PUT HEALTH
OF POTENTIALLY THOUSANDS AT RISK IN COMING YEARS, IT MUST NOT BE
IGNORED, WE WILL CONTINUE TO PRESS FOR RESPONSIBLE HANDLING OF
SELENIUM ISSUES THROUGH EIS PROCESS, LEGISLATIVE CONTACTS AND MEDIA.

SINCERELY
GARY C. LEE
602-623-7575

18:43 EST

MGMCOMP

TO REPLY BY MAILGRAM MESSAGE, SEE REVERSE SIDE FOR WESTERN UNION'S TOLL - FREE PHONE NUMBERS

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Forest Service Response

88-1

Your comment has been considered in the selection of the Preferred Alternative.

88-2

Please refer to responses to letter 23.

National Parks & Conservation Association

1701 Eighteenth Street, N.W.• Washington, D.C. 20009

RUSSELL D. BUTCHER
Regional Representative
SOUTHWEST & CALIFORNIA
Box 67
Cottonwood, AZ 86326
(602) 634-5758

(202) 265-2717

April 28, 1986

RE: CANYON MINE DRAFT EIS

Mr. Leonard A. Lindquist
Forest Supervisor
Kaibab National Forest
800 S. 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

National Parks and Conservation Association, a private nonprofit membership organization founded 67 years ago to promote the protection, enhancement, and public understanding of the National Park System and related public lands, appreciates this opportunity to comment upon the Draft Environmental Impact Statement on Energy Fuels Nuclear, Inc.'s proposed Canyon Mine project south of the Grand Canyon in the Kaibab National Forest.

First, we compliment you and your staff on a generally well prepared draft EIS document. Except for a couple of matters discussed below, you seem to have analized all aspects and implications of EFN's proposal.

Concerning the proposed mine itself, we continue to believe that EFN's activities will be well constrained by generous environmental safeguards during the period of operation, and by full rehabilitation measures afterward. Based upon our experience with this company on the BLM lands of the Arizona Strip, we have every reason to feel confident that EFN will carry out its activities responsibly and with more than extra care and concern for the welfare of the environment. In this regard, EFN has demonstrated it is a leader in the mining industry.

Nor do we have any concerns regarding the mine's impact upon Grand Canyon National Park, the nearest boundary of which lies more than seven miles to the north. We believe there is not even the remote chance that the Colorado River in the Canyon could be contaminated through surface runoff from the mine site, both because the site will be particularly well protected from possible extraordinarily heavy rainfall and because the site is so many watershed miles upstream from the river--much farther, in fact, than are several EFN mines and mine sites on the Arizona Strip.

2-NPCA response: canyon mine draft EIS

Likewise, we view as equally remote the possibility of underground water contamination of such Grand Canyon waters as Indian Gardens in the park and Havasu on the Havasupai Indian Reservation, especially given the presence of two major limestone strata beneath the surface of the Coconino Plateau of the South Rim area. Incidentally, we commend EFN for funding water sampling research in 1985 (of water from Indian Gardens and Havasu Springs). We understand this analysis is to continue for another year. The results of this program should provide an important basis for comparison in the future, should there ever be any question of uranium contamination. It is further encouraging to note that a well is to be drilled in search of water. If none is found, then it seems obvious there would be no cause for concern about underground water contamination. If water is discovered, then this well could become a water-monitoring facility.

We are pleased to see that our Association's earlier suggestion has been included in the Draft EIS (page 2.11): that if potable water is not found (through drilling either the mine shaft or the ground-water well), "trucking water from Williams or Bellemont will continue throughout the operation of the mine." We had urged this stipulation so there would be no public concern over whether water might somehow be obtained from Grand Canyon National Park.

Finally, we want to comment upon the question of ore-haul routes from Canyon Mine. It is clear from our review of the Draft EIS that each of the five route options being considered has positive and negative aspects. This circumstance makes a choice of "the best" difficult.

Weighing all the factors of which we are aware, however, our Association most favors Option 5 as being on the whole better than the others. It would avoid elk calving and deer-and-antelope fawning areas, and it is farther away from Grand Canyon National Park. It also avoids using the heavily traveled highway 180 that leads to the park's south entrance. On the down side, it appears to be the most expensive option in terms of initial costs for upgrading and construction; and it would necessitate cutting a scar into the north face of the Coconino Plateau where the road would drop to down meet highway 64.

89-1 Regarding Option 6, the most appealing aspect is that virtually no construction would be required. However, there is some serious uncertainty concerning whether or not a right-of-way across state and private lands could be obtained. Without such an agreement, this is not a viable option. It also has the drawback of requiring EFN trucks to travel a stretch of heavily traveled highway 180. On the positive side, as with Option 5, this route avoids the primary calving and fawning habitat.

Regarding Option 7, we seriously question the wisdom of using heavily traveled highway 180/64; Interstate 40 through the Flagstaff vicinity; and heavily traveled 89 through the developing northeasterly part of Flagstaff. This route, by far the longest of the options, also traverses an area of high elevation on I-40 that is frequently hit by heavy summer thunderstorms in summer and by snowstorms in winter. All of the above circumstances would seem to contribute unnecessarily to the risk of transporting the ore from mine to mill.

Regarding Option 2, we recognize this is the shortest of the routes. That is an appealing factor. On the downside, though, we are concerned that Option 2 traverses two areas each identified by the document as important deer and antelope fawning habitat. Based upon the Draft EIS, we find it difficult to determine just how serious this matter may be; there seems a need to expand~~ed~~ quantitative information. Will ten or twelve ore trucks daily in each direction pose a threat to fawning activities? Will the upgraded road allow such an increase in recreational users of the Kaibab National Forest as to pose ~~of~~ a threat to fawning? How much of a threat in each situation? Are there other known fawning areas in this or another national forest that can help shed light on this question? We urge that the wildlife section be expanded in the Final EIS to substantially clarify this issue.

89-2 In addition, there seems to be an inconsistency between the map on page 3.15 showing Option 2 not running through any elk calving areas and the statement on page 4.13 which says: "An estimated 55 acres of elk calving habitat will be disrupted by haul route traffic." (The statement refers back to route 2 three lines above.) We urge that this apparent discrepency be clarified or corrected.

89-3 Route Option 2 would also come to about a mile at its closest point of the national park's East Rim Drive. Nowhere does the Draft EIS refer to any possibility that the sound of haul trucks might be audible to park visitors. It is our assumption that the sound of EFN's trucks probably wouldn't be audible from within the park since the intervening forest would probably muffle the sound and since the intervening higher ground between the park road and Option 2 would tend to deflect the sound of trucks away from the park. We wonder, though, whether the document's omission of this matter results from a conclusion that there will be no sound impacts upon the park visitors or whether this matter was simply overlooked. In either case, we urge that this issue be addressed in the Final EIS.

Sincerely,

Russell D. Butcher

Russell D. Butcher
Southwest & California Representative
Box 67, Cottonwood, AZ 86326

Forest Service Response

89-1

We appreciate your comments. They have been considered in the selection of the Preferred Alternative. Alternative 5, including haul route options #6 and #7, has been selected as the Preferred Alternative by the interdisciplinary team. (See Section 2.4.) We believe that these routes will create the least environmental impacts. As you note, the SP Crater route (#7) may not be a viable option if EFN can not obtain the necessary rights-of-way.

U.S. 180 and U.S. 89 are heavily travelled and should easily absorb an additional 20 trucks per day. Their daily traffic counts are currently from 2900 to 7700 vehicles respectively.

Your comments on haul route option #2 are noted.

89-2

Current literature has shown that vehicle traffic may disrupt elk habitat use within .25 to 1.8 miles of open roads. In the wildlife evaluation (Appendix C) it was assumed that traffic would potentially impact elk use within a .5 mile zone on either side of haul roads. An estimated 55 acres of elk calving habitat are within .5 miles of haul route 2. Based on the parameters used in the wildlife evaluation, these 55 acres of elk calving habitat will be impacted by projected increases in vehicle traffic along haul route 2.

89-3

As shown in Figure 2.2, both haul route options 1 and 2 use a portion of Forest Road 302 which passes within one mile of the East Rim Drive in the Grand Canyon National Park near Grandview. The forest vegetation in this particular area is fairly dense. At present, vehicle traffic on Forest Road 302 is inaudible to Park visitors along the East Rim Drive. Given the buffering effect of a dense forest canopy on noise and the anticipated minor increase in traffic noise from the ore trucks, the noise impacts of ore truck traffic upon Park visitors should be negligible, if any.

SAN JUAN SCHOOL DISTRICT

April 22, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

90-1

This letter is in support of Energy Fuels Nuclear, Inc. and their proposal to develop the Canyon Project in Coconino County, Arizona, south of the Grand Canyon.

The development of this mine is important to the energy independence of this country. It is important to the economies and well being of the people in Northern Arizona and Southern Utah as it is a major source of business, jobs, and tax revenue.

Energy Fuels has a record as a company that does an outstanding job in operating safe and environmentally sound projects. They have operated uranium mines and mills, and coal mines in many western states. They are known as "good neighbors" and contribute a great deal to the communities they operate in and near.

The jobs and businesses of many of my friends and others in Southern Utah and Northern Arizona are dependent on timely approval being given for Energy Fuels to develop this property.

Please do everything in your power to expedite such approval.

Sincerely,

Hal M. Jensen
Superintendent

HMJ:cc

17 NORTH FIRST EAST • POST OFFICE BOX 219 • MONTICELLO, UTAH 84535 • PHONE (801) 587-2254

Forest Service Response

90-1

Letters 90 through 238 all supported development of the Canyon Mine. The following response applies generally to all of these letters. However, individualized responses are also provided for some letters.

We agree that there could be economic impacts, some beneficial, from the Canyon Mine. Our analysis predicts that about $3.8 million per year will be spent on wages, equipment, supplies, ore transportation, energy and taxes. This expenditure would create as many as 58 new jobs in the Williams area and 102 in Coconino County. (See Section 4.21.) Economic impacts associated with operation of the mill would also be felt in Blanding, Utah.

Based on public comments and interagency consultation, we agree that EFN generally appears to enjoy a reputation of being environmentally conscientious and a good neighbor. EFN has continually expressed to us their willingness to assure that environmental impacts caused by the Canyon Mine are minimized.

Some impacts may be positive. For example, we believe that the wildlife mitigation measures included in the Preferred Alternative could create a positive impacts on certain big game species by creating an additional water source while the existing water source is only partially lost due to reduced use during the life of the mine.

Letters identical to letter 90 were received from:

Clint Waters
Roger Waters
Duane Edwards
Glen Steed
Merlin S. Jessop and William Knudson
Merril Jessop
Robert Steed
Lorin Waters
Chris Waters
Harry Geisinger
Martin L. Williamson
Calvin Black

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, AZ 86046

Dear Mr. Lindquist

I fully support the undertaking of a uranium mine located in Coconino County by Energy Fuels Nuclear. The project referred to as Canyon which is approximately 13 miles south of the Grand Canyon.

The impact of this project would greatly benefit the people in both Kanab, UT area and the Fredonia, AZ area by providing desperately needed jobs.

Energy Fuels Nuclear has proven to the people in this area that they are both conscientious and a responsible company.

They presently hire approximately 153 people and would need an additional 30 to 50 employees with the approval of this project.

I urge your support of this project.

Sincerely

Mark Homer
P.O. Box 352
Fredonia, Az
86022

131

Forest Service Response

103-1

Please refer to the response to letter 90.

Letters identical to letter 103 were received from:

Bernard C. Ripper
Virginia L. Martin
John Gordon
Paul Aragon
Paula DeMills
Tresa West
Byron S. Lathin
William D. Spencer
Robin Campbell
Valley Jean Williford
Dewey B. Hawkins
Deanna T. Glover
Jeff Allen
Al Jackson
Michael R. Lambert
Lyn Evans
Dayle Wooden
George Kirby
Belinda Glover
James Gil Hardy
Jon DeMills
Robert Falest
Tina Jorgenson
Nita West
Marc R. McPhearson
E. Kent Hunt
Marlin B. Brown
Darrell Neilson
Ted Atherly
Diana M. Jessup
Carl E. Olson
Leonard M. Jessop
Richard Evans
Mark Lee Utter
Chic Evans
Anthony LaCorti
E. M. Halter
Kerry Lee Butler
Russell L. Hunt
Judy Moon

April 22, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist,

As a concerned citizen of San Juan County I strongly support Energy Fuels Nuclear, Inc. in their efforts to open and operate the underground uranium mine known as the Canyon Project.

As you are aware there is a uranium mill just nine miles south of Blanding. The approval of this project will enhance employment opportunities as a result of the ore mined and milled. Additionally there are scores of unemployed miners throughout northern Arizona and southern Utah who will have a chance at obtaining gainful employment if this project is approved.

From an environmental view Energy Fuels Nuclear, Inc. is as conscientious an operator as there is. They have restored past mining and exploration sites with the utmost skill and care. I every reason to believe they will do the same throughout the life of this project.

Energy Fuels Nuclear, Inc. has been present in our community for nearly a decade and have never been anything but beneficial to the residents of this county. I am very confident they will prove themselves a fair employer, an environmentally concerned corporation and, a healthy presence in all towns and counties they deal with.

For these reasons I encourage your support in their efforts to open and operate the Canyon Project.

Sincerely yours,

Lindsey Shumway
[illegible] S Main
Blanding UT 84511

Forest Service Response

149-1

Please refer to the response to letter 90.

Letters identical to letter 149 were received from:

Marjorie Black
Dian Hurst
Leon Black

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist

Have you ever been unemployed? It is not a good condition. It is a constant worry on how you are going to make ends meet, how you are going to feed your family, and the impact goes on and on and on.

Energy Fuels is proposing a uranium mine located in Coconino County called the Canyon project. The opening up of this project can provide additional jobs to people in this area who are now presently unemployed. I urge your support.

Energy Fuels is a responsible employer in this area and has provided jobs to over 150 people. We need this type of employer and totally support this project.

Sincerely

Raymond R. Dudley

133

L-153

Forest Service Response

153-1

Please refer to the response to letter 90.

Letters identical to letter 153 were received from:

Kurt Brinkerhoff
Charles W. Cox
Gordon Pollock
Carlene Hay

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist

Energy Fuels is proposing a new uranium mine located in the Canyon area in Coconino County. I feel that this project should be approved immediately.

The project would provide jobs which are needed. These jobs are good jobs as they provide a good salary, good benefits, and good working conditions. With unemployment running wild in our area and with few good jobs available, we need to support conscientious and responsible growth and expansion of business. JOBS are needed!

Energy Fuels should be allowed to start this project immediately.

I strongly support this project.

Sincerely

Sean R' Hamblin
PO Box 504
KANAB, Ut. 84741

L-159

Forest Service Response

159-1

Please refer to the response to letter 90.

Letters identical to letter 159 were received from:

Ina B. Hamblin
Val Hoyt
Earlene Drake
Arden A. Campbell
Don C. Allen
Judy Beagley

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, AZ 86046

An underground uranium mine proposed by Energy Fuels should be supported by all. The mine I'm referring to is at the Canyon site located in Coconino County, Arizona.

This mine would provide additional jobs which are needed so badly.

Energy Fuels has been a reliable company and I'm sure they will continue to operate in a responsible manner.

The impact with the approval of this project would only be positive. We need jobs so that people can work and support their families. These are primary jobs.

I am pleading for support of this project.

Sincerely

John A. Hopkins

P.O Box 618
KANAB, UTAH 84741

134

Forest Service Response

167-1

Please refer to the response to letter 90.

Letter 168, received from Connie Hopkins, is identical to letter 167.

KANE COUNTY
PUBLIC WORKS DEPT.
Kanab, Utah 84741
Box 728

Building Department
County Engineer
County Surveyor

RECEIVED
APR 30 1986
KAIBAB N.F.

April 28, 1986

Mr. Leonard A. Linquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

170-1 The Kane County Commission is aware of two uranium mines that Energy Fuels Nuclear, Inc. is trying to develop in northern Arizona. We support Energy Fuels Nuclear in their endeavor to complete these mining interests.

170-2 It will be a benefit to the economies of northern Arizona and southern Utah for these mining activities to be completed.

170-3 We are acquainted with Energy Fuels Nuclear and know them to be a dependable and conscientious operator with an established record of responsible environmental management.

Sincerely,

KANE COUNTY COMMISSION

Calvin C. Johnson
Chairman

Jay L. Ramsay
Commissioner

Vince Underwood
Commissioner

am

136

Forest Service Response

170-1

Kane County's support for the development of the proposed Canyon Mine is noted. Your comment has been considered in the selection of the Preferred Alternative.

170-2

The projected economic impacts of the Canyon Mine are discussed in Section 4.2.1. See also the response to letter 90.

170-3

Your comment is noted. Please refer to the response to letter 90.

San Juan County
Monticello, Utah 84535
(801) 587-2231

County Offices
KENNETH R. BAILEY-Commissioner
CALVIN BLACK-Commissioner
JERRY HOLLIDAY-Commissioner
GAIL D. JOHNSON-Clerk and Auditor
MARY LOU MOSHER-Recorder
BARBARA MONTELLA-Assessor
MARIAN BAYLES-Treasurer
S. RIGBY WRIGHT-Sheriff
BRUCE K. HALLIDAY-Attorney
Travel / Development Council

April 22, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist,

171-1 As a member of the San Juan County Commission I urge you to approve the proposed development and production of the "Canyon Project" as planned by Energy Fuels Nuclear, Inc. and any future projects in your area.

171-2 The uranium mill south of Blanding (which depends on the "Canyon Project" production) provides many jobs in San Juan County. As our county is having an economic crisis, I can't over stress our need for the continued operation of the mill.

I urge you to approve their proposal for development of the Canyon Project.

Sincerely,

Kenneth R. Bailey

Kenneth R. Bailey
SAN JUAN COUNTY COMMISSION

Forest Service Response

171-1

San Juan County's support for the proposed Canyon Mine is noted and your comment was considered in the selection of the Preferred Alternative.

171-2

We recognize the economic importance of the Blanding mill. See the response to letter 90.

COLLEGE of EASTERN UTAH
James R. Randolph, President
SAN JUAN CENTER
(801) 678-2201

Lynn Lee
Director
Kay Shumway
Associate Director
for Instruction

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

172-1 I would like to express support for the proposed development of the Canyon Project by Energy Fuels Nuclear, Inc. Although the project site itself is not in relatively close geographic proximity to Blanding, Utah, it will have tremendous impact here. The reason for this is that the uranium ore proposed to be mined at the Canyon Project will be transported to Blanding to be processed at the White Mesa Uranium Mill.

172-2 This mill is presently the largest private employer in San Juan County. We recently experienced about a two year shut down of the mill, and the economic impact was devastating. Both the Native American and Anglo populations of this region of northern Arizona and southern Utah have experienced severe economic depression. The per capita income of the Indian population is $2,414 compared to the U.S. average of $8,012. The media family income is $5,831. Forty nine percent have incomes below the poverty level in comparison to the U.S. rate of only 12.5 percent.

The development of the Canyon Project will provide jobs and tax revenue which are vitally needed for economic survival in our area. I simply feel that, as a country, we can no longer afford to preserve areas of such economic significance to our people merely to allow a select few to enjoy a primitive wilderness experience. The survival of those who inhabit this land is just too important.

172-3 We in southeastern Utah have had the opportunity to observe the operation of Energy Fuels for several years now. Few companies could be more community oriented than they have been. They have been deligent in preserving the environment and have made numerous contributions to community programs. At the same time they have exhibited exemplary business operation procedures. The College of Eastern Utah has cooperated with Energy Fuels on several training programs, and I have found their personnel to be most professional and competent. Our community has been fortunate to have Energy Fuels employees in our midst, and have realized significant economic benefits from the company.

I sincerely emplore your support in using your position to enhance approval for Energy Fuels Nuclear, Inc. to proceed with the Canyon Project development. Thank you.

Sincerely,

Lynn Lee

npb

639 West 1st South (50-1) Blanding, Utah 84511

137

Forest Service Response

172-1

Your support for the proposed Canyon Mine is noted and your comment was considered in the selection of the Preferred Alternative.

172-2

We recognize the importance of the Blanding mill. Please refer to the response to letter 90.

172-3

Your comment is noted. See also the response to letter 90.

April 19, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest

Dear Mr. Lindquist:

173-1 I am writing in support of a request before your Agency by Energy Fuels Nuclear, To develope mining property in your area known as the, "Canyon Project."

As a Blanding City Councilman, and as a Businessman doing business in all of San Juan County I am very interested and concerned about our economy and the
173-2 ability of our residents to sustain themselves.

Without ore to process, Energy Fuels will be forced to close their Mill which will be a serious blow to our economy.

Energy Fuels has proven themselves to be
173-3 responsible in both their Mining and Mill operations. They are sensitive to the beauty and environment needs and will comply with the requirements of your agency. Thank you for your consideration.

Singerly Yours
Ray R. Johnson
P.O. Box 531 – Blanding, Ut. 84511

Forest Service Response

173-1

Your support for the proposed Canyon Mine is noted and your comment has been considered in the selection of the Preferred Alternative.

173-2

We recognize that the Canyon Mine may have economic impacts in Southern Utah. See the response to letter 90.

173-3

Your comment is noted. See also the response to letter 90.

Inviting

Friendly Unforgettable

San Juan County

Box 392 Monticello, Utah 84535

(801) 587-2231

County Offices

KENNETH R. BAILEY-Commissioner
CALVIN BLACK-Commissioner
JERRY HOLLIDAY-Commissioner
GAIL D. JOHNSON-Clerk and Auditor
MARY LOU MOSHER-Recorder
BARBARA MONTELLA-Assessor
MARIAN BAYLES-Treasurer
S. RIGBY WRIGHT-Sheriff
BRUCE K. HALLIDAY-Attorney
Travel/Development Council

April 17, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

174-1 This letter is to advise you that the San Juan County Commission supports the proposed development of the "Canyon Project" some 13 miles south of the Grand Canyon as planned by Energy Fuels Nuclear, Inc.

174-2 Energy Fuels has a uranium mill south of Blanding which processes ore presently produced from the Arizona Strip and other areas. The Canyon Project production is necessary to assure the continued operation of the uranium mill here. The mill, directly and indirectly, provides about 250 jobs in San Juan County. It's continued operation is absolutely necessary to these jobs being continued, and such operation is dependent on the Canyon Project being approved without further delay. Uranium mining and milling in America is also critically important to attain energy independence and for our National Security.

174-3 Energy Fuels has been in San Juan in the mining and milling business since 1977. They have an excellent record of invironmental concern. They go the "extra mile" in every way to assure clean, safe operations. They care about the people in the areas they operate. In short, they are "good nieghbors".

We urge you to expeditiously approve their proposal for development and production of the Canyon Project and any future projects in your area.

Sincerely,

Calvin Black

Calvin Black, Chairman
San Juan County Commission

139

Forest Service Response

174-1

San Juan County's support for the proposed Canyon Mine is noted and your comment has been considered in the selection of the Preferred Alternative.

174-2

We recognize the economic importance of the Blanding mill. Please refer to the response to letter 90.

174-3

Your comment is noted. See also the response to letter 90.

SOUTHEASTERN UTAH ASSOCIATION OF LOCAL GOVERNMENTS

CALVIN BLACK
Chairman
WILLIAM D. HOWELL
Executive Director

P.O. Drawer 1106 • Price, Utah 84501-0881 • Telephone (801) 637-5444

April 22, 1986

Mr. Leonard A. Lindquist
Karbab National Forest
800 South 6th Street
Williams, AZ 86046

Dear Mr. Lindquist:

175-1 This letter is to advise you that the Southeastern Utah Association of Local Governments supports development of the "Canyon Project" approximately 13 miles south of the Grand Canyon as proposed by Energy Fuels Nuclear, Inc.

175-2 The economy of San Juan County Utah is largely dependent upon the mining and milling of uranium on the Colorado Plateau. Uranium processing in San Juan County generates approximately 250 critically needed jobs. Furthermore, it is of critical national strategic importance that the viable uranium industry be maintained.

175-3 Energy Fuels has been a good neighbor in Southeast Utah. They are concerned both about their poeple and the environment. We feel they deserve your support.

We urge you to expeditiously approve their proposal for development and production of the Canyon Project and any future projects in your area.

Sincerely,

William D. Howell

William D. Howell
Executive Director

WDH:db

REGIONAL CLEARINGHOUSE

140

Forest Service Response

175-1

The support of the Southeastern Utah Association of Governments for the proposed Canyon Mine is noted and your comment has been considered in the selection of the Preferred Alternative.

175-2

We recognize that the Canyon Mine may create economic impacts in Southeastern Utah. Please refer to the response to letter 90.

175-3

Your comment is noted. See also the response to letter 90.

City of Blanding

50 WEST 1ST SOUTH STREET
BLANDING, UTAH 84511
(801) 678-2791

April 15, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

176-1 Blanding is a small Community with limited industry and as in the past we presently depend on Natural Resources for our existence. The Uranium Mill just south of town has been our life blood over the past few years. This Mill has provided our Citizens with good and desperately needed jobs, both at the Mill and the related service industry.

176-2 You have before your agency a request from Energy Fuels Nuclear to develop the Canyon Project. We urge your support and approval of this project. It is just such development of our Natural Resources that will keep our Community alive.

Our 3,500 Citizens thank you in advance for your support of the Canyon Project.

Sincerely,

CITY OF BLANDING

Norman L. Johnson
City Administrator

pc: Mayor James S. Shumway
City Councilmembers
Energy Fuels Nuclear Inc.

Forest Service Response

176-1

We recognize the importance of the mill at Blanding. Please refer to the response to letter 90.

176-2

Blanding's support for the proposed Canyon Mine is noted and your comment was considered in the selection of the Preferred Alternative.

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist

Energy Fuels Nuclear has brought to Southern Utah and Northern Arizona a higher standard of living. They have provided over 150 jobs. Jobs are needed in our area.

I am encouraging support of the Canyon project proposed by Energy Fuels Nuclear.

Energy Fuels Nuclear is an outstanding employer. They are conscientious and responsible for their employees and their envoronmental management. Their presence has provided good quality jobs which are much needed in this area.

We need the development of this uranium mine and strongly aupport this project.

Sincerely

142

Forest Service Response

Letters 177 through 238 all express support for the development of the Canyon Mine. The response to letter 90 also serves as a response to each of these letters. However, since each letter is unique and may emphasize different comments, all of these letters are reprinted.

143

To: Andy Lindquist Supt.
Kaibab Nath. Forest
Wms., Az. 86046

April 28, 1986

Dear Mr. Lindquist:

This letter is to let you know that I am in favor of the "Energy Fuels Corp's" activities in the exploration and mining of Uranium and Vanadium, specifically at this time in the Areas of the Canyon Site, the Pinenut Site and other sites that are necessary for them to produce Uranium and Vanadium.

This activity of mining is so important to the sustaining of families in San Juan County, Utah and also the Kanab & Fredonia Areas.

I would appreciate all the support you can give in this matter.

Sincerely,

Waldon Scott
Blanding.

April 28, 1986

Dear Mr. Lindquist:

I am writing this to let you know that I am in favor of the continuation of the exploration and mining of Energy Fuels at the sites of Pinenut & Canyon sites — as a resident of Southern Utah I know the effect it has on our economy and the jobs that certainly effects our children.

We love this land & we want it to be beautiful - but I feel the good Lord gave us these resources so that we could sustain our selves. I feel that Energy Fuels wants to do this -

Please continue in your good work But go forward & helping our families & live and to continue to live in this great land. Sincerely Waldon Scott

April 17, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 S. 6th Street
Williams, AZ 86046

Mr. and Mrs. Norman Hammon
Hwy. 89A
Fredonia, AZ 86022

Dear Sir:

It has come to our attention that various environmental groups are determined to terminate any exploration or mine development on public lands. How can so few radicals determine the future of the mass population? The closure of any mining development would have a serious setback on the local economies surrounding the Arizona Strip and Grand Canyon areas. The developed mines on these public properties have been well-planned and developed environmentally. The contract drillers and EFNI have been conscious of the environment.

The agreement that EFNI and the environmental groups established some time ago, opening and closing certain areas to exploration and mine development seems to me a compromise on EFNI's part and a willingness to work with these environmental groups. Why now are the environmentalist trying to hamper and violate their agreement? If these people had their way, we would see no development of any kind on public lands including forestry, mining, etc. We need these industries, not only for their products, but for their employment and economic benefits.

In conclusion and specifically, we support the development of the Canyon and Pinenut mine sites proposed by EFNI or any other further mine development that is conscientiously planned.

Yours truly,

Mr. and Mrs. Norman Hammon

Blanding, Utah
April 17, 1986

Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

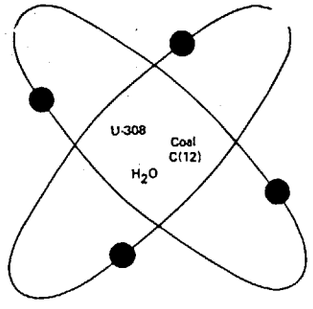
Dear Mr Leonard Lindquist

I support Energy Fuels in developing the Canyon project. While it is in Arizona it can effect our economy. It could help keep our mill in Blanding running and would provide jobs for our truck drivers. The closing of the mill was a sad thing and put many of our people out of work. People had to move away and there are homes for sale all over town. With the opening of the mill some of our people are going back to work. If our town is to servive there must be jobs. One of our nice little businesses has just folded, because there aren't people to support it. Our tax base has gone down and the town and county are suffering.

I believe in protecting the environment but I don't think it should be for just a few. I think the welfare of the majority should be the primary concern of the government.

Sincerely,

Lucy M Harris
158 So 200 E 91-9
Blanding, Utah 84511



HAVE DRILLS,WILL TRAVEL

ENERGY DRILLING & DEVELOPMENT CO.
P.O. DRAWER E, BLANDING, UTAH 84511

(801) 678-2711
(801) 678-2196

April 16, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

RE: Energy Fuels Nuclear, Inc.
Canyon Project

Dear Sirs:

We would like to express our concern regarding the Canyon Project. We would like to see this Project developed according to the plans laid out by Energy Fuels.

The economy of our company and our community is directly effected by the development of this mine even though it is located in Coconino County, Arizona. The ore from this mine will be hauled by a number of local trucks to a mill just south of Blanding which employes a number of local residents. So you can see how this directly and indirectly affects our community.

Our company has dealt with Energy Fuels for many years and has always found them to be an honorable company and conscious of the environment to an extent more than is required by law.

Thank you for your attention to this matter.

Very truly yours,

ENERGY DRILLING & DEVELOPMENT CO.

W. E. Hoggard

WEH:n

146

April 15, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

As a resident of Blanding, Utah, I urge your support of the Canyon Project.

Having been laid off from a good job by Energy Fuels when the Uranium Mill was closed in 1982, I personally know the need to develop new ore bodies. The Mill is now open again and though I have found other employment, I urge you to support Energy Fuels and their development of the Canyon Project. This Mine will help to keep the Mill open and provide needed jobs.

I have every faith that Energy Fuels will develop the project and yet protect the environment as is possible. They are a good company and some of the most trustworthy people I could ever hope to know.

I and my family urge and thank you for your support of the Canyon Project.

Very truly yours,

Norman and Ruth Johnson
438 South 100 West (71-2)
Blanding, Utah 84511

RAYMOND RICK LYMAN, DMD

FAMILY DENTISTRY

28 NORTH MAIN STREET
BLANDING, UTAH 84511
(801) 678-2615

Dear Mr. Lindquist

I am writing in support of the Canyon project.

The area needs the employment which the project will afford

Sincerely

R. R. Lyman DMD

KENNETH SILLIMAN
Trucking and Bulldozing
Phone 564-3454
P. O. Box 365
GREEN RIVER, UTAH

April 16, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Re: Canyon Project - Coconino Co., AZ.

Dear Mr. Lindquist:

I am writing you in support of the Canyon Project. My father (now deceased) and myself have been involved in the uranium business since 1934 working in various fields of the industry. We own our own claims, have our own mines that we have produced from, and also have our own equipment for hauling the product. As a result of the decline in the uranium industry in our area, we erre forced to cease operation of our mines and consequently our hauling end of the business also. At that time, we began leasing out to other people whenever possible. We are currently working in the Kanab area hauling, enabling me to maintain my equipment and business.

In our immediate area the decline in this industry has completely closed down all mines (including the Energy Fuels operation on the San Rafael Site) leaving our area with a 37% unemployment rate equalling out to virtually no employment available in this area. Energy Fuels was a very well supported company in this area as they maintained a very conscientious and dependable operation. I and my father personally worked with Energy Fuels in the Yellow Cat area where our mines are located with a most favorable working relationship. At the present time, even though their operation is inactive, the site of their mine on the San Rafael is still maintained and checked regularly.

I urge you to seriously consider working with this firm, therefore allowing badly needed employment to be available to the immediate area as well as extending into our area where we desperately need the jobs.

Should I be of any further assistance in this project, please do not hesitate to contact me.

Sincerely,

K. Blaine Silliman
Owner

KBS/ss

147

Box 7
Bluff Utah
84512

Kaibab National Forest
Forest Supervisors Office
800 South 6th Street
Williams, Ariz 86046

RECEIVED
APR 17 1986
KAIBAB N.F.

Dear Sirs.

I am very much in favor of the development of the Canyon Mine, or any other type of development in the Arizona Strip. I have been in a position to witness the activities of Energy Fuel Corp. for several years, and I fully believe that the will do there very best to conduct their future activites with a minimum of disturbance to the environment.

Sincerely Yours
Robert N. Howell
Box 7
Bluff Utah
84512

11 April 1986

RECEIVED
APR 17 1986
KAIBAB N.F.

Dear Mr. Lindquist,

As an interested party I ask you to support the Canyon Uranium Project located south of the Grand Canyon.

We all effected deeply by its development and operation; we need it for our livlihood and economic stability. Much good can come of this project and we ask your support.

Sincerly Yours
Paul and Shirley
Freeman

Blandin , Utah
April 19, 1986

M.r Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Daar Mr. Lindquist,

We understand there is opposition being raised to the developement of an underground uranium mine in Coconino County, Arizona, known as the Canyon site. We also understand this developement will affect the operations of the Energy Fuels plant in Blanding, Utah.

We feel very strongly that this mine should be allowed developement. We have two sons enployed at the Energy Fuel facility. They are young men with families to fupport, who desire to remain in this area to live; and it would be a severe blow to us personally, as well as to them, if they had to leave home to make a living.

There is an economic concern for us as well. We are both employed at a local grocery business and depend greatly on the patronage of Energy Fuels and Umedco employees. This plant has been a great stimulus to our entire community as a whole and it would be a tragic economic blow to this area to loose the benefit of its operations in our community.

The Energy Fuels plant has always been very responsible in its operations and enviornmental awareness and we welcome it as a very desireable neighbor.

We live in a very beautiful part of the world, and we all enjoy its scenic beauty, but we feel that both interests can be served. We are tired of being told here in southeastern Utah what we may, or may not, do for a livin . We would like to see the developement of any uranium mines which will benefit us here in Blanding.

Sincerely,
Wm Ellis Palmer
Mabel June Palmer

Ellis and Mabel June Palmer
461 S. 100 E. (83-1)
Blanding, Utah 84511

April 22, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

We are writing this in support of the development of the Canyon Project in Coconino County, Arizona, south of the Grand Canyon.

This project is important for the present and future energy needs of our country.

This mine means my job, as well as jobs of my friends, businesses and others in northern Arizona and southern Utah. It will be a major source of business jobs and tax revenue.

Energy Fuels Nuclear, Inc. is a company with an outstanding record of operating safe and environmentally sound projects. They have been in the business of mining coal and uranium for many years in many western states. They always keep their mining areas neat and tidy.

This company has always contributed a lot to the communities they operate in and around.

The timely approval given for Energy Fuels to develop this property would assure the jobs of myself, many of my friends and businesses in this area.

Please do everything you can to bring about this approval.

Sincerely,

Curtiss Earl Perkins

Mona Kaye Perkins

49 So. 300 E #5

Ephraim, UT. 84627

Dear Mr. Sandquist 4-23-86

This letter is in support of Energy Fuels Nuclear Inc. for Canyon Project in Coconino County AZ.

My son + I came to Kanab Ut in Jan 86 to haul ore for Energy Fuels.

Energy Fuels are the best company we've worked for. Pays days on time — Safety meetings every 90 days. operating Safe + environmentally Sound.

Started trucking with My Dad in July 1961 — with Kennecott shout down + other Business we hauled for cutting back just about put us out of Business.

This Job has been a life saver — I'm thankful for the work — we're all working together hopeing for approval, to press forward.

Thank You

Richard E. West
David R. West

RE West & Sons Trucking
232 So 200 So. Kanab Ut 84741

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

April 22, 1986

Dear Mr. Lindquist:

The opening of the Canyon project, as with other uranium ~~mi~~ development is very much need at this time.

The mill in Blanding, Utah depends on the Uranium industry to keep its doors open. The employment the mill provides is essential to this area as it is the major employer in San Juan county.

The uranium industry has been experienced in this area for many years and I feel it is an acceptable industry. Sure, environmental impacts are a concern and rightly so, but with all the expertise in the field today, damage could be minimized to an acceptable level.

In these times of economic depression, employment is necessary for survival and this industry does ~~pro~~ provide much needed employment. Energy Fuels is respected in this area and I certainly hope they can keep there doors open.

Sincerely,

Marion Christensen
136 Uranium Drive
Monticello, Utah 84535

9283 Yorkshire Dr.
South Jordan, Utah 84095
April 22, 1986

Mr. Leonard A. Linquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

We are in support of Energy Fuels Nuclear, Inc. and their proposal to develop the Canyon Project in Coconino County, Arizona, south of the Grand Canyon.

We feel the development of this mine is important to the energy independence of this country. The economies and well being of the people in Northern Arizona and Southern Utah will be affected by this project with regard to jobs and tax revenue.

Operational safety and environmentally sound projects have given Energy Fuels a good record. Uranium mines and mills, and coal mines in many western states have been operated by them. We feel they contribute a great deal to the communities wherein they operate.

Many businesses and jobs of many people in Southern Utah and Northern Arizona are dependent on approval being given to Energy Fuels to develop this property.

We would appreciate your doing everything you can to expedite such approval.

Yours truly,

Dale C. Hansen
Hansen Trucking

151

Mr. Leonard Lindquist

Subject: Energy Fuels Nuclear Canyon Mine Project

Having been employed by Energy Fuels at the White Mesa Mill and currently employed by Umetco Minerals at the White Mesa Mill, I support the development of the Canyon Mine Project. The development of the Canyon Mine directly affects my employment at the White Mesa Mill, which process Uranium Ore from Energy Fuels mines. Appx 140 employees work at the White Mesa Mill.

Approval of the Canyon Mine will greatly enhance the continued operation of the White Mesa Mill in Blanding Utah.

Energy Fuels has established a record of responsible environmental management, a good example being the reclamation of the Glade Pit Mine in Local Manti Forrest in San Juan County, Utah.

Thank You
Fike A Carroll
Shift Foreman
Umetco Minerals
White Mesa Mill

152

K. HOGGARD & SONS LOGGING

P.O. Box 487
Monticello, Utah 84535
Bus. (801) 587-2033 • Res. (801) 587-2683

Mine Cribbing
Mine Wedges
Rough-Cut Lumber
House Logs
Aspen Shakes
Firewood

RECEIVED
APR 21 1986
KAIBAB N.F.

April 16, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Gentlemen:

Our company would like you to note that we are in favor of Energy Fuels Nuclear, Inc. developing their Canyon Project on schedule.

Although this proposed development is located in Coconino County, Arizona, it affects us and those in our community and nearby communities as the ore is hauled by local trucks to a mill south of Blanding, a nearly community.

In addition, Energy Fuels has been a dependable and conscientious company and very responsible with regard to environmental management.

Your attention to this matter is greatly appreciated.

Very truly yours,

K. HOGGARD & SONS LOGGING

Keith Hoggard

KH:n

L-194

Blanding, Utah
April 18, 1986

RECEIVED
APR 21 1986
KAIBAB N.F.

Mr Leonard A Lindquist
Kaibab National Forest
800 South 6th St.
Williams, Arizona 86046

Sir:

I am writing to ask you to support the Canyon project. I am sure you are aware that Energy Fuels has a uranium refining mill here in Blanding, Utah. This mill is new and very sophisticated and will process the ore from the Canyon project. Energy Fuels is a reputable Company, they are true environmentalists, they will extract & process the ore and then restore the terrain.

To shut this mill down because they do not have ore to process would impose a real economic hardship on Blanding as well as many people in Kanab, Utah. This not only affects the mill workers but it also affects the miners truckers, drillers and all related businesses.

Energy Fuels is a fine Company as a business women in Blanding for many years I have had first hand knowledge of them. They are a concerened Company. I hope you would give this project your Consideration and support

Sincerely
Zelma Acton
Elk Ridge Restaurant
Box 28
Blanding, Utah 84511

L-195

153

April 17 1986

Mr.Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, AZ 86046

Dear Sir

I am writing to ask your support of theCayon project.
Energy Fuels is a very reputable Company. Iworked for them when they first built their Mill Here in Blanding. They are a very concerned Company.

To Shut this mill down because of a lack of ore to process would be a real economic blow to Citzens of both Kane and San Juan Countys. This would not only affect the people who work in the mill here in Blanding but would also affect the miners, the Trucking Company and Drivers and many other related bussiness.

Energy Fuels is a company that is very concerend about Enviromental Management and they have a very good record.

In closing I hope that you will give your support to this project. It is very important to the economy of this area.

Sincerely,

Kim H. Acton
Elk Ridge Restaurant
Blanding, Utah 84511

Mike Young, Inc.
533 East Central, Box 488
Monticello, Utah 84535 (801) 587-2258

Dear Mr. Lindquist,

I am a small business owner here in Monticello, Utah and I am very concerned with the progress of the Canyon Project. This project is very important to all of us that live and pay taxes in this area, because of the added revenue which this project contribues to the area. Our future business plans and growth is greatly based on the future of such mining operations such as the Canyon project. I would like to express my support of the project and would hope that you are doing all you can to see that the project continues. If there is any thing else that I can do to help encourge progress I would appreciate the oppoutunity to do so.

Thank You very much.

Michael D. Young
Monticello, Utah 84538
Mike Young, Inc.

Buick • Chevrolet • Oldsmobile

154

Leonard Lindquist,

I am writing you concerning the proposed mine project, Canyon, to be mined by Energy Fuels.

Myself (and many of my friends and neighbors) are totally in favor of allowing the ore to be mined. I feel this will have little (if any) effect on the environment.

Many jobs are hanging in the balance of this decision and Southern Utahs economy will be hurting badly if the mining is not allowed.

I have worked with Energy Fuels on some of their exploration projects and can testify that they are a responsible company not out to rape the land but to extract the ore with the greatest of care for the environment.

Let Energy Fuels mine the Canyon Claim!

Thank You,

Tom Cook
Box 4
Bluff, Utah
84512

April 21, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

REFERENCE TO: Canyon Project

Dear Sir:
This is to inform you that we think this mine could be mined and the area restored without any undue degredation to the surrounding environment.

There are several hundred jobs involved in this project; and the area, as you know, is depressed economically.

Which is better: To feed the chipmunks or the children?

Sincerely,

Walter K. Steed

Walter K. Steed

c.c.

Senator Ivan Mathason
Representative Jim Yardly
Representative Ray Schmutz
Senator Jake Garn

155

Mr. & Mrs. Philip L. Palmer
& Family
330 W. 100 N. (29-2)
Blanding, Utah 84511
April 18, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Sir:

We are writing to register our support in favor of Canyon Mine Project located in Coconino County, Arizona some 13 miles south of Grand Canyon. We are residents of Blanding, Utah because we were fortunate to find employment here less than eight years ago. To allow this mine project to proceed will go along way to help employment in our area.

We consider nuclear power a great National asset and one of the cleanest, safest and most efficient sources of energy available.

We have been directly involved with the operations of Energy Fuels in our area and are impressed with their awareness of their surroundings, their neighbors, and we are impressed with their commitment to a quality environment. Please consider our support.

Respectfully,

Philip L Palmer
Philip L Palmer

L-200

April 21, 86

RECEIVED
APR 24 1986
KAIBAB N.F.

Mr. Leonard A. Lindquist
Kaibab National Forest
800 So. 6th Street
Williams, Az. 86046

Dear Mr. Lindquist:

This letter is in support of Energy Fuels Nuclear, Inc. & their proposal to develop the Canyon Project in Coconino Co. Az., south of the Grand Canyon.

The development of this mine is important to the energy independence of this country. It is important to the economies & well being of the people in Northern Az. & Southern Utah as it is a major source of business, jobs & tax revenues.

Energy Fuels has a record as a company that does an outstanding job in operating safe & environmentally sound projects. They have operated uranium mines & mills, & Co mines in many western states. They are known as "good neighbors" & contribute a great deal to the communities they operate in & near.

The jobs & businesses of many of my friends & others in Southern Utah & Northern Az. are dependent on timely approval being given for Energy Fuels to develop this property.

Please do everything in your power to expedite such approval.

Sincerely

Frank E. Jackson Sr.
Ex 1677
P. O. Box 1741
Blanding, Utah 84511

VL-11 5/62

L-201

HAVE DRILLS, WILL TRAVEL

E.D.D.C.O. EXPLORATION, INC.
P.O. BOX 578, BLANDING, UTAH 84511

(801) 678-2711 (office)
(801) 678-2992 (shop)

April 16, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

RE: Energy Fuels Nuclear, Inc.
Canyon Project

Dear Sirs:

Please note our opinion that the Canyon Project be continued as planned by Energy Fuels.

In our many dealings with Energy Fuels, they have always proven themselves to be a responsible company, especially regarding environmental management.

Even though this Project is located in Coconino County, Arizona, it will directly affect our company and our community as local truckers will be involved in hauling the ore and the ore will be processed at a mill located just south of Blanding which employes many local residents.

We appreciate your time in considering our opinion on this matter.

Sincerely,

EDDCO EXPLORATION, INC.

W. E. Hoggard, Jr.
President

WEH:n

156

L-202

April 17, 1986

Mr Leonard A Lindquist
Kaibab National Forest
800 So 6th Street
Williams, Arizona 86046

Dear Mr Lindquist,

We are writing to you in support of the Canyon Project in Coconino County, Arizona.
This project is of utmost importance to our dieing economy in this part of the State.
Our children and friends have had to leave the place they loved, in order to feed their families. If the conditions here get worse, well all have to leave here, and most of us have no place to go.
Having the Energy Fuel mill operating again the past months has brought a large number of jobs to our community, and we need this employment here so that people can survive.
Energy Fuels is a dependable operator, with an established record of responsible environmental management.
We beg of you to help keep the mines going, so we can continue to live here and be an independant people.

Sincerely,

Dave & Freeda Guymon
393 W Center 47-3
Blanding Utah 84511

L-203

Blanding, Utah 84511
April 18, 1986

Mr. Leonard Lindquist
Kaibab, National Forest

Dear Mr. Lindquist

I am very much in support of the Canyon mining project by Energy Fuels Nuclear

I have been a uranium miner all my life. I have seen the many jobs created by the mining industry.

Energy Fuels is not a fly by night out fit. They are a reliable company that a great asset to this County.

We here in Blanding need the success of Energy Fuels

Thank You.

Glen A. Thurston
141 N 400 W Box 54-4
Blanding, UT 84511

Dear Sirs

I am employed in the Uranium By Energy Fuels. I fell that we need the backing from you people to go ahead. With the uranium projects on the canyons Strip. Without ~~these~~ uranium mines I would be out of work and have to sell my homes and move on. So hope you people would help my family and our employer to find a way to go ahead with these projects.

an employe of
the Uranium business

Truitt Purcell
41 N 2 W Vl 35-2
Blanding UT 84511

April 22, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

I should like to request your support of the Energy Fuels Nuclear proposed development of the uranium mine known as the Canyon project.

In view of the depressed state of the economy in Northern Arizona and Southern Utah, the opening of this mine would be of great value to the people in these areas.

I sincerely urge your support of this project.

Sincerely,

Z/7 Casby J.
Casby Trucking
Box 661
Blanding UT 84511

April 20, 1986

Mr. Lenard A. Lindquist,

We are writing Concerning the opening of Canyon Mine.

We have been in Kanab hauling ore for 1 year now, out of the Hack mine. in that year we have sold our home in Salt lake and moved our family down South, and made our home in Kanab

We are a young family and have been in the trucking Busin as owner operators since we were 17.

We have been very pleased with the conditions of the mine, and with our obligations to Basic Transport

We often take our children 4 & 1 with us, but since we have been hauling ore the safety rules won't allow it, Just as extra precautions due the the fact that they don't want to take any safety risks.

over

We are looking forward to raising our family in a country atmosphere,

Therefore, I hope there will be an opportunity to do so with the opening of Canyon mine,

Our future depends on it!

Sincerely,

Mr. & Mrs. David R. West
Bland, Ut. 84741

159

QUALITY DRILLING COMPANY
2724 E. Lakin, Suite #2
Pueblo Plaza
Flagstaff, AZ 86001

Mr. Leonard A. Lindquist,

I would like to express my concern about the controversial issue concerning underground Uranium mining of the Canyon project, proposed by Energy Fuels Inc. Although, there are some organizations around that would like to stop all Uranium, mining activity & Uranium production, those groups have nothing to lose by such action. Those of us who live and PAY to make a living in southern Utah & Northern Arizona, need the opportunity for employment & monies in our business community, as Uranium, mining & milling contribute substantially to the local economy.
Energy Fuels Nuclear Inc. has operations currently working in the Arizona strip & other area,s with Uranium activity. Energy Fuels Nuclear Inc. have in the past. and will in the future, I feel, been very responsible, conscientious operators with, an excellent established record of good environmental management.
The Canyon mine project south of the Grand Canyon, will provide much needed employment, for people from the Williams,Flagstaff, and Kanab area's as well as the people in the Blanding Utah, area where the ore will be snipped for processing.

I feel my views are valid in this matter, as I own and operate Quality Drilling, Inc. based in Blanding Utah, & Flagstaff Arizona.

I have observed Energy Fuels mining operations firsthand, therefore I can say, Energy Fuels Nuclear Inc. is a dependable, conscientious, operator with an established record of responsible envirormental practice.

Thank you

Clinton K. Howell
Quality Drilling Inc.

L-208

Apr. 22, 1986
Box 368
Monticello, UT 84535

U.S. Forest Service
Kiabab National Forest
Andy Lindquist
800 S. 6th Street
Williams, AZ 86046

Dear Mr Lindquist:

I am in favor of proceeding further in drilling, developing and extracting uranium ore from the Pine Nut and Canyon Project. I understand that you are involved in the decision making process for the Canyon project.

Uranium production in the U.S. is important in establishing our energy independence. I think the current low oil prices are a lure to get us relying on foreign oil again, so that OPEC can ~~then~~ then up the price. This veiwpoint was shared by oil analyst, Dan Lundberg on the Nightly Business Report last week.

Uranium is a clean source of power relative to coal or oil. Also, I understand Energy Fuels has a good record of respect for the environment. This is important in preserving our public lands for future generations.

As this project is 13 miles south of the Grand canyon, the care for the environment is more critical; however, I feel that this very high grade ore should be extracted now. The high grade makes it possible for Energy Fuels to compete with foreign ore which is higher quality and can be produced cheaply.

One of the reasons I particularly favor this project is the employment it brings me here in Monticello. I moved back to this area last spring, after spending 5 years in Salt Lake City. The continued operation of the Mill in Blanding makes it possible for me to earn a living selling insurance in San Juan County because of the money - direct and indirect - that the ~~Corpus~~ mill brings this county.

Please give consideration to my opinion and the points discussed herein. The continued progress in developing the Canyon project on time is important to producing ore for the mill in Blanding which directly affects me and my family.

Thank you for your time.

John K. Black, CLU

160

April 20, 1986

Mr. Leonard a. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046.

Dear Mr. Lindquist:

I am writing this letter in regard to the problem Energy Fuels Nuclear Inc. is having with the environmentalist.

Our Son has a couple of trucks working there. It means his livelyhood and a good many others.

He says "they are especially careful about the safty of all concerned.

They are contributing much in and around much of Southern Utah.

We hope you can do much to expidite approval of this very worthy project.

Sincerely
Ritchie Stuffo sr.
Box F
Orino Ut. 84738

L-210

Dear Mr. Lindquist,

I am writing this letter in regards to an proposal from Energy Fuels to develop the Canyon Project in Coconino Co. Ariz.

I as well as many of my friends and Co-Wkr feel that the approval of this project is essencial to nuclear future of our country, as well as our local economy of northern Ariz and southern Utah.

I personally am involved in transporting Ore for Energy Fuels from their present operations in Blanding Utah. Energy Fuels has an outstanding record for safe and environmentally sound operations. Energy Fuels is a very responsible company in their operations of nuclear energy.

I would like to urge you personally, to do everything in your power to gain the approve of this project.

Thank you Sir, very much for your time.

Sincerely,

Wayne A Phillips

(Phillips Trucking)
[illegible] Drive
Kanab Ut 84741

L-211

april 22-1986

Mr. Lenard Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear mr. Lindquist

I am writing this letter to you in hopes you can do something to help a lot of us people who's livelyhood depend upon this project.

Yes, this Energy Fuels Nuclear, Inc. that are proposing to developing the Canyon Project in Coconino County, Arizona South of Grand Canyon.

It is very important to the economics and well being of a great many people in Northern Arizona and Southern Utah, both for jobs and businesses.

These people have an excelent record in operating safely and environmentally.

Money of us depend upon timely approval being given this project.

We would appreciate very much your efforts and approval as soon as possible

Respectfully Yours
Ritchie Stubbs Jr.
Moccasin Ariz

Box 563
Green River, Utah
April 21, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Sir:

This letter is in support of opening the CANYON project in Coconino County, 18 miles south of the Grand Canyon.

My truck is on the haul from that area to the operating mill at Blanding, Utah. Opening this mine would not only add to the local work force, but also would keep our fleet running, as well as stabalize the mill at Blanding. This whole operation is a small part of the endangered mining industry of the Western U.S., but it is much easier to expand an industry than to start one. If uranium prices advanced, it would take several months to get the mines running again, but with one already working, production could be increased overnight.

Experienced miners of the northern Arizona area will have to find other work if mines are closed or not opened, and many of them will probably not return to the industry no matter how good it gets in the future. To hold this work force together and to stabalize a sector of the industry, it is most important to utilize every opportunity.

Energy Fuels Nuclear Company is willing to open this mine, and is now being evaluated by Federal Agencies, including yours. As a concerned party of this matter of opening the CANYON mine, I urge you to give it every consideration in keeping a going operation a part of your economy.

Sincerely yours,

Ronald Hall
Ronald Hall

April 23, 1985

Mr. Leonard A. Lindquist
Kaibab national Forest
800 south 6th Street
Williams, AZ 86046

Dear Mr. Lindquist:

This is in support of Energy Fuels Nuclear, Inc. and their idea of developing the Canyon Projectin Arizona.

This is important to the economy of Southern Utah as well as to Arizona. The jobs that are created for San Juan County are beneficial to that county's economy and also provides jobs for us that live nearby.

Having worked around Uranium for over 30 years, I know of the outstanding job that Energy Fuels provides in operating a safe project.

Please do everything in your power to help get this approved.

Thank you,

Carlyle Gibbons

C. Gibbons Trucking
198 N. 400 W.
Price, Ut 84501

April 25, 1986

Mr. Leonard Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

I am a Heavy Equipment Operator with Energy Fuels Nuclear of Fredonia, Arizona. The proposal that this company has for construction of a uranium mine in Coconino County, Arizona, known as the Canyon site, needs to be approved.

I have never worked for a company previously that was as conscientious of environmental practices as Energy Fuels is. In my work, and personally as an individual, I have always tried to play my part in helping them in meeting environmental requirements.

I worked for Energy Fuels in Blanding, Utah, for three and one-half years. During this time, I was involved with the reclamation project on the Elk Mountain in San Juan County. Having lived in the area all my life, I can honestly say that the site looked a hell of a lot better after the reclamation than it did before.

I was laid off from Energy Fuels in March of 1983, due to the economic conditions of the uranium industry. In December of 1985, I was fortunate to be rehired by this company in Fredonia. Pulling up roots and having to relocate my family at 50 years of age is a traumatic experience, one that I hope I don't have to repeat. There is a critical need for employment opportunities in this area; and if this proposal is not approved, family heads will be out of work.

I urge your support of this proposal and will commit to you that I will do my part as an operator for Energy Fuels to see that the environmental requirements are met or exceeded.

Again, I urge your support.

Sincerely,

Kenneth Vee Palmer

Kenneth Vee Palmer
P.O. Box 1117
Kanab, Utah 84741

Monticello, Utah
April 23, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, AZ 86046

Dear Mr. Lindquist:

I am writing to offer my support to the approval of the opening of the Canyon project. As a citizen of San Juan County, Utah, I am vitally interested in seeing uranium development continue. Employment opportunities are greatly enhanced in San Juan County when uranium is available to support the mill in Blanding, Utah.

The mill in Blanding is the only industry in San Juan County and as such is a major employer of the area. The mill was forced to close for several years and has only recently opened. It is vital we maintain this industry for the economic value it provides to this rural area.

While I realize that mining produces environmental impacts, I am confident your agency has the expertise available to minimize the damage to an acceptable level so that we, the public, may truly enjoy the best of both worlds.

Sincerely,

Kenneth R. Christensen

Kenneth R. Christensen
P. O. Box 337
Monticello, Utah 84535

April 25, 1986

Mr. Leonard Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

I am writing this letter in support of Energy Fuels Nuclear's proposal to open a uranium mine in Coconino County, approximately 13 miles south of the Grand Canyon at the Canyon site.

As an employee with the Utah Job Serivce, I have worked closely with this company and their hiring needs. I have found them to be an exceptional employer to work with.

The people in Kane and Mohave Counties have benefited from this employer in terms of employment. They have been a good employer with good wages and benefits. It would be devastating to the economy of these counties if this employer weren't permitted to continue with long-term employment.

Before transferring to the Kanab Job Service eight months ago, I was working in Blanding, Utah, where the primary industry was uranium. This is where I first experienced working with Energy Fuels. They are a company that is very conscientious of being on top of what is required of them in this industry. I have seen the reclamation work that has been done after the completion of a project; and without hesitation, I can say that the site was in a lot better condition than when it was started.

In the 15 years that I have worked with the Job Service, I have seen many heads of households out of work. It is impossible to really know the mental and emotional stress these men go through when the unemployment is not due to their work habits of skills, but to circumstance. There is such a shortage of employment opportunities that men have to go and take whatever they can get.

This quite often results in family separations and financial difficulties. If the Pinenut project is approved, it will mean a continuation of employment and additional jobs. It is estimated that at full production Energy Fuels will hire an additional 30 to 50 new people. If the project is not approved, it will mean a decline in employment as the other existing mines are mined out.

I urge your support for this project to continue with the economic growth of Southern Utah and Northern Arizona. Energy Fuels Nuclear is a good company, and I am confident they will adhere to any requirements asked of them.

Sincerely,

Peggy Palmer, Interviewer

April 25, 1986

Mr. Leonard Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist:

I am writing to inform you of my concern and approval of the uranium mine which Energy Fuels has proposed, the mine being the Canyon site location in Coconino County, Arizona, approximately 13 miles south of the Grand Canyon.

Working for Job Service in Kanab has been a very eye-opening experience. Many people visit the office to either seek work or file for unemployment insurance benefits. Unemployment rates in this area often run in double-digit figures. There are seasonal layoffs which have an impact to our area, and many, many people are seeking work. Energy Fuels maintains a year-round, steady work force of over 150 employees. This employer has stimulated our economy and given the opportunity to both men and women to work. Energy Fuels has been a company that cares about its employees.

I have personally visited some of their site locations, and feel that the reclamation has far surpassed by expectations. In my opinion they have established a record of responsible environmental management.

I feel that we should allow responsible operators opportunities to develop projects that are beneficial to them and yet beneficial to others by providing jobs. I feel that companies that come into the area and exploit the resources without concern of environmental management should not be allowed; however, Energy Fuels is not that kind of an operator.

I totally support the project at the Canyon site.

Sincerely,

Karen Alvey

Karen Alvey
P.O. Box 356
Kanab, Utah
84741

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist

The approval of the uranium mine located in Coconino County, Arizona called Canyon is desperately needed.

Energy Fuels should be allowed to develop the Canyon project. It would provide employment which is needed to the people of southern Utah and northern Arizona.

The rural areas need employers who hire on primary jobs which Energy Fuels have and will continue to provide. With the approval of the Canyon project additional employees would be needed.

Energy Fuels is a good employer and has always shown to be conscientious and responsible environmental managers.

Support on this project is needed.

Sincerely

Loneta J. Williams

Mr. & Mrs. Jeff Black & Family
565 N. 100 W. (21-8)
Blanding, Utah 84511
April 18, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Sir:

This letter is to tell you of our support for the Canyon Mine Project. To allow the mine to proceed would be a positive decision because of the use of the resource. The project would help the employment and economy in that area of the State plus our area here. We feel nuclear energy has received a bad rap from the media and we favor its use.

We can also pass on a favorable compliment for Energy Fuels Company who would operate the mine. Our experience with their operations, their management and policies, and the people who work for them has all been positive. Please consider our support in favor of this proposed project.

Respectfully,

Jeff Black
Jeff Black

April. 21, 86

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Az. 86046

Dear Mr. Lindquist

This letter is in support of Energy Fuels Nuclear, Inc and their proposal to develop the Canyon Project in Coconino Co. Az. south of the Grand Canyon.

The development of this mine is important to the energy independence of this country. It is important to the economies & well being of the people in Northern Az. & Southern Utah as it is a major source of business, jobs, & tax revenues.

Energy Fuels has a record as a company that does an outstanding job in operating safe & environmentally sound projects. They have operated uranium mills & mines, & coal mines in many western states. They are known as "good neighbors" & contribute a great deal to the communities they operate in & near.

The jobs & businesses of many of my friends & others in Southern Utah & Northern Az. are dependent on timely approval being given for Energy Fuels to develop this property.

Please do everything in your power to expedite such approval.

Sincerely

Theresa E. Jackson
Box 114 Kanab Ut 84741

VL-11 5/82

L-221

Dear Mr Lindquist,

I worked for Energy Fuels for four years, from 1979 to 1983; I know them to be a very conscientious company who has always been concerned with maintaining the natural environment. My job was directly concerned with building ponds to contain the waste, and I know the care that was insisted upon.

The economy of Southern Utah and Northern Arizona is in serious trouble. It is a real shame that it is further threatened by people who do not live here and really do not know the problems.

Sincerely
Elmer Hurst
561 W. 100 S. (50-6)
Blanding, Utah
84511

L-222

April 24, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, ARizona 86046

Dear Mr. Lindquist

The proposed uranium mine located in Coconino County, Arizona, called Canyon has my total support.

Energy Fuels Nuclear has an excellent track record of being dependable and very conscientious as a responsible environmental manager.

Energy Fuels Nuclear has also provided over 150 jobs that has stimulated the economy and a higher standard of living for the people in both Northern Arizona and Southern Utah. These jobs have provided people opportunities to work for good wages year around.

Unemployment has always been high in our area but because of Energy Fuels Nuclear there have been over 150 people working who might not be working at this time.

Support and approval of this project would mean an additional 30 to 70 jobs. It might mean a job for myself or my family and it also might mean one of my children can remain at home to work.

Rural areas need employers like Energy Fuels Nuclear. It needs this uranium mine for jobs.

Please support this project.

Sincerely

Randall Hoyt
N-89-A
FREDONIA ARIZONA

GREATER KANE COUNTY AREA

CHAMBER OF COMMERCE

"Home of Western Hospitality"

P.O. Box 369 Kanab, Utah 84741 (801) 644-5229

Mr. Leonard A. Lindquist
Kisbab National Forest
800 South 6th Street
Williams, Arizona 86046

April 23, 1986

Dear Sir:

I am writing to express my concern relavent to the mineral developement of public land and specifically the projects now under consideration and known as the Pinenut and Canyon projects. With the laws and regulations now in place that control mining activities from start to final reclamation, I fully support the developement of our mineral resources an public lands.

I would urge you to support mineral developement under the present guide lines.

Sincerely;

Glen Martin
Glen Martin
Citizen, bussinessman and
past officer of the C of C.

Glen Martin
Box 1161
Kansb, Utah
84741

PHIL B. ACTON
CERTIFIED PUBLIC ACCOUNTANT
BLANDING, UT 84511

60 NORTH MAIN

(801) 678-2758 OR 678-2127

April 22, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist,

As a concerned citizen and businessman of San Juan County I strongly support Energy Fuels Nuclear, Inc. in their efforts to open and operate the underground uranium mine known as the Canyon Project.

As you are aware there is a uranium mill just nine miles south of Blanding. The approval of this project will enhance employment opportunities as a result of the ore mined and milled. Additionally there are scores of unemployed miners throughout northern Arizona and southern Utah who will have a chance at obtaining gainful employment if this project is approved.

From an environmental view Energy Fuels Nuclear, Inc. is as conscientious an operator as there is. They have restored past mining and exploration sites with the utmost skill and care. I every reason to believe they will do the same throughout the life of this project.

Energy Fuels Nuclear, Inc. has been present in our community for nearly a decade and have never been anything but beneficial to the residents of this county. I am very confident they will prove themselves a fair employer, an environmentally concerned corporation and, a healthy presence in all towns and counties they deal with.

For these reasons I encourage your support in their efforts to open and operate the Canyon Project.

Sincerely yours,
Phil B. Acton
Phil B. Acton

Northern Electric
288 N 1ST W. · BLANDING, UTAH 84511 · (801) 678-2415 · 2498

April 22, 1986

Mr. Leonard A. Lindquist
Kiabab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Sir:

I am writing in support of the Canyon Project. This project is essential to the economic well being of our community as the ore from this mine will be processed at the Energy Fuels mill near our community.

This mill is a dependable and conscientious operator with a good record of responsible enviromental management, and as a Blanding business woman and a member of the Blanding city council, I am fully aware of the economic benefits it gives us. Not only does it help us in our tax base, but in employment. We are in an area of high unemployment .

From a personal point of view, I came from a family of uranium miners. I have 5 brothers and numerous nephews who have spent their lives in the mines and have seen what the low price of uranium and the closure of the mines have done to them.

I strongly urge you to support this project as we here in San Juan County, Utah do.

Sincerely,
Clea S Johnson
Clea S Johnson

Dear Sir,

I am writing in reference to the mining project proposed by Energy Fuels Nuclear, at the Canyon site located in Arizona.

Energy Fuels is known locally for it's integrity when it come's to dealing with people and the enviroment. I myself worked for them as a lead-man on their reclamation crews. They made every effort to comply with jurisdictional requirements and restore the natural surrounding as close to original as possible.

If this project is denied it will have a devasting effect on the economy of Blanding, Kanab and surrounding areas due to the loss of a large number of jobs. In a time of questionable economic stability of southern Utah, this is a project that is sorely needed.

As a supplier of Uranium ore to the White Mesa Mill, Energy Fuels is one of but a handfull of companies still in the uranium industry. Without a viable domestic uranium industry, our country is once again in danger of losing it's independance from forgien markets.

I strongly urge your support of the right of Energy Fuels to conduct mining operations in your area.

A Concerned Citizen
Ben A Auth
288 S 100 E 80-2
Blanding, Ut 84511

April 17

Dear Mr. Lundquist,

We are writing in favor of the Canyon project. We feel that the jobs it would provide the residents of Glendale would be beneficial to those here also keeping the mill at work. Mean would be good for us as that is where we earn the money to support our family. It has helped us for the last 10 months & we hope it will continue.

Sincerely,

Jack & Lynette Spurr
158 S. [illegible] E. (-4)
Glendale, Ut. [illegible]

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Mr. Leonard A. Lindquist
Kaibab National Forest
800 So. 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist,

It has come to our attention that there is a possibility of two underground Uranium mines being developed. The two projects are the Pinenut and Canyon projects, both in Arizona. We are very much in favour of the development of these mines, as the ore would come to our local Energy Fuels Mill here in Blanding, providing badly needed jobs for many local people.

Energy Fuels has been very dependable and conscientious about protecting the natural environment, and have an established record for doing so. They have an excellent safety record also.

Please do what you can to see that these two mines are developed.

Sincerely,
Mr. and Mrs. Robert A. Jones
157 So. 200 E. (92-1)
Blanding, Utah 84511

L-229

April 23, 1986

Dear Mr. Lindquist

I'm writing to you as a Utah business man as well as a concerned citizen to voice my opinion in support of Energy Fuels Nuclear Inc. and their proposed Pinenut Project southwest of Sedona, Arizona.

I feel that this project would be a direct boon to the continued economic growth that we have enjoyed since E.F.N.I. has moved into our area.

I urge that you do everything in your power to expedite the clearance of this project.

Sincerely,

Jayne Williamson

L-230

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Dear Mr. Lindquist
I'm Writing to you not only as A Southern UTAH Businessman But as A Concered citizen, In Support Of Energy fuels nuclear Inc. Proposed Canyon Project in Coconino County.
This Project is importons to the Continued development and growth Of our area Wich we have all enjoyed Since Energy fuels has Come to our area.
Energy fuels has a good track record in there past handleing Of Environemtly Safe and Clean Project Sites. I feel that in the Best intrests of all the Citizens of Both UTAH and Arizona that you Should do all in your Power to EXPidite the Clearance Of this Project

Sincerely
J.D. Bishop
[illegible]
Kanab, Ut. 84741

April 19, 1986

Mr. Leonard A. Lindquist
Kaibab National Forest
800 S. 6th Street
Williams, Az 86046

Dear Mr. Lindquist:

We strongly support further development of uranium mines by Energy Fuels Nuclear, Inc. The impact on our small community of low income opportunities has been a blessing. We are impressed with the personnel of E.F.N. and their concern of the environmental impact of their operations

Please lend your support to the approval of further mine development by E.F.N. Thank you.

Sincerely,

Mr. & Mrs. Truman Lynch
Box 268
Kanab, Ut 84741

Leonard A Lindquist
Kaibab National Forest
800 So. 6th St.
Williams, Az 86046

Lehi, Utah
April 25-86

Mr Lindquist;

This letter is written in regards to the proposed shut-down of certain uranium mining projects in the Arizona strip. Which shut-downs we are opposed too, because of the direct effect they would have on the economy in our area, such as the mining, trucking, and milling, which supply much needed employment.

We wish to express our support for the Canyon Project 32 miles south of Fredonia Az.

Yours truly,
Mr & Mrs. J. Glen Shumway
76 E 100 So. 87-1
Blanding Utah 84511

Kiabab Nat. Forest
Andy Lindquist
800 So. 6th St.
Williams Ariz. 86046

apr. 13, 1986

Sir.

I understand Energy Fuels is trying to open a new mine on the South Rim of the Grand Canyon, called "Canyon Project".

There is an environmental group opposing this

We have agencies such as the B.L.M. and forest Ser. to control the forest and lands against maring the land.

I think those people are wrong we need the natural resources to sustain our growing society.

In the creation of the earth these things were put there for the use of our civilization which we will have to use someday.

I am in favor of them opening the mine and reclaiming the land used, when the project is done

Glenn Skinner.
765 W 2nd N. 47-1
Blanding, Ut 84511

April 24, 1986

Mr. Leonard A. Kindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Sir:

I am writing in regard to the Canyon project as proposed by Energy Fuels Nuclear Inc.

I am asking that you be in favor of this project and give your approval to the necessary permits.

Ore mined from this project would affect us personally, as my husband is employed at the mill in Blanding where the ore would be processed.

Additionally, the town of Blanding, Utah would be affected.

Blanding is a small town with about 3000 population. When the mill is in operation it employs about 130 people full time, and this makes a lot of difference in the economy of this small town.

Again, I ask for your positive support on the Canyon project.

Sincerely,
Joan Richards
P.O. Box 1148
Blanding, Utah
84511

Leonard LINDQUIST

4-23-86

Dear MR ~~LINDQUIST~~
-this letter is in support of Energy Fuels proposal to develop the Canyon Project, South of the Grand Canyon.

Being a business man in Blanding Utah, I feel that it is important to our economy as well as the people in Northern Arizona's, it also creates both jobs and tax revenue to both countys

the businesses and jobs of my family & friends in both Southern Utah and Northern Az. are dependet on timely approval being given to Energy Fuels to develop this project.

As far as Energy Fuels is concerned, I feel they have always operated in a safe manner, and sure they will continue to do so in the future

Sincerely
Mike V. Johnsen
Save-Way Tire
BLANDING
Blanding, Utah
84511

Ken Black
88 East Center
Blanding, Ut 84511

Mr. Leanard A. Lindquist
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Dear Mr. Lindquist,

I am writing to voice my concern about the slow down in the timely development of the Canyon mine Project. I am concerned about this because of the jobs that will be effected. These jobs include the workers in the Canyon Mine area, who would be working on the project and the truckers who haul the Ore and many more. These payrolls pump a lot of money into the economy of a somewhat depressed area. Without these jobs Coconino and San Juan Counties would be very much affected in regards to employment.

I have been associated with Energy Fuels since they opened the mill at Blanding and I feel they are operating their mines & Mill in a safe, responsible, and conscientious Environmental maner.

I sincerely hope that you and members of your staff will help in every way possible for a timely development & production of this mine.

Best Regards
Ken Black
Partner - Manager
C & K Black Trucking.

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4-23-86

Mr. Leonard Ludquist:

I have heard there is a possibility of opening a uranium mine south of the Grand Canyon (Canyon Project) & think is the name. Please do all you can to help get this project going as it will have a very significant impact on all the residents & businesses in the area (Utah, Az & Nevada). It is Energy Fuels who will be doing the mine, I think we can rest assured they will use sufficient caution to preserve our wilderness areas in their original beauty, as they have done in other areas. We have heard from over-zealous environmentalists too long. It is now time for the working class to be heard. I'm sure there is a middle-ground somewhere, that will allow development of our abundant natural resources without significantly our desert beauty. In your position of influence I feel you could have an impact on this issue, & help get this mine (& other industries like it) operating. It will be to the benefit for us all.

Thanks,

A. H. Barlow

P.O. Box 133 - Colo. City, Az. 86021

RECORD OF DECISION

1986

USDA Forest Service
Kaibab National Forest

CANYON MINE PROPOSAL

Final Environmental Impact Statement

Coconino County, Arizona

ENERGY FUELS NUCLEAR

FREDONIA 643-7321
FLAGSTAFF 774-0609 ~~[illegible]~~
DENVER 303/623-8317

RECORD OF DECISION

USDA Forest Service
Kaibab National Forest

CANYON MINE PROPOSAL
Final Environmental Impact Statement

Coconino County, Arizona

I. Introduction

This Record of Decision documents my approval of a modified Plan of Operations for the Canyon Uranium Mine on the Kaibab National Forest. The alternatives considered and my rationale for selecting the preferred alternative are described in this Record of Decision. The environmentally preferred alternative is also identified.

In October, 1984, Energy Fuels Nuclear, Inc. (EFN), submitted to the USDA Forest Service, Kaibab National Forest, a proposed Plan of Operations to mine uranium on unpatented mining claims on the Tusayan Ranger District. The proposed mine is located in Coconino County, Arizona, approximately six miles south of the community of Tusayan.

A detailed description of the proposed mine operations can be found in the Environmental Impact Statement (EIS). In brief, the proposed Canyon Mine would involve underground mining of a breccia pipe uranium deposit and would require disturbance of approximately 17 acres for the mine shaft and surface facilities. Ore from the mine will be trucked to the licensed mill near Blanding, Utah.

When the Plan of Operations was submitted, the Forest Service sought public review and comment on the proposal to assist in determining the appropriate level of analysis and documentation required under the National Environmental Policy Act (NEPA). The Forest Service decided the preparation of an EIS was warranted and a notice to prepare an EIS was published in the Federal Register on April 30, 1985.

A Draft EIS was prepared and released to the public on February 28, 1986. A Final EIS, including public comments on the Draft EIS and Forest Service responses, was completed and released on September 29, 1986. The purpose of the EIS was to present information to allow for an informed decision on whether to reject, accept, or accept with modifications the proposed Plan of Operations. The EIS analyzed potential environmental, social and economic impacts of the proposed mine and developed and evaluated mitigation measures designed to minimize potential impacts from mining and ore transportation.

II. Decision

My decision is to select Alternative 5, the alternative preferred by the interdisciplinary team in the EIS.

The Selected Alternative includes approval of a modified Plan of Operations for an underground uranium mine and allows EFN to choose between two ore transportation options: Haul Route #6, an all-highway route along Highway 64, Interstate 40 and Highway 89, from the mine site to Blanding; and Haul Route #7, another southern route which crosses State and private lands on gravel roads near SP Crater. A detailed description and analysis of the haul route options considered and selected is provided in the EIS. If EFN chooses to use Haul Route #7, it must negotiate the necessary rights-of-way with the State of Arizona and private landowners.

Other important operational features of the Selected Alternative include:

1. Expanded monitoring of soil, air and water to determine the environmental impacts, if any, of mine operations and ore transport, and the need for imposing additional mitigation measures, if necessary;

2. Construction of an overhead powerline from Highway 64 following the access road to the mine site;

3. Transportation of mine workers by company van or bus;

4. Modified surface water diversion structure to provide increased protection from storm runoff;

5. Mitigation measures for the replacement of disturbed wildlife habitat and key wildlife waters; and

6. Expanded mine reclamation plan.

The operational components of the Selected Alternative are analyzed in detail in the EIS. The mitigation measures which have been adopted as part of my decision are described in Section VII of this Record of Decision. All practicable means to avoid, minimize and monitor environmental impacts have been adopted.

III. Alternatives Considered

Based on available data, all reasonable alternatives to the proposed Plan of Operations were developed and analyzed in the EIS. The following alternatives were considered in detail:

Alternative 1 — No Action, Disapproval of the Plan of Operations.

No mine would be developed at the Canyon Mine site. While the Forest Service can impose reasonable environmental controls on a mining operation, we do not have the authority to disapprove a reasonable operating plan for a mining operation which will be conducted in an environmentally responsible manner. The use of this alternative,

however, is consistent with previous Forest Service administrative decisions to treat the no action mining alternative as the no project option.

Alternative 2 — Proposed Plan of Operations.

This alternative is the Plan of Operations as proposed by EFN, in October, 1984.

Alternative 3 — Modified Plan of Operations with Additional Monitoring, Mitigation and Haul Routes #1 and 2.

This alternative includes an expanded monitoring program for soil, air and water, an alternative haul route and additional mitigating measures, including the replacement of disturbed wildlife habitat and key wildlife waters.

Alternative 4 — Modified Plan of Operations with Additional Monitoring, Mitigation and Haul Route #5.

This alternative includes the monitoring and mitigation measures of Alternative 3, but considered different haul routes. Alternative 4 also includes company provided transportation for mine workers.

Alternative 5 — Preferred Alternative.

The Preferred Alternative includes the monitoring program and mitigation measures considered in Alternatives 3 and 4, haul route options #6 and 7, company transportation for mine workers and a surface powerline along the access road to the mine site.

The project alternatives differ primarily in the level of monitoring and mitigation required, and the haul routes evaluated. The alternatives also consider different operational features of the mine, including power supply, worker transportation and surface water diversion.

In addition to the alternatives described above, several other alternatives were considered but eliminated from detailed study in the EIS. Two alternatives that were initially considered as possible agency actions, but dropped from further consideration, were withdrawal of the land from mineral entry and patenting (fee title ownership of the mine site) of the lands in the area of the proposed Canyon Mine by EFN. Patenting remains a discretionary option still available to EFN, and the authority of the Forest Service to influence project mitigation and monitoring under this alternative would be much less. Other non-project alternatives considered but eliminated from detailed analysis as remote, speculative and conjectural, providing no additional information which could aid the public or the Forest Service in considering the impacts of the proposed Canyon Mine include energy conservation, alternative energy development and obtaining uranium from other sources. The reasons for eliminating these alternatives from detailed study are discussed in Chapter 2 of the EIS.

IV. Response to Public Comments

Two hundred and thirty-eight letters were received in response to the Draft EIS. The major concerns expressed in these letters fell mainly into the following broad categories: Proximity of the proposed mine to the Grand Canyon National Park, including the perception that the mine was located within the boundaries of the Park; cumulative impacts of several uranium mines; potential for groundwater contamination; the "valuable mineral" test under the 1872 mining law; radioactive dust exposure along haul routes; potential human health effects; effects on wildlife and wildlife habitat; heavy truck traffic; and, opposition to the proposed mine because of social issues and controversy associated with the use of uranium.

The EIS was revised to reflect the comments received on the Draft EIS. Important changes include:

1. **Addition of Indian religious concerns as an issue and concern.** The potential impact of the Canyon Mine on Indian religious sites and practices was considered in the Draft EIS in conjunction with a general analysis of impacts on American Indians. Comments on the Draft EIS by the Hopi and Havasupai Tribes alleged that religious sites and practices would be adversely affected by the Canyon Mine, a concern which was not raised by the Tribes during scoping or earlier consultation with the Tribes. Based on those comments and continuing consultation with the affected Tribes, Indian religious concerns was added to the list of issues evaluated in detail by the EIS. The text of the EIS includes an expanded discussion of Indian religious sites and practices, and beliefs about the affected area. Following the printing of the EIS, Havasupai and Hopi representatives met with Forest Service representatives and provided additional comments and information with respect to these issues. Consultation with the Tribes regarding religious concerns will continue during the review, construction and operation of the mine.

2. **Expanded discussion of potential groundwater impacts.** Several comments expressed concern about potential depletion or contamination of groundwater resources in the area, including potential impacts on seeps and springs which flow from underground aquifers. The Draft EIS evaluated the impacts on surface and subsurface water as a major issue and concern. The Draft EIS concluded that adverse impacts either during or after mining operations were extremely unlikely. In response to public comments, the EIS was revised to include an expanded discussion and analysis of groundwater conditions and potential impacts. The additional analysis confirms the conclusion of the Draft EIS that no adverse groundwater impacts are expected.

Many letters responding to the Draft EIS expressed concerns related to the milling process in Blanding, Utah, rather than the extraction of uranium ore at the mine site. There seems to be some confusion over the two separate processes. The proper handling and disposal of tailings at the Blanding mill site and the safe transport of "yellowcake" surfaced frequently in letters. Both of these concerns are associated with the concentration process of the uranium ore at the mill in Blanding, Utah. No uranium ore will be processed at the Canyon Mine site. Therefore, comments related to the potential

impacts of uranium milling are not appropriate and are beyond the scope of the Canyon Mine EIS.

In addition to comments made about specific elements of the Draft EIS, many letters expressed a preference for one or more of the alternatives evaluated in the Draft EIS. One hundred and fifty responses were supportive of the mining development. Seventy four letters, including some with multiple signatures, expressed opposition to all mining alternatives, preferring the No Action Alternative. Section 1.1.1 of the EIS discusses the statutory and regulatory authorities of the Forest Service to administer mining activities. The general mining laws provide a statutory right to explore and extract certain minerals from the National Forests. The Forest Service does not have the discretionary authority to categorically deny access for the purpose of prospecting for and extracting minerals on those National Forest System lands that are open to mineral entry. It is the responsibility of the Forest Service to review and where necessary, modify proposed plans of operation for the development of a mine. Review and modification of plans is to ensure that the mining operations will be conducted in a manner which minimizes, prevents, mitigates or repairs adverse environmental impacts. The Forest Service does not have the authority to categorically deny reasonable operations proposed under the mining laws.

Many comments also expressed the need for a "regional programmatic planning document" for uranium mining operations on the entire Coconino Plateau and Arizona Strip. The option of preparing a broader, regional analysis of uranium mining was considered and rejected in the decision to prepare the EIS for the Canyon Mine proposal. NEPA requires such an analysis in two instances; when there is a comprehensive federal plan for the development of a region and where various federal actions have significant cumulative or synergistic environmental impacts in a well defined region. The first requirement is clearly inapplicable. The second was analyzed in detail but rejected for several reasons. First, only one mining plan was pending before the Forest Service. While other mine plans are possible, and perhaps even likely, only one federal decision in the region south of the Grand Canyon required NEPA analysis, the review of the Canyon Mine Plan of Operations. Second, evidence from similar mines operating north of the Grand Canyon indicated that impacts were localized and that major interactive impacts were unlikely. The distance between the two areas and the unique geology which separates them creates two distinct regions.

We were also influenced by the practical problems of such a regional analysis. Since no other mine sites had been proposed, a regional analysis would have required us to hypothesize sites and development schedules for an unspecified number of future mines. Since the location and timing of the mines would determine whether cumulative or interactive impacts existed, the outcome of the study would have been determined by the selection of mine sites. Such an artificial study did not appear to be valuable in the review of the Canyon Mine Plan of Operations.

While there was no basis for a regional environmental impact statement, the EIS does recognize the possibility of cumulative impacts from the development of additional mines in the area. Potential cumulative impacts on the region were analyzed by considering two scenarios; one additional mine in the Tusayan area near the Canyon Mine and three additional mines in Coconino County south of the Grand Canyon. The conclusion of the EIS was that, apart from transportation and social and economic impacts, the impacts of

development of mines such as the Canyon Mine are limited to a relatively small area near the mine site. While several commentors asked for more detailed analysis of cumulative impacts, no comment challenged the conclusion of the Draft EIS or provided any evidence to the contrary.

Finally, the Forest Service land management planning process is the agency's primary broad environmental analysis effort. Special resource values and uses that could be affected by exploration and mining have been identified in the proposed Forest Land Management Plan. Standards and guidelines in the proposed Plan specify restrictions and mineral withdrawals to protect these special resources. Thus, while it does not specifically focus on uranium mining, the proposed Plan is, to some extent, comparable to an "area wide" EIS for the entire Kaibab National Forest, which includes Forest lands both north and south of the Grand Canyon. The lands in the Grand Canyon region are managed under a myriad of federal, state, private and tribal jurisdictions and, taken collectively, both the Canyon Mine EIS and the proposed Forest Land Management Plan reflect an appropriate level of analysis at this time in light of the past, present and reasonably foreseeable proposals.

V. Issue Resolution

Although none of the project alternatives fully resolves all of the identified issues and concerns, the modified project alternatives with specified mitigation measures are all considered environmentally acceptable. A brief discussion of how each alternative analyzed in the EIS addresses each issue is provided below:

1. **Social and Economic Impacts.** Social and economic impacts on the community of Williams and Coconino County as a whole are considered to be beneficial and virtually the same for Alternatives 2-5. If the No Action Alternative were implemented, there would be no change in current levels of employment, income, tax revenue or output as a result of the Canyon Mine.

2. **Reclamation Measures.** Reclamation measures required at the mine site are satisfactory in Alternatives 2-5, although additional measures called for in the modified project alternatives (Alternatives 3-5) are more comprehensive and oriented toward improving wildlife habitat at the mine site upon its closing. No reclamation would be required at the mine site under the No Action Alternative.

3. **Project Costs.** The least cost alternative is Alternative 2. Alternatives 3-5 all result in increased expenditures depending on the haul route used and mitigation measures required. Increased expenditures are generally associated with mitigation requirements. The costs of exploration and environmental review already incurred by EFN could not be recovered under the No Action Alternative.

4. **Wildlife Impacts.** Wildlife habitat will be affected to varying degrees in all alternatives depending on the ore transportation route used. Alternative 5 has the least impact on wildlife. Alternative 2 would have the greatest impact because of a lack of

mitigation requirements. Mitigation measures in Alternatives 3 and 4 should be effective in reducing the adverse impacts on wildlife resulting from increased road traffic.

Alternatives 3-5 all call for equivalent habitat replacement to offset impacts to wildlife habitat caused by the mine and expanded transportation system. Alternative 3 also includes a proponent choice of road closure during May and June in lieu of habitat replacement.

The No Action Alternative would have no impact from mining or ore transport on wildlife or wildlife habitat and would, therefore, require no mitigation.

5. **Impacts on Vegetation.** Alternatives 2-5 will have a negligible and insignificant effect on the make-up of vegetative types now present on the Tusayan Ranger District. The No Action Alternative would have no impact on vegetation at the Canyon Mine site.

6. **Visual Quality Impacts.** Visual quality associated with the Grand Canyon will not be affected by the development of the Canyon Mine regardless of the alternative selected for implementation. Alternatives 2-5 will alter the short term visual quality at the mine site. Alternative 4 requires constructing a road off the Coconino Rim in a location that would be visible to travelers going to and from the Grand Canyon using the east Highway 64 entrance. The No Action Alternative would have no impact on the visual quality of the area.

7. **Impacts on Air Quality.** Implementation of Alternative 2-5 will have no appreciable effect on the air quality, which includes particulates, radon gas, or radioactive dust, at either the Grand Canyon or the community of Tusayan. Increases in particulate matter will be site specific along haul routes and at the mine site itself and are expected to be well within air quality standards. Current levels of air quality in the vicinity of the Canyon Mine site and haul routes would be unchanged by the No Action Alternative.

8. **Impacts from Ore Transportation System.** Implementation of Alternative 5 and use of either the SP Crater haul route or the Federal and State Highway system would minimize impacts on National Forest resources and general forest environmental setting. The haul route identified in Alternative 4 would be most cost effective in providing a road that would meet long term management needs in the event other mines are developed in the eastern quadrant of the Tusayan Ranger District. Haul routes analyzed in Alternatives 2 and 3 are the most cost effective routes for hauling ore from the Canyon Mine to the mill in Blanding, Utah. No ore would be transported under the No Action Alternative.

9. **Impacts on Soil, and Surface and Ground Water.** Mitigation measures, operational procedures and monitoring requirements included in Alternatives 3-5 will reduce the possibility of radionuclide contamination to soil, and surface and subsurface water sources, and identify any contamination at the earliest

possible time. Alternative 2 does not include air, water and soil monitoring requirements to ensure the operational designs of the mine are functioning properly. Current parameters for water quantity and water quality would remain unchanged at the mine site under the No Action Alternative.

Neither the water quality on the Havasupai Indian Reservation nor the Grand Canyon National Park should be environmentally affected by the development of the Canyon Mine under Alternatives 2-5.

10. **Impacts on Indian Religious Sites and Practices.** Development of the mine site under Alternatives 2-5 and haul route options requiring the new road construction (Alternatives 2-4) could slightly reduce the land area available for Indian religious practices consisting of plant gathering and ceremonial activities. However, the current level of religious activity is not expected to be curtailed by any alternative nor will access to any known religious sites or areas be restricted. Although there is no physical evidence of Indian religious activity at the mine site itself, the Havasupai have recently stated that sacred camping and burial sites are present in the general area north of Red Butte, and perhaps at the mine site itself. However, the Havasupai Tribe refuses to disclose the location of the sites. The Havasupai Tribe has also recently stated that the general area around the mine is important to the Tribe's religious well being because it lies within a sphere of existence or continuum of life extending generally from the Grand Canyon to Red Butte. They explain that any uranium mining or similar activity within the sphere or continuum will violate unidentified Havasupai religious values and, may pose a threat to their very existence. The Havasupai have steadfastly declined to provide any additional information concerning the nature or importance of this sphere of existence, because, they stated, to discuss it further would be sacrilege.

In comments regarding other proposed actions on the Kaibab National Forest, the Hopi Tribe has expressed a belief that the earth is sacred and that it should not be subjected to digging, tearing or commercial exploitation. While this conflict has not been raised directly in relation to the Canyon Mine, it is acknowledged that commercial use of the Forest within the area of Hopi ancestral occupancy is inconsistent with these stated beliefs.

Further consultation with the Havasupai and Hopi people will continue during project review, construction and operation in an effort to better identify the religious practices and beliefs that the Havasupai and Hopi believe may be affected, to avoid or mitigate impacts and otherwise avoid placing unnecessary burdens on the exercise of Indian religious practices or beliefs.

The No Action Alternative would have no impact on Indian religious sites or practices. The Hopi and Havasupai Tribes have expressed a preference for the No Action Alternative, stating that no degree of project mitigation is acceptable.

Environmentally Preferred Alternative

Alternative 1, the No Action Alternative, represents the no project option. Under Alternative 1, no impacts from mine development and ore transport would occur. Therefore, Alternative 1 is the environmentally preferrable alternative.

VI. Reasons for Decision

While the Forest Service acknowledges the controversy surrounding the eventual uses of processed uranium and the heated debate over potential health hazards from radiological contaminants, the EIS disclosed no potential significant environmental impacts of the proposed Canyon Mine which could not be substantially mitigated or avoided entirely. These controversial issues of national debate are clearly outside the scope of the Canyon Mine analysis in light of anticipated impacts of the proposed mine and the well-defined legislative mandates and authorities of the Forest Service. Although none of the modified project alternatives were considered environmentally unacceptable, the Selected Alternative represents the combination of operational components, mitigation measures and haul routes which minimize potential impacts and best responds to the issues and concerns identified in the EIS.

Based on the EIS, no significant environmental impacts are expected from mining operations or ore transportation. Impacts are expected to be small and localized near the mine site. The mitigation measures adopted as part of this decision further reduce the potential impacts to acceptable levels. Accordingly, I feel that the Canyon Mine can be permitted consistent with my responsibilities to minimize degradation of Forest resources.

Specific reasons and factors which I gave particular attention to in selecting Alternative 5 are listed below. No single factor determined the decision. Based on consideration of these factors, I feel the Selected Alternative provides the highest level of issue resolution and best meets the intent of the laws and regulations governing Forest Service operations.

1. Expanded Monitoring -- The air, soil and water monitoring program responds to issues and concerns raised during scoping and evaluated in the Draft EIS, and to comments made on the Draft EIS. The groundwater monitoring well, while expensive, is an important element of the monitoring and mitigation strategy as it responds to the unique concerns raised by the proposed Canyon Mine. The groundwater monitoring will confirm or invalidate assumptions about groundwater hydrology used in the Canyon Mine analysis. It helps assure that important water sources, including springs which are sacred to the Hopi and Havasupai Tribes, will not be adversely affected by the Canyon Mine. The monitoring program also responds to the fear of radioactive contamination of air, water and soil expressed by some members of the public. It will help determine the need to further modify the Plan of Operations to provide additional mitigation measures, including the construction of other groundwater monitoring wells, should any unforeseen impacts occur. Finally, the results of the monitoring program will provide important data needed for the evaluation of future mining proposals in the area, if any should occur.

2. Modified Surface Water Diversion -- The alternative flood diversion plan is clearly superior to that proposed in the Plan of Operations. It provides for increased flood control capacity (a 500-year event) with less surface disturbance at the mine site.

3. Haul Routes -- The Selected Alternative offers EFN the choice of two haul routes. Either haul route option minimizes potential impacts on wildlife, cultural resources and the Grand Canyon National Park. These benefits, however, create substantial increased costs for the proponent, EFN. Haul route #6 is the longest route, resulting in the highest hauling costs. Haul route #7 is the next most expensive option and will also require that EFN acquire State and private rights-of-way at additional costs.

   These haul route options were selected despite the increased costs for several reasons. These routes are most responsive to public comments. While the EIS states that the impacts of any haul route option can be successfully mitigated, routes #6 and #7 have the least potential for adverse impacts. Finally, and most importantly, they provide the most flexibility for future transportation decisions and preclude an irrevocable commitment of resources to road construction or improvements which might forclose future transportation options. As the EIS notes, future uranium mines in this region are possible, however, it is impossible to predict the specific sites or timing of any future mine proposals. This decision which uses existing roads and minimizes new construction, will allow reconsideration of ore transportation routes when future mines, if any, are proposed. This decision also allows future decisionmakers to consider the option of consolidating or dispersing ore truck traffic to minimize transportation costs and environmental impacts.

4. Overhead Powerline -- The EIS evaluated a buried powerline and two surface powerline routes, one following the shortest route from the existing powerline to the mine site and one following the mine site access road. The surface powerline along the access road has been selected because it disturbs no new area. The buried line was rejected because it substantially increases project costs without any significant corresponding environmental benefit.

5. Transportation of Mine Workers -- Company transportation of mine workers is preferrable to private transportation because it reduces surface disturbance (no large employee parking lot is required) and traffic to and from the mine.

6. Wildlife Mitigation -- While the potential wildlife impacts of the Selected Alternative are less than those of the other project alternatives considered in the EIS, any loss of key wildlife habitat should be mitigated. Implementation of this decision will require that EFN replace the 32 acres of big game foraging habitat lost at the mine site and replace one key watering source impacted by the mine access and ore transportation route. In addition, operating restrictions may be imposed on the use of haul route #7 to avoid potential impacts on elk migration.

7. Other Mitigation -- This decision also adopts an extensive list of additional mitigation measures designed to minimize potential environmental impacts. These measures are listed and discussed in the following section.

VII. Mitigation Measures

The mitigation measures and operational components described in Sections 2.2.1.2 and 2.5 of the EIS are all adopted as part of my decision. Important measures include:

1. **Regulatory Requirements with Associated Monitoring.** Compliance with all applicable federal, state and local statutory and regulatory requirements will be assured by monitoring of EFN activities during construction, operation and reclamation of the mine and through appropriate language in permitting documents.

2. **Reclamation Plan.** The reclamation plan in the Plan of Operations (Appendix A) and those Forest Service modifications contained in Appendix B of the EIS are adopted as part of this decision. EFN will be required to post a performance and reclamation bond in the amount of $100,000 before mining activities begin.

3. **Visual Impacts.** The mine head frame and support facilities will be painted with earth tone colors.

4. **Public Safety.** The mine site will be fenced, posted and secured.

5. **Ore Haulage.** Ore trucks will be tightly covered with a tarpaulin. Any ore spilled will be cleaned up immediately and the spill reported to appropriate federal, state and tribal authorities.

6. **Air Quality.** Ore stockpiles will be managed to minimize wind dispersal of dust. This may require management of the stockpiled ore by wetting or chemical treatment.

7. **Ore Stockpiles.** Prior to stockpiling ore, ore pads a minimum of one foot thick will be constructed to prevent leaching of mineral values from the ore into the soil. Uranium ore will be removed and trucked to a distant processing plant. During post-mining reclamation operations, only barren or slightly mineralized waste rock may be replaced into the mined-out workings.

8. **Holding Ponds.** Holding ponds will be constructed with a minimum capacity of six acre feet, with no more than three acre feet of storage used at any time. Total holding pond storage capacity is sufficient to accomodate runoff from a 100 year storm event, plus normal annual runoff and water that may be pumped from the mine. The ponds must be lined with plastic or impervious material to prevent percolation into the substrate.

9. **Noise.** The mine will be designed and operated in a manner to reduce noise to the lowest practical levels. All equipment will be carefully maintained.

10. **Erosion Control.** Erosion will be controlled by revegetating disturbed areas. Stabilization of stockpiled topsoil will be accomplished by revegetation. The outside slopes of the diversion dikes that surround the mine yard will be riprapped.

11. **Fire Protection.** The riprapped dike slopes surrounding the mine yard will serve as a fire break and a water tank and fire extinguishers will be maintained on site for fire suppression.

12. **Radiological Monitoring.** Baseline measurements of radiation values in soil, air and water have been taken. Monitoring will continue after the mine becomes operational. The monitoring program may be extended, expanded, suspended or curtailed by the Forest Service based on the results obtained. Monitoring will continue until sufficient data is available to assure that there are no significant off-site radiological impacts. A final radiological survey will be conducted at the time the mine is closed to assess the impact of the mine, and the need for additional reclamation measures and monitoring, of the project area. Radiological surveys and appropriate cleanup measures will be required for all unplanned events, including ore haulage accidents and failure of the surface water control stuctures. All monitoring will be by independent contractors and all costs will be borne by the applicant, EFN.

13. **Groundwater Monitoring.** A water well to the Redwall-Muav aquifer will be constructed and tested prior to the intersection of ore by mining operations. If groundwater is present, it will be sampled at regular intervals and analyzed. If groundwater becomes contaminated during mining operations, continuous pumping will be maintained until concentrations of the critical constituents are reduced to recommended primary drinking water standards or to within ten percent of ambient concentrations, or to some comparable level approved by the Forest Service. If new information surfaces which suggests the need for an expanded groundwater monitoring program, the Forest Service reserves the right to impose additional monitoring and mitigation measures it deems necessary, including the construction of other groundwater monitoring wells.

    If groundwater is not yielded from the Redwall-Muav aquifer at the mine site, the test borehole will be plugged and abandoned in accordance with requirements of the Arizona Department of Water Resources.

14. **Floodwater Control.** This decision adopts the modified surface water diversion system described in detail in the EIS in Section 2.5.12 and Appendix D. The modified design increases the flood carrying capacity of the channels to handle a 500 year event and precludes the possibility of runoff from local intense storms from either entering or leaving the operating site, thereby eliminating the potential of downstream radionuclide contamination from ore stock piles.

15. **Traffic Control.** Signing, and other measures if deemed necessary, will be used to control traffic at the intersection of Highway 64 and Forest Road 305.

16. **Wildlife Mitigation.** The acreage temporarily lost to development of the mine site will be mitigated by the creation of a foraging area in a different location. Important wildlife waters disturbed by mine development or ore transportation will be replaced. The location and design of these replacement habitats will be coordinated with the Arizona Game and Fish Department.

17. **Raptor Protection.** The overhead powerline will have a 60 inch minimum separation.

18. **Worker Transportation.** EFN will provide transportation for mine workers by van or bus and will discourage use of private vehicles.

VIII. Right to Administrative Review

This decision is subject to administrative review in accordance with the provisions of 36 CFR 211.18. The operator also has appeal rights under 36 CFR 228.14. Notice of appeal must be made in writing and submitted to:

Leonard A. Lindquist, Forest Supervisor
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Appeal notices must be submitted within 45 days from the date of this decision. A statement of reasons to support the appeal and any request for oral presentation must be filed within the 45 days allowed for filing a notice of appeal.

Implementation of this decision will not take place sooner than 30 days after publication by the Environmental Protection Agency of the Notice of Availability for the Final EIS.

LEONARD A. LINDQUIST
Forest Supervisor

September 26, 1986
Date