

256

CANYON MINE  
ADMINISTRATIVE APPEAL  
CASE #03072078

DECISION OF THE CHIEF  
USDA FOREST SERVICE

IN RESPONSE TO:

APPEALS OF THE MERITS OF  
THE SOUTHWESTERN REGIONAL FORESTER'S  
AUGUST 28, 1987 DECISION  
APPROVING ENERGY FUELS NUCLEAR'S  
PLAN OF OPERATIONS FOR THE CANYON MINE

Appellants: the Arizona Wildlife Federation, Friends of the River, the Havasupai Indian Tribe, Phyllis Hogan and James Mahoney, the Hopi Indian Tribe, Ian Root, the Sierra Club and Reverend Garrison Lee, and the Tonantzin Land Institute.

Intervenors: Energy Fuels Nuclear.

CONTENTS

	<u>Page</u>
1. INTRODUCTION.....	3
2. SCOPE.....	5
3. ISSUES.....	6
A. Compliance with the American Indian Religious Freedom Act.	
B. Religious Rights Guaranteed under the First Amendment.	
C. Violation of the Grand Canyon Enlargement Act.	
D. Fiduciary Duty owed to the Havasupai Tribe.	
E. Impacts to the Grand Canyon.	
F. Compliance With 40 CFR 1502.22.	
G. Analysis of Cumulative Impact is Deficient and a Regional Programmatic EIS is Required.	
H. Cumulative Analysis of Impacts on Native American Belief and Practices.	
I. Valuable Mineral Test.	
J. No Action Alternative.	
K. Reclamation Plan and Bonding.	
L. Ground and Surface Water.	
M. Selenium.	
N. Wildlife.	
O. Ore Truck Accident Analysis.	
4. DECISION.....	21
5. APPENDICES.....	22

## 1. INTRODUCTION

This is my decision under 36 CFR 211.18 on the various administrative appeals collectively being treated as case number 03072078. These appeals involve the Southwestern Regional Forester's August 28, 1987, decision affirming the decision of the Forest Supervisor of Kaibab National Forest to approve a plan of operations for the proposed Canyon Mine.

The appeals, which have previously been consolidated to facilitate consideration, have been filed by: the Arizona Wildlife Federation (AWF); Friends of the River (FOR); the Havasupai Indian Tribe; Phyllis Hogan and James Mahoney; the Hopi Indian Tribe; Ian Root; the Sierra Club and Reverend Garrison Lee; and the Tonantzin Land Institute. Energy Fuels Nuclear, Inc. (EFN) is the proponent of the mine and has acted as intervenor in the consolidated appeal.

This decision concludes an administrative appeal process which began shortly after the Forest Supervisor signed a Record of Decision on September 26, 1986. The Record of Decision documented his approval of a modified plan of operations for the Canyon Uranium Mine on the Tusayan Ranger District in Coconino County, Arizona. Various prior analyses of issues during the appeal process have been taken into account in reaching this decision. For this reason a brief outline of the events leading to this decision is given below. Thousands of pages of analysis and arguments have been generated by Apellants, Intervenors, and the Forest Service in this matter. As a familiarity with this record is essential to this decision, a listing of documents in the record is provided as Appendix B.

The site of the proposed mine is on three unpatented mining claims owned by EFN approximately six miles south of the community of Tusayan where exploratory drilling confirmed the presence of an economic deposit of uranium. In accordance with 36 CFR 228.4, EFN submitted to the Forest Service a proposed plan of operations to develop and produce this deposit in October of 1984.

EFN has submitted detailed documentation showing the extent, degree and frequency of activities over the last 10 years. The activities have included the drilling of 38 exploration holes using truck-mounted drill rigs, backhoes, bulldozers, road graders, and auxiliary water, pipe, fuel, probe, and pickup trucks. Site disturbance associated with the drilling program included surface grading, top soil removal, and road upgrading. (See affidavits of Wayne A. Seick and Muril D. Vincelette.) The company has also "[G]raded and leveled the mine yard, improved existing roads, constructed surface water diversion structures, installed a (one and a quarter) acre hypalon-lined evaporation pond, constructed several substantial mine buildings (including administrative offices, showers, lockerrooms, a machine and equipment shop, a well house, a hoist building, etc.), and installed a power line and a septic system. Additionally, EFN has conducted mine shaft preparation work, including the erection of a head frame and a hoist, and the excavation and installation of a shaft collar (to a depth of approximately 75 feet). Finally, EFN has drilled and cased a monitor/water well to a depth of about 3,000 feet." (See Intervenors Reply to Appellants' Statements of Reasons.)

The proposal calls for an underground mine requiring about 17 acres for the mine shaft and surface facilities; ore would be trucked to Blanding, Utah, for milling. Section 2.2.1 of the EIS outlines discrete operational components involved in development of the proposed mine. That section specifies that the operational components considered in the analysis leading to the Forest

Supervisor's Decision included: Haul routes, utility corridors, transportation of workers, sewage, method of ore transport, mine production rate, method of mining, potable water, and site configuration. These operational components are described in detail on pages 2.2 through 2.13 of the EIS.

Following the preparation of a draft and then final Environmental Impact Statement (EIS) analyzing the consequences of the proposal, the Forest Supervisor reached his September 1986 decision to approve a modified plan of operations. His decision was subject to various appeals and requests for stay. The stay requests resulted in the Regional Forester issuing a stay decision on November 21, 1986, which limited EFN's activities at the site pending review of the appeals on the merits. The stay allowed only those site preparation activities which would take place on areas which had already been disturbed. This included drilling of a groundwater monitoring well, grading of the mine yard, and construction of surface water diversion structures and evaporation ponds. EFN was not authorized to construct the mineshaft leading to the ore body while the appeals were pending. Thus, construction and operation of the mine itself were stayed.

Procedural appeals and stay requests were filed in response to the Regional Forester's stay decision. The procedural appeals and stay requests sought the same relief: a stay of all activities at the mine site until the Regional Forester could complete his pending review of appeals on the merits of the Forest Supervisor's decision. These subsequent appeals and stay requests were reviewed and decided upon by this office.

In reaching a decision on these procedural filings, the analysis was confined to the issues raised in response to the partial stay decision. It did not deal with other issues raised in appeals on the merits which were still before the Regional Forester. The issues considered by this office in reaching a stay decision included:

- 1) First Amendment Considerations and American Indian Religious Freedom Act;
- 2) Environmental Impacts on Ground and Surface Water;
- 3) Direct Adverse Effects on Affected Parties and Possible Liability to the Forest Service;
- 4) National Pollutant Discharge Elimination System Permit;
- 5) Interpretation of the Law;
- 6) Conformity of Rules and Regulations with 5 U.S.C. 552 and 553;
- 7) Effectiveness and Constitutionality of the Mine Approval Process;
- 8) The Partial Stay Decision as a Decision on the Merits of the Appeal;
- 9) The Effect of a Stay on the Parties and on the Public Interest, Including the Possibility of Irreparable Harm to Parties to the Appeal;
- 10) The Potential for Irreversible Impact on the Resource During the Pendency of the Appeal;
- 11) The Effect of a Stay or Denial of a Stay on Preservation of a Meaningful Appeal on the Merits.

Based on an analysis of the issues above, including material presented in oral presentations before me, I decided on May 4, 1987, to affirm the Regional Forester's November 21, 1986, stay decision. My decision included one modification which was aimed at assuring the Havasupai Indians access to the site while the Regional Forester considered the merits on appeal. This retained the Regional Forester's basic decision to stay development and production of the mine itself, but allowed continued site preparation on areas that had already been disturbed. This decision remained in effect during the period when the appeals on the merits were still before the Regional Forester.

On August 28, 1987, the Regional Forester rendered a 25 page decision on the merits under appeal before him. Each of the parties involved in the present appeals was also represented in the appeals before the Regional Forester when he made his decision. The issues before me now were before the Regional Forester when he made his decision.

The stay which had been in effect when the Regional Forester made his decision on the merits was scheduled to expire 10 days after his decision. The Havasupai and Hopi Tribes requested that an interim stay be granted in order to provide them with an opportunity to make a formal stay request in response to the decision itself. This relief was granted. EFN went on the record at this point as considering a continuance of the stay during the interim period as a voluntary action on their part because the pertinent regulations at 36 CFR 211.18 do not provide for such an action,

The interim stay remained in effect until October 22, 1987, when I made a decision responding to the Havasupai's formal stay request which had been filed on September 25, 1987. In the October stay decision, it was specified that the existing partial stay of activities will remain in effect for 10 days after the present decision on the merits of the appeal is made. This decision was made to ensure that the Tribe's appeal on the merits would continue to be meaningful and to preserve the opportunity for the Secretary of Agriculture to review the decision if he chooses to do so.

At the time the October stay decision was rendered, various other parties had pending stay requests but, as these parties requested relief similar to that which the Havasupai were granted, it was not necessary to respond individually to these requests. Also in the October decision, parties to the appeal were told that a decision on several requests for oral presentation would be dealt with when the Regional Forester submitted the record-to-date to this office.

On December 4, 1987, the decision was made not to grant the pending requests for oral presentations which had been made by four appellants. The decision to deny the requests was based on the fact that the parties seeking the presentations had already had sufficient opportunity to provide their viewpoints or to clarify the record.

On January 26, 1988, the administrative record on which this present decision is based was closed.

## 2. SCOPE

My review of the pending appeal was based on an examination of the entire administrative record as detailed in the Appendices. In the interest of brevity and clarity I have not attempted to exhaustively display in detail all the facts, arguments and prior decisions reached on each issue. Instead, I have characterized the main aspects of each issue as they relate to my decision.

The issues before me have been considered previously in arguments by appellants and intervenors. Several prior responsive statements and decisions by the Forest Service, including my stay decision, have considered these matters. Generally, where a prior agency response appears to have adequately characterized and responded to an issue, I have simply entered a summary of

that treatment here. Greater detail is provided where some aspect of the subject before me calls for a different response than has been provided before.

The earlier agency responses bearing on these issues include the Forest Supervisor's final EIS and Record of Decision of September 26, 1986, the Forest Supervisor's Responsive Statement of February 17, 1987, the Regional Forester's Decision of August 28, 1987, and the Regional Forester's Responsive Statement of October 28, 1987. Additionally, many of the issues at hand have already been reviewed in the Regional Forester's Stay Decision of November 21, 1986, his Responsive Statement to procedural appeals and stay requests of January 30, 1987, the Chief's procedural appeal decision of May 4, 1987, and the Chief's stay decision of October 22, 1987.

### 3. ISSUES

The issue categories used in the Regional Forester's responsive statement of October 28, 1987, have been retained. As some issues have evolved or have been deleted since the merits were considered by him, the alphabetical designations given to the issues have changed.

#### A. Compliance with the American Indian Religious Freedom Act (AIRFA). (Issue raised by the Havasupai Tribe and Hogan and Mahoney.)

The Havasupai have relied on AIRFA indicating that it "[A]dds further support to the Havasupai's right to be free from unconstitutional interference." They go on to quote and characterize the Act claiming it underscores the protection they argue is provided by the First Amendment of the Constitution.

Appellants Hogan and Mahoney have alleged that agency actions to date are "[A]n obvious violation of AIRFA." They further indicate that future sinking of the mine shaft "[I]s a desecration to the temple where the spiritual intercessors dwell. Another violation of the AIRFA."

The Regional Forester in his decision of August 28, 1987, stated:

I have reviewed the complete administrative record and find that the Forest Supervisor sought Tribal input and review of the operating plan and environmental documents, from the appellants and from the Navajo Tribe, early in the scoping process and Forest Service environmental review. Religious concerns were not raised by appellants until after the completion of the (Draft) EIS. All of the Tribal comments were responded to and the EIS was substantially revised to reflect the information provided by the Havasupai and the Hopi.

The record reflects that the Forest Supervisor and his staff considered and evaluated Native American (Indian) religious beliefs and practices as part of their overall NEPA (environmental) review of the Canyon Mine project. In addition, the record indicates that the environmental documentation contained, or considered, available information on religious beliefs and practices when written. A decision was made on the basis of the information disclosed after adequate opportunity and time was made available. The record clearly displays the Forest's full commitment to and understanding of AIRFA and

compliance with the law."

The Supreme Court has recently interpreted the AIRFA in Lyng v. Northwest Indian Cemetery Protective Association (NICPA), No. 86-1013, April 19, 1988. In that decision the Court rejected NICPA's contention that AIRFA places a statutory limitation on federal agency activities which could burden their religious practices, unless the agency demonstrates a compelling need to conduct the activity. The Court went on to state that AIRFA does not "create a cause of action or any judicially enforceable individual rights." Slip op. at 15.

I find that the Forest Supervisor's decision complies with the requirements of AIRFA as interpreted by the Supreme Court. The Forest Supervisor sought the early involvement of the Indian tribes, prepared a draft EIS which considered Indian beliefs, responded to their comments on the draft EIS, identified the Indian's concerns as one of the major issues to be analyzed in detail in the final EIS, and after careful consideration of the competing interests of all interested and affected parties, selected the alternative which fulfilled the agency's statutory responsibilities and minimized any impacts on the Indian's opportunity to exercise their traditional religious practices. The Regional Forester's decision is affirmed in this regard.

B. Religious Rights Guaranteed Under the First Amendment.

(Issue raised by the Havasupai Tribe, Hogan and Mahoney, the Hopi Tribe, and Ian Root.)

The Havasupai and Hopi Tribes, Hogan and Mahoney, and Ian Root all allege that mining activities at the Canyon Mine site would, to varying extents, thwart the free exercise of religious practices in violation of the First Amendment of the Constitution.

This issue was originally considered in my May 4, 1987, decision on the procedural appeals. The decision of May 4 dealt with whether a stay should remain in effect as defined by the Regional Forester or if it should be modified or terminated. This present decision also considers whether the activities which have been stayed thus far (sinking of the mine shaft, mine development, and production), as well as the site preparation work which has taken place over the last year and a half, should be halted.

Appellants claim that approval of the operating permit for the Canyon Mine would violate their rights under the Free Exercise Clause of the First Amendment. The Supreme Court's recent decision in Lyng v. Northwest Indian Cemetery Protection Association, supra, holds that the Court's prior decisions interpreting the Free Exercise Clause of the First Amendment cannot be read to "imply that incidental effects of government programs, which may make it more difficult to practice certain religions but which have no tendency to coerce individuals into acting contrary to their religious beliefs, require government to bring forward a compelling justification for its otherwise lawful actions." Slip op. at 10. The Court found this to be the case even if the government's action could virtually destroy an individual's ability to practice their religion. Id. at 11. However, the court noted that "[n]othing in our opinion should be read to encourage government insensitivity to the religious needs of any citizen." Id. at 13.

The Regional Forester's decision (page 9) indicates that:

[t]he record supports the Forest Supervisor's conclusion that no Tribal beliefs are penalized by this action. Individual members of

the Tribe can continue to express and act on their beliefs without undue governmental interference. The record does not support the contention that identified religious practices will be prohibited.

The Forest Supervisor, Regional Forester, and I have provided appellants a variety of forums to consult, comment, discuss and ultimately appeal this matter. As noted in the Regional Forester's appeal decision, it was not until publication of the draft EIS that the Tribes began to express concerns over the development of the mine. As stated in the Forest Supervisor's Record of Decision (ROD), "[b]ased 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 [final] EIS. The text of the [final] EIS includes an expanded discussion of Indian religious sites and practices, and beliefs about the area." ROD p. 4.

The ROD also notes that the further consultation identified in the EIS has taken place, and "will continue during the 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." ROD p. 8.

We recognize the difficult position of the Havasupai, who have declined to provide additional information regarding their religion or religious practices in the area on the basis that to discuss it further would be sacrilege. The Forest Service recognizes and respects this belief. The Regional Forester and Forest Supervisor have both identified their commitment to whenever possible accommodating the appellants' religious beliefs and practices. The Forest Service remains open to any information which the appellants can provide which will assist in avoiding or limiting any unnecessary effects on Indian religious practices or beliefs.

Intervenor EFN has also demonstrated a willingness to avoid or limit any unnecessary effects. At the February 25, 1987 Oral Presentation, Mr. Garver stated:

[I]t is our preferred option that we could work with the Havasupai tribe, that the Havasupai would be willing to discuss the Canyon mine and reach an accommodation to assure that we could have multiple, but consistent uses of that area. It may be that you will feel that this is not possible. But it is our invitation. We believe that is what the law concerning the management of the Forest Service requires, and we hope that there is some way you will determine mitigation or avoidance strategies are appropriate. We think that we have done everything we can to ensure your views are taken into account and that we will continue to do that. (Appellants' Transcript of Oral Presentation, Doc. No. 176, p. 89-90.)

As identified in the discussion of AIRFA above, the Forest Supervisor sought the early involvement of the Indian tribes, prepared a draft EIS which considered Indian beliefs, responded to their comments on the draft EIS, identified their concerns as one of the major issues to be analyzed in detail in the final EIS, and after careful consideration of the competing interests of all interested and affected parties, selected the alternative which fulfilled the agency's statutory responsibilities and to the extent possible minimized any impacts on the Indians' opportunity to exercise their traditional religious practices. The record demonstrates that the Forest Service has been, and will continue to be, sensitive to the religious beliefs of Native Americans.

I find that the implementation of the selected alternative does not violate appellant's First Amendment rights. The Regional Forester's decision is affirmed in this regard.

C. Violation of the Grand Canyon Enlargement Act.  
(Issue raised by the Havasupai Tribe.)

Appellants maintain that development of the Canyon Mine violates the Grand Canyon Enlargement Act (GCEA) citing 16 USC 228(c). The cited provision is as follows:

Nothing in sections 228a to 228j of this title shall be construed to prohibit access by any members of the [Havasupai] 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.

As the Regional Forester points out in his appeal decision (page 10), this language does not guarantee access to sites the Havasupai consider sacred. Instead, it indicates that nothing in the GCEA will be interpreted to prohibit access to public lands not otherwise covered by the Act. Neither the Forest Supervisor, nor the Regional Forester have interpreted the GCEA to prohibit access to the lands involved in the proposed Canyon Mine. I find the Forest Supervisor and Regional Forester have correctly interpreted the GCEA and I affirm the Regional Forester's decision in this regard.

D. Fiduciary Duty Owed to the Havasupai Tribe.  
(Issue raised by the Havasupai.)

The Havasupai contend that in approval of operations at the Canyon Mine site the Forest Service has misunderstood its trust responsibility to the Tribe. They have argued at length on the applicability of fiduciary duty to this case.

The Regional Forester's appeal decision (page 10) states:

Federal agencies may have statutorily established fiduciary duties associated with the management of Indian lands and resources. No such duties are at issue here since the lands embraced within EFN's mining claims are National Forest System lands, not Indian lands. There is nothing in the record to support appellant's contention that the development and operation of the Canyon Mine on National Forest System land will have a deleterious effect on the Reservation....

The scope of a fiduciary duty or trust responsibility in any particular situation between a federal agency and an Indian tribe or individual is defined by the statute, treaty, or executive order which specifies the particular duty or relationship at issue. The Forest Service recognizes its special responsibility to consult with, and give consideration to, the views and interests of Indian Tribes through the American Indian Religious Freedom Act and other statutory responsibilities.

The Forest Supervisor's February 17, 1987 Responsive Statement (page 69) states:

[t]he Forest Service has met any fiduciary responsibilities it may have through the exhaustive analysis undertaken for the Canyon Mine and the imposition of extensive monitoring, mitigation and reclamation measures largely developed to offset or avoid impacts to...Tribal

lands. As a result of the analysis, the Forest Service concluded that there are no significant environmental impacts of the proposed Canyon Mine which can not be substantially mitigated or avoided entirely. Impacts are expected to be small and localized near the mine site. The mitigation measures adopted further reduce the potential impact to acceptable levels.

I concur with these statements. To the extent that AIRFA or other statutes create a duty or obligation, I find that the Forest Supervisor has complied with those statutory requirements. The Regional Forester's decision is affirmed in this regard.

E. Impacts to the Grand Canyon.

(Issue raised by Friends of the River and Ian Root)

The appellants on this issue maintain the decisions to date have ignored the potential for impacts on the Grand Canyon National Park, including cumulative impacts from future mining activities. They cite "dust, access, vandalism, traffic and wildlife" concerns mentioned by the Park Service as part of the basis for this appeal point.

Pages 34 through 37 of the Forest Supervisor's Responsive Statement of February 17, 1987, provide a detailed response to this issue. In that response he cites points in the Final EIS which dealt with the issue. These citations were numerous as the potential for impacting the Park had been identified as a major issue during the scoping process. (See the final EIS at pages 1.8, 1.9, 1.15, 2.16, 2.50, 3.2, 3.6, 3.27, 3.28, 4.18-4.26, 4.37 and 4.38 as well as repeated entries in Appendix G of the EIS: Public Comment and Forest Service Response.) The Forest Supervisor and Regional Forester found that the impacts of the proposed Canyon Mine would be small and localized and should pose no threat to the Grand Canyon.

I find that the Forest Supervisor and Regional Forester's treatment of this issue was adequate and note that several of the subparts of this issue are also addressed under other headings in this decision.

F. Compliance with 40 CFR 1502.22.

(Issue raised by the Sierra Club.)

The Sierra Club maintains: "The (final) EIS does not comply with the C.E.Q.'s new regulation dealing with missing or unavailable information. See 40 C.F.R. (section) 1502.22...."

The Forest Supervisor's Responsive Statement of February 17, 1987, indicates that the statement on page 102 Appendix G of the final EIS on which the Sierra Club relies is taken out of context. He says that in proper context it does not support the Sierra Club's contention. Intervenor EFN has provided a succinct summary of its interpretation on page 67 of its November 12, 1987, Reply to Appellants' Statements of Reasons. I include this entry in full:

Appellants' claim that the Forest Service is missing information about the magnitude of uranium mining in the Grand Canyon area. (Sierra Club at 5-6). This issue has already been addressed by the Forest Supervisor (FS's Responsive Statement at 50-51) and the Regional Forester. (RF's Decision at 12.) The CEQ regulations require an agency to take certain steps to obtain missing information when that information is "relevant to adverse impacts" and "essential to a reasoned choice among alter-

natives." 40 C.F.R. (section) 1502.22 (1986). In responding to a comment on the (draft) EIS by the National Park Service, the Forest Service explained that it chose to prepare an EIS for the Canyon Mine Proposal in part because of the "unknown magnitude of the impacts of uranium mining in the area south of the Grand Canyon." (FEIS, Appendix G at 102.) Sierra Club has taken the Forest Service's "admission" of unknown information entirely out of context and mischaracterized it as the type of unknown information "essential to a reasoned choice among alternatives" contemplated by the CEQ regulation, when in fact it was merely an explanation of why the Forest Service decided to prepare an EIS.

I find that EFN has correctly characterized the situation and affirm the Regional Forester's decision in this regard.

G. Analysis of Cumulative Impact is Deficient and a Regional Programmatic EIS is Required.

(Issue raised by the Arizona Wildlife Federation, Friends of the River, and the Sierra Club.)

Appellants argue that the potential for cumulative effects stemming from the Canyon Mine has not been adequately considered and that a regional programmatic EIS should be prepared. Appellants cite as the basis for this need the presence of numerous mining claims south of the Grand Canyon, the probability of future mining proposals, and past development activity of any kind. (The Sierra Club also refers to "two mines proposed on state lands" but the appeal record suggests that there are no longer any pending proposals for such mines. This reference probably refers to leasing proposals that EFN had before the State of Arizona at one time.)

The EIS did address cumulative effects in great detail. (See the final EIS at pages 1.9, 1.10, 4.1, 4.2, 4.6, 4.12, 4.18, 4.26, 4.41, 4.44, and page 103 of Appendix G.) The Forest Supervisor in his Responsive Statement of February 17, 1987, summarizes at length the treatment of this issue in the EIS. That extended discussion will not be reiterated here but it should be noted that it documents consideration that is both detailed and comprehensive.

In addition it is important to recognize that there is no comprehensive federal plan or proposal of a regional nature involved in this situation. It is clear that the detailed analysis that NEPA requires in an EIS is tempered by the nature and scope of the proposed action. The scope of the proposal in this case has been defined by the nature of the proposal submitted by EFN (i.e., an application for approval of a plan of operations for the proposed Canyon Mine).

The conclusion that cumulative or synergistic impacts are not expected was based on detailed consideration of the nature, extent, distribution, and timing of impacts described in the EIS. Appellants have suggested that future mine sites can be determined by examining mining claim locations. However, the record shows that there are thousands of these claims scattered over much of Northern Arizona. The Forest Service has no control over the quantity or timing of applications it may receive from these private operators. Appellants have offered little to suggest how it might be determined which, if any, of these claims is likely to receive future exploration, let alone development proposals. In dealing with an analogous situation on BLM lands, the Interior Board of Land Appeals found "[i]n the absence of any indication as to the situs of future mines, it would be totally speculative and conjectural to attempt to estimate how roads to such mines might impact upon the environment. Any such

analysis would be so speculative that it would serve no useful purpose, even if it could be attempted." (See Southwest Resource Council, 96 IBLA 105, 115 (1987).)

Nonetheless, the Forest Supervisor provided two hypothetical scenarios in the Canyon Mine EIS characterizing the potential effects of future mining proposals. One scenario was based on an additional mine near the Canyon Mine and the other was based on three additional mines all located south of the Grand Canyon. These provided a further context, given that there are no proposed mines to assess, which helped the Forest Supervisor reach a conclusion that there would not likely be cumulative effects even if additional sites were known. In doing this the Forest Supervisor has endeavored to take the analysis of potential cumulative effects as far as it can be reasonably taken.

Finally, appellants argue that the present proposal should be analyzed in light of past development. This has already been done in two key ways. First, the entire analysis was conducted in light of the existing environment which inherently includes past development in the area. Second, essentially identical mines also operated by EFN north of the Grand Canyon were used by analogy for helping to determine what the reasonably foreseeable effects of the Canyon Mine would be.

Given all of the above, including the detailed incorporation of cumulative effects considerations throughout the Canyon Mine analysis as documented in the EIS, I find the EIS contains adequate consideration of cumulative effects, and affirm the Regional Forester's decision in this regard.

H. Cumulative Analysis of Impacts on Native American Belief and Practices.  
(Issue raised by the Hopi Tribe.)

The Hopi contend "[t]he (final) EIS fails to give adequate consideration to the cumulative effects of the proposed Canyon Mine together with past, present, or reasonably foreseeable development in the Kaibab and Coconino National Forests, on the environment (see discussion above) and on the Hopi Tribe's ability freely to exercise its religious beliefs." (See page 2 of the Hopi Notice of Appeal of September 28, 1987.) They further describe their concern as it relates to impacts on prayer and ceremonial gathering activities, and impacts on sacred sites.

I have already addressed the issue of cumulative effects on the environment in this decision. This portion of the decision will consider the contention that the EIS fails to consider cumulative effects on the Hopi Tribe's ability to exercise its religious beliefs.

It is well established that NEPA is essentially a procedural statute which requires federal decision makers to have considered the environmental consequences of a proposed action prior to making a decision on the proposal. NEPA also requires that the decisionmaker inform the public that environmental consequences were taken into account. As such, NEPA is often referred to as a "public disclosure" law.

What the Hopi seem to argue is that NEPA requires consideration of the proposals' consequences on the Tribe's religious practices, as well as the consideration of the proposal's consequences on the environment. The CEQ regulations (40 CFR 1501.7(a)(1)) provide that as a part of the scoping process, federal agencies will "[i]nvite the participation of affected Federal, State, and local agencies, and any affected Indian tribe, the proponent of the action, and other interested persons (including those who might not be in accord with the action on environmental grounds)...." The CEQ regulations (40

CFR 1506.6(b), and (b)(3)(ii)) also require federal agencies to "[p]rovide public notice of hearings, public meetings, and the availability of environmental documents so as to inform those persons who may be interested or affected....[A]nd in the case of an action with primarily local effects the notice may include "[n]otice to "Indian tribes, when the effects may be on the reservation...."

It is clear from the record that the Forest Supervisor went well beyond these notice requirements when preparing the EIS. (See the final EIS at pages iii, vii, xi, 1.8, 1.10, 1.13, 1.18, 2.9, 2.24, 2.25, 2.48, 2.51, 2.52, 3.58-59, 4.42-4.44, and Appendix G of the EIS at page 2 and agency response numbers 60-2, 60-5, 60-6, 61-1, and 61-2.) In fact "all information provided by the Tribes, their attorneys or consultants on archeological issues" was incorporated and considered in the EIS (Forest Supervisor's Responsive Statement of February 17, 1987; emphasis added.)

The Hopi, however, insist that NEPA requires that this EIS coordinate the analysis of any cumulative effects on their religious practices of all foreseeable activities on two National Forests. Neither NEPA nor the implementing CEQ regulations require that this be done.

The CEQ regulations define "cumulative impacts" as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions ...." 40 CFR 1508.7 (emphasis added). The Supreme Court has stressed that NEPA was not intended to be a vehicle for airing general policy objections to the actions of federal agencies, but was to address the protection of human health and welfare through evaluation of the physical environment with primary concern for potential irreparable impacts to the physical resources that support life, i.e. air, land, and water. Metropolitan Edison Co. v. People Against Nuclear Energy, 460 U.S. 766, 772-777 (1983).

The effects that the Hopi seek reviewed are the cumulative effects of all Forest Service activities on their religion, rather than on the physical environment. The Hopi's request would turn the EIS on the proposed Canyon Mine into a multi-Forest review of the effects of all proposed actions to be taken on these National Forests on the Hopi's religious beliefs and practices. This is not within the scope of the proposed action and the necessary review of the environmental consequences of the proposed action under NEPA.

Nevertheless, the Forest Supervisor in preparing the EIS undertook a substantial effort to identify, consider, avoid, and mitigate any unnecessary impacts to the Indians' religious beliefs and practices. The Forest Supervisor prepared the EIS in order to comply with NEPA as well as all other relevant laws affecting the situation. These laws included AIRFA and the National Historic Preservation Act.

The Forest Supervisor in his Responsive Statement of February 17, 1987, indicated with respect to cumulative effects on religious beliefs and practices that:

- \*They are addressed in the EIS at page 4.44;
- \*The EIS recognizes the sensitivity to mining;
- \*The Forest Service is not required to protect religious beliefs and practices to the exclusion of all other land uses;
- \*The Hopi were repeatedly asked to provide religious information during the project analysis;
- \*The EIS deals with cumulative impacts to the extent religious information was made available by the Tribe.

The Forest Supervisor's contention that he did consider the religious information is well supported in the record. For example, affidavits supplied by Tribal members and included in Appendix G of the final EIS speak to hunting and gathering for ceremonial purposes in "areas generally around Twin Lakes, Skinner Ridge, and Red Butte" and concerns about ore spills at the bridge where U.S. Highway 89 crosses the Little Colorado River. (This latter concern relates to religious issues because of sacred sites downstream including Blue Springs, the Sipapu and the Salt Trail.) The Forest Supervisor dealt with each of these considerations in the EIS in sections entitled "Indian Religious Concerns" and "Impacts on Indian Religious Concerns." The potential effects on hunting and gathering activities were also addressed.

The possibility of impacts downstream from the Little Colorado River crossing have been looked at in detail and found to be extremely remote. The Forest Supervisor based his findings on EFN's haulage safety record, accident frequency information for the subject stretch of highway provided by the Arizona Department of Transportation, and an evaluation of what the impacts would be in the most unlikely event of ore spillage at the bridge site. (See the section of this Decision titled "Ore Truck Accident Analysis.")

The Forest Supervisor used the information on religious beliefs and practices made available to him by the Hopi. No information has been provided that would support the contention that a cumulative impact may be incurred which has not already been evaluated. The issue of cumulative effects was raised only in the broadest manner during the NEPA process and subsequent appeal process.

Considering all of the above, I find that this issue of cumulative effects on religion has received adequate consideration and I affirm this aspect of the Regional Forester's decision.

#### I. Valuable Mineral Test.

(Issue raised by Friends of the River and the Sierra Club.)

Friends of the River and the Sierra Club both contend that inadequate consideration was given to the issue of whether EFN has discovered a valuable mineral deposit as that term is defined in 30 U.S.C. 22. The focus of the two groups' concerns is slightly different. Sierra Club contends that the Forest Service should have analyzed a no-action alternative of bringing a mineral contest in order to determine whether EFN has made a discovery of a valuable mineral deposit. Sierra Club argues that a mineral contest would serve the needed function of making a determination as to whether the development of Canyon Mine will be profitable enough to cover the costs of reclamation and mitigation. Friends of the River contends that the Regional Forester was required to and has wrongly refused to consider that the environmental and social costs of EFN's operations must be factored into a determination of the validity of EFN's claims.

Mineral examinations are not generally conducted in conjunction with NEPA analyses. This is done so that the Forest Service can develop the suitable mitigation and reclamation independently of their effects of the economics of the mining proposal. This approach prevents tailoring of the mitigation and reclamation to ensure a profitable mine at the expense of sound resource management. Forest Service knowledge of the costs associated with reclamation is, however, used in calculation of bond amounts. Thus, while the Forest Service does have the authority to initiate mining claim contests (though not the authority to determine validity), it is the agency's own regulations at

36 CFR 228, Subpart A, not the mining laws or validity tests, that are used to provide for reclamation and mitigation.

The Forest Supervisor in his Responsive Statement indicated that drilling data were provided in conjunction with the Plan of Operations (see exhibit #15, paragraph 8 of the Plan) coupled with EFN's success with comparable deposits north of the Grand Canyon, this data suggests that EFN is proceeding in good faith and that a reasonable mine can be developed. No information showing significant differences between the proposed mine and those north of the Canyon has been provided that would provide a basis for questioning the validity of EFN's claims.

J. No Action Alternative.

(Issue raised by the Havasupai and Hopi Tribes and the Sierra Club.)

The appellants argue that the analysis of the no action alternative reflected in the EIS was inadequate. They further suggest that this resulted from an understanding that the agency did not have the authority to deny the Canyon Mine proposal. For example, the Havasupai contend that this "[t]o a great extent explains the lack of required in depth considerations of the Canyon Mine site to the Havasupai way of life. In other words, had the Forest Service at the time of preparing the EIS known it could disapprove of a plan of operation if such approval violated Constitutionally protected rights or other federal laws, those circumstances would have been more fully and adequately investigated, and a different result achieved." As identified above though, the appellant's assertion that approval of the proposed Canyon Mine violates either the Tribe's First Amendment rights or AIRFA is incorrect.

The Havasupai further state: "[w]hile the Responsive Statement of the Forest Supervisor describes the discussion in the (EIS) of the No-Action Alternative as considered "in detail," it consisted of merely two paragraphs....The EIS provides that the Forest Service does not have authority to disapprove a reasonable operating plan as long as it is conducted in an environmentally responsible matter (sic). In other words, the Forest Service in the EIS took the position that approval of some sort of plan of operation was mandatory under existing and applicable mining laws if the plan of operation was environmentally sound." They then argue that if the agency had known it could deny the plan on religious or other legal grounds, the No Action Alternative "would have been more fully and adequately investigated, and a different result achieved."

The other appellants arguments are much to the same effect with the Sierra Club's position embracing the concept of contesting EFN's mining claims through a valuable mineral test as described previously above.

The argument that the no action alternative got lesser treatment is not sustained by a review of the EIS itself. The two paragraph entry the Havasupai cite is far from the complete treatment of the alternative. To begin with, that entry is merely a statement of what the alternative represents. As it represents a continuation of the existing situation, the entirety of the "Affected Environment" chapter of the EIS further describes the alternative. Throughout the other chapters of the EIS, the no action alternative is carried through the analysis in a manner comparable to each other individual alternative.

The appellants incorrectly assume that the references in the description of the no action alternative to environmental considerations, as in "environmentally responsible manner," exclude consideration of First Amendment and other legal

issues. This is not the case. The Environmental Impact Statement contains a far broader discussion than just the "environment" in terms of the physical and biological elements involved. Thus, "Impacts on American Indian Religious Concerns" was an integral part of the decisionmakers' analysis as were a variety of other nonbio-physical factors. First Amendment and other statutory considerations were properly considered.

K. Reclamation Plan and Bonding.

(Issue raised by the Arizona Wildlife Federation and the Hopi Tribe.)

The Arizona Wildlife Federation maintains "Based upon discussion before you (the Regional Forester) at the hearing (sic), the cost of similar projects running well over the \$100,000 figure, more adequate mitigation bonding of \$250,000 in 1986 dollars factored to 1996 or the end of the project must be required of the operator."

The Hopi Tribe asserts that the final EIS is "silent" on post-mining considerations. They also indicate that there is "no provision for monitoring ground-water or surface-water contamination once the mine is closed."

The Forest Supervisor in his Responsive Statement of February 17, 1987, states that the bond amount took into consideration the estimated cost of stabilizing, rehabilitating, and reclaiming the area of operations; and that the bond amount was adjusted for inflation, cost-estimate errors, and discounting over a 7-year planning horizon.

Although the Arizona Wildlife Federation indicates they presented a basis for the figure of \$250,000 as being appropriate, I can find no such basis in the record. Given all of the above, I find the bond amount determined by the Forest Supervisor to be reasonable. The Regional Forester's decision is affirmed in this regard.

With respect to the Hopi concerns, which seem aimed specifically at the possibility of problems with radioactive materials, I cite the two following excerpts from the Record of Decision of September 26, 1986:

1. 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. 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.

I find the monitoring issues raised by the Hopi to be well covered in the record as summarized in the above entries from the Record of Decision. They allow for any post-mining monitoring to be tailored to additional needs identified during mine production. The Regional Forester's decision is affirmed in this regard.

L. Ground and Surface Water.

(Issue raised by the Arizona Wildlife Federation, Friends of the River, the Havasupai and Hopi Indian Tribes, and the Sierra Club.)

Ground and surface water issues have been argued at great length during the appeals process relating to the Canyon Mine proposal. The record is replete with analyses and conclusions. Appellants, intervenors, and the Forest Service alike have contributed numerous documents on this issue. Some of the arguments have been recycled repeatedly while others have evolved in the various forums thus far (appeals, stay requests, comment periods, and oral presentations; not to mention the various agency decisions and responsive statements).

This extensive information has been reviewed in detail. Upon careful consideration, I have decided to adopt the rationale and conclusions provided by the Forest Supervisor on pages 10-20 and 54-58 of his Responsive Statement of February 17, 1987. These portions of his Responsive Statement have been provided as Appendix A to this Decision. Rather than detail those rationale and conclusions fully here, I have provided below a listing of Key considerations made by the Forest Supervisor's Responsive Statement that deal with this issue.

KEY CONSIDERATIONS ON GROUND AND SURFACE WATER  
MADE IN THE FOREST SUPERVISOR'S RESPONSIVE STATEMENT

Groundwater

- \* The Forest Service retained a consulting hydrogeologist with more than 20 years experience in groundwater geology.
- \* Groundwater data was obtained from records of existing water wells and exploration drill holes.
- \* A monitoring program was initiated for springs discharging along the south wall of the Grand Canyon.
- \* The analysis of groundwater in the EIS was discussed in sections 2.5,

2.51, 2.511, (Table) 2.12, 2.61, 3.2, 7.2, 4.2, and in Appendix G at pages 70, 71, 72, 79, 80, 86, 87, 103-105, and 125.

- \* The consulting hydrogeologist responded to the points of appeal and this response was evaluated by the Forest Service.

#### Surface water

- \* The EIS contains extensive coverage of all aspects of the surface water issues. (See EIS at 2.16-2.22, 2.32, 2.33, 2.32-3.35, 4.31-4.36, 5.1, Appendix D (Downstream Hydrologic Impacts) and Appendix G at pages 34-35, 54, 75-82, 113-114, 116-117, 123, and 126.
- \* A consulting hydrologist hired for the project performed duties including design of a surface water protection system for the project.
- \* Mitigation includes water diversion for a 500-year storm event and containment for a 100-year storm event.
- \* Ore pad design will prevent solution percolation into subsoil.
- \* Mitigation at the mine site would prevent any significant downstream radionuclide contamination in the event of an extreme flood.

#### M. Selenium.

(Issue raised by the Sierra Club.)

The Sierra Club contends that the final EIS fails to adequately consider the possibility of contamination of groundwater and soils by selenium and that the Forest Service has not conducted sufficient independent research and evaluation of this matter. Further, the Sierra Club called for a supplemental EIS to address this issue.

The Regional Forester found that the Forest Supervisor had,

sought consultation with an experienced and reputable geochemist to assess the problem potential. Based on the July 15, 1986, report prepared by Mr. Allan R. Reid, Senior Geochemist with the Huntly Group, Ltd., I conclude that background selenium concentrations at the surface will not be adversely affected due to the mining operation, nor, is groundwater likely to be affected by the selenium.

In reviewing the record, it is apparent that the Forest Service did consider the possibility of selenium contamination and determined that it was not a significant problem at the site of the proposed mine. A discussion of this finding is presented in the EIS Appendix G at pages 44 and 45.

That the Forest Service did independently evaluate the report prepared by Mr. Reid is evidenced in the language of the discussion cited above. That discussion reads, in part: "[w]e 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....[w]e have concluded....Our additional analysis is summarized below." (Emphasis added.)

This independent evaluation, together with the overall preparation of the EIS, fulfills any responsibility the Forest Service has to conduct independent research in conjunction with the review and approval of a plan of operations for the proposed Canyon Mine.

The Forest Supervisor and Regional Forester have demonstrated their willingness to consider any new information that has already, or may in the future, be presented on this subject. Additionally, the mitigation and monitoring program

established in the Forest Supervisor's decision assures that the agency will continue to gather and evaluate new information as it becomes available during the review, construction, operation, and reclamation of the proposed Canyon Mine.

Here the Forest Supervisor and Regional Forester considered the information presented by the Sierra Club and EFN. Following this consideration they determined that no significant selenium impacts were anticipated and that the new information did not rise to the level of environmental significance that would warrant preparation of a supplement to the EIS. These considerations and conclusions are well documented.

For these reasons, I find that the actions of the Regional Forester and the Forest Supervisor were reasonable and correct. Therefore, the Regional Forester's appeal decision is affirmed and no Supplemental EIS is required.

#### N. Wildlife.

(Issue raised by the Arizona Wildlife Federation, and the Sierra Club.)

The Arizona Wildlife Federation (AWF) resubmitted their initial appeal of May 22, 1987, because they felt the operating plan failed "to adequately preserve, protect or promote the interests of wildlife and the environment." They also specified "Although the Decision sets forth that the Forest Supervisor will be directed to attempt to do certain things such directions are not part of the Operating Plan and therefore, are not enforceable."

The Regional Forester saw merit in much of what the AWF was seeking. On October 26, 1987, he directed the Forest Supervisor to review AWF's May letter as well as his August 28, 1987, decision. He directed that the Forest Supervisor should "Consider any reasonable means" to implement the direction in his decision either within the context of the existing operating plan or through amending the plan.

The Regional Forester emphasized through his October letter that the Forest Supervisor should consider: implementing mitigation as soon as possible; enhancing existing meadow environments; alternative mitigation or compensation using measures such as road closures or obliteration of roads, use of plant seedings and water tanks. The direction put particular emphasis on expediting wildlife habitat improvement or replacement.

I think the position taken by the Regional Forester on these matters should satisfy the principal concerns of AWF. The Federation is also concerned that the measures be enforceable and in some manner incorporated in the operating plan. I find this entirely appropriate and direct the Regional Forester to see that the implementation of his October 26, 1987, direction be reflected in the operating plan itself.

#### O. Ore Truck Accident Analysis.

(Issue raised by the Hopi Tribe.)

The Hopi maintain that the analysis of the potential for ore spills into the Little Colorado River is inadequate.

The Forest Supervisor's Responsive Statement of February 17, 1987, reflects a detailed consideration of this possibility. He cites the final EIS at page 4.27, Appendix E pages 27 and 28, and Appendix G page 70. He further cites mitigation requirements for spills in Section 2.55 of the final EIS.

The Responsive Statement includes consideration of:

- \*Spill frequency in 6,600,000 miles of ore haulage by EFN;
- \*Radiological consultant Dr. John McKlveen's conclusions that people living along the haul route would not experience any measurable radiation increases and radiological consequences of spills would be negligible;
- \*There is no evidence to indicate spills are more likely at any one site;
- \*The Arizona Department of Transportation indicates no accidents have been reported at the Little Colorado River crossing in the last 3.5 years;
- \*The extremely remote possibility of contamination of downstream springs;
- \*That the River is frequently dry at this point;
- \*The effects of dilution should a spill occur during a period of heavy surface water flow.

In the absence of any additional information refuting this analysis, I find that the Forest Supervisor and Regional Forester's finding that the risk related to ore haulage and spills to be quite remote is appropriate and the Regional Forester's decision is affirmed in this regard.

In their appeal before me, the Hopi have also raised the issue of the possibility of a tarpaulin being omitted or blowing off in transit resulting in ore dust being dispersed by an ore truck. In all the appeals and stay requests before me, representing a year and a half of dispute, I do not see where this issue has surfaced previously.

Although this matter has not been addressed specifically before, there is relevant information in the record. This information was summarized by EFN in their "Intervenor's Reply to Appellants' Statements of Reasons" of November 12, 1987. On page 66 of that document they state, in part:

With regard to ore dust disposal during transport, Appendix E of the (draft) EIS discusses this issue in the context of ore transport radiation and radioactivity. The discussion was based on a radiological assessment of the Canyon Mine project prepared by Dr. John McKlveen, consulting radiological engineer. It states that ore from the mine is "moist, uncrushed rocks" that contain "only a small percentage of respirable dust which might be released during an accident." ((draft) EIS, Appendix E at 28.) The (draft) EIS goes on to analyze the consequences of a release of ore dust in the event of an accident, concluding that the potential impact should not be considered significant. (Id.) In light of this analysis of ore dust releases from an accident involving complete spillage of ore, Appellants have failed to show how a discussion of ore dust releases caused by a blown-off tarpaulin would add any meaningful information to the (final) EIS.

Given all the above information, I find that the remote prospect of a missing tarpaulin and resulting radiological exposure has been adequately considered.

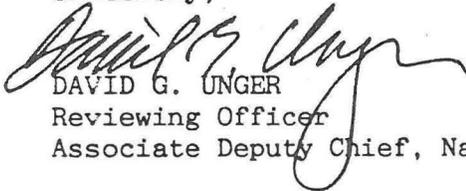
4. DECISION

Based on the preceding analysis, I have decided to affirm the Regional Forester's decision of August 28, 1987, with one modification. That change involves directing the Regional Forester to incorporate the wildlife habitat mitigation and compensation measures under development into EFN's plan of operations as soon as possible. It is not anticipated that a delay of operations beyond the termination date of the stay which is currently in effect will be needed to accomplish this task.

The stay which is currently in effect shall remain in effect for 10 days following the date of this decision.

This determination constitutes the final administrative determination of the Department of Agriculture unless the Secretary of Agriculture elects to review the decision within 10 days of receipt (36 CFR 211.18(f)). The Secretary of Agriculture will not accept a notice of appeal or a petition for review of this decision (36 CFR 211.18(f)(2)).

Sincerely,



DAVID G. UNGER  
Reviewing Officer  
Associate Deputy Chief, National Forest System

JUN 9 1988

APPENDICES

A. PORTIONS OF THE FOREST SUPERVISOR'S RESPONSIVE STATEMENT  
OF FEBRUARY 17, 1987,  
DEALING WITH GROUND AND SURFACE WATER.

B. DOCUMENTS IN THE ADMINISTRATIVE RECORD

APPENDIX A.

PORTIONS OR THE FOREST SUPERVISOR'S RESPONSIVE STATEMENT  
OF FEBRUARY 17, 1987,

A. GROUNDWATER

Points raised by the Appellants related to groundwater generally allege that the EIS failed to adequately address the effects of the proposed mine on groundwater quality and quantity and question the effectiveness of the monitoring program.

1. Appellants' Position

- a. The Havasupai Tribe, Tonantzin Land Institute and Friends of the River allege that there are more unknowns related to hydrogeology and groundwater than the known, solid data, and the assumptions, research and conclusions of the groundwater analysis may be defective, erroneous and insufficient. The groundwater analysis generally lacks the scientific integrity necessary to make decisions regarding groundwater.
- b. The Havasupai Tribe rejects the conclusion of the EIS that the water monitoring plan is sufficiently statistically valid. The Appellants contend that it is the Central Limit Theorem of statistical mathematics that allows one to make inferences about the true concentrations of radioactive particles in Havasu Creek. Samples of less than 20 are not sufficient. Appellants fear that if levels of radioactive particles do increase after mining operations begin, those responsible will simply state that sufficient samples have not been taken for a statistical claim to be made with a high degree of

confidence. They conclude it is reasonable to expect that this important concern be addressed by qualified statistical mathematicians before the proposed operating plan is implemented.

- c. The Havasupai Tribe claim that 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.

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.

- d. The Havasupai Tribe believes that Sinyella Springs, approximately 30 miles south of the Village of Supai, is particularly susceptible to contamination and depletion because it is closest to the mine site and the supporting aquifer is in the stratum closest to the surface.

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 Havasupai Tribe.

- e. The Havasupai Tribe alleges that 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.
- f. The Havasupai Tribe, Tonantzin Land Institute and Friends of the River fear contamination of the Redwall-Muav aquifer. Appellants claim that, because mineralization is known to be present 2100 feet below the surface, there is a very real possibility that mining at this depth will contaminate the Redwall-Muav aquifer.

Appellants further allege that the applicant's proposed mitigation and monitoring program, together with the conditions imposed by the Forest Service, will not ensure the

prevention of contamination of the Redwall-Muav aquifer. In support of their claim, Friends of the River assume the existence of a single groundwater conduit, containing a stream one foot wide. They state that such a stream width would be typical, unless a trunk conduit happened to exist beneath the site, an extremely improbable circumstance in their view. Appellants conclude that interception of this assumed narrow conduit by the groundwater monitor and supply well is unlikely.

The Havasupai fear that any groundwater withdrawal from the monitor and supply well may interfere with the flow of springs and seeps in the area.

- g. Based on their assumption that the primary aquifer at the Canyon Mine site may be a single, narrow conduit, Friends of the River reiterate the difficulty in intercepting the aquifer. The Appellants contend that even if one did intercept the target cave stream, it is highly probable that one would not recognize it because small diameter conduits can drain quickly and are frequently observed to be dry or to contain just an inch or two of water during base flow.
- h. Tonantzin Land Institute claims that insufficient information exists for siting the proposed monitoring well in a location that can detect and capture contaminated groundwater.
- i. Tonantzin Land Institute alleges that the onsite storage ponds are inadequate to capture all contaminated waters that may be generated from the groundwater monitor and supply well (if it is pumped in order to contain contamination) and from surface drainage.
- j. Tonantzin Land Institute claims that the studies and data are insufficient to support the EIS conclusion at page 4.36 that "concentrations of radioactive minerals would be decreased significantly via chemical precipitation and hydrodynamic dispersion in the subsurface."
- k. Friends of the River fear contamination of groundwater may result from the percolation of contaminated surface water. Appellants state that, in an area having an annual rainfall of 15 inches, the surface waters rapidly run into subsurface aquifers which charge springs, seeps and creeks used for human and animal consumption in Cataract Creek and other Grand Canyon areas, and are seasonally affected. Rainfall is also summer-dominant and erosive, and events during only the last 5 years demonstrate the folly of hedging against severe flooding and erosion (e.g., Hack Canyon flooding; rainfall and snowpack patterns in Salt River and Upper Colorado River drainages, creating "uncontrolled" floods and releases).

Appellants further contend the groundwater situation may very well be too complex, and our technologies too insufficient, to allow permitting of underground mines in Karst terrains. Appellants cite an EPA publication in support of their conclusions.

1. Friends of the River contends that the Forest Service failed to study the hydrogeology of the Orphan Mine, a similar breccia pipe ore body, and that there is presently contaminated water at the mine which has four times the EPA allowable standard for radium 226. Appellants cite the Reclamation Plan for the Orphan Mine, prepared by the National Park Service, Grand Canyon National Park, in June 1986, in support of their contention. Appellants further state that studies undertaken on the Navajo Reservation reveal serious health problems attributable to the impacts of modern uranium mines and milling, including lung cancers, birth defects, contaminated drinking water and contaminated livestock.
- m. Friends of the River claims that in an area underlain by carbonate rocks, one must seriously consider the possibility of adverse effects occurring perhaps 5 miles or more from a waste disposal site and occurring there only a day or two after a spill or other incident at the site.
- n. Friends of the River states that the Record of Decision makes no mention of the spring monitoring program developed by EFN and the Park Service. The Forest Service should realize that this is the only reliable method for detecting water contamination in a karst terrain, and that the program needs to be drastically improved.

Appellant further contends that the Forest Service must recognize that monitoring techniques for karst terrains are different from those for granular aquifers.

- o. Friends of the River states that recent EPA recognition of the problems of waste disposal in karst terrains includes awareness that: 1) sinkholes may breach liners and dikes at disposal facilities; 2) the inability of owners or operators of new waste disposal facilities to properly monitor groundwater quality in karst terrains should be considered as grounds for permit denial; and 3) hydrologic conditions in karsts may be so complex that determination of groundwater flow direction and flow rate is not possible and such conditions are also grounds for permit denial. The Appellants cite a study conducted by EPA to support their contentions.

Friends of the River also concludes that if a waste disposal site or spill site overlies limestone or dolomite in any terrain, all nearby springs should be located, their discharge characteristics should be evaluated and dye traces should be run.

- p. Friends of the River states that the groundwater analysis fails to address the occurrence of the nearly vertical ring fractures surrounding the perimeter of the breccia pipe. Appellant claims that this ring fracture is the conduit that could allow contaminated water to quickly reach the Redwall-Muav aquifer.
- q. Friends of the River states that mineralized breccia pipes tend to be geographically grouped along the Redwall limestone cavern system. Appellant further claims that this phenomenon suggests that the mineralizing fluids used a hydrologic system that connected multiple pipes, perhaps the Redwall limestone cavern systems, moving into those pipes connected by the same cavern.
- r. Friends of the River claims that the hydrogeology of the perched aquifers above the Redwall-Muav aquifer makes them susceptible to contamination.
- s. Friends of the River states that water percolates quickly through the Kaibab Limestone, the Toroweap Formation and the Coconino Sandstone until it reaches confining layers. The Appellant further claims that substantial quantities of groundwater may be perched above the confining layers in areas where fractures are sparse.

## 2. Forest Service Response

Impacts of the proposed mine on subsurface water quality and quantity were identified as a major concern from the onset of the environmental analysis process. Recognizing the highly specialized nature of this subject, the Forest Service retained the services of Dr. Errol L. Montgomery, a consulting hydrogeologist with over 20 years experience in groundwater geology. During the initial phase of the groundwater analysis, data was obtained from records of water wells and exploration boreholes in the area, and an extensive monitoring program was initiated for springs which discharge along the south wall of the Grand Canyon. Information gathered during the spring monitoring program was routinely forwarded to all interested parties. The groundwater analysis has been continually reviewed and updated to address concerns of the Havasupai Tribe and other interested groups and individuals throughout the EIS process.

Possible ground water impacts resulting from the proposed mining project, along with the monitoring program to detect any future effects, are discussed in the FEIS in Sections: 2.5 (page 2.22), 2.51 (page 2.24), 2.5.11 (page 2.32), Table 2.12 (page 2.47), 2.61 (page 2.51), 3.2.7.2 (pages 3.36-3.57), 4.2.7.2 (pages 4.36-4.42); Appendix G: 60-4 (page 70), 60-7, 60-14 and 60-18 (pages 71, 72), 61-3, 61-4, 61-5, 61-6, 61-7 and 61-8 (pages 79 and 80), 64-1, 64-2, 64-3 and 64-4 (pages 86 and 87), 78-3, 78-12 and 78-14 (pages 103-105) and 87-1 (page 125).

Points of appeal pertaining to groundwater were forwarded to Errol L. Montgomery and Associates for their review and analysis. Input from our groundwater consultants has been carefully evaluated, and the following responses reflect their conclusions and the independent Forest Service evaluation.

- a. For all environmental impact investigations, technical assumptions were combined with available data to project environmental impacts. For the Canyon Mine groundwater investigation, the hydrogeologic information essential for making important conclusions are known, including: location and rate of flow at the principal points of discharge from the Redwall-Muav aquifer; recharge to the Redwall-Muav aquifer; nature of the small, thin, discontinuous perched groundwater zones; and hydrogeologic conditions at the mine site and surrounding area.

Site-specific data were recently obtained during construction of a groundwater monitor and supply well at the mine site. These data confirmed data and projections used in the groundwater analysis. The existence of a perched groundwater zone overlying the Hermit Shale was confirmed near the approximate projected depth. Reported water yield from the perched groundwater zone during drilling operations was in the magnitude projected. In addition, groundwater was reported to have been encountered in the Redwall Limestone formation near the approximate projected depth.

Combined with other salient data, the information indicates that, even using extremely conservative assumptions that in the opinion of our groundwater consultants are unlikely to occur, the proposed mining operations will have little or no impact on the quantity or quality of groundwater in the area. These conclusions are based on sound assumptions and on results of excellent research conducted by many scientists on the unique hydrogeologic conditions in the Grand Canyon region. The conclusions are supported by data recently obtained from construction of the groundwater monitor and supply well.

- b. This comment was raised by the Havasupai Tribe in several letters prepared in response to the Draft EIS. No additional information is offered by the Appellants in support of their earlier claims. The Forest Service reply to these comments is given in Appendix G of the EIS in response 64-4. 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 the Central Limit Theorem. It appears that the baseline information which is gathered by the monitoring program will be adequate to allow identification of any significant changes in water quality. However, it should be noted that the Havasupai Tribe may, at their own initiative and expense,

conduct additional tests to add to the data base if they feel there is a need to confirm existing data.

- c. These same comments were also previously submitted in response to the Draft EIS. The Final EIS was revised to consider the comments concerning perched groundwater reservoirs. Such reservoirs are thin, discontinuous, and often ephemeral. Data reported for the perched groundwater zone encountered in the on-site monitor and supply well suggest that this zone may also be small, thin and discontinuous (See Appendix G of the Final EIS, Forest Service response 61-3).
- d. This same comment was addressed earlier in the Forest Service response 61-4, Appendix G of the Final EIS. No new information is offered by the Appellants. 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 and, therefore, is not connected with any of the perched aquifers on the east side of Cataract Canyon, e.g. activities on the east side of Cataract Canyon can not affect the Sinyella Springs aquifer on the west, or opposite side of the Canyon; perched aquifers in the area are discontinuous; and the distance between the spring and the mine site is great.
- e. The Forest Service reply to this identical comment can be seen in Appendix G, response 61-5 of the Final EIS. The discussion in Section 4.2.7.2 of the Final EIS was also expanded to address this issue. The Appellants have submitted no new information that requires reanalysis or modification of our earlier response. 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. Additionally, concentrations of radioactive minerals in a water solution under these conditions would be decreased significantly through chemical precipitation and hydrodynamic dispersion.

Furthermore, if large unanticipated quantities of groundwater in perched aquifers are encountered during mining operations, additional monitoring and mitigation requirements can be imposed if warranted. These additional measures can include continuation of groundwater monitoring after the mining operations have ceased.

- f. Similar comments were raised by the Havasupai Tribe in review of the Draft EIS. Forest Service response 61-6 in Appendix G of the Final EIS discusses the possibility of mining below the

projected base of the proposed operations, which is estimated to be about 1400 feet below the land surface. The groundwater analysis projected the top of the Redwall-Muav aquifer at the Canyon Mine site to be about 2300 feet below the land surface. Recent data obtained from the construction of the groundwater monitor and supply well confirms the presence of this formation at a depth of 2500 feet. Although exploration drilling indicates mineralization occurs to a depth of 2100 feet below the land surface, the EIS states, and further discussions with EFN confirm (See Exhibit #6, paragraph no. 6), that the base of uranium ore that can be mined economically does not extend significantly beyond a depth of approximately 1400 feet. Mining operations significantly below this depth may require further evaluation under NEPA.

After extensive analysis, our expert consultants have concluded that the potential for a discharge from the mine to affect chemical quality of groundwater in the Redwall-Muav aquifer is low. Recent data obtained from the construction of the on-site groundwater monitor and supply well confirms projections that the mine may encounter perched groundwater in the basal portion of the Coconino Sandstone. Data for existing wells in the Canyon Mine area indicate that the perched groundwater is expected over time to drain after it is intercepted by mine shaft construction. Drainage to the mine is expected to be small and will be lost to evaporation or will be used in mining operations. For purposes of discussion, in the unlikely event that a substantial quantity of such water would percolate downward from the mine openings, there is a low potential that water with elevated concentrations of dissolved radioactive minerals would reach groundwater in the Redwall-Muav aquifer, which has been reported at a depth of more than 2500 feet in the on-site monitor and supply well. This water level is more than 1000 feet below the projected base of mine openings. For further purposes of discussion, in the unlikely event water with elevated concentrations of dissolved radioactive minerals were to reach the Redwall-Muav aquifer, and if the extremely conservative assumption is made that no hydrodynamic dispersion or chemical precipitation would occur during groundwater flow from the minesite area to Havasu or Blue Springs, the change in chemical quality of water at the springs would still not be discernible.

Seepage, if any, of water from the mine openings would be subject to subsurface conditions, including but not limited to: hydrodynamic dispersion; intergranular flow through porous media containing minerals stable in reducing environments; chemical precipitation; and specific retention of clastic media. These factors cumulatively suggest that no contamination of the Redwall-Muav aquifer would occur. Accordingly, our consultants still do not believe, and we concur, that there will be impacts to monitor.

However, even though there is only an extremely remote possibility for groundwater impacts, we have required EFN to construct a groundwater monitoring well to provide an additional measure of safety for detection and mitigation in the unlikely event that adverse impacts would occur. Preliminary results from the groundwater monitor and supply well drilling program at the Canyon Mine site indicates that groundwater has been encountered in the Redwall Limestone. Because groundwater occurs in the unit at the mine site, periodic chemical sampling would detect increases in concentrations of radioactive minerals in the unlikely event that migration of these minerals from the mine opening to the Redwall Limestone should occur.

The single groundwater conduit assumption proposed by Friends of the River is extreme. Inspection of springs and caverns in the Redwall Limestone exposed in the walls of the Grand Canyon indicates that groundwater is most likely to occur in large interwoven fracture and solution systems. If breccia pipes such as the Canyon Mine breccia pipe are the result of collapse of solution caverns in the Redwall Limestone, large extensive fracture systems would have been associated with the caverns at the time of formation of the breccia pipes. Because of this origin of breccia pipes, it is likely that the monitor well would intersect a substantial number of fractures in the Redwall formation. If deep percolation had a sufficient concentration of radioactive elements and if sufficient water occurred to permit sampling, monitoring at the well could detect groundwater contamination. The monitoring network presently established for the Canyon Mine monitors more than 90 percent of spring discharge from the Redwall-Muav aquifer along the south wall of the Grand Canyon. Therefore, the monitoring network is effective, and should be more than sufficient to monitor the effect of any potential impacts.

In the unlikely event that percolation of mine drainage would occur in perched groundwater zones intersected by mine openings, the inward dip of strata in the vicinity of the collapsed breccia pipe structure would tend to direct the drainage toward mine openings. If sufficient quantities of this drainage entered the mine, most of it would evaporate and the remainder would be recirculated in mine operations. In the unlikely event that such drainage would occur and be detected in the mine, the drainage could be monitored for chemical quality.

Perched groundwater zones are believed to be small, thin and discontinuous in the mine site area. It is unlikely that small, thin, discontinuous perched groundwater zones would contribute to discharge to the low yielding springs along the south wall of the Grand Canyon, located more than 10 miles from the mine site. The groundwater drainage areas for

springs in the Grand Canyon that yield small amounts of water from perched groundwater zones are not large and the drainage areas would not be likely to encompass the mine site. Data reported for the perched groundwater zone encountered in the on-site monitor and supply well suggest that this zone may also be small, thin and discontinuous.

Finally, it should be noted that NEPA does not require mitigation measures be 100 percent foolproof, but merely requires that reasonable measures be taken to identify, avoid and minimize impacts. This requirement has clearly been met through the in-depth analysis of potential groundwater impacts and the design of a detailed groundwater monitoring and mitigation plan.

- g. If the water that may occur in the fractures is insufficient to detect, the potential maximum impact from the proposed mining operations would be small or none.
- h. The on-site groundwater monitor and supply well, which was recently constructed a few hundred feet from the breccia pipe, encountered groundwater in the Redwall-Muav aquifer and is being equipped for groundwater withdrawal and monitoring. The well will be monitored to document chemical quality of groundwater in the Redwall-Muav aquifer at the mine site.

Based on our analysis and the analysis of others for the hydrogeologic conditions in the mine site area, we believe there is only an extremely remote possibility that there will be impacts to monitor at the on-site monitor and supply well. However, for the purposes of discussion, in the unlikely event that drainage from the mine openings would occur and would reach the Redwall-Muav aquifer, the zone of downward percolation would resemble an inverted cone distorted by flow along low permeable layers and fractures, with the apex near the base of mine openings. The monitor and supply well is located near enough to the breccia pipe to be within the basal area of the inverted cone of percolation. Therefore, the well is located properly. In the unlikely event that such percolation should occur, and in the further unlikely event that such percolation would contain elevated concentrations of dissolved radioactive minerals, monitoring of the well will detect any potential change in chemical quality of groundwater in the aquifer.

- i. If it becomes necessary to pump groundwater to contain and reclaim aquifer contamination, appropriate on-site facilities could be built within the designated area of operations to manage the reclaimed groundwater. It is not standard practice, or prudent, to build such facilities prior to detection, delineation and quantification of groundwater contamination.

- j. Sulfide minerals, including pyrite, are common in the rock units of the Grand Canyon South Rim region. These minerals are stable in reducing environments. Dissolved radioactive minerals commonly precipitate out of solution when subjected to reducing mechanisms. When such chemical precipitation occurs, the concentration of radioactive minerals remaining in the solution is decreased.

As water flows through porous or fractured media, it naturally spreads out through the media from the point of origin. Hydrodynamic dispersion is a principal mechanism that causes this spreading. In flow of a water solution through the vadose zone, this spreading generally occurs until the moisture content of the spreading front no longer exceeds the specific retention of the media, and further flow does not occur. The vadose zone commonly contains a natural moisture content greater than zero but less than specific retention, and the water solution would mix and be diluted with this moisture. In flow of a water solution through saturated media, such as an aquifer, the spreading by hydrodynamic dispersion is ongoing and results in relatively rapid mixing and dilution of the solution with groundwater in the aquifer.

Therefore, concentrations of radioactive minerals in a water solution under these conditions would be decreased significantly via chemical precipitation and hydrodynamic dispersion. Further data for the Canyon Mine investigations is not required to reach this conclusion.

- k. Local rainfall and snowmelt provide meager quantities of recharge to groundwater systems in the Canyon Mine region. This conclusion is supported by the absence of large springs discharging from perched groundwater zones along the south wall of the Grand Canyon and the lack of sustained yield to existing wells completed in perched groundwater zones in the region, including the several abandoned wells at Tusayan, Arizona. A comparison of the 100-year flood projections for the relatively small local 3.3-square mile drainage area of Little Red Horse Wash at the mine site, to the 100-year flood projections for the large complex regional drainage areas of the Salt River and Upper Colorado River is inappropriate and misleading.

Our groundwater consultants were unable to locate the EPA document cited by Friends of the River. However, the semi-arid highland terrain of the South Rim region is not typical of the humid lowland karstic terrains discussed in several other EPA documents concerning karstic terrains. Hydrogeologic features typical of humid lowland karstic terrains include shallow depth to groundwater and absence of established through-going surface drainage systems. These features are not common in the Grand Canyon South Rim region.

Unqualified comparisons made by the Friends of the River to these environs are inappropriate.

1. Published research on the Orphan Mine and other breccia pipes, field inspections of the Hack Canyon breccia pipe mines and field inspections and drilling information for the Canyon Mine site were used to formulate conclusions in the hydrogeologic analysis for the Canyon Mine.

The water sampled at the Orphan Mine is reported by the Appellants to have contained a concentration of radium 226 equal to four times the drinking water standard, which is three picocuries per liter (pCi/l). We have not been able to verify the chemical results cited by the Appellants, however, a concentration of four times the drinking water standard would be 12 pCi/l. Natural concentrations of radium 226 in groundwater which has percolated through a breccia pipe containing uranium minerals would be expected to exceed EPA standards for potable drinking water. The fact that the reported concentration was only four times the EPA standard indicates that the radium 226 content of the water was quite low. For comparison, the Safe Drinking Water Committee ("Drinking Water and Health", by the National Academy of Sciences, 1977) indicates that 920,000 people in Illinois and Iowa have drinking water supplies with radium 226 concentrations in the range from three to 80 pCi/l, which equates to one to 27 times the EPA standard. Some groundwater may contain up to 100 pCi/l of radium 226. It has never been contended that groundwater which has percolated through a mineralized breccia pipe will meet EPA standards for potable drinking water.

Neither the Forest Service nor our expert consultants are aware of any groundwater contamination on the Navajo Reservation that could be attributed to uranium mining activities in Arizona. However, our consultants are aware, in mineralized areas, of naturally occurring concentrations of uranium and other radioactive elements in groundwater supplies. To illustrate this fact, the EIS gives results of laboratory chemical analyses, conducted in conjunction with the Canyon Mine groundwater analysis, which 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.

- m. Perched groundwater in the Kaibab Limestone occurs in small, thin, discontinuous zones. In the unlikely event that a spill of uranium ore should occur at the mine site, there is no

reasonable probability that it would affect a useable water supply. However, due to the nature of perched groundwater zones, the effects would be small and isolated if one were to be affected. If subsequent rainfall would dissolve small amounts of radioactive minerals and that infiltration of the rainfall would be sufficient to cause movement of the radionuclides between discontinuous perched groundwater zones, extreme dilution of the spill would occur.

- n. The groundwater monitoring program, including the provisions for monitoring the network of springs in the Grand Canyon, was developed by the Forest Service with the concurrence of EFN and the Park Service. The spring monitoring program monitors more than 90 percent of the discharge from the Redwall-Muav aquifer along the south wall of the Grand Canyon. The scope of this monitoring program exceeds that of most groundwater monitoring systems, and should be more than sufficient to monitor the effects of any potential impacts. The few springs which issue from the small, thin and discontinuous perched groundwater zones are not likely to be affected by the proposed mine operations.

The groundwater monitoring network established for the Canyon Mine recognizes the inherent differences in the unique hydrogeologic environment of the South Rim region, and takes advantage of these differences.

- o. Hydrogeologic conditions indicate that this statement is not applicable at the mine site. Although some karst features occur in the Kaibab Limestone, they are not typical of karst features in humid lowland areas of the southeastern United States. Most of the references for karst features cited by the Appellants were for investigations conducted in the humid lowlands of the southeastern United States, not in the semi-arid highlands of the South Rim region, and are not appropriate for comparison with the Canyon Mine area. Direction and rate of groundwater flow have been determined for several limestone units in Arizona, including the Kaibab Limestone.

Table 2 and Figure 3 of the Groundwater technical report (Appendix F of the EIS) identifies all known nearby springs along the South Rim of the Grand Canyon together with published data on discharge rates. Because the distances between the springs and the mine site are large and the zone of recharge covers a large area, tests using tracer dyes are not feasible. However, use of tracer dyes is feasible in many karst areas in the humid lowlands of the southeast, where depth to groundwater and distance from karst features to springs is small.

- p. Inspections of the perimeter of the breccia pipes in numerous tunnels at similar mines north of the Grand Canyon in the

Arizona Strip indicate that fractures associated with the perimeter are tightly closed and do not comprise conduits for fluid flow.

- q. Mine openings and mineralized portions of the Hack Canyon breccia pipes occur at similar stratigraphic levels as the proposed Canyon Mine. Mineralization of the Hack Canyon breccia pipe structures is believed to have been associated with fluid flow within the breccia pipes. However, due to gradual and natural compaction and cementation of the breccia, porosity of the breccia is low. Voids between the blocks are filled with firmly cemented matrix and the breccia appears to have very low permeability.
- r. The perched groundwater zones above the Redwall-Muav aquifer are small, discontinuous, and often ephemeral. Contamination of perched groundwater at the mine site is unlikely. In the unlikely event that contamination should occur, it would be isolated and would have little or no impact on the springs which discharge at the Grand Canyon or the wells which are completed in perched groundwater zones northwest from the mine site.
- s. Although precipitation in the mine area is approximately 15 inches per year, much of the rainfall and snowmelt is lost through evapotranspiration. Most of the remaining fraction infiltrates via permeable surficial deposits and via fractures and solution openings in the Kaibab Limestone.

Substantial quantities of groundwater may be perched above confining layers in areas where fractures are sparse. These conditions occur most commonly in the Toroweap Formation where groundwater is perched in sandstone units overlying shaley confining strata, and, as for the perched groundwater zone encountered in the groundwater monitor and supply well, 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 is interpreted to indicate that the principal direction of groundwater movement is downward in the rocks overlying the Redwall-Muav aquifer.

It is our opinion that the conclusions stated on p. vii of the FEIS Summary stand unchanged:

"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 significant quantities of 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."

B. COMPLIANCE WITH THE AMERICAN INDIAN RELIGIOUS FREEDOM ACT

Appellants contend that the decision to approve the development and operation of the Canyon Mine is substantively contrary to the American Indian Religious Freedom Act (AIRFA), and the analysis to identify impacts on Native American religious beliefs was fatally defective and unconstitutional. Appellants claim that the Forest Service had decided prior to preparing the EIS that it lacked the authority to deny a Plan of Operation. Therefore, the Forest Service did not affirmatively seek to identify Native American religious concerns regarding the proposed action. Unless otherwise noted, the points of appeal are common to both the Havasupi and Tonantzin Land Institute.

1. Appellants' Position

- a. It is apparent that Native American religious rights were not given the weight and due consideration, which was ordered by Congress, under the American Indian Religious Freedom Act (42 U.S.C. 1996). The Forest Service has a legal mandate to protect the inherent right of freedom for American Indians to believe, express, and exercise their traditional religions (36 CFR 219.1b) (6). It is the contention of the Appellants that federal regulations and AIRFA require a more specific commitment to this task than that which was shown during the Forest Service approval of the Canyon Mine and implementation of the Plan of Operation and without further analysis of the impact on Native American religion, is clearly contrary to the purpose of AIRFA.
- b. Appellants contend the procedures used by the Forest Service to identify Native American religious concerns were unlawful and ineffective. Comments of the Havasupai Tribe regarding religious significance were ignored. The Forest Service failed to identify the experts on Indian Religious sites and practices that were consulted in preparation of the FEIS, nor were appropriate Tribal Council or important Tribal Cultural and Religious Leaders informed or consulted about the proposed operating plan.

K. SURFACE WATER

Three appellants have challenged the Forest Service consideration of potential surface water impacts in the EIS, by alleging either inadequacies in the surface water studies, or in the EIS surface water protection measures.

1. Appellants' Position

- a. The Havasupai Tribe claims that the surface water studies upon which the decision to approve the Plan of Operations is based, lack the scientific integrity necessary to make such a decision.
- b. The Havasupai Tribe and Tonantzín Land Institute allege that the mitigation and monitoring program does not "ensure" the prevention of surface water contamination.

- c. The above Appellants, along with the Sierra Club and Friends of the River, contend that the on-site storage ponds are inadequate to contain all entering waters.
- d. The Tonantzín Land Institute and the Havasupai Tribe allege that the ore pads are inadequate to prevent contaminated seepage.
- e. The Tonantzín Land Institute also contends that the SCS methodology for estimating surface runoff is inappropriate to the climate and hydrologic conditions found in the Kaibab regional environment.
- f. The Sierra Club generally alleges that the EIS deals inadequately with the possibility of floods and the resultant contamination of water supplies, and that based upon a November 12, 1986 comment of Patricia Port (USDI), the Forest Service must complete a supplemental EIS on the issue of sediment transfer in the event of a flood.
- g. Comments from the USDI, referenced and appended to the Sierra Club appeal contend that a serious error in the hydrologic analyses is the assumption that, if debris from the mine escapes the site, it will not get past the broad flat area some 14 miles downstream.

2. Forest Service Response

The FEIS contains extensive coverage of all aspects of surface water issues. The FEIS first compared the different surface water diversion structure designs identified for the various project alternatives (FEIS 2.16-.22). It also discussed the measures to be taken to safeguard the environment in the unlikely event of a failure of the surface water control features (FEIS 2.32). An entire section was devoted to a discussion of surface flood water control at the mine site (FEIS 2.33). The EIS also provided an extensive discussion on the surface water resources and a detailed description of the surface drainage and storm runoff in the general area of the mine (FEIS 3.32-.35). A comparison of the effects of each of the project alternatives on the surface water resources was also included (FEIS 4.31-.36).

Each comment received on the DEIS concerning possible surface water impacts was conscientiously and responsibly published and responded to in Appendix G of the FEIS, and, in appropriate cases, the text of the FEIS was changed to reflect those comments (See FEIS, Appendix G pages 34-35, 54, 75-82, 113-114, 116-117, 123, and 126).

- a. The Forest Service retained Dr. Charles F. Leaf, P.E., as the consulting hydrologist for the Canyon Mine project. Dr. Leaf's credentials are briefly outlined in the FEIS List of Preparers at 5.1. Dr. Leaf was directly in charge of devising the surface water protection system for the project. An

extensive report on the "Downstream Hydrologic Impacts of Proposed Canyon Mine" was prepared by Dr. Leaf and submitted to the Forest Service in July of 1985. The report was available for public comment as part of the DEIS (See DEIS, Appendix D). Although general allegations of insufficiency or inadequacy have been forwarded, no specific errors in Dr. Leaf's report or methodology have been identified.

- b. Mitigation is not required to "ensure" that there will be no impact. Indeed, CEQ's definition of "mitigation" presumes in many cases there will be environmental impacts. Mitigation provides an agency the opportunity to impose conditions that avoid or minimize those impacts.

To "avoid" or "minimize" potential surface water impacts, the Forest Service has imposed several mitigation measures. We have required the construction of several surface water diversion and containment devices (See FEIS at 2.33). The holding ponds must be adequate to contain a 100-year thunderstorm event, plus normal annual runoff and water that may be pumped from the mine. The original 100-year flood channels have been modified to accommodate a 500-year event, thus precluding "the possibility of runoff from local intense storms from either entering or leaving the operating site . . ." Additionally, should the containment facilities ever fail, EFN has agreed that the flooded area downstream will be radiometrically surveyed for above base line radiation levels, and any contaminated soil removed and returned to the mine site (FEIS 3.32). We believe we have taken all reasonable measures to prevent any surface water contamination.

- c. The holding ponds are constructed to contain a 100-year storm event plus annual runoff and water that may be pumped from the mine (FEIS 2.33). As additional protection, the flood channels and perimeter berms are constructed to prevent waters from a 500-year storm event from either entering or leaving the mine. Appellant's contentions are completely unsupported by the record.
- d. Appellants allege design inadequacies of the ore pads but fail to provide any specific information in support of their allegation. The Plan of Operations submitted by EFN outlines specific design characteristics for the construction of the ore stockpile pads. It specifies that all ore grade material will be stockpiled on the pads pending removal from the project area. Each ore pad will be at least one foot thick and shall be constructed utilizing an equal mixture of limestone and shale produced from the underground excavation at the mine site. The purpose for constructing ore pads is to elevate the ore stockpiles above water levels that would be expected if the surface water diversion dikes failed during a 500+ year event and to prevent leaching of mineral values contained within the ore grade material into the soil from

percolation of surface water. Leaching is prevented by the chemical reaction which occurs when and if any dissolved uranium contacts the limestone component of the ore pad. Lacking any information to the contrary, we believe that the one-foot thick ore pads are adequate to prevent solution percolation into the subsoil.

- e. Once again, the calculations alleged as being inappropriate were conducted by an eminently qualified hydrologist with over 20 years experience in, among other things, streamflow forecasting (See FEIS at 5.1). The methodology used was that accepted by the United States Soil Conservation Service (See DEIS, Appendix D at 8). In addition to the SCS method, the statistical method of Roeske was used as a comparison. Agreement in the two methods is obvious in Table 2, Appendix D, of the EIS. Without evidence to the contrary, we believe the SCS methodology is appropriate and sufficient.
- f. Although here the Appellant has exceeded the typical simple conclusory allegations by providing outside comments, these comments do not in any way refute the findings of the FEIS.

Ms. Ports' comments raise two concerns: (1) Holding ponds should accommodate a 500-year event, and (2) escaped debris from the mine site will become part of the "sediment in transit" and eventually contaminate surface water supplies. These concerns are easily answered with a quick look at the EIS.

First, although Ms. Ports' obvious preference is for holding ponds with a 500-year capacity rather than the chosen 100-year capacity ponds, she provides no reason why our choice based upon expert analyses is inadequate. In the absence of supporting evidence that the Forest Service analyses and conclusions are arbitrary and capricious, the decisions in the FEIS should stand (See also "c" above).

Second, Ms. Ports' concern over sediment in transit overlooks one of the major mitigation measures required in the FEIS. In the unlikely event of a flood control failure, the flooded downstream area will be radiometrically surveyed, and "any soil showing radiation levels above baseline measurements would be removed and returned to the mine site." (FEIS at 2.32). Therefore, any discharge will not become part of the "sediment in transit" and will not endanger surface water resources.

- g. The Appellants' conclusion that no "debris" will get beyond 14 miles downstream from the mine, is a misinterpretation of the results of the hydrologic study reported in Appendix D of the EIS. This conclusion is only valid for the local thunderstorm event as depicted in Figure 6 (and validated by on-site observations during and after the August, 1984

thunderstorms). However, in the case of a general storm (shown in Figure 7) the initial concentration of leachate and/or sediment from the mine site, is reduced at the playa 14 miles downstream by 98 percent, as a result of inflows from a rapidly increasing drainage area. In other words, in the unlikely event that the flood control structures should fail (and they are designed to accommodate a 500-year flood), water from the mine yard would be so diluted by the inflow from the main arm of Red Horse Wash that it is unlikely any radiation levels above background could be detected beyond the playa.

We do not believe the Appellants' contentions in any way change the conclusions in the FEIS:

"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. 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." (FEIS Summary pages x and xi).

#### L. HOLDING PONDS

Appellants allege that the EIS does not adequately address possible pond leaks and pond monitoring.

##### 1. Appellants' Position

- a. The Tonantzin Land Institute and Friends of the River allege that the EIS does not address the problem of leaky holding ponds and the maintenance of their physical integrity. They also contend that no mitigation measures have been taken to directly monitor the ponds.

##### 2. Forest Service Response

The design of the mine yard perimeter berm, the drainageways around the yard, the holding ponds and the ore pads, have all been extra conservative. The berm is designed to keep water from a 500-year flood from either entering or leaving the mine yard. As a redundant safeguard the ore pad is to be elevated above the 500-year flood level. Similarly, the pond size is designed to hold more than the runoff from a 100-year storm, even though the berm is designed to contain a 500-year event. Additionally, all discharges

APPENDIX B.

DOCUMENTS IN THE ADMINISTRATIVE RECORD

NOTES  
ABOUT THE LISTING OF DOCUMENTS  
IN THE APPEAL RECORD

1. Abbreviations used to represent appeal parties and Forest Service officers or administrative units in their order of appearance are: KNF--Kaibab National Forest; EFN--Energy Fuels Nuclear; HAV--Havasupai Indian Tribe; RF--Regional Forester; AWF--Arizona Wildlife Federation; DR--District Ranger; FOR--Friends of the River; SCLDF--Sierra Club Legal Defense Fund; TLI--Tonantzin Land Institute; and SC--Sierra Club.
2. Various documents which are out of sequence in the record can be found in Volume 5 of the record.
3. Many of the documents cited had attachments and enclosures far to numerous for inclusion in this summary listing. Reference to the record itself is required for a full picture of the extent of the record on any particular topic. Some insight into the extent of supplements to any one document can be gained by checking the number of pages indicated for that document.

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
1	1	12-85	KNF--Draft Environmental Impact Statement (DEIS)	1
	2	12-85	KNF--Appendix to DEIS	199
	3	09-86	KNF--Final Environmental Impact Statement (FEIS)	487
	4	09-86	KNF--Addendum to Appendix G of FEIS	909
	5	09-22-86	KNF--Transmittal letter for FEIS and Record of Decision	913
	6	09-26-86	KNF--Record of Decision for FEIS	915
2*	7	11-06-86	William C. McDowell to KNF --Protest	943
	8	11-09-86	Ellen R. Hansen to KNF --Protest	946
	9	11-09-86	Bradford S. Cheff to KNF --Protest	948
	10	11-10-86	Hopi to KNF--Notice of Appeal and Statement of Reasons	950
	11	11-14-86	RF to EFN--Granting Intervention Request	955
	12	11-17-86	KNF to HAV--Receipt of Notice of Appeal	957
	13	11-17-86	KNF to Hopi--Receipt of Notice of Appeal	959
	14	11-17-86	KNF to ANF--Receipt of Notice of Appeal	961
	15	11-17-86	KNF to Sierra Club Legal Defense Fund--Receipt of Notice of Appeal	963
	16	11-17-86	KNF to RF--Forwarding Appeals and listing of Request for Stay and Oral Presentation	965
	17	11-20-86	KNF to RF--Forwarding EFN Requests for Intervention	967
	18	11-24-86	KNF to RF--Explanation of Appeal Period	982
	19	11-25-86	KNF to RF--Timeliness of Sierra Club and Garrison Lee Statement of Reasons	985

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
2	40	03-06-87	HAV to RF--Request for Extension	1479
	41	03-08-87	Ian Root to RF--Reply to Responsive Statement	1482
	42	03-10-87	RF to HAV--Granting Extension	1485
	43	03-10-87	EFN to KNF--Reply to Appeals and Responsive Statement	1487
	44	03-12-87	RF to the Record--Removal of E. Hansen and Wm. McDowell as Appellants	1711
	45	(Received) 03-13-87	TLI to RF--Reply to Responsive Statement	1713
	46	03-19-87	EFN to KNF--Addendum to Reply to Appeals and Responsive Statement	1724
	47	03-23-87	HAV to RF--Request for Extension	1749
	48	03-26-87	RF to HAV--Granting Extension	1752
	49	03-30-87	Granting Additional Extension	1754
	50	04-07-87	HAV to KNF--Reply to Responsive Statement	1756
	51	04-07-87	RF to KNF--Delegation of Authority	1787
	52	04-21-87	EFN to RF--Request for Oral Presentation	1789
	53	04-30-87	RF to EFN--Granting Request for Oral Presentation	1792
	54	05-07-87	SCLDF to RF--Yielding Oral Presentation time to HAV	1796
	55	05-08-87	HAV to RF--Attendance at Oral Presentation	1798
	56	05-08-87	EFN to RF--Confirmation Re: Oral Presentation	1800
	57	05-19-87	RF to Canyon Under Siege--Due Date for Summary of Oral	1803
	58	05-22-87	AWF to RF--Follow-up comments	1806
	59	05-28-87	HAV to RF--Supplemental Comments of HAV (incl. transcript of Oral)	1813
	60	05-28-87	Hopi to RF--Summary of Oral Presentation	1876
	61***	05-26-87	TLI to RF--Summary of Oral Presentation	1883

5273

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
2	62*****	05-26-87	EFN to RF--Submittal of 19 Documents to the Record: (a) Transcript; (b) Analysis of Public Comment; (c) Selenium; (d) Archeology; (e) Air quality; (f) Hydrogeology; (g) Groundwater monitoring; (h) EPA; (i) Hydrogeology; (j) Hydrogeology; (k) Hydrogeology; (l) Radiological; (m) NPDES; (n) Summary of Oral; (o) Response to Summary and Transcript; (p) Procedural Appeal Record; (q) Procedural Decision of the Chief; (r) Article by Harold S. Coltory; (s) Groundwater).	1887
	63	05-27-87	EFN to RF--Affidavit of Wayne A. Seick	2568
	64	05-29-87	EFN to RF--Affidavit of Robert C. Euler	2577
	65	06-18-87	Canyon Under Siege to RF--Support of No Action Alternative	2581
	66	06-18-87	HAV to RF--Transmittal of <u>Sierra Club, et. al., vs. Michael Penfold</u>	2583
	67	07-10-87	RF to HAV--Extension	2604
-----				
END OF VOLUME 2				
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5274

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
3	68	10-08-86	Canyon Unger Siege to KHf--Appeal	2606
	69	10-08-86	Ian Root to Chief--Protest	2610
	70	10-29-86	Chief to Ian Root--Receipt of Appeal	2613
	71	11-06-86	Wm. McDowell to Chief--Protest	2615
	72	11-07-86	FOR to RF--Appeal, Stay Request, Statement of Reasons	2618
	73	11-07-86	EFN to RF--Affidavits in the Event of an Appeal	2631
	74	11-07-86	TLI to KNF--Notice of Appeal and Request for Stay	2647
	75	11-09-86	AWF to KNF--Appeal	2651
	76	11-09-86	Bradford Cheff to KNF	2658
	77	11-09-86	E. Hanson to KNF--Protest	2660
	78	11-10-86	EFN to RF and KNF--Affidavit of Muril D. Vincelette	2662
	79	11-10-86	EFN to KNF--Requests for Intervention	2673
	80	11-10-86	HAY--Notice of Appeal	2678
	81	11-10-86	James Mahoney and Phyllis Hogan to RF--Appeal	2715
	82	11-10-86	Hopi to KNF--Notice of Appeal and Statement of Reasons	2723
	83	11-10-86	SCLDF to KNF--Notice of Appeal	2727
	84	11-10-86	TLI to KNF--"Reason for an Appeal"	2730
	85	11-11-86	EFN to RF--Affidavit of John Vaughn	2744
	86	11-11-86	EFN to RF--Response to TLI Request for Stay	2749
	87	11-13-86	AWF to RF--Request for Stay	2771
	88	11-13-86	EFN to RF--Voluntary Suspension of Activity	2773
	89	11-13-86	EFN to KNF--Requests for Intervention	2776

5275

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
3	90	11-14-86	RF to EFN--Reply to EFN letter of 11-13-86	2781
	91	11-15-86	EFN to HAV--Response to Request to Suspend well drilling	2786
	92	11-17-86	EFN to KNF--Requests for Intervention	2790
	93	11-17-86	HAV to RF--Comments to EPA on NPDES	2795
	94	11-18-86	EFN to RF--Memo in Opposition to Stay Requests	2833
	95	11-18-86	EFN to RF--Affidavits of Brad L. Doores	2962
	96	11-18-86	EFN to RF--Motions for Dismissals	2980
	97	11-18-86	SC to RF--Statement of Reasons and Request for Oral Presentation	2989
	98	11-19-86	EFN to RF--Correspondence re: NPDES permit	2999
	99	11-19-86	EFN to RF--Memo in Opposition to Stay Request and third affidavit of Brad Doores	3006
	100*	11-18-86	HAV to RF--Correspondence with EPA re: NPDES permit	3041
	101*	11-18-86	HAV to RF--Enclosure to accompany letter of 11-17-86	3056
	102	11-20-86	KNF to RF--Response to Requests for Stay	3059
	103	11-21-86	RF to HAV--Response to Requests for Stay	3068
	104	11-21-86	EFN to RF--Suspension of site activities	3073
	105	11-24-86	AWF to Chief--Stay Request	3076
	106	11-24-86	EFN to RF--Motion to Dismiss Appeal of SC	3078
	107	11-24-86	FGR to RF--Opposition to EFN's Motion to Dismiss and Intervention Request	3093
	108	11-25-86	RF to EFN--Acknowledgement of EFN letter of 11-21-86	3098
	109	11-25-86	RF to Bradford Cheff--Transmittal of 09-29-86 Stay Decision	3101

5276

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
3	110	11-25-86	RF to HAV--Notification of continuation of suspension	3103
	111	11-26-86	SC to RF--Re: Request for Extension	3106
	112	11-29-86	Ian Root to RF--Appeal of Stay Decision	3111
	113	12-03-86	RF to AWF--Denial of Stay Request	3114
	114	12-08-86	HAV to RF--Re: Suspension of Activity and intention to file for Stay	3119
	115	12-10-86	RF to Chief--Responsive Statement to AWF Procedural Appeal	3121
	116	12-12-86	RF to Chief--Responsive Statement to Ian Root's Procedural Appeal	3123
	117	12-16-86	KNF to RF--Request for Extension	3125
	118	12-17-86	Canyon Under Siege to RF--Request for Stay	3127
	119	12-22-86	TLI to RF--Procedural Appeal	3129
	120	12-22-86	Chief to AWF--Stay Decision	3133
	121	12-22-86	RF to Chief--Responsive Statement Re: Canyon Under Siege	3135
	122	12-22-86	HAV--Affidavit of four Havasupai	3137
	123	12-23-86	Chief to Ian Root--Stay Decision	3144
	124	12-24-86	RF to Chief--Responsive Statement to TLI Procedural Appeal	3146
	125	12-29-86	RF to HAV--Re: HAV Affidavit	3148
	126	12-30-86	Chief to Representative John McCain --Re: AWF and Stay	3150
	127	12-30-86	EFN to RF--Motion to Dismiss SC Appeal	3152
	128	12-31-86	Hogan and Mahoney to RF--Request for Stay and Statement of Reasons	3178
	129	01-05-87	EFN to RF and Chief--Response to HAV second Request for Stay	3189
	130	01-07-87	RF to EFN--Response to EFN letter of 12-30-86	3197
	131	01-07-87	RF to KNF--Granting Extension	3199

5277

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
3	132	01-07-87	SC to RF--Response to Appeal by EFN	3201
	133	01-09-87	RF to Chief--Request for Extension	3210
	134	01-12-87	RF to Chief--Transmittal of Responsive Statement and TLI Appeal	3212
	135	01-13-87	Chief to AWF--Transmittal of Root Appeal to Appellants	3218
	136	01-13-87	Chief to EFN--Transmittal of AFW Correspondence to Intervenors	3221
	137	01-13-87	Chief to E. Hanson--Transmittal of Root Correspondence	3225
	138	01-13-87	KNF to SC--Reply to 01-08-87 Freedom of Information Act Request	3228
	139	01-14-87	RF to Mahoney and Hogan--Response to Notice of Request for Stay	3238
	140	01-14-87	RF to Chief--Record to Dismiss Mahoney/Hogan Appeal	3240
	141	01-15-87	RF to Chief--Re: Extension	3253
	142	01-21-87	Chief to Canyon Under Siege--Re: Extension	3255
	143	01-23-87	Chief to RF--Granting Extension	3257
	144	01-26-87	KNF to RF--Re: Extension	3259
	145	01-27-87	EFN to Chief--Reply to HAV Appeal of Stay Decision and Exhibits	3561
	146	01-29-87	RF to KNF--Re: Extension	3549
	147	01-30-87	RF to Chief--Response and Recommendation Re: HAV procedural appeal	3551
	148	01-30-87	Canyon Under Siege to RF--Re: Extension and Appeal Procedures	3574
	149	01-30-87	Chief to HAV--Re: Extension and Appeal Procedures	3576
	150*	01-30-87	Mahoney and Hogan to RF--Request to consider Stay Request timely	3581
	160	02-03-87	Chief to Canyon Under Siege--Decision on Appeal of 12-17-86	3584
	161	02-05-87	RF to Hogan and Mahoney--Re: Timeliness of Procedural Appeal	3586

5278

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO</u>
3	162	02-06-87	HAV to Chief--Reply to RF Response and Recommendation	
	163	02-09-87	Chief to TLI--Consolidation with HAV Appeal	3607
	164	02-10-87	Secretary of Agriculture to Chief-- Decision not to review	3609
	165	02-12-87	Chief to Hogan and Mahoney-- Notice of untimely filing	3611
	166	02-13-87	Chief to Margaret Vick--Granting Oral Presentation	3613
	167	02-13-87	Chief to TLI--Granting oral presentation	3616
	168	02-13-87	Chief to Canyon Under Siege-- Notice of Orals	3619
		02-13-87	Chief to Mahoney--Notice of Orals	3621
	169	02-18-87	Chief to Canyon Under Siege--Response to letter of 01-30-87	3622
	170	02-19-87	EFN to Chief--Re: Oral Presentation	3625
	171	02-20-87	HAV to Chief--Re: Harm to Havasupai	3628
	172/173	02-25-87	Two documents provided by HAV at the 02-25-87 Oral Presentation: (1) Hirst, Stephen, Hausw 'Buaja: People of the Blue Green Water, Havasupai Tribe, Supai, Arizona, 270p.; (2) Martin, John F, "The Havasupai" Plateau, 50, Vol. 4, 1986, Museum of Northern Arizona, Flagstaff, 32p.	3632
	174	03-02-87	Secretary of Agriculture to Chief-- Decision not to review	3634
	175	03-09-87	EFN to Chief--Summary of Oral Presentation	3636
	176	03-09-87	HAV to Chief--Transcript of Oral Presentation	3714
	177	03-09-87	TLI to Chief--Summary of Oral Presentation	3826
	178	03-30-87	EFN to Chief--Response to Summary and Transcript/Oral Presentation	3831
	179	03-31-87	Chief to HAV--Granting Request for Extension	3862
	180	04-07-87	HAV to Chief--Response to EFN Summary of Oral	3864

5279

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
3	181	04-13-87	Chief to Canyon Under Siege--Re: Inability to appeal and treatment of extensions, etc.	3878
	182	04-16-87	Chief to HAV--Closure of Record on Procedurals	3881
	183	04-21-87	RF to KNF--Interpretation of FS Manual	3883
	184	05-04-87	Chief to HAV--Decision on Procedural Appeals (cover letter)	3885
	185	05-04-87	Chief to TLI--Decision on Procedural appeals (cover letter)	3887
	186	05-04-87	Decision of the Chief--Re: Procedural Appeals	3889
	187	05-07-87	Secretary of Agriculture to Chief-- Decision not to review	3924
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END OF VOLUME 3				-----

5280

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
4	188	08-28-87	R.F. Decision on the Merits of KNF 09/28/86 Decision	3927
	189	08-28-87	RF Cover Letter for 08/28/87 Decision	3973
	190	09-11-87	Ian Root to RF--Appeal of 08/28/87 Decision	3976
	191	09-16-87	RF to Ian Root--Receipt of Appeal	3979
	192	09-21-87	FOR to RF--Appeal of 08/28/87 Decision	3981
	193	09-22-87	AWF to RF--Appeal of 08/28/87 Decision	4001
	194	09-22-87	SL to RF--Appeal of 08/28/87 Decision	4009
	195	09-25-87	HAV to RF--Appeal of 08/28/87 Decision	4019
	196	09-26-87	Hogan and Mohoney to RF--Appeal of 08/28/87 Decision	4072
	197	09-28-87	Hopi to RF--Appeal of 08/28/87 Decision	4083
	198	09-28-87	TLI to RF--Appeal of 08/28/87 Decision	4136
	199	09-29-87	SC to RF--Corrections to mailing of 09/22/87	4139
	200	09-29-87	EFN to Chief--Comments on letter from portion of Arizona Delegation	4151
	201	10-02-87	RF to EFN--Transmittal of Appeal Documents	4154
	202	10-02-87	RF to Chief--Re: TLI request for extension	4156
	203	10-02-87	RF to "File"--Removal of Bradford S. Cheff	4158
	204	10-06-87	EFN to RF--Draft of Opposition to Stay	4160
	205	10-09-87	Hopi to Chief--Transmittal of <u>Oregon Natural Resources Council v. Marsh</u>	4210
	206	10-13-87	RF to HAV--Receipt of Appeal	4228
	207	10-21-87	RF to Chief--Request to Consolidate Appeals	4213

5281

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
4	208	10-21-87	EFN to Chief--Request for Expedited Consideration of Merits	4233
	209 210	10-26-87	RF to KNF--Instruction to formulate plans to address wildlife considerations	4236
	211	10-26-87	RF to Hogan and Mahoney--Responsive Statement to consolidate Appeals	4240
	212	10-29-87	Chief to RF--Granting Request to Consolidate	4246
	213	11-02-87	EFN to Chief--Hydrologic comments by Charles F. Leaf	4248
	214	11-11-87	EFN to Chief--Hydrologic comments by Errol L. Montgomery and Associates	4258
	215	11-12-87	EFN to Chief--Intervenor's Reply to Appellants' Statements of Reasons with 2 volumes of Exhibits	4324
	216	11-13-87	EFN to Chief--Re: Typographical Errors in Document 215	4712
	217	11-16-87	HAV to RF--Extension	4714
	218	11-16-87	Hopi to Chief--Extension	4717
	219	11-17-87	RF to Hopi--Re: Extension	4722
	220*	11-16-87	Hogan and Mahoney to RF--Comments on Responsive Statement	4724
	221	11-19-87	FOR to RF--Comments on Responsive Statement	4730
	222*	11-17-87	Hopi to Chief--Re: Extension	4733
	223	11-17-87	EFN to Chief--Re: Hopi Extension Request	4738
	224	11-19-87	HAV to RF--Reply to EFN Stay Opposition	4741
	225	11-19-87	Hopi to RF--Comments on Responsive Statement	4784
	226	12-01-87	RF to Chief--Transmittal of Appeal Record	4792
	227	12-04-87	Chief to Appeal Parties--Receipt of Record and Decision on Orals	4794

5282

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
4	208	10-21-87	EFN to Chief--Request for Expedited Consideration of Merits	4233
	209 210	10-26-87	RF to KNF--Instruction to formulate plans to address wildlife considerations	4236
	211	10-26-87	RF to Hogan and Mahoney--Responsive Statement to consolidate Appeals	4240
	212	10-29-87	Chief to RF--Granting Request to Consolidate	4246
	213	11-02-87	EFN to Chief--Hydrologic comments by Charles F. Leaf	4248
	214	11-11-87	EFN to Chief--Hydrologic comments by Errol L. Montgomery and Associates	4258
	215	11-12-87	EFN to Chief--Intervenor's Reply to Appellants' Statements of Reasons with 2 volumes of Exhibits	4324
	216	11-13-87	EFN to Chief--Re: Typographical Errors in Document 215	4712
	217	11-16-87	HAV to RF--Extension	4714
	218	11-16-87	Hopi to Chief--Extension	4717
	219	11-17-87	RF to Hopi--Re: Extension	4722
	220*	11-16-87	Hogan and Mahoney to RF--Comments on Responsive Statement	4724
	221	11-19-87	FOR to RF--Comments on Responsive Statement	4730
	222*	11-17-87	Hopi to Chief--Re: Extension	4733
	223	11-17-87	EFN to Chief--Re: Hopi Extension Request	4738
	224	11-19-87	HAV to RF--Reply to EFN Stay Opposition	4741
	225	11-19-87	Hopi to RF--Comments on Responsive Statement	4784
	226	12-01-87	RF to Chief--Transmittal of Appeal Record	4792
	227	12-04-87	Chief to Appeal Parties--Receipt of Record and Decision on Orals	4794

5283

<u>VOLUME</u>	<u>DOC. NO.</u>	<u>DATE</u>	<u>DOCUMENT</u>	<u>PAGE NO.</u>
4	228	12-11-87	EFN to Chief--Hydrogeology letter by David Kreamer	4797
	229	12-11-87	Hopi to Chief--Comments on EFN's Reply to Appellants Statement of Reasons	4802
	230	12-14-87	HAV to Chief--Additional Information	4860
	231	01-11-88	EFN to Chief--Response Hopi Comments and HAV additional information	4875
	233	01-11-88	EFN to Chief--Charles Leaf Comments on Flood Control Plan	4905
	234	01-11-88	EFN to Chief--Errol L. Montgomery and Associates comments on hydrogeology	4911
	235	01-26-88	Chef to RF--Closing of the Record	4927

5284

mNamenMr. Patrick J. Garver  
mAddressnParsons, Behle & Latimer  
185 South State Street, Suite 700  
P.O. Box 11898  
Salt Lake City, Utah 84147-0898  
mSalutationnMr. Garver:

mNamenMr. James Mahoney  
c/o Ms. Phyllis Hogan  
mAddressnArizona Ethnobotanical Research Association  
18 East Santa Fe Avenue--B  
Flagstaff, Arizona 86001  
mSalutationnMr. Mahoney:

mNamenMs. Lori Potter  
mAddressnSierra Club Legal Defense Fund  
1600 Broadway, Suite 1600  
Denver, Colorado 80202  
mSalutationnMs. Potter:

mNamenMs. Margaret E. Vick and  
Mr. Joe P. Sparks  
mAddressnSparks & Siler, P.C.  
7503 First Street  
Scottsdale, Arizona 85251-4573  
mSalutationnMs. Vick and Mr. Sparks:

mNamenMr. Robert P. Lippman  
mAddressnFriends of the River--  
Colorado Plateau Reserve Law Office  
P.O. Box 1115  
Flagstaff, Arizona 86002  
mSalutationnMr. Lippman:

mNamenMr. Donald P. Judges  
mAddressnLaw Office of Arnold and Porter  
One United Bank Center  
1700 Lincoln Street  
Denver, Colorado 80203  
mSalutationnMr. Judges:  
mNamenMs. Phyllis Hogan  
mAddressnArizona Ethnobotanical Research Association  
18 East Santa Fe Avenue--B  
Flagstaff, Arizona 86001  
mSalutationnMs. Hogan:

mNamenMr. David Lujan  
mAddressnTonantzin Land Institute  
3907 Isleta Boulevard, SW  
Albuquerque, New Mexico 87105

mSalutationnMr. Lujan:

mNamenMr. Ian Root

mAddressnP.O. Box 23  
Lewis Run, Pennsylvania 16738  
mSalutationnMr. Root:

mNamenFederation President  
mAddressnArizona Wildlife Federation  
4330 N. 62nd Street  
Suite 102  
Scottsdale, Arizona 85251  
mSalutationnFederation President:

mNamenRegional Forester  
mAddressnUSDA Forest Service  
Southwestern Region (R-3)  
Federal Building  
517 Gold Avenue, SW  
Albuquerque, New Mexico 87102  
mSalutationnMr. Muniz: