UMTRA-DOE/AL -050504
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RAP Modification No. 4
Cooperative Agreement
No. DE-FC04-83AL16258

United States Department of Energy

Attachment 1

Modifications to the

Remedial Action Plan and Site Conceptual Design for Stabilization of the Inactive Uranium Mill Tailings Site at Shiprock, New Mexico

REVISED FINAL

October 1989

Uranium Mill Tailings Remedial Action Project UMTRAP

TO: BDeutsch/MNelson

FROM: JBrinkman/PLongmire/DMiller

DATE: December 16, 1986

SUBJECT: Meeting with Navajo Tribe and NRC on Shiprock Ground-Water

A meeting took place at the Shiprock site between the TAC/DOE, Navajo Nation and NRC to discuss current issues concerning ground-water contamination in the floodplain area adjacent to the Shiprock tailings site. At the onset of the meeting it was agreed that the latest ground-water and surface-water data need to be more fully evaluated to determine the relationships of contamination between the various sampling locations. Water table maps and iso-concentration maps need to be developed from these data.

The need for protective fencing for the floodplain was also addressed by both the Navajo Tribe and Mike Young of the NRC. They believe the floodplain must be protected from animal and human intrusion. This can be accomplished by installing a fence at the north and south ends of the floodplain from the escarpment to the San Juan River and along the escarpment wherever access could be obtained to the floodplain. The San Juan River would act as a natural barrier to access on the east side of the floodplain. It would not be appropriate to install a fence along the bank of the San Juan River as yearly flooding conditions would result in frequent maintenance and repair costs.

Both the NRC and the Navajo Nation believe that the ground water at the north boundary of the floodplain (the area northeast of the channel which cuts the floodplain) needs to be characterized for ground-water contamination and water levels. Further, upgradient water samples need to be collected between well locations 608/609 at the southern boundary of the floodplain, to more accurately determine background water-quality conditions. It appears that shallow ground water on the east side of the San Juan River is not contaminated due to the site, but high levels of TDS (6000 mg/l) and sulfate (3500 mg/l) are probably due to irrigation return flow. However, it was requested that additional shallow ground-water samples be collected across the San Juan River, adjacent to the floodplain. It was also requested that water samples be collected on adjacent sides of the San Juan River at the upgradient, cross-gradient and downgradient surface water locations.

It was agreed by all parties that the least costly and time consuming approach to install monitor wells and obtain water-sample/water-level data would be to use a backhoe to excavate into the gravel/alluvium and install well points. The Navajo representatives requested that this work be completed in one month. Approximately ten well points would need to be installed. The TAC/DOE representatives agree that the additional water quality and water-level data would better define the extent and movement of ground-water contamination. This information will greatly enhance

estimates of the natural movement of ground water to the San Juan River and the viability and cost/benefit of potential contaminant clean-up control scenarios.

A flowing artesian well is located on the fairground, north of the stabilized pile. This well has an output of approximately 40-300 gpm, depending on valve settings. The well has flowed for a number of years (≅ 1960 to the present). The well is completed in the Dakota/Morrison-Formation, which generally produces brackish water in the area. Masud Zaman, Director of the Navajo Water Resources, said he would investigate if there are water-quality data available for this well. Discharge of this well flows into the Bob Lee Wash, adjacent to the site, and is a source of recharge and ground-water mounding for the floodplain alluvial aquifer.

Two monitor wells are located at the top of the escarpment adjacent to the stabilized tailings pile. One of these wells does not have a protective metal casing nor is it capable of being locked. A one-inch diameter hole is in the top of the pvc cap, leaving the well open to environmental conditions. Mike Young also suggested that the NRC would recommend that monitor wells be installed to the north of the stabilized pile. This seems excessive because ground water within the Mancos Shale Formation on the escarpment is not currently being used and its potential use is none to minimal. Recharge of ground water to the floodplain of the San Juan River should be determined, and various scenarios for passive restoration and active aquifer restoration developed. The cost/benefit of these scenarios should be calculated. The additional data requested by the Navajo Tribe and NRC representatives will greatly enhance the validity and accuracy of the hydrological characterization of the site. Therefore, we recommend that the installation of approximately ten well points and additional water sampling be pursued as soon as possible.

DM/11

cc: DDubois through LStepp
DLechel
DLeske

DECEMBER 11, 1986

M-K OFFICE

	NAME	DEPT.	
1.	Stanley Pollack	Navajo Justice	
2.	Masood Zaman	NAV. DWR.	
3.	Carol J. Boughton	Navajo Water Resources	
4.	Jim Brinkman	TAC/DOE	
5.	Donald F. Leake	DOE	846-1236
6.	Tommy K Begay, Jr.	NAVAJO UNITRA	
7	Patrick Longmire	TAC/DOE	
8	Jim Angela	BIA/NAO	
9	David Miller	TAC/DOE.	
10	Richard Young	NRC/HQ	
11.	Perry Charley	Navajo Unitra	

MODIFICATION 4

TO THE

REMEDIAL ACTION PLAN

AND

SITE CONCEPTUAL DESIGN

FOR STABILIZATION OF THE INACTIVE URANIUM MILL TAILINGS

SITE AT SHIPROCK, NEW MEXICO

October 1989

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EXHIBITS

1.0 DESCRIPTION OF THE MODIFICATION

This document, Modification 4, consists of changes to the Shiprock Remedial Action Plan (RAP) that more completely describe the San Juan River floodplain groundwater conditions adjacent to the disposal cell and recommends interim restrictions to last until groundwater restoration decisions are finalized on the use of floodplain lands that contain contaminated groundwater. The updated groundwater data were obtained through investigations conducted subsequent to the publication of the final RAP.

In addition to revisions in the text of the RAP, a report containing the floodplain groundwater data and interpretation is included as Appendix E to the Processing Site Characterization Report (Exhibit 6) and supersedes the previous versions of Appendix E to the Processing Site Characterization Report.

Responses to letters from the U.S. Nuclear Regulatory Commission (NRC), the Navajo Nation, and the Bureau of Indian Affairs have been prepared and are included to address concerns related to the San Juan River floodplain.

2.0 NEED FOR THE MODIFICATION

This modification to the RAP is needed to address concerns that were expressed by the NRC, Navajo Nation, and Bureau of Indian Affairs in letters to the U.S. Department of Energy (DOE). Copies of the letters are included as Exhibits 1 and 2. The letters inquired about the extent of groundwater contamination in the floodplain, the risk posed to the public by the contaminated groundwater, and the DOE's plan for cleaning up the floodplain. Responses to the NRC, Navajo Nation, and Bureau of Indian Affairs comments are included as Exhibits 3 and 4. In letters from the DOE to the NRC, Navajo Nation, and Bureau of Indian Affairs (Exhibit 5), the DOE agreed to respond to the floodplain groundwater issues in a separate RAP modification.

3.0 RAP TEXT REVISIONS

Page 15, Section 3.6

Replace the last sentence of the second paragraph on page 16 with the following: "These seeps and a pond in the floodplain that may have been used to hold liquid mill effluent are the apparent sources of contaminated groundwater conditions in the alluvium. A complete description of groundwater conditions in the floodplain alluvium is contained in Appendix E to the Processing Site Characterization Report, dated August 1989."

Page 21, Section 4.4

Delete the first complete paragraph and the third paragraph on page 21. Replace the last paragraph on page 21 with the following:

> The background groundwater quality in the floodplain alluvium adjacent to the site is very similar to the quality of the San Juan River. The floodplain alluvium is physically separated from the Mancos Shale by an escarpment which is the discharge/evaporation boundary of the shallow system. During active milling there was discharge of contaminated water across the floodplain alluvium. This discharge was apparently the source of elevated concentrations of TDS, chloride, nitrate, sulfate, and uranium, which are found in groundwater in the floodplain alluvium. A complete description of groundwater conditions in the floodplain alluvium is contained in Appendix E of the Processing Site Characterization Report, dated February 1989. The sampling described in that document was done when the stage of the San Juan River represented average to below average flow conditions. The mean daily discharge for the two rounds of sampling ranged from 1460 to 2740 cfs. The two rounds of sampling were completed during the 1985 water year and the 1985 calendar year, for which the mean daily discharge had minimums of 920 cfs and 920 cfs; maximums of 12,700 cfs and 12,700 cfs; and means of 3,589 cfs and 3,688 cfs, respectively. Constituents, other than molybdenum and vanadium, on the opposite side of the river were at background concentrations.
>
> There is no current use of the floodplain groundwater, and the likelihood of future use is low because of the poor water quality and the availability of water from a municipal supply system. Considering the low likelihood of future use and the provisions for a surveillance and maintenance plan, further measures for water resources protection are not necessary at this time.

Page 23, Section 5.2

Add the following sentences at the end of the second paragraph in Section 5.2: "As the floodplain adjacent to the site will be included as part of the final disposal site, access will be restricted. Upon

promulgation of final EPA groundwater standards, the DOE will determine the potential for adverse effects on human health and the ervironment resulting from the contaminated groundwater in the floodplain."

Page E-6, Section E.2.2.2

Replace the sixth paragraph of Section E.2.2.2 with the following: "Discharge of tailings raffinate and mill drainage to the Bob Lee Wash and the floodplain alluvium adjacent to the Shiprock site during active processing resulted in soil and groundwater contamination. This contamination is also the result of tailings seepage through the Mancos Shale, as evidenced by seepage faces occurring along the escarpment.

EXHIBIT 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 8 1986

John G. Themelis, Project Manager
UMTRA Project Office
U.S. Department of Energy
Post Office Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Themelis:

We have reviewed Modification No. 3 to the Shiprock, New Mexico, Remedial Action Plan, transmitted to us by your letter dated May 29, 1986. The modification deals with the three remaining conditional concurrence issues, i.e. groundwater in the floodplain alluvium, radon barrier thickness, and seismic stability.

Based on the staff's review of the textual changes to the RAP and the detailed calculations and design pertinent to Change No. 14-Radon Barrier Thickness, we conclude that this change is acceptable and closes the Shiprock radon barrier conditional concurrence issue. Likewise, based on our review, we find that the proposed RAP changes presented in Change No. 15 - Seismic Stability of Embankment are acceptable and close the seismotectonic characterization conditional concurrence issue.

However, the staff's review of Change No. 13 has resulted in a conclusion that the proposed modification is inadequate to resolve NRC's concurrence contingency about the contaminated groundwater in floodplain alluvial sediments northeast of the Shiprock site. Enclosed are major and detailed comments on both the proposed action and Appendix E to the Shiprock Processing Site Characterization Report, and questions pertinent to the legal aspects of DOE's proposal.

Should you have any questions regarding this matter, please contact Dan Gillen of my staff at FTS 427-4160.

Malcolm R. Knapp, Chief
Low-Level Waste and Uranium
Recovery Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure:
As stated

ENCLOSURE

REVIEW OF SHIPROCK RAP MODIFICATION NO. 3,
CHANGE NO.13 AND APPENDIX E TO THE SHIPROCK PSCR

We endorse consideration of institutional controls, such as land use restrictions, to prevent human or environmental exposure to groundwater contaminated by uranium milling activities at UMTRAP sites. Implementation of institutional controls at the Shiprock site appears favorable because access to the contaminated area is limited by a natural cliff, the San Juan River, and one dirt road through the restricted Shiprock site; the floodplain sediments have been deposited in the current geomorphic setting and will probably be eroded in the next tens to hundreds of years; and a public water system is available locally for distribution of drinking water.

The proposed modification, however, does not adequately address how the proposed institutional controls will be effective in preventing human and environmental exposure. Under Section 4 of NRC's Standard Review Plan for RAP's, NRC must verify that proposed institutional controls will prevent exposure of human and environmental populations to contaminants. Problems with the current proposal include (1) lack of specific actions in the proposed RAP modification, (2) lack of consideration of the duration of the necessary control, (3) insufficient demonstration that the institutional controls fully encompass all contaminated groundwater that may pose potential hazards to humans and the environment, and (4) insufficient consideration of the legality of the proposed approach for preventing exposure to contaminated groundwater.

Major Comments

1. The language of the modification does not specify any particular course of action to restrict access to contaminated groundwater beneath the floodplain. This precludes an NRC finding that the proposed institutional controls will be effective in preventing exposure to the contaminants. The RAP modification should be amended to specify the measures that will be implemented to prevent human or environmental exposure to the contaminated groundwater. These measures could include documentation such as a deed notice about the groundwater contamination, deed notice prohibiting use of the groundwater, specific monitoring and enforcement provisions for the restriction, and letters of agreement from the Navajo Nation, the State of New Mexico, and other interested parties.

2. Section 4 of NRC's SRP requires NRC staff to verify that proposed institutional controls are accompanied by provisions for monitoring programs sufficient to determine the termination of water contamination hazards. Unlike the perpetual custody needed for the stabilized uranium tailings, NRC expects that institutional controls for groundwater contamination may be terminated in the future because the contamination should dissipate with time. Institutional controls for contaminated groundwater may be terminated after contaminant concentrations no longer pose a significant hazard to humans or the environment. The proposed modification, however, does not estimate the duration of the groundwater contamination hazard nor make provisions for monitoring programs sufficient to assess the duration of the hazard. The proposed modification should be revised to assess realistic ranges in the duration of the contamination hazard and to provide for monitoring programs to determine when the hazard has dissipated. The details of the monitoring programs, however, should be included in the Maintenance and Surveillance Plan for the Shiprock site.

3. Section 4 of NRC's SRP requires NRC reviewers to verify that proposed institutional controls encompass water contamination that may cause significant adverse impacts. The last line of the first paragraph proposed to be added to the end of paragraph 6 in Section 4.4 can be interpreted to imply that shallow groundwater on the north side of the San Juan River has been contaminated by molybdenum and vanadium. NRC staff considers it unlikely that shallow contaminated groundwater flows under the San Juan River from the floodplain sediments on the south side of the river. Nevertheless, it is logical to suspect uranium milling at Shiprock as a potential source of this contamination since vanadium and molybdenum are often associated with groundwater contamination from uranium tailings. The RAP should be modified to assess whether uranium milling has contaminated shallow groundwater on the north side of the San Juan River across from the Shiprock site, and if so, to what extent. In addition, because of flooding when the monitoring wells were installed, the extent of contamination in the floodplain sediments between the river and wells 601, 624 and 627 has not been characterized. The RAP should be modified to provide information related to these areas that adequately demonstrates that proposed institutional controls encompass the extent of contamination.

Questions on Legal Aspects

1. Does DOE have authority under UMTRCA to purchase property and water rights to prevent potential human and environmental exposure to contaminated groundwater?

2. If DOE does not have this authority, does the Navajo Nation or the State of New Mexico have authority to purchase and control property to prevent human and environmental exposure to groundwater contaminants?

3. What groundwater doctrine governs the allocation of tributary and non-tributary groundwater in the vicinity of the Shiprock site?

4. Is DOE's purchase and inclusion of the floodplain in the designated site consistent with the groundwater allocation doctrine for the Shiprock area?

5. Could a person use contaminated groundwater from beneath the Shiprock site if DOE owned and controlled the floodplain property?

6. What legal instruments would be required to establish institutional controls at the Shiprock site to prevent exposure of humans or the environment to contaminated groundwater?

7. What enforcement authorities exist to enforce a groundwater use prohibition at the Shiprock site? How effectively are these authorities likely to be enforced?

Detailed Comments

RAP Modification No. 3, Change No. 13

1. Potential Impacts on Surface Water Quality

The RAP, as proposed to be modified, does not evaluate the potential impacts of contaminated groundwater discharge on water quality in the San Juan River. This evaluation should be included in the RAP modification and should consider river flow rate data presented in the proposed change to Section 4.4.

2. Probability of Future Use

The second paragraph of the text to be added to the end of Section 4.4 states that the likelihood of future use of groundwater within the floodplain sediments is low because of the availability of a municipal water supply and because of the groundwater's "naturally poor quality." The natural quality of the groundwater, however, has not been reliably established. Appendix E to the Shiprock PSCR states that it is difficult to determine the background quality of groundwater within the floodplain sediments. Wells installed in the sediments hydraulically upgradient of the core of the groundwater contamination also indicated contamination. As a result, DOE has had to assume that the

background quality of groundwater within the floodplain is approximately the quality of water in the San Juan River. Consequently, background groundwater quality in the floodplain sediments has been very poorly established, if established at all. In addition, comparison of these assumed ranges of background concentrations indicate that the background quality of groundwater in the floodplain is better than the quality of other nearby sources of groundwater. Therefore, the RAP should delete "naturally poor quality" as a reason why potential use of groundwater within the floodplain sediments is expected to be low.

3. Necessity for Protective Measures

The last sentence proposed to be added to Section 4.4 states that further measures for water resources protection are not necessary and cites the absence of "toxic constituents" as a partial justification. This statement is inaccurate since the proposed inclusion of the floodplain in the designated site to prevent future exposure of humans and the environment to the contaminated groundwater is considered a protection measure. In addition, the statement about the absence of toxic constituents is not consistent with groundwater quality data from the floodplain sediments north of the site. These data indicate elevated concentrations of nitrate (up to 100 times the New Mexico State drinking water standard), fluoride (up to 7 times New Mexico standards), and uranium (not exceeding New Mexico's standard but up to more than 100 times EPA's advisory level for drinking water). The RAP should be modified to remove the statement that protective measures for water resources are not necessary and that contaminated groundwater does not contain toxic constituents.

4. Present Contamination

The proposed modification to Paragraph 6 of Section E.2.2.2 indicates that the source of contamination of groundwater in the floodplain sediments is existing seepage along the escarpment north of the site. The RAP should be revised to state whether contamination is presently occurring or whether it was primarily caused by past discharges. In addition, modifications to Sections E.2.2.2 and 3.6 should be consistent with one another with respect to the source(s) of groundwater contamination.

Comments on Appendix E, Shiprock PSCR

1. Groundwater Flow

Figure E.8 illustrates that groundwater flow in the floodplain sediments generally parallels flow directions in the San Juan River, but does not provide water level contours near the mouth of Bob Lee Wash (i.e., the ephemeral channel from N9000, E9500 to N10000, E9500). Close to the mouth, however, the water levels are higher than those in adjacent floodplain sediments closer to the river. This observation suggests that shallow groundwater flows through the sediments in Bob Lee Wash and recharges the alluvial sediments in the floodplain. This recharge may affect the duration and extent of groundwater contamination of the floodplain sediments, since the recharge originates from the highly contaminated terrace alluvium beneath the tailings piles and mill site. The appendix should be revised to assess whether the wash is recharging the groundwater system in the floodplain sediments and to evaluate the significance of such recharge to long-term contamination of floodplain sediments.

2. River Stage

Because of the proximity of the shallow groundwater system in the floodplain sediments to the San Juan River, groundwater flow in this system is expected to be highly transient in response to changes in river stages. The appendix does not provide river stages measured at the time when water levels were measured in the floodplain sediments in October and December of 1985. The appendix should be revised to provide such measurements if available, and future sampling should include concurrent river stage measurements.

3. Artesian Conditions

Based on the groundwater levels provided in Table E.2, it appears that wells 629, 630, and 633 are weakly artesian. The appendix, however, does not discuss the validity or significance of the artesian water levels in the context of vertical flow within the alluvial sediments. The artesian levels may indicate vertical upward flow from the Mancos Shale into the floodplain alluvium, indicating that this area is a regional or local discharge zone. The appendix should be revised to include an assessment of the significance of artesian water levels measured in these wells.

4. Water Level Measurements and Sampling

Table E.2 indicates that well(point) 601 was dry when water levels were measured on December 19, 1985. Table E.3 lists the analytical results from a sample collected in well 601 in October of 1984, thus indicating the presence of enough water in the well to collect a sample. If there was enough water in the well to sample, there should have been enough to measure a water level. However, the appendix does not provide a water level for well 601. The appendix should be revised to clarify why well 601 was sampled without measuring a water level.

5. Missing Constituents

Appendix E presents analytical results for water quality samples collected from groundwater within floodplain sediments along the San Juan River. Samples from the monitoring wells (wells 608-632), however, were not analyzed for concentrations of aluminum, antimony, arsenic, barium, chromium, cobalt, lead, mercury, nickel, organic carbon, lead-210, phosphate, polonium-210, radium-226, silica, silver, strontium, and thorium-230. The appendix should be revised to explain why these constituents were not analyzed for at least initial characterization of groundwater quality.

EXHIBIT 2

THE NAVAJO NATION

WINDOW ROCK, NAVAJO NATION (ARIZONA) 86515

PETERSON ZAH
CHAIRMAN, NAVAJO TRIBAL COUNCIL

EDWARD T. BEGAY
VICE CHAIRMAN, NAVAJO TRIBAL COUNCIL

August 21, 1986

John G. Themelis
Project Manager
Uranium mill Tailings Office
U. S. Department of Energy
Albuquerque, New Mexico

Dear Mr. Themelis:

Enclosed for your review are additional comments to the "Shiprock RAP Modification No. 3". Specifically, Change No. 13, Groundwater in Floodplain Alluvium.

Should you require additional information or have any questions, please do not hesitate to give me a call at 602/871-6594. We regret this delay. Your understanding and assistance is greatly appreciated.

Sincerely,

Tommy K. Begay, Jr.
Program Manager
UMTRA Project Navajo Site Program
Division of Resources
THE NAVAJO NATION

THE NAVAJO NATION

WINDOW ROCK, NAVAJO NATION (ARIZONA) 86515

PETERSON ZAH
CHAIRMAN, NAVAJO TRIBAL COUNCIL

EDWARD T. BEGAY
VICE CHAIRMAN, NAVAJO TRIBAL COUNCIL

August 21, 1986

MEMORANDUM

TO: Tommy E. Begay, Jr., Program Manager
Navajo UMTRA Project, Division of Resources

FROM: Masud Zaman, Director
Water Management Department

SUBJECT: MODIFICATION NO. 13 TO SHIPROCK TAILINGS REMEDIAL ACTION PLAN (RAP) I.E. DISCOVERY OF CONTAMINATED GROUNDWATER IN THE ALLUVIUM OF SAN JUAN RIVER FLOOD PLAIN.

Reference is made to your memorandum of June 10, 1986 along with the aforementioned subject document. As requested the Water Management Department staff has completed the review of the subject package and are pleased to submit the following comments for DOE'S consideration:

1. The document failed to establish an exact boundary of the contamination in the area e.g. well points 608 and 609 show very high contamination in the south eastern part. It seems that no effort was made to determine the water quality in the alluvium beyond these points.

Similarly, no efforts have been made to investigate the sandbar sandwiched between the river channel and the contaminated area already investigated (Figure E-8). Our analysis of groundwater elevations given in the figure E-8 indicates that the contaminated groundwater in the middle part is not totally stagnant but move's northward towards the sandbar and is not in anyway parallel to river flow.

We suggest that the sandbar area should be investigated to define the total extent of the contaminated area.

2. The document failed to provide the estimate of the volume of the contaminated water in the area and the amount of contaminated water being discharged to the surface flow of the river.

3. The document also failed to provide the true background water quality of the alluvial water in the area. The two well points, 631 and 632, located in the alluvium north of the river channel do not provide the true background quality of the alluvial water. That the water quality at these locations is very poor may be due to the explanation provided in this document or because of other reasons. But, an Indian Health Service (IHS)

1980-81 hydrologic investigation of the north bank alluvium plain of the river indicated that the alluvial water in the area is of good quality about a mile east southeast of well points 631 and 632 with total dissolved solids (TDS) ranging between 500 to 800 mg/l. Whatever the reason may be, it is a small area located either side north of the 666 bridge where the quality of the alluvial water is poor.

In the light of above, in order to establish a true background water quality in the alluvium, additional areas should be investigated e.g. area east southeast of the bridge on the north bank, Helium Plant Infiltration Gallery area southwest and the area southeast of well points 608 and 609 along the south bank of the San Juan River.

4. A statement on page 4, paragraph 3, that the surface water in the adjacent San Juan River is apparently not affected by contamination in the alluvium, i.e there is no detectable degradation of the river.

Please provide the analysis of water at the point of discharge of the contaminated water into the river and the surface water quality upstream and down stream of the point of discharge.

5. On page 4, paragraph 4, line 3 states that "however, chemical pollution from these sources at times of very low river flow would be significant."

a. What is that significant amount of contaminated groundwater to be introduced to surface water during the low river flow?

b. How will the NTUA water supply be impacted during the low flows at the point of withdrawal located at a short distance down gradient of contaminated area?

c. What is the DOE'S estimated low river flow?

6. A statement on page 4, paragraph 2 quotes the apparent contamination of groundwater across the San Juan River has limited importance for several reasons. Foremost is the fact that there is no use of this water, and utilization of the water is unlikely because of the availability of a better quality municipal supply. Another reason is that the other sources of contamination to the groundwater, both natural (leaching of salts from Mancos Shale) and man made (concentration of salts in irrigation return flow), tend to overshadow the effects of apparent contamination from the mill. Finally, there are no drinking water standards for either molybdenum or vanadium. This may be attributed to the fact that data on toxic effects in humans for the two elements are lacking.

Our analysis of the statement is as follows:

a. Under the existing conditions the first reasoning seems quite logical i.e alternate and better quality surface water is readily available against the poor quality groundwater for all practical uses. But, conditions may change in the future. The contaminated alluvial water in the questionable area, as proposed, could be restricted for human/livestock uses through institutional control or other means but, what about the

discharge of contaminated water through seepage into the main body of the river during the low flows and degrading the Public water supply as discussed in item 5 above? How will this problem be controlled?

b. Under the second reasoning that natural leaching from Mancos Shale and man made concentration of salts in irrigation return flow overshadow the effects of apparent contamination from mill. We disagree with the first part of this reasoning. As discussed in item 3 above that, except the small area near the bridge, alluvial water in rest of the area is of acceptable quality for all practical uses (IES 1981). Moverover, two existing Wells 12E-300D and 12E-300E both located approximately 2 miles north northwest of Shiprock (Location. Quad 17 11'65 X 13'40 miles and Quad 17-11'35 X 13'95 miles respectively) 14 and 20 feet deep respectively tap the alluvium of San Juan Floodplain. The water quality in both wells is good with TDS 762 and 493 mg/l respectively (data can be provided on request). If leaching from Mancos shale was the reason then all alluvial water in the area could have been contaminated but, that is not the case.

As far as the contamination from irrigation flow return is concerned, it may be true for certain areas but is not true for all alluvial water in the area.

NOTE: The Bureau of Reclamation (BOR) in cooperation with Navajo Division of Water Resources is in the process of starting a salinity study to determine the impact of irrigation return flow in the San Juan River between Hogback and Shiprock. This study will also reveal the contribution of salt to the shallow alluvial water from return flow.

Under the third reasoning, it is true that presently the standards for Vanadium and Molybdenum are lacking but, per amended Safe Drinking Water Act of May, 1986, the standard for these elements will be forthcoming within next three years.

However, there are at least preliminary indications that health effects for molybdenum and vanadium do occur at some yet undefined level.

Suggestions and Recommendations

1. Redefine the area contaminated by the milling operation including the sandbar area and the area southeast of well points 608 and 609.

2. Determine a true background chemical quality of the alluvial water in the area.

3. Determine the impacts of contaminated groundwater through seepage on the NTUA water supply in the San Juan River during the low flows.

4. If the institutional control of the contaminated area is the alternative DOE is planning to adopt then in that case a proper monitoring and surveillance program should be adopted so that long term changes could be noted and its impacts on the NTUA water supply in particular and on surface flow in general could be evaluated.

5. Finally, this would seem to be an appropriate time to point out that in 40 CFR 192.2 Standards for the Control of Residual Radioactive Materials call for control for a minimum of 200 years and up to 1,000 years. Because control is to be inherent in the design plan, monitoring after disposal is not required to demonstrate compliance.

   Since migration from the site has been detected during the final construction stages of the remedial action, it seems apparent that the plan may have some potentially fatal flaws. This should be the basis enough to call for a re-evaluation of the RAP to make sure that those designs flaws are identified and remediated if necessary.

Thank you for giving us a chance to review the subject document and regret the delay in submitting our comments. If you have any questions, please do not hesitate to call Carol Boughton or myself at 602/729-5281 or 729-5282.

Sincerely yours,

NAVAJO NATION

Masud Zaman, Director
Water Management Department
Division of Water Resources

MZ/gs

cc: Peter Deswood, Jr., Executive Director
Division of Water Resources

Mike Nelson, Staff Assistant
Chairman's Office

John MacKinnon, Attorney
Navajo Department of Justice

Stanley Pollack, Attorney
Navajo Department of Justice

THE NAVAJO NATION

August 12,1986

DLB 8/14

MEMORANDUM

TO : Tommy K. Begay, Jr., Program Manager
UMTRA Project Navajo Site Program

FROM : Navajo Fish and Wildlife Program
Division of Resources

SUBJECT : Comments of Modification No. 3 to the Shiprock Revised Final Remedial Action Plan, Change No. 13- Groundwater in Floodplain Alluvium

Due to recently discovered ground water contamination in floodplain alluvium adjacent to the Shiprock uranium mill tailings site, we support the proposed elimination of waterfowl ponds in the floodplain alluvium. Open waters would pose a potential threat to human health and completely blocking human access to the ponds would be impossible. In addition, though contamination levels in the ponds may not be toxic enough to be lethal to wildlife species such as waterfowl or to humans ingesting the birds, we do not advocate allowing any uranium mill tailings contamination in open waters or ground waters, whether lethal to wildlife or not.

The recent discovery of ground water floodplain alluvium contamination points up the fact that adequate initial testing may not have been done. These contamination conditions should have been discovered in the initial analysis of the site. The two wells, No. 631 and 632, which show uranium contamination, also show the extent to which ground water contamination can spread.

What are the alternative wildlife mitigation plans proposed to compensate for the loss of the waterfowl ponds? Are there any long range plans for possible future reinstatement of the ponds? Are there any plans to close off the contaminated seeps and pond in the floodplain alluvium to wildlife access?

An addition to the map on page 6 of the document "Appendix E to the Processing Site Characterization Report for the Uranium Mill Tailings Site at Shiprock, New Mexico, March, 1986" shows the control fence running from the escarpment to the San Juan River, blocking access to the waterfowl pond areas. The map also shows what appears to be a retention pond outside the new designated site inclusion. This pond should also be included in the designated site if it currently is not.

Sincerely,

Samuel F. Diswood

Samuel F. Diswood, Program Manager
Navajo Fish and Wildlife

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS

Navajo Area Office
Post Office Box M
Window Rock, Arizona 86515

IN REPLY REFER TO:

Environmental Quality

JUL - 1 1985

Mr. John G. Themelis
Project Manager
UMTRA Project Office
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Themelis:

The Revised Final, RAP Modification No. 3, Attachment 1, for the Stabilizatio. of the Inactive Uranium Mill Tailings Site at Shiprock, New Mexico has been reviewed by this office.

We respectfully submit the following comments for your consideration:

-Page 1, Section B., Paragraph 1

The last sentence of this paragraph states that "Constituents, other than molybdenum and vanadium on the other side of the river were at background concentrations." What were the levels of concentration, if any, of these elements (molybdenum/vanadium) on this (south?) side of the river? Should the levels measured to be of concern?

-Page 1, Section B., Paragraph 2

The second sentence of this paragraph states refers to an absence of **toxic constituents**, this does not appear to be consistent with the first paragraph of Section B.

Although the elevated concentrations of TDS, chloride, nitrate, sulfate, and uranium which were found were at levels less than those considered hazardous, they were present. May we suggest that these findings be acknowledged, and a statement that while they were existent that the levels at which they were present were not to be of concern.

Due to the highly technical nature of the remainder of the document, we have no additional comments and are dependent on your expertise in this area.

Thank you for the opportunity to review and comment on this document and with your response to our issues of concern, please consider this as our concurrence in the Revised Final, RAP Modification No. 3, Attachment 1, for the subject project.

Sincerely,

Area Director

Acting Assistant

EXHIBIT 3

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Detailed Comments,
RAP, Change No. 13

1. Potential Impacts on Surface Water Quality

   The RAP, as proposed to be modified, does not evaluate the potential impacts of contaminated groundwater discharge on water quality in the San Juan River. This evaluation should be included in the RAP modification and should consider river flow rate data presented in the proposed change to Section 4.4.

SECTION 2

Response: Change No. 13 By: P. Longmire - TAC

Date: June 14, 1988

1. Laboratory analyses of surface water collected along the San Juan River (north and south banks) adjacent to the Shiprock site show that contaminated alluvial groundwater has not adversely impacted the river. This groundwater is diluted by the San Juan River; concentrations of molybdenum, nitrate, sulfate, and uranium in the river are below proposed EPA maximum concentration limits (MCLs) for these constituents. Concentrations of these solutes are essentially the same along the north and south banks of the San Juan River. Surface water quality data are provided in Appendix E to the Shiprock Processing Site Characterization Report, dated August 1989.

Plans for Implementation:

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Major Comments

2. Section 4 of NRC's SRP requires NRC staff to verify that proposed institutional controls are accompanied by provisions for monitoring programs sufficient to determine the termination of water contamination hazards. Unlike the perpetual custody needed for the stabilized uranium tailings, NRC expects that institutional controls for groundwater contamination may be terminated in the future because the contamination should dissipate with time. Institutional controls for contaminated groundwater may be terminated after contaminant concentrations no longer pose a significant hazard to humans or the environment. The proposed modification, however, does not estimate the duration of the groundwater contamination hazard nor make provisions for monitoring programs sufficient to assess the duration of the hazard. The proposed modification should be revised to assess realistic ranges in the duration of the contamination hazard and to provide for monitoring programs to determine when the hazard was dissipated. The details of the monitoring programs, however, should be included in the Maintenance and Surveillance Plan for the Shiprock site.

SECTION 2

Response: Major Comments By: P. Longmire - TAC

Date: June 14, 1988

2. The DOE agrees with the NRC's comment No. 2 regarding institutional controls for groundwater contamination and that details of the monitoring programs should be included in the Maintenance and Surveillance Plan for the Shiprock site. If aquifer restoration is not performed on the floodplain alluvium, groundwater contamination may persist for several hundred years.

Plans for Implementation:

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Major Comments

3. Section 4 of NRC's SRP requires NRC reviewers to verify that proposed institutional controls encompass water contamination that may cause significant adverse impacts. The last line of the first paragraph proposed to be added to the end of paragraph 6 in Section 4.4 can be interpreted to imply that shallow groundwater on the north side of the San Juan River has been contaminated by molybdenum and vanadium. NRC staff considers it unlikely that shallow contaminated groundwater flows under the San Juan River from the floodplain sediments on the south side of the river. Nevertheless, it is logical to suspect uranium milling at Shiprock as a potential source of this contamination since vanadium and molybdenum are often associated with groundwater contamination from uranium tailings. The RAP should be modified to assess whether uranium milling has contaminated shallow groundwater on the north side of the San Juan River across from the Shiprock site, and if so, to what extent. In addition, because of flooding when the monitoring wells were installed, the extent of contamination in the floodplain sediments between the river and wells 601, 624, and 627 has not been characterized. The RAP should be modified to provide information related to these areas that adequately demonstrates that proposed institutional controls encompass the extent of contamination.

SECTION 2

Response: Major Comments By: P. Longmire - TAC

Date: June 14, 1988

3. Five additional well points were installed north of the San Juan River during February 1987 and January 1988. Laboratory analyses of water collected from these well points show that the groundwater is not contaminated, and groundwater is not flowing under the San Juan River. A complete discussion on water quality conditions of the floodplain alluvium is provided in Appendix E to the Shiprock Processing Site Characterization Report, dated August 1989. Five additional well points were installed north of the canal and south of the San Juan River. Water quality data collected from these well points show that groundwater is contaminated in this portion of the floodplain alluvium.

Plans for Implementation:

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SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Detailed Comments,
RAP, Change No. 13

2. Probability of Future Use

The second paragraph of the text to be added to the end of Section 4.4 states that the likelihood of future use of groundwater within the floodplain sediments is low because of the availability of a municipal water supply and because of the groundwater's "naturally poor quality." The natural quality of the groundwater, however, has not been reliably established. Appendix E to the Shiprock PSCR states that it is difficult to determine the background quality of groundwater within the floodplain sediments. Wells installed in the sediments hydraulically upgradient of the core of the groundwater contamination also indicated contamination. As a result, DOE has had to assume that the background quality of groundwater within the floodplain is approximately the quality of water in the San Juan River. Consequently, background groundwater quality in the floodplain sediments has been very poorly established, if established at all. In addition, comparison of these assumed ranges of background concentrations indicate that the background quality of groundwater in the floodplain is better than the quality of other nearby sources of groundwater. Therefore, the RAP should delete "naturally poor quality" as a reason why potential use of groundwater within the floodplain sediments is expected to be low.

SECTION 2

Response: Change No. 13 By: P. Longmire - TAC

Date: June 14, 1988

2. The phrase "naturally poor quality" of the floodplain alluvium in Section 4.4, paragraph 2, first sentence of the RAP has been deleted.

Plans for Implementation:

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Detailed Comments,
RAP, Change No. 13

3. Necessity for Protective Measures

The last sentence proposed to be added to Section 4.4 states that further measures for water resources protection are not necessary and cites the absence of "toxic constituents" as a partial justification. This statement is inaccurate since the proposed inclusion of the floodplain in the designated site to prevent future exposure of humans and the environment to the contaminated groundwater is considered a protection measure. In addition, the statement about the absence of toxic constituents is not consistent with groundwater quality data from the floodplain sediments north of the site. These data indicate elevated concentrations of nitrate (up to 100 times the New Mexico State drinking water standard), fluoride (up to 7 times New Mexico standards), and uranium (not exceeding New Mexico's standard but up to more than 100 times EPA's advisory level for drinking water). The RAP should be modified to remove the statement that protective measures for water resources are not necessary and that contaminated groundwater does not contain toxic constituents.

SECTION 2

Response: Change No. 13 By: R. Peel - TAC

Date: August 28, 1989

3. The DOE is in general agreement with the comment and appropriate revisions have been made. See Section 3.0, RAP Text Revisions.

Plans for Implementation:

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Detailed Comments,
RAP, Change No. 13

4. Present Contamination

The proposed modification to Paragraph 6 of Section E.2.2.2 indicates that the source of contamination of groundwater in the floodplain sediments is existing seepage along the escarpment north of the site. The RAP should be revised to state whether contamination is presently occurring or whether it was primarily caused by past discharges. In addition, modifications to Sections E.2.2.2 and 3.6 should be consistent with one another with respect to the source(s) of groundwater contamination.

SECTION 2

Response: Change No. 13 By: P. Longmire - TAC

Date: June 14, 1988

4. Sections 3.6 and E.2.2.2 of the RAP have been revised as stated in Section 3.0, Rap Text Changes.

Plans for Implementation:

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Appendix E, Shiprock PSCR

1. Groundwater Flow

Figure E.8 illustrates that groundwater flow in the floodplain sediments generally parallels flow directions in the San Juan River, but does not provide water level contours near the mouth of the Bob Lee Wash (i.e., the ephemeral channel from N9000, E9500 to N10000, E9500). Close to the mouth, however, the water levels are higher than those in adjacent floodplain sediments closer to the river. This observation suggests that shallow groundwater flows through the sediments in Bob Lee Wash and recharges the alluvial sediments in the floodplain. This recharge may affect the duration and extent of groundwater contamination of the floodplain sediments, since the recharge originates from the highly contaminated terrace alluvium beneath the tailings piles and mill site. The appendix should be revised to assess whether the wash is recharging the groundwater system in the floodplain sediments and to evaluate the significance of such recharge to long-term contamination of floodplain sediments.

SECTION 2

Response: Major Comments 1 By: P. Longmire - TAC

Date: June 14, 1988

1. Bob Lee Wash recharges the central portion of the floodplain alluvium, based on water-level measurements made in October 1985. In addition, discharge from a continuously flowing well (monitor well 648) completed in the Dakota Formation and located above the floodplain on the escarpment near the rodeo grounds flows into Bob Lee Wash. Ponded water resulting from this flow recharges the alluvium. This ponded water may leach contaminants from the soil due to past tailings raffinate discharge and serve as a source term for groundwater contamination with the floodplain alluvium. This recharge may have a long-term effect on alluvial groundwater quality. The effect of soil contamination within the floodplain alluvium is addressed in Appendix E to the Shiprock Processing Site Characterization Report, dated August, 1989.

Plans for Implementation:

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Site: Shiprock, New Mexico Date: August 8, 1986

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Commentor: Nuclear Regulatory Commission

Comment: Appendix E, Shiprock PSCR

2. River Stage

Because of the proximity of the shallow groundwater system in the floodplain sediments to the San Juan River, groundwater flow in this system is expected to be highly transient in response to changes in river stages. The appendix does not provide river stages measured at the time when water levels were measured in the floodplain sediments in October and December of 1985. The appendix should be revised to provide such measurements if available, and future sampling should include concurrent river stage measurements.

SECTION 2

Response: Appendix E By: P. Longmire - TAC

Date: June 14, 1988

2. Surface water elevations for the San Juan River were recorded in January 1988; these data are provided in Appendix E to the Shiprock Processing Site Characterization Report, August 1989. During January 1988, alluvial groundwater north of the river discharged to the river, where the elevation of the water table is higher than the river elevation. Surface water elevations were not recorded in October and December 1985. River stage data will be obtained in the future from the USGS for dates corresponding to the dates of water level measurements and sampling in the floodplain.

Plans for Implementation:

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SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

Document: Remedial Action Plan

Commentor: Nuclear Regulatory Commission

Comment: Appendix E, Shiprock PSCR

3. Artesian Conditions

Based on the groundwater levels provided in Table E.2, it appears that wells 629, 630, and 633 are weakly artesian. The appendix, however, does not discuss the validity of significance of the artesian water levels in the context of vertical flow within the alluvial sediments. The artesian levels may indicate vertical upward flow from the Mancos Shale into the floodplain alluvium, indicating that this area is a regional or local discharge zone. The appendix should be revised to include an assessment of the significance of artesian water levels measured in these wells.

SECTION 2

Response: Appendix E By: P. Longmire - TAC

Date: June 14, 1988

3. Alluvial monitor wells 629, 630, and 633 are weakly artesian, based on water level measurements tabulated in Table E.2 of Appendix E to the RAP. Inspection of water level measurements for well clusters 607-620-621-622-622, 602-617-618, 610-611, and 613-614 (Table E.2) shows that vertical gradients probably exist in these locations as well. The floodplain alluvium is probably a regional or local discharge zone for the underlying Mancos Shale. In addition, these vertical gradients inhibit downward migration of contaminants through the Mancos Shale, which are found in the overlying floodplain alluvium. These vertical gradients may also inhibit underflow beneath the San Juan River within the alluvial aquifer. Appendix E of the PSCR (included here as Exhibit 6) includes an assessment of the significance of artesian water levels measured in these monitor wells.

Plans for Implementation:

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Comment: Appendix E, Shiprock PSCR

4. Water Level Measurements and Sampling

Table E.2 indicates that well (point) 601 was dry when water levels were measured on December 19, 1985. Table E.3 lists the analytical results from a sample collected in well 601 in October of 1984, thus indicating the presence of enough water in the well to collect a sample. If there was enough water in the well to sample, there should have been enough to measure a water level. However, the appendix does not provide a water level for well 601. The appendix should be revised to clarify why well 601 was sampled without measuring a water level.

SECTION 2

Response: Appendix E By: P. Longmire - TAC

Date: June 14, 1988

4. A water level measurement was not taken at well point 601 during October 1984 for a reason that is unknown.

Plans for Implementation:

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SECTION 1

Site: Shiprock, New Mexico Date: August 8, 1986

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Commentor: Nuclear Regulatory Commission

Comment: Appendix E, Shiprock PSCR

5. Missing Constituents

Appendix E presents analytical results for water quality samples collected from groundwater within floodplain sediments along the San Juan River. Samples from the monitoring wells (wells 608-632), however, were not analyzed for concentrations of aluminum, antimony, arsenic, barium, chromium, cobalt, lead, mercury, nickel, organic carbon, lead-210, phosphate, polonium-210, radium-226, silica, silver, strontium, and thorium-230. The appendix should be revised to explain why these constituents were not analyzed for at least initial characterization of groundwater quality.

SECTION 2

Response: Appendix E By: P. Longmire - TAC

Date: June 14, 1988

5. Monitor wells 608 through 632 were not analyzed for concentrations of aluminum, antimony, arsenic, barium, chromium, cobalt, lead, mercury, nickel, organic carbon, lead-210, phosphate, polonium-210, radium-226, silica, silver, strontium, and thorium-230. Tailings leachate within the floodplain alluvium is characterized by elevated (above background levels) concentrations of chloride, fluoride, molybdenum, nitrate, sulfate, total dissolved solids, uranium, and vanadium. Although the above species, which were not analyzed, contribute to a complete chemical analysis, the reported water quality data are adequate for characterizing water quality conditions within the floodplain alluvium. Additional and complete chemical analyses, with geochemical discussions, are provided in Appendix E to the Shiprock Processing Site Characterization Report, dated August 1989.

Plans for Implementation:

EXHIBIT 4

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 21, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Masud Zaman, The Navajo Nation

Comment: 1

The document failed to establish an exact boundary of the contamination in the area e.g. well points 608 and 609 show very high contamination in the southeastern part. It seems that no effort was made to determine the water quality in the alluvium beyond these points.

Similarly, no efforts have been made to investigate the sandbar sandwiched between the river channel and the contaminated area already investigated (Figure E-8). Our analysis of groundwater elevations given in the figure E-8 indicates that the contaminated groundwater in the middle part is not totally stagnant but moves northward toward the sandbar and is not in anyway parallel to river flow.

We suggest that the sandbar area should be investigated to define the total extent of the contaminated area.

SECTION 2

Response: _____ By: P. Longmire, TAC

Date: March 8, 1989

The DOE has characterized the hydrogeology of the floodplain alluvium adjacent to the San Juan River. The results of this investigation are provided in Exhibit 6, Floodplain Groundwater Characterization. Groundwater contamination from past discharges is present south of the San Juan River within the floodplain alluvium.

Plans for Implementation:

See response.

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 21, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Masud Zaman, The Navajo Nation

Comment: 2

The document failed to provide the estimate of the volume of the contaminated water in the area and the amount of contaminated water being discharged to the surface flow of the river.

SECTION 2

Response: _____ By: P. Longmire, TAC

Date: March 8, 1989

See response to comment 5.

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 21, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Masud Zaman, The Navajo Nation

Comment: 3

The document also failed to provide the true background water quality of the alluvial water in the area. The two well points, 631 and 632, located in the alluvium north of the river channel do not provide the true background quality of the alluvial water. That the water quality at these locations is very poor may be due to the explanation provided in this document or because of other reasons. But, an Indian Health (IHS) 1980-81 hydrologic investigation of the north bank alluvium plain of the river indicated that the alluvial water in the area is of good quality about a mile east southeast of well points 631 and 632 with total dissolved solids (TDS) ranging between 500 to 800 mg/l. Whatever the reason may be, it is a small area located either side north of the 666 bridge where the quality of the alluvial water is poor.

In the light of above, in order to establish a true background water quality in the alluvium, additional areas should be investigated e.g. area east southeast of the bridge on the north bank, Helium Plant Infiltration Gallery area southwest and the area southeast of well points 608 and 609 along the south bank of the San Juan River.

SECTION 2

Response: By: P. Longmire, TAC

Date: March 8, 1989

Monitor wells 634 and 645 are upgradient from the contaminated floodplain alluvium; monitor well 634 is north of the San Juan River, approximately one mile east of the stabilized tailings pile and monitoring well 645 is in the southeast portion of the floodplain alluvium adjacent to the San Juan River. The total dissolved solids (TDS) of water samples collected from monitoring wells 634 and 645 are 807 mg/l and 645 mg/l, respectively. These values are the lowest in the area and represent background water quality. Additionally, well points 638, 639, 670, 671, and 672 were installed along the north side of the San Juan River where the TDS ranged between 2,090 mg/l and 3,210 mg/l.

Plans for Implementation:

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SECTION 1

Site: Shiprock, New Mexico Date: August 21, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Masud Zaman, The Navajo Nation

Comment: 4

A statement on page 4, paragraph 3, that the surface water in the adjacent San Juan River is apparently not affected by contamination in the alluvium, i.e. there is no detectable degradation of the river.

Please provide the analysis of water at the point of discharge of the contaminated water into the river and the surface water quality upstream and downstream of the point of discharge.

SECTION 2

Response: _____ By: P. Longmire, TAC

Date: March 8, 1989

Surface-water samples collected in 1987 from the San Juan River do not contain concentrations of nitrate, molybdenum, uranium, and other contaminates above EPA MCLs. These data, provided in the report, show that contaminated groundwater has not impacted surface-water quality of the San Juan River.

Plans for Implementation:

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 21, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Masud Zaman, The Navajo Nation

Comment: 5

On page 4, paragraph 4, line 3 states that "however, chemical pollution from these sources at times of very low river flow would be significant."

a. What is that significant amount of contaminated groundwater to be introduced to surface water during the low river flow?

b. How will the NTUA water supply be impacted during the low flows at the point of withdrawal located at a short distance downgradient of contaminated area?

c. What is the DOE's estimated low river flow?

SECTION 2

Response: By: J. Dupuy, TAC

Date: August 15, 1989

The statement on page 4, paragraph 4 in the March, 1986 version of the PSCR regarding surface-water quality and discharging contaminated groundwater is incorrect. Surface-water quality collected in periods of low flow (early spring 1987) show no evidence of contamination. Sampling took place in March and May 1987. The contribution of contaminated groundwater from the floodplain on the water quality of the San Juan River may be quantitatively estimated as follows:

Assume:

1. Contaminated groundwater enters the San Juan River along the length of the floodplain equal to the distance from monitor well 603 to well point 640, i.e. 4,900 feet (ft) (Fig. 1.1).

2. This contaminated groundwater flows from the floodplain into the river under a hydraulic gradient equal to the steepest hydraulic gradient measured for groundwater in the floodplain, i.e. 0.01 (Fig. 3.1).

SECTION 2 (con't).

Response: _____ By: J. Dupuy, TAC

Date: August 15, 1989

3. The saturated floodplain deposits are 15 feet thick (DOE 1986, Remedial Action Plan).

4. The saturated hydraulic conductivity of the floodplain deposits is assumed to be equal to the value reported for coarse sand, i.e. 15 ft/day (Todd, Groundwater Hydrology, 1980).

5. The San Juan River has a 62-year, low-flow average of 400 cubic feet per second (cfs) at Shiprock (per conversation with J. Schaffer, USGS, July 1989).

6. The water quality effects of mixing contaminated alluvial groundwater with San Juan River water may be calculated through the use of a simple mixing-cell model.

Calculations:

1. Contaminated floodplain groundwater flux into San Juan River.

$Q = KiA$
$= (15 \text{ ft/day}) (0.01) (4{,}900 \text{ ft}) (15 \text{ ft})$
$= 11{,}025 \text{ ft}^3/\text{day}$
$= 0.13 \text{ cfs}$

2. Mixing Cell Model $C_f = \dfrac{Q_1C_1 + Q_2C_2}{Q_1 + Q_2}$

Where:

C_f = resulting concentration
Q_1 = discharge fom contaminated floodplain, 0.13 cfs
C_1 = highest reported concentration of sulfate from floodplain samples, 36,900 mg/l
Q_2 = discharge from San Juan River, 400 cfs
C_2 = highest reported concentration of sulfate from San Juan River samples, 75 mg/l

$C_f = \dfrac{(0.13 \text{ cfs}) (36{,}900 \text{ mg/l}) + (400 \text{ cfs}) (75 \text{ mg/l})}{(0.13 \text{ cfs} + 400 \text{ cfs})}$

$= 87 \text{ mg/l}$

The estimated conservative impacts of contaminated floodplain groundwater on the water quality of the San Juan River are small. Sulfate concentration in the San Juan River after addition of groundwater from the floodplain is sixteen (16) percent higher than the concentration prior to addition of floodplain groundwater. The value (87 mg/l) is still well below the EPA and State of New Mexico Secondary Drinking Water Standard recommended maximum concentration of 250 mg/l. Therefore, the NTUA water supply will not be affected.

Plans for Implementation:

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SECTION 1

Site: Shiprock, New Mexico Date: August 21, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Masud Zaman, The Navajo Nation

Comment: 6

A statement on page 4, paragraph 2 quotes the apparent contamination of groundwater across the San Juan River has limited importance for several reasons. Foremost is the fact that there is no use of this water, and utilization of the water is unlikely because of the availability of a better quality municipal supply. Another reason is that the other sources of contamination to the groundwater, both natural (leaching of salts from Mancos Shale) and man made (concentration of salts in irrigation return flow), tend to overshadow the effects of apparent contamination from the mill. Finally, there are no drinking water standards for either molybdenum or vanadium. This may be attributed to the fact that data on toxic effects in humans for the two elements are lacking.

Our analysis of the statement follows:

a. Under the existing conditions the first reasoning seems quite logical i.e. alternate and better quality surface water is readily available against the poor quality groundwater for all practical uses. But, conditions may change in the future. The contaminated alluvial water in the questionable area, as proposed, could be restricted for human/livestock uses through institutional control or other means but, what about the discharge of contaminated water through seepage into the main body of the river during the low flows and degrading the public water supply as discussed in items 5 above? How will this problem be controlled?

b. Under the second reasoning that natural leaching from Mancos Shale and man made concentration of salts in irrigation return flow overshadow the effects of apparent contamination from mill. We disagree with the first part of this reasoning. As discussed in item 3 above that, except the small area near the bridge, alluvial water in rest of the area is of acceptable quality for all practical uses (IHS 1981). Moreover, two existing Wells 12K-300D and 12K-300E both located approximately 2 miles north northwest of Shiprock (Location. Quad 17 11^{0} 65 x 13^{0} x 40 miles and Quad 17-11^{0} 35 x 13^{0}95 miles respectively) 14 and 20 feet deep respectively tap the alluvium of San Juan Floodplain. The water quality in both wells is good with TDS 762 and 493 mg/l respectively (data can be provided on request). If leaching from Mancos shale was the reason then all alluvial water in the area could have been contaminated but, that is not the case.

As far as the contamination from irrigation flow return is concerned, it may be true for certain areas but is not true for all alluvial water in the area.

SECTION 1

NOTE: The Bureau of Reclamation (BOR) in cooperation with Navajo Division of Water Resources is in the process of starting a salinity study to determine the impact of irrigation return flow in the San Juan River between Hogback and Shiprock. This study will also reveal the contribution of salt to the shallow alluvial water from return flow.

Under the third reasoning, it is true that presently the standards for Vanadium and Molybdenum are lacking but, per amended Safe Drinking Water Act of May, 1986, the standard for these elements will be forthcoming within next three years.

However, there are at least preliminary indications that health effects for molybdenum and vanadium do occur at some yet undefined level.

Suggestions and Recommendations

1. Redefine the area contaminated by the milling operation including the sandbar area and the area southeast of well points 608 and 609.

2. Determine a true background chemical quality of the alluvial water in the area.

3. Determine the impacts of contaminated groundwater through seepage on the NTUA water supply in the San Juan River during the low flows.

4 If the institutional control of the contaminated area is the alternative DOE is planning to adopt then in that case a proper monitoring and surveillance program should be adopted so that long term changes could be noted and its impacts on the NTUA water supply in particular and on surface flow in general could be evaluated.

5. Finally, this would seem to be an appropriate time to point out that in 40 CFR 192.2 Standards for the Control of Residual Radioactive Materials call for control for a minimum of 200 years and up to 1,000 years. Because control is to be inherent in the design plan, monitoring after disposal is not required to demonsirate compliance.

   Since migration from the site has been detected during the final construction stages of the remedial action, it seems apparent that the plan may have some potentially fatal flaws. This should be the basis enough to call for a reevaluation of the RAP to make sure that those designs flaws are identified and remediated if necessary.

UMTRA DOCUMENT REVIEW FORM

SECTION 2

Response: Comment 6 By: P. Longmire, TAC

Date: March 8, 1989

6a. During periods of low flow, the San Juan River is not impacted by discharge of contaminated groundwater. Contaminated groundwater associated with tailings leachate only occurs south of the San Juan River.

6b. Water quality within the floodplain alluvium is variable; groundwater samples collected from background monitoring wells (634 and 645) contain TDS values ranging from 600 to 850 mg/l. Impacts of Mancos Shale on alluvial groundwater are not completely understood adjacent to the Shiprock site. The DOE agrees with your comment regarding the variability of water quality in the floodplain alluvium. Impacts of irrigation return flow on alluvial water quality probably affects groundwater immediately subjacent to the irrigation ditch. This concept has not been verified because of a paucity of groundwater monitoring wells adjacent to the Shiprock site.

Plans for Implementation:

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 2

Date: March 8, 1989 By: Pat Longmire

Response: Summary of the DOE Investigations, Comment 6 Suggestions and Recommendations

The DOE has redefined the zone of contaminated groundwater within the floodplain alluvium south the San Juan River. Tailings leachate within the floodplain alluvium discharges to the San Juan River with no detectable impacts on surface water quality during periods of low flow.

Background water quality within the floodplain alluvium adjacent to the Shiprock site has been established. The concentration of TDS in background groundwater in the floodplain alluvium ranges between 600 and 850 mg/l.

The NTUA water supply is not being impacted by discharge of tailings leachate to the San Juan River, based on several rounds of surface-water samples collected at the site. Concentrations of molybdenum, nitrate, and uranium within discharging, contaminated groundwater are below EPA maximum concentration limits for these constituents.

A long-term, environmental-monitoring program will be addressed in the surveillance and maintenance document for the Shiprock site. This program will focus on groundwater and surface-water quality conditions at the site.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 12, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Samuel Diswood, Navajo Nation

Comment: Paragraph 2

The recent discovery of groundwater floodplain alluvium contamination points up the fact that adequate initial testing may not have been done. These contamination conditions should have been discovered in the initial analysis of the site. The two wells, No. 631 and 632, which show uranium contamination, also show the extent to which groundwater contamination can spread.

SECTION 2

Response: Paragraph 2 By: B. Peel, TAC

Date: June 27, 1989

We agree that the initial characterization did not identify the full extent of the floodplain contamination. However, the initial studies were intended to be only a screening investigation to confirm the nature of the problem. The follow-up investigations were much more comprehensive and were based on the results of the earlier study. Results of the most recent investigations are presented in Exhibit 6, Floodplain Groundwater Characterization.

Plans for Implementation:

See response.

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 12, 1986

Document: Remedial Action Plan, Change No. 3

Commentor: Samuel Diswood, Navajo Nation

Comment: Paragraph 3

What are the alternative wildlife mitigation plans proposed to compensate for the loss of the waterfowl ponds? Are there any long range plans for possible future reinstatement of the ponds? Are there any plans to close off the contaminated seeps and pond in the floodplain alluvium to wildlife access?

SECTION 2

Response: Paragraph 3 By: R. Peel, TAC

Date: June 27, 1989

At this time the Department of Energy does not plan additional wildlife mitigation activities to compensate for loss of the waterfowl ponds. The ponds were found to contain contaminated water due to inflow of contaminated groundwater from the surrounding floodplain. The contaminated seeps and ponds have been backfilled with the concurrence of the Navajo Nation and further action is not needed at this time. After the proposed EPA groundwater protection standards are finalized, the DOE will address the need for groundwater remediation in a program separate from the current UMTRA Project. The DOE may then reconsider the need for additional wildlife mitigation efforts.

Plans for Implementation:

See response.

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: August 12, 1986

Document: Remedial Action Plan, Change No. 13

Commentor: Samuel Diswood, Navajo Nation

Comment: Paragraph 4

An addition to the map on page 6 of the document, "Appendix E to the Processing Site Characterization Report for the Uranium Mill Tailings Site at Shiprock, New Mexico, March, 1986" shows the control fence running from the escarpment to the San Juan River, blocking access to the waterfowl pond areas. The map also shows what appears to be a retention pond outside the new designated site inclusion. This pond should also be included in the designated site if it currently is not.

SECTION 2

Response: Paragraph 4 By: R. Peel, TAC

Date: June 27, 1989

A larger area will be included in the final disposal site boundary. This boundary will be described in the Final Surveillance and Maintenance Plan to be issued within a few months.

Plans for Implementation:

See response.

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: July 1, 1985

Document: Remedial Action Plan, Mod. 3

Commentor: Department of the Interior-BIA

-Page 1, Section B., Paragraph 1

The last sentence of this paragraph states that "Constituents, other than molybdenum and vanadium on the other side of the river were at background concentrations" What were the levels of concentration, if any, of these elements (molybdenum/vanadium) on this (south?) side of the river? Should the levels measured to be of concern?

SECTION 2

Response: _____ By: J. Dupuy - TAC

Date: October 9, 1989

Measured concentrations of molybdenum and vanadium, within the contaminated floodplain groundwater on the south side of the river, ranged between 0.01 mg/l to 0.50, mg/l for molybdenum, and 0.01 mg/l to 0.60 mg/l for vanadium. Because withdrawals of this contaminated floodplain groundwater are restricted and this contaminated groundwater is diluted to below background concentrations in the San Juan River, there is no present concern.

Plans for Implementation:

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Shiprock, New Mexico Date: July 1, 1985

Document: Remedial Action Plan, Mod. 3

Commentor: Department of the Interior - BIA

-Page 1, Section B., Paragraph 2

The second sentence of this paragraph states refers to an absence of toxic constituents, this does not appear to be consistent with the first paragraph of Section B.

Although the elevated concentrations of TDS, chloride, nitrate, sulfate, and uranium which were found were at levels less than those considered hazardous, they were present. May we suggest that these findings be acknowledged, and a statement that while they were existent that the levels at which they were present were not to be of concern.

SECTION 2

Response: _____ By: R. Peel - TAC

Date: October 9, 1989

The DOE is in general agreement with the comment and appropriate revisions have been made. See Section 3.0, RAP Text Revisions.

Plans for Implementation:

SECTION 3

Confirmation of Implementation:

Checked by: _____ Date: _____

Approved by: _____ Date: _____

EXHIBIT 5

UMTRA/NRC-0486-002

2.2.5
SHP

SEP 23 1986

DM:NO-14
DOCU CONTROL/SHP

Mr. Malcolm R. Knapp
Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Springs, MD 20910

Dear Mr. Knapp:

Per your letter of August 8, 1986, the NRC concurs with Changes No. 14 and No. 15 presented in Modification No. 3 to the Shiprock, New Mexico, Remedial Action Plan (RAP). Both the Navajo Nation and the Bureau of Indian Affairs (BIA) have also indicated their acceptance of these two changes and, like the NRC, have extensive comments regarding Change No. 13.

Because it will take several weeks to adequately respond to Tribe/Agency comments on Change No. 13, the DOE has chosen to issue Modification No. 3A, which contains only Changes No. 14 and No. 15. Change No. 13 will be re-issued at a later date as Modification No. 4.

Therefore, enclosed are four copies of Modification No. 3A. Also enclosed for your execution are four original signature pages.

Please sign the enclosed pages, indicating your concurrence with Modification No. 3A, and return them to this office as soon as possible so that they may be forwarded to the Navajo Nation and the BIA for execution. Following execution of the signature pages by all parties, a modification to Cooperative Agreement No. DE-FC04-83AL16258 between DOE and the Navajo Tribe will be executed to incorporate Modification No. 3A as part of the cooperative agreement.

Should you have questions regarding this matter, please contact Deborah Mann of my staff at FTS 846-1243.

Sincerely,

Original Signed by

John G. Themelis, Project Manager
Uranium Mill Tailings Project Office

Enclosures (8)

cc w/o enclosures:
L. Stepp, JBG
J. Oldham, MK-F
J. Royal, CIRD
D. Gillen, NRC
F. Bosiljevac, UMTRA

CONCURRENCES	
RTG SYMBOL	UMTRA:PBC
INITIALS/SIG	MANN dlm
DATE	9/23/86
RTG SYMBOL	UMTRA
INITIALS/SIG	BOSILJEVAC
DATE	9/22/86
RTG SYMBOL	UMTRA
INITIALS/SIG	D'ANTONIO
DATE	9/22/86
RTG SYMBOL	UMTRA
INITIALS/SIG	ARTHUR
DATE	9/24/86
RTG SYMBOL	UMTRA
INITIALS/SIG	THEMELIS
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(7-79)

OFFICIAL FILE COPY

UNITRAT-1110-003 SHIPROCK

OCT 28 1986

Mr. Charles Damon
Executive Director
Div. of Resources
The Navajo Nation
P.O. Box 308
Window Rock, AZ 86515

Attention: Mr. Tommy Begay

Dear Mr. Damon:

On July 24, 1986, your office submitted comments on Modification No. 3 to the Shiprock Remedial Action Plan. On August 12, 1986, we transmitted to you responses to those comments. We believe that the responses adequately addressed the Navajo Nation comments and that no unresolved issues remain regarding this particular set of comments. On August 21, 1986, additional comments on Modification No. 3 were submitted by your office. All of these additional comments related only to Change No. 13, Groundwater in Floodplain Alluvium. Therefore, the DOE assumes that, since the July 24 comments have been resolved, the Navajo Nation concurs with Change No. 14, Radon Barrier Thickness, and Change No. 15, Seismic Stability of Embankment.

Both the NRC and the BIA have indicated their acceptance of Changes No. 14 and No. 15 and, like the Navajo Nation, both agencies have extensive comments regarding Change No. 13. Because it will take several weeks to adequately respond to Tribe/Agency comments on Change No. 13, the DOE has chosen to issue Modification No. 3A, which contains only Changes No. 14 and No. 15, in order to obtain final concurrence and close the issues addressed in these two changes. Change No. 13 will be re-issued at a later date as Modification No. 4.

Enclosed for your files is one copy of Modification No. 3A. As Deborah Mann has discussed with Tommy Begay of your staff, four original signature pages for your execution will be forwarded to you from the BIA after Mr. Wilson Barber has signed them.

Upon receipt of the signature pages, please sign them, indicating your concurrence with Modification No. 3A, and return them to this office as soon as possible. Following execution of the signature pages by all parties, a modification to Cooperative Agreement No. DE-FC04-83AL16258 between DOE and the Navajo Tribe will be executed to incorporate Modification No. 3A as part of the Cooperative Agreement.

BOSILEVA	
DATE	10/28/86
RTG SYMBOL	UMTRA
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ARTHUR	
DATE	10/28/86
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INITIALS/SIG	
THEMELIS	
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D'ANTONIO	
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DOE F 1325.10 (7-79)

OFFICIAL FILE COPY

Should you have questions regarding this matter, please contact Deborah Mann of my staff at (505) 846-1243.

Sincerely,

Original Signed by:

John R. D'Antonio, Operations Group Leader
Uranium Mill Tailings Project Office

Enclosure

cc w/c enclosure:
L. Stepp, JEG
J. Oldham, MK-E
G. Dixson, CIRD
F. Bosiljevac, UMTRA

Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

JUL 14 1986

Mr. Wilson Barber
Area Director
Navajo Area Office
Bureau of Indian Affairs
P.O. Box M
Window Rock, AZ 86515

Dear Mr. Barber:

Per your letter of July 1, 1986, the BIA's issues of concern regarding the Revised, Final RAP Modification No. 3, Attachment 1, for the Stabilization of the Inactive Mill Tailings site at Shiprock, New Mexico, relate to Change No. 13, Groundwater in Floodplain Alluvium. No issues of concern were presented on Change No. 14, Radon Barrier Thickness, or Change No. 15, Seismic Stability of Embankment; therefore, the DOE assumes that the BIA concurs with these two changes.

Both the NRC and the Navajo Nation have indicated their acceptance of Changes No. 14 and No. 15, and both agencies have extensive comments on Change No. 13. Because it will take several weeks to adequately respond to Tribe/Agency comments on Change No. 13, the DOE has chosen to issue Modification No. 3A, which contains only Change No. 14 and No. 15, in order to obtain final concurrence and close the issues addressed in these two changes. Change No. 13 will be re-issued at a later date as Modification No. 4.

Therefore, enclosed for your files is one copy of Modification No. 3A. Also enclosed for your execution are four original signature pages.

Please sign the enclosed pages, indicating your concurrence with Modification No. 3A, and return them to this office as soon as possible so that they may be forwarded to the Navajo Nation for execution. Following execution of the signature page by all parties, a modification to Cooperative Agreement No. DE-FC04-83AL16258 between DOE and the Navajo Tribe will be executed to incorporate Modification No. 3A as part of the cooperative agreement.

Should you have questions regarding this matter, please contact Deborah Mann of my staff at (505) 846-1243.

Sincerely,

John G. Themelis, Project Manager
Uranium Mill Tailings Project Office

Enclosures (5)

cc w/o enclosures:
L. Stepp, JEG
J. Oldham, MK-F
T. Coalson, CIRD
F. Bosiljevac, UMTRA
T. Begay, NN

EXHIBIT 6

FLOODPLAIN GROUNDWATER CHARACTERIZATION

APPENDIX E OF THE SHIPROCK PROCESSING SITE CHARACTERIZATION REPORT

SHIPROCK, NEW MEXICO

INACTIVE URANIUM MILL TAILINGS SITE

AUGUST 1989

TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

The discharge of uranium tailings raffinate to Bob Lee Wash and the floodplain alluvium while the Shiprock uranium processing site was active resulted in groundwater contamination in the floodplain alluvium south of the San Juan River. Tailings raffinate initially was discharged to the floodplain alluvium in 1954 (DOE, 1984); the discharge continued for an undetermined amount of time.

The purpose of this report is to discuss additional groundwater monitoring data collected in the floodplain alluvium and to investigate the potential for underflow of contaminated groundwater beneath the San Juan River. Groundwater quality data and the migration of several solutes (including fluoride, sulfate, uranium, vanadium, molybdenum, nitrate, and total dissolved solids) are addressed.

Thirteen well points (numbers 638-647 and 670-672) were installed to supplement the 31 existing monitor wells. Five of these well points were installed on the north side of the San Juan River near and within the residential area. All well points were installed near and along the San Juan River to monitor groundwater quality and water levels in the floodplain alluvium (Figure 1.1). The well points consist of a steel five-foot well screen, a five- to ten-foot steel blank, and a locking cap. Interpretation of groundwater quality data is based on the average concentrations from rounds of samples collected by the Technical Assistance Contractor (TAC) to the DOE.

Conclusions presented in this report are that:

a) No transverse flow of groundwater can occur beneath the river, because in this reach the river serves as a line discharge for groundwater from the alluvium on both sides.

b) Both the lack of transverse underflow and the high contrast in solute concentrations between the south and north sides of the river support the conclusion that contaminants are not being transported to the north side by groundwater.

c) Additional protection of public health is the result, since all the nearby residents north of the river receive treated municipal surface water for domestic use from the town of Shiprock.

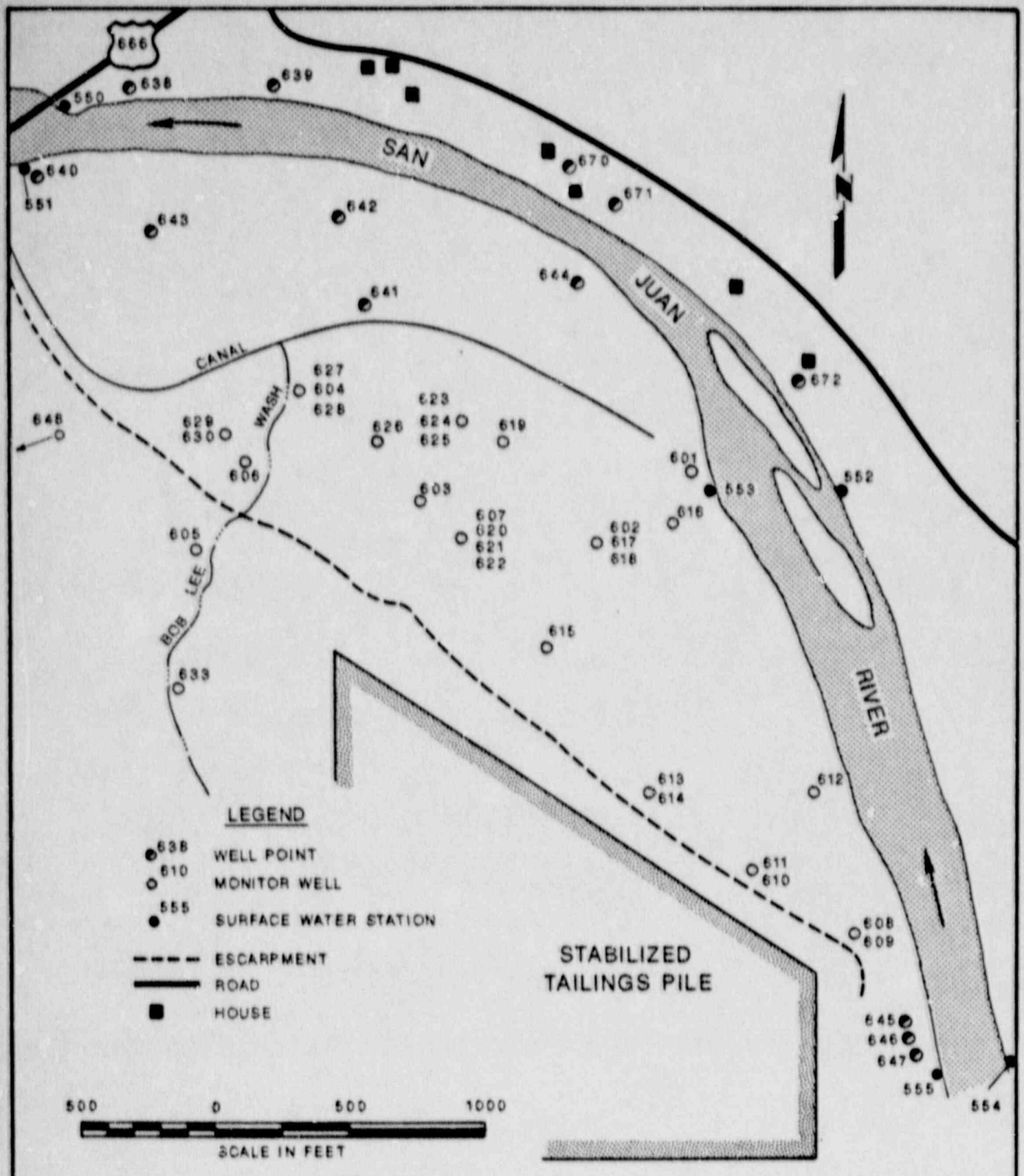

FIGURE 1.1

LOCATIONS OF FLOODPLAIN MONITOR WELLS, WELL POINTS, AND SURFACE-WATER STATIONS ADJACENT TO SHIPROCK TAILINGS SITE SHIPROCK, NEW MEXICO

2.0 WATER USE

Several residents immediately north of the San Juan River, across from the contaminated floodplain alluvium, use surface water for domestic purposes. This treated San Juan River water is provided to the residents by the town of Shiprock. A field search and inquiries have revealed no existing domestic or other wells north or south in the floodplain alluvium of the San Juan River near the residential area.

3.0 GROUNDWATER FLOW

A water table map for the floodplain alluvium adjacent to the Shiprock tailings site is shown in Figure 3.1. Groundwater flow south of the San Juan River is generally to the northwest, roughly parallel to the river. Potentiometric data obtained from well points 670-672 north of the San Juan River were measured in January 1988, whereas water table elevations were measured at well points 638 and 639 in May 1987. Water table elevations were measured at well points south of the San Juan River in May 1987.

In the eastern portion of the floodplain alluvium (see Figure 3.1) groundwater flow is parallel to the San Juan River and the river is neither losing water to, nor gaining water from, the alluvial groundwater. In the downstream half of the reach, groundwater is flowing toward the river and discharging to it. Because the floodplain alluvial aquifer is unconfined and the San Juan River is gaining water from groundwater discharge on both the north and south sides of the floodplain, groundwater underflow is not occurring. Based on the present hydrogeological conditions, tailings leachate within the floodplain alluvium is not migrating beneath the San Juan River and, accordingly, is not affecting groundwater quality to the north.

The hydraulic gradient within the floodplain alluvium ranges from 0.0009 to 0.002 foot per foot under most of the area shown in Figure 3.1, although the gradient in the northwesternmost part of the area is steeper. The discharge from a continuously flowing well (monitor well 648) completed in the Dakota Formation and located above the floodplain on the escarpment flows to the northwesternmost area in the floodplain. Ponded water from this flowing well recharges the alluvium.

During periods of high spring runoff in the San Juan River, the river water backs up into the canal (Figure 3.1) from the west end of the floodplain eastward towards the closed end of the canal, separating the floodplain alluvium south of the river. Groundwater recharge of the alluvium occurs during these periods of high water. This recharge influences the rate of groundwater flow by causing seasonal changes in hydraulic gradient. Net flow on an annual basis, however, results in groundwater discharge to the river in the downstream half of the reach considered here.

Alluvial monitor wells 629, 630, and 633 are weakly artesian, based on water-level measurements provided by the DOE (1986a). The floodplain alluvium is a regional or local discharge zone for the underlying Mancos Shale, characterized by upward vertical gradients. In addition, these vertical gradients inhibit downward migration of contaminants into the Mancos Shale. These vertical gradients, in combination with gaining conditions for the San Juan River, may also inhibit underflow within the alluvial aquifer beneath the San Juan River.

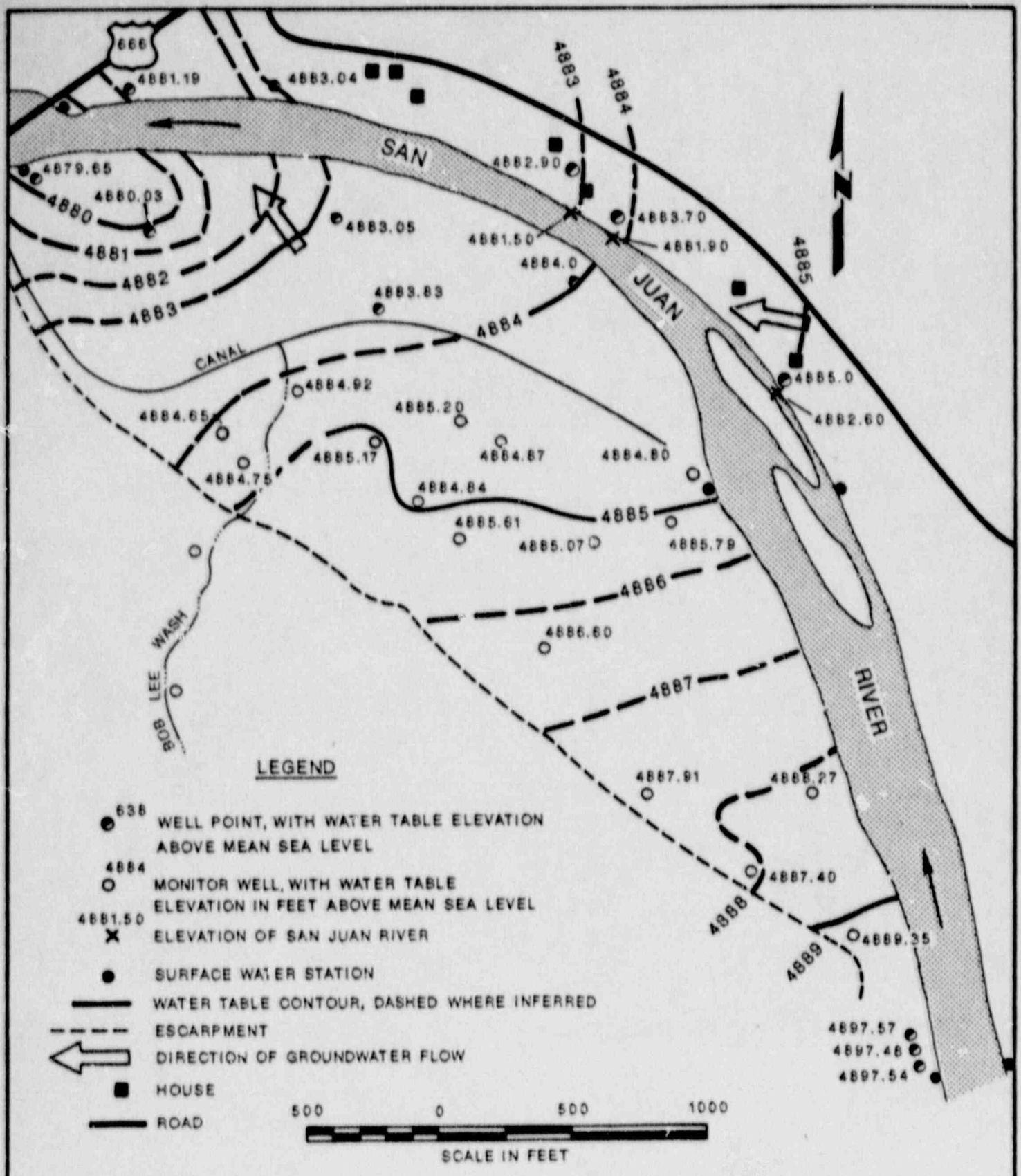

FIGURE 3.1
WATER TABLE MAP OF FLOODPLAIN ALLUVIUM
SHIPROCK, NEW MEXICO

4.0 GROUNDWATER QUALITY

Initial discharge of tailings raffinate in 1954 resulted in soil and groundwater contamination in the local alluvial aquifer; the contamination has not been removed by natural flushing. Soil contamination within the floodplain alluvium is likely because of the past discharge of tailings raffinate to unlined ponds and other surface discharges to Bob Lee Wash. The extent of soil contamination is not known; however, it probably correlates closely with the extent of groundwater contamination.

Dissolved contaminants within the floodplain alluvium at the Shiprock site include fluoride (F), sulfate (SO_4), nitrate (NO_3), uranium (U), vanadium (V), molybdenum (Mo), and total dissolved solids (TDS). Figures 4.1 through 4.7 represent isopleth maps for F, Mo, NO_3, SO_4, TDS, U, and V, respectively. Analytical results obtained from groundwater samples collected during this investigation were used to construct these isopleth maps. Water quality data are summarized in Attachment 1 at the end of this report. Groundwater monitoring data for those monitor wells south of the canal are tabulated in a previously published report (DOE, 1986a). Forty-one monitor wells, including the 13 new well points and six surface water stations, are included in the water monitoring network for the floodplain alluvium. Solute concentrations shown on Figures 4.1 through 4.7 represent the average of two rounds of sampling from each of the monitor wells and wells points (excluding well points 640, 643, 670, 671, and 672, which were sampled once on March 19, 1987). Groundwater and surface water sampling and analytical techniques were performed in accordance with procedures described in detail by the DOE (1986b). Monitor well completion information is presented in a separate report by the DOE (1986a).

Figures 4.1 through 4.7 show that a large portion of the floodplain alluvium is contaminated by uranium tailings leachate. Most of the contaminated groundwater occurs in the central portion of the floodplain alluvium. Well point 643, located near the northwest portion of the alluvium in the study area, contained the poorest groundwater quality; maximum concentrations of Mo, NO_3, SO_4, TDS, U, and V were 0.1, 709, 36900, 64200, 4.32, and 0.1 milligrams per liter (mg/l), respectively (see Figures 4.2 through 4.7). Well points 640 and 643 were not sampled in May 1987 because the ground surface was flooded by the San Juan River.

Well point 647, installed within the southeastern portion of the floodplain alluvium along this reach of the San Juan River, serves as a source of background water quality data (Figure 1.1). Well point 647 contains the lowest TDS concentrations (588 mg/l for the May 1987 sampling round) of the background wells. For this well point, the average concentrations of F, Mo, NO_3, SO_4, V, and U from sampling in March and May 1987 were 0.4, 0.05, 1.15, 321, 0.06, and 0.01 mg/l, respectively.

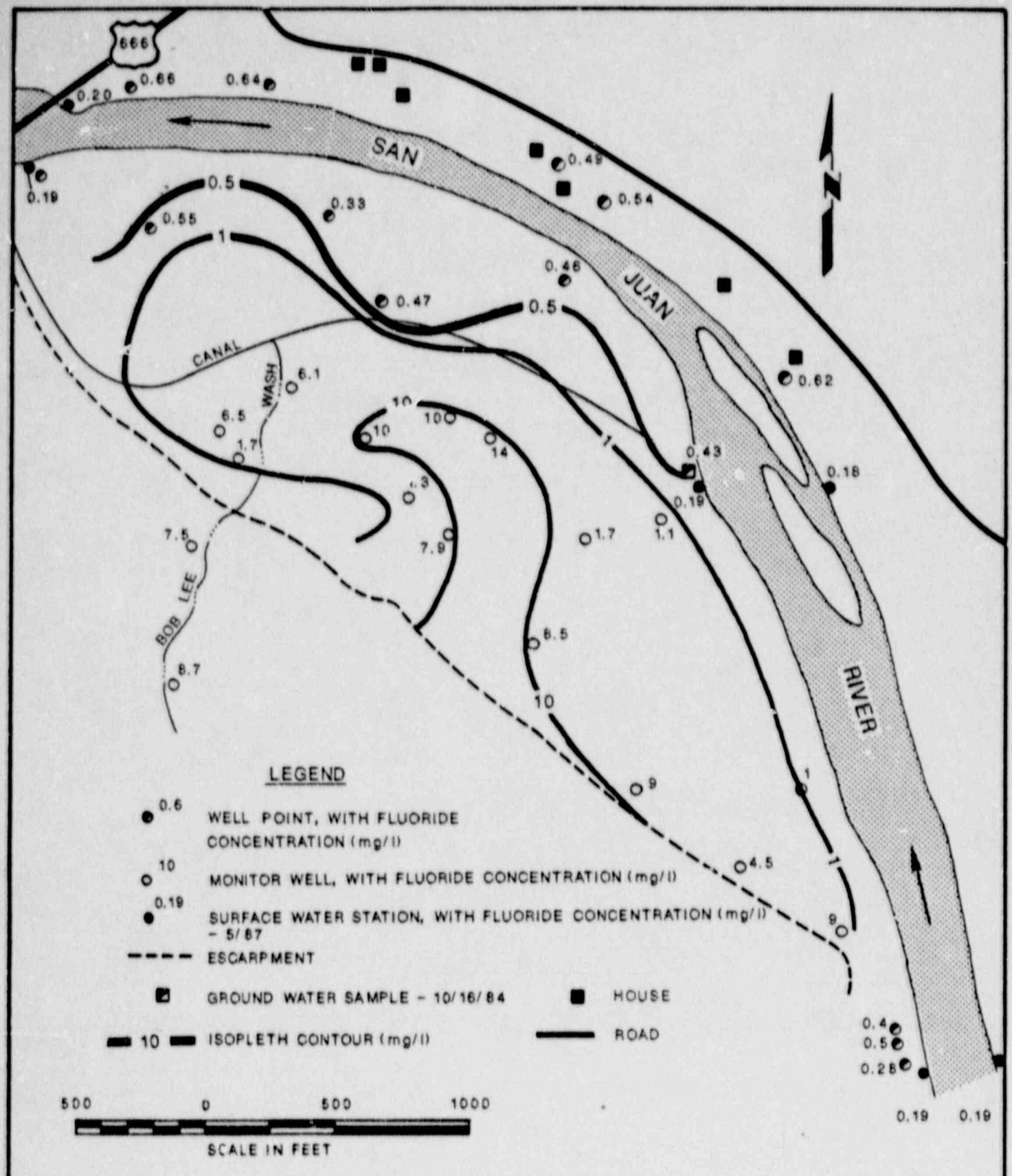

FIGURE 4.1

FLUORIDE ISOPLETH (mg/l) 10/85 - 5/88
SHIPROCK, NEW MEXICO

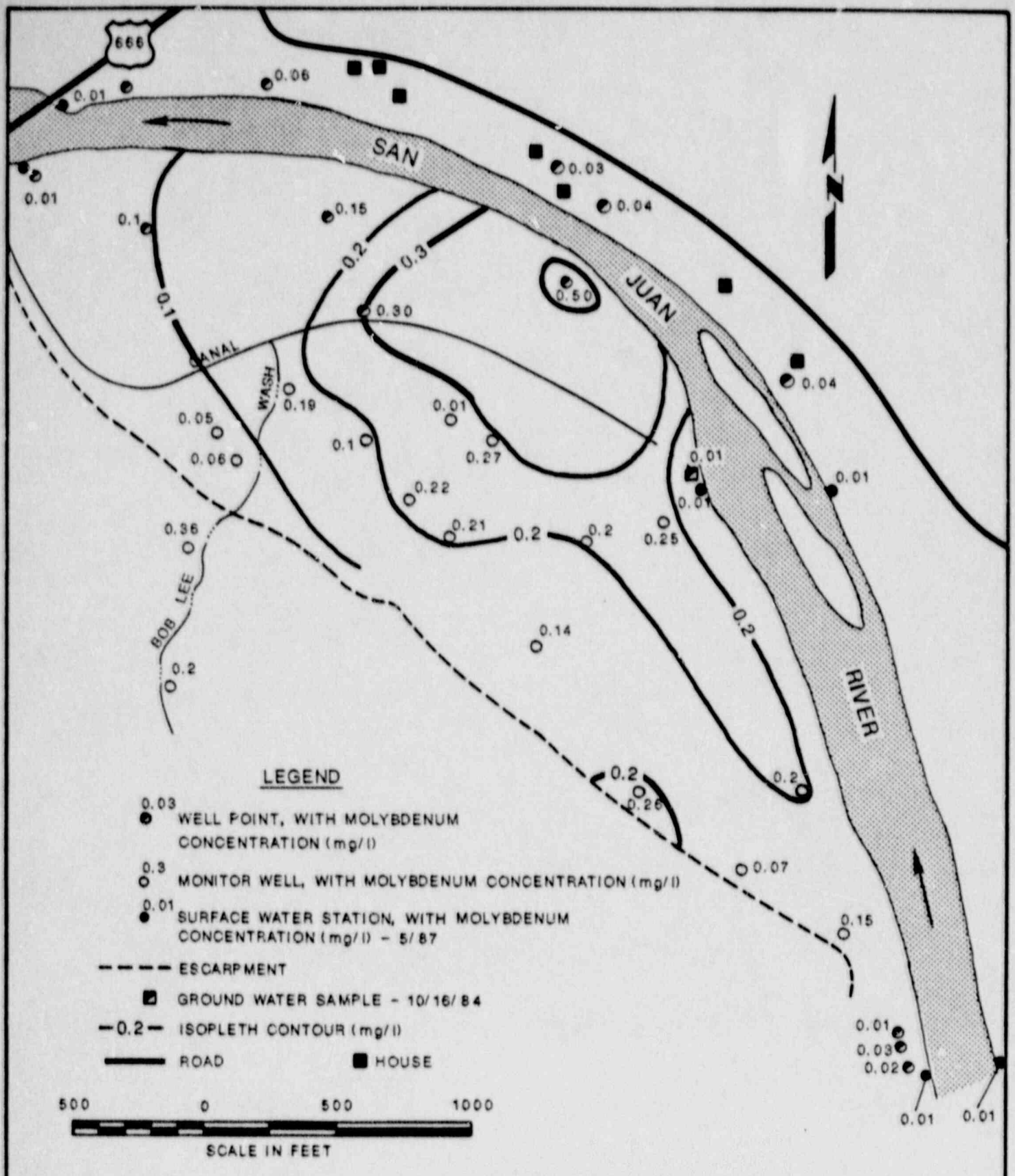

FIGURE 4.2

MOLYBDENUM ISOPLETH (mg/l) 10/85 - 5/88
SHIPROCK, NEW MEXICO

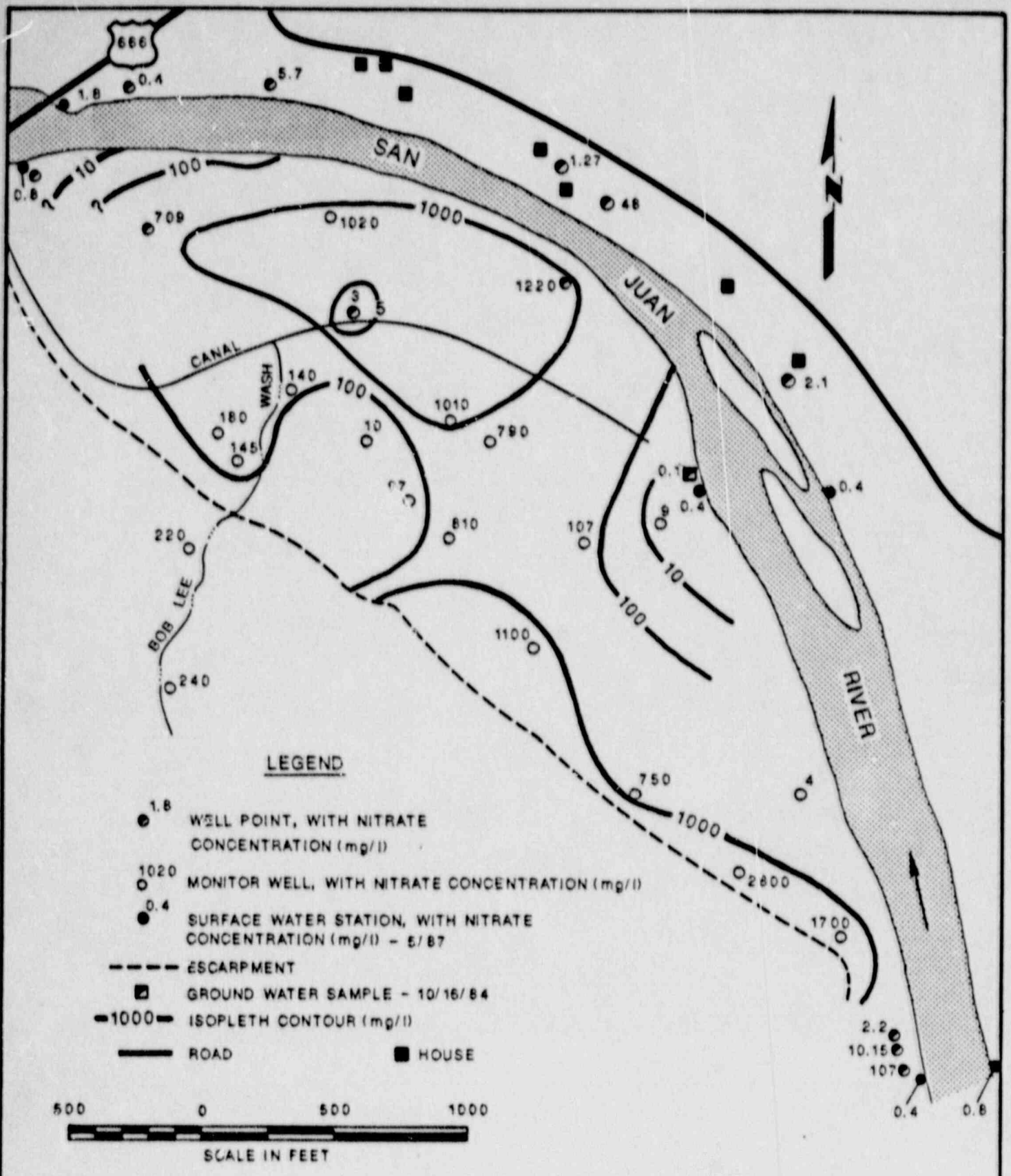

FIGURE 4.3
NITRATE ISOPLETH (mg/l) 10/85 - 5/88
SHIPROCK, NEW MEXICO

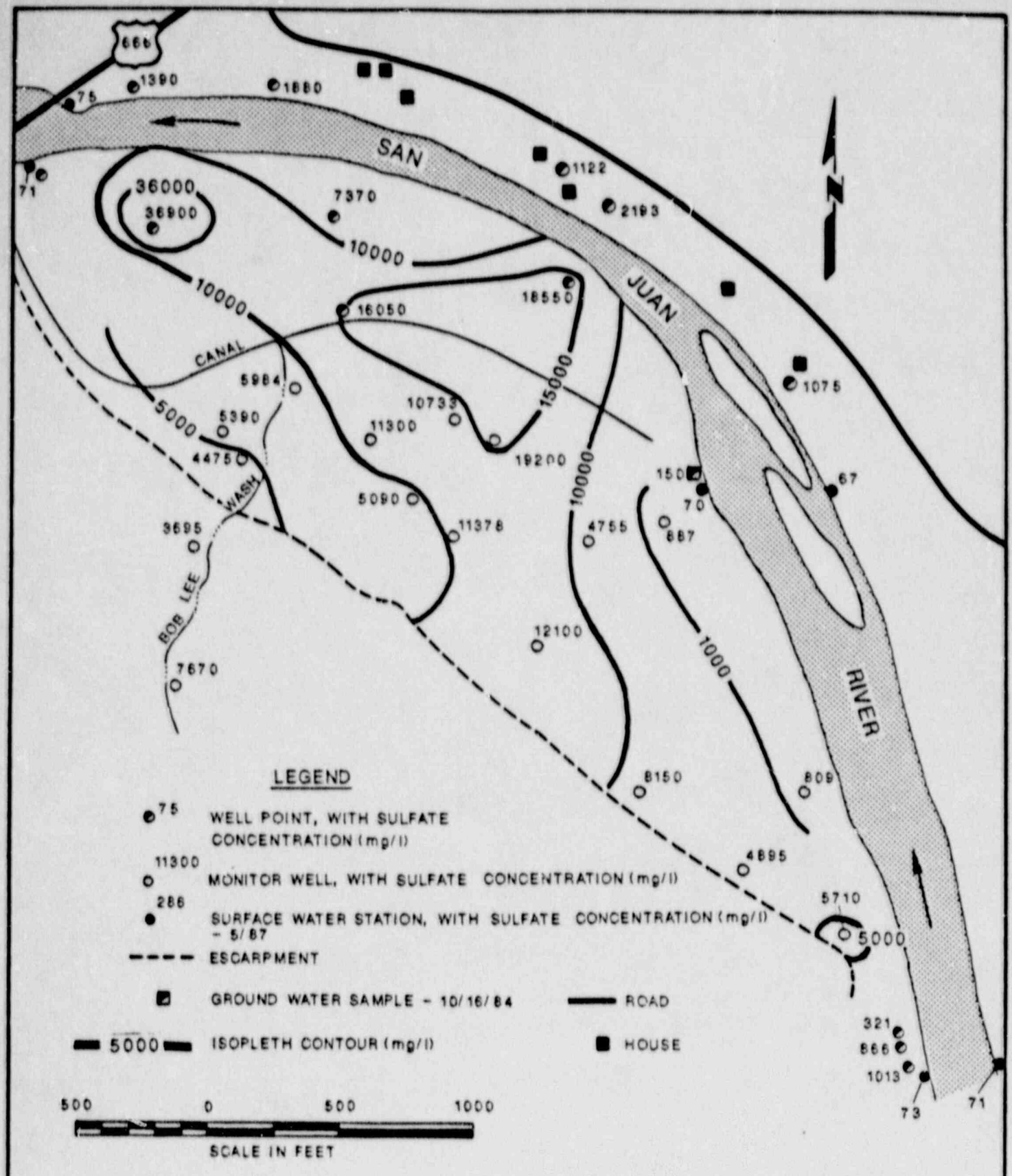

FIGURE 4.4

SULFATE ISOPLETH (mg/l) 10/85 - 5/88
SHIPROCK, NEW MEXICO

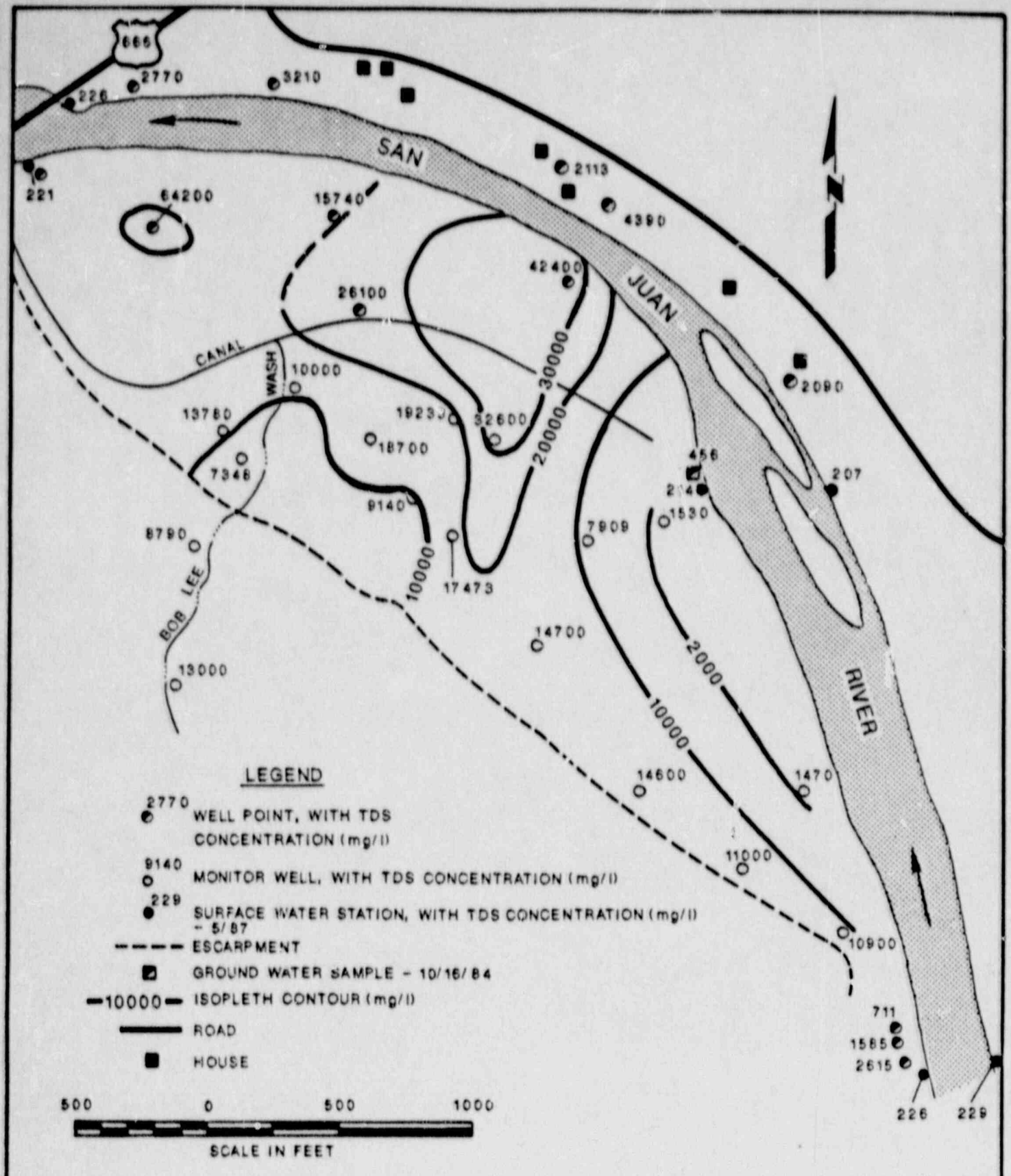

FIGURE 4.5
TOTAL DISSOLVED SOLIDS ISOPLETH (mg/l) 10/85 - 5/88
SHIPROCK, NEW MEXICO

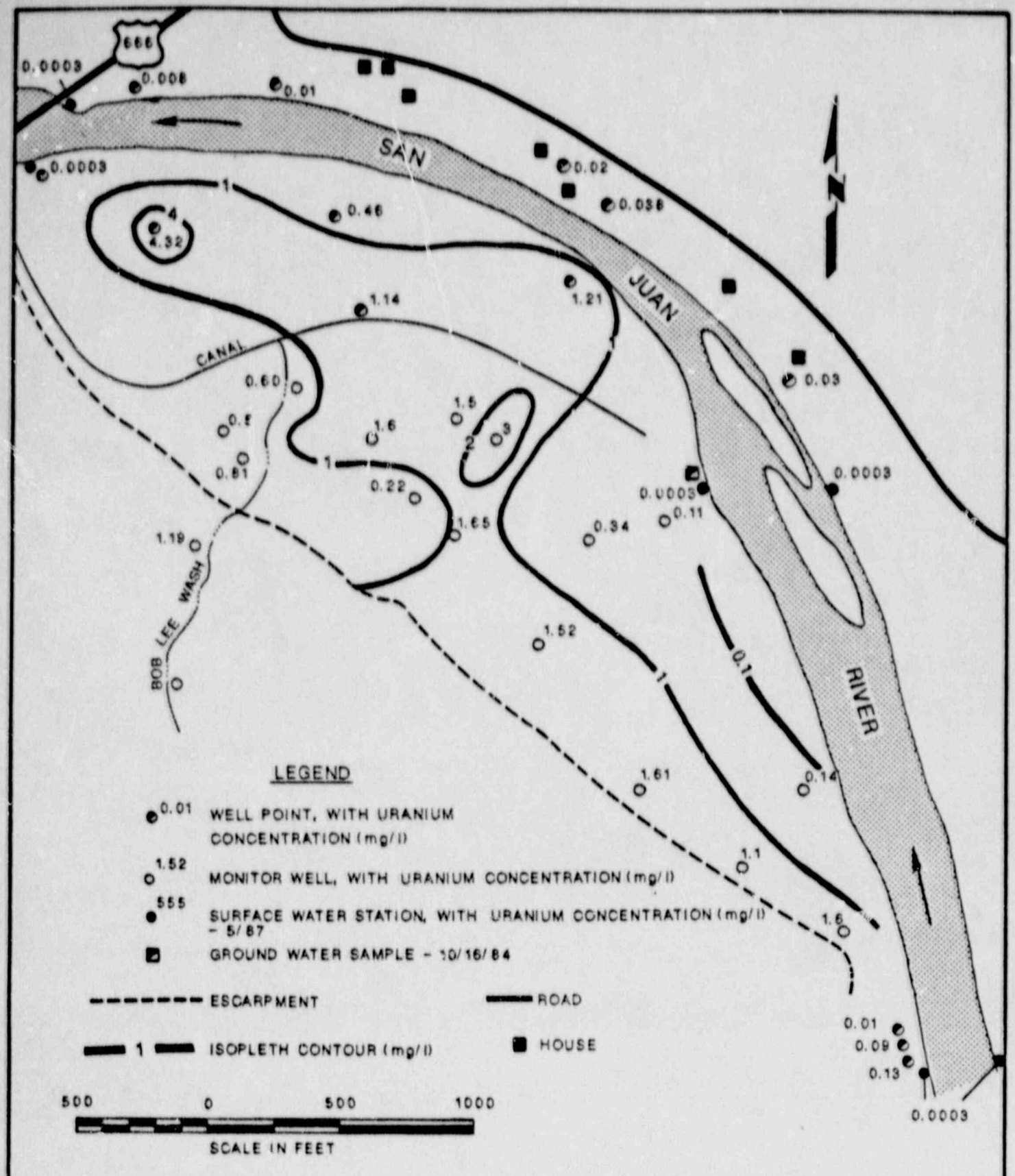

FIGURE 4.6
URANIUM ISOPLETH (mg/l) 10/85 - 5/88
SHIPROCK, NEW MEXICO

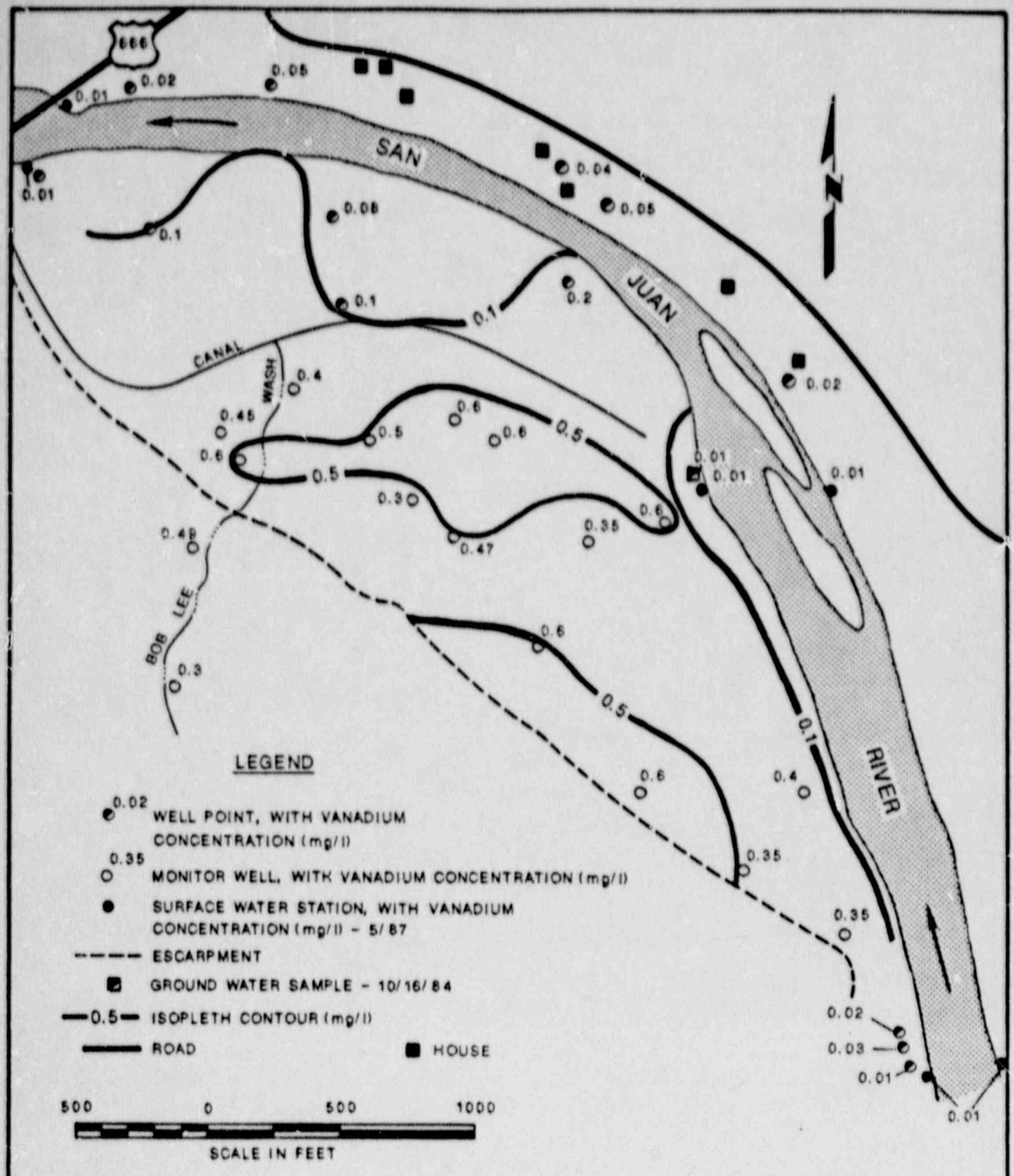

FIGURE 4.7

VANADIUM ISOPLETH (mg/l) 10/85 - 5/88
SHIPROCK, NEW MEXICO

Contaminated groundwater discharges to the San Juan River with no detectable impact to surface water quality (sample locations 550 through 555; see Attachment 1) (see Figures 4.1 through 4.7). Concentrations of solutes do not vary outside the expected range of analytical accuracy in surface water samples collected along the San Juan River (see Figures 4.1 through 4.7). Solute concentrations in surface water samples are less than solute concentrations in groundwater samples. Surface water stations 554 and 555, upriver from well points 645 through 647, generally had even lower concentrations of the above solutes, where average surface water concentrations of Mo, U, and V were 0.1, 0.004, and 0.2 mg/l, respectively (see Attachment 1).

Concentrations of Mo and V elevated above background levels (well point 647) were reported by the DOE (1986c) north of the San Juan River. Average concentrations of Mo, NO_3, U, and V in well point 638 immediately north of the San Juan River were 0.07, 0.25, 0.01, and 0.06 mg/l, respectively (see Attachment 1). Concentrations of Mo, NO_3, and U in this well point were below their respective proposed EPA groundwater MCLs (Mo, NO_3, 44 mg/l; U, 0.044 mg/l). Concentrations of Mo, NO_3, and U in well point 639, east of 638, were also below their respective EPA proposed groundwater MCLs, but generally above concentrations detected in well point 638. Average concentrations of Mo and U in three groundwater samples obtained from well points 670 through 672 were below the proposed EPA groundwater MCLs for Mo and U (well point 670, Mo=0.03 mg/l, U=0.0179 mg/l; well point 671, Mo=0.04 mg/l, U=0.0384 mg/l; well point 672, Mo=0.04 mg/l, U=0.0281 mg/l). Nitrate concentrations in samples from well points 670, 671, and 672 were below the proposed EPA groundwater standard, excluding a sample taken in January 1988 from well point 671, which had a NO_3 concentration of 141 mg/l. Two more recent analyses of groundwater samples from well point 671 taken in March and May of 1988 have NO_3 concentrations of 0.9 and 2.0 mg/l, respectively. The higher initial concentration may be attributed to laboratory error.

Solute concentrations north of the San Juan River are much less than solute concentrations observed in contaminated groundwater south of the river. A comparison of analyses of samples obtained from well points 638, 639, and 670 through 672 north of San Juan River with water quality analyses from monitor wells and well points south of the San Juan River, supports the conclusion that uranium tailings leachate is not migrating beneath the San Juan River. Much higher concentrations of conservative solutes such as NO_3, U, and SO_4 would be observed in well points 638, 639, and 670 through 672 if such groundwater underflow was occurring. Hydrodynamic dispersion is considered inadequate to account for the observed reduction in contaminant concentrations north of the river. However, initial concentrations of U were above the EPA groundwater standard by 0.02 mg/l in well point 671. Concentrations of U have decreased in two more recent rounds of sampling. The initial higher U concentrations may have resulted from windblown, contaminated soil that was placed back in the pit used to install well point 671.

Uranium, selenium (Se), arsenic (As), Mo, SO_4, and NO_3 are soluble contaminants under the relatively oxidizing, alkaline conditions that dominate in the floodplain alluvium (Rai and Zachara, 1984). Uranium probably occurs as uranyl carbontate $(UO_2(Co_3)_2^{2-}$ and $(UO_2(CO_3)_3^{4-})$ species that are not significantly absorbed by aquifer material. Adsorption of these species onto aquifer materials probably is minimal under existing site conditions. Arsenic and Se occur at low microgram per liter levels within the floodplain alluvium; therefore, impacts of As and Se on groundwater quality in the floodplain alluvium are minimal.

Molybdenum may occur as MoO_4^{2-} based on thermodynamic calculations. Molybdenum forms soluble anionic complexes (MoO_4^{2-}) under relatively oxidizing, alkaline conditions. Adsorption of these complexes is minimal where electrostatic repulsion occurs between the net-negative surface charge present on aquifer material and the negatively charged Mo species (MoO_4^{2-}) under relatively oxidizing, alkaline conditions. Adsorption of these complexes is minimal where electrostatic repulsion occurs between the net-negative surface charge present on aquifer material and the negatively charged Mo species (MoO_4^{2-}). Fluoride is also soluble and is not absorbed under the relatively oxidizing, alkaline groundwater conditions for similar reasons. Vanadium may occur as $H_2VO_4^-$, based on thermodynamic calculations. The geochemical behavior of V is influenced by iron (Fe), and adsorption of V by hydrous iron oxides is documented by Rai and Zachara (1984). Vanadium, however, is mobilized by soluble organic matter (total organic carbon, or TOC) under relatively oxidizing conditions, which may account for the elevated V concentrations observed at the site. The TOC concentrations generally are above 10 mg/l in both the surface water and groundwater samples collected at the Shiprock tailings site. The TOC concentrations are elevated in this area because San Juan River water and alluvial groundwater occur in a highly vegetative environment.

Sulfate concentrations within tailings leachate can decrease in groundwater because of precipitation reactions with gypsum ($CaSO_4 \cdot 2H_2O$), based on calculations performed by PHREEQE (Parkhurst et al., 1980). Groundwater is shown to be oversaturated with gypsum by the model. Dissolved SO_4, however, is predicted to form soluble complexes with magnesium (Mg) and calcium (Ca) within contaminated groundwater; these complexes can limit the amount of SO_4 available for gypsum precipitation.

5.0 SUMMARY

Past discharge of tailings raffinate to Bob Lee Wash and the floodplain alluvium adjacent to the Shiprock site has resulted in groundwater contamination in the alluvium on the south side of the San Juan River.

Residents immediately north or south of the San Juan River are not directly exposed to, or are ingesting, contaminated alluvial groundwater because all such residents use treated surface water provided by the town of Shiprock for domestic purposes.

Uranium tailings leachate in the floodplain alluvium south of the San Juan River is characterized by average concentrations of NO_3 (526 mg/l), SO_4 (8140 mg/l), TDS (14,328 mg/l), Mo (0.16 mg/l), U (1.03 mg/l), and V (0.38 mg/l) that are elevated above background groundwater concentrations and proposed EPA groundwater MCLs when applicable. North of the San Juan River, average concentrations of NO_3, SO_4, TDS, Mo, U, and V are 11.9, 1547, 2960, 0.04, 0.02, and 0.04 mg/l, respectively. Impacts of tailings leachate on the San Juan River are not detectable, as evidenced by uniform surface water quality upstream and downstream from the Shiprock Tailings site.

Upon promulgation of the final EPA groundwater standards, the DOE will reevaluate the groundwater issues at the Shiprock site to determine the need for further characterization, institutional controls, or groundwater restoration to assure compliance with the standards.

6.0 REFERENCES

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ATTACHMENT 1

GROUNDWATER QUALITY DATA BY LOCATION
SHIPROCK UMTRA SITE

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 550-01 03/19/87 PARAMETER VALUE +/- UNCERTAINTY		550-01 05/14/87 PARAMETER VALUE +/- UNCERTAINTY		550-01 09/06/87 PARAMETER VALUE +/- UNCERTAINTY		550-02 09/06/87 PARAMETER VALUE +/- UNCERTAINTY		550-03 09/06/87 PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	121.		91.		126.		126.		126.	
ALUMINUM	MG/L	-		0.05		0.07		0.06		0.06	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	0.007		0.015		< 0.003		0.003		< 0.003	
ARSENIC	MG/L	0.003		< 0.001		0.003		0.002		0.002	
BARIUM	MG/L	< 0.1		0.06		0.09		0.09		0.09	
BERYLLIUM	MG/L	-		-		-		-		-	
BORON	MG/L	0.06		0.06		0.05		0.05		0.05	
BROMIDE	MG/L	-		-		< 0.1		< 0.1		< 0.1	
CADMIUM	MG/L	< 0.001		0.003		< 0.005		< 0.005		< 0.005	
CALCIUM	MG/L	46.9		40.2		62.7		63.6		64.6	
CHLORIDE	MG/L	6.1		4.9		11.8		11.8		11.8	
CHROMIUM	MG/L	0.01		0.02		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	< 0.05		< 0.01		< 0.01		< 0.01		< 0.01	
CONDUCTANCE	UMHO/CM	255.		200.		450.		450.		450.	
COPPER	MG/L	0.03		< 0.01		< 0.01		< 0.01		< 0.01	
CYANIDE	MG/L	-		-		-		-		-	
FLUORIDE	MG/L	0.21		0.20		0.24		0.25		0.25	
GROSS ALPHA	PCI/L	-		-		1.3	3.0	0.0	2.2	0.0	2.2
GROSS BETA	PCI/L	-		-		3.6	3.4	3.8	2.5	3.8	2.6
IRON	MG/L	0.05		0.02		< 0.01		< 0.01		< 0.01	
LEAD	MG/L	< 0.001		0.02		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	12.2		7.33		11.9		11.9		12.1	
MANGANESE	MG/L	0.01		< 0.01		0.02		0.02		0.02	
MERCURY	MG/L	-		-		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.1		< 0.01		0.01		0.04		0.01	
NICKEL	MG/L	0.02		< 0.01		< 0.01		< 0.01		< 0.01	
NITRATE	MG/L	10.1		1.0		0.4		< 0.1		0.4	
NITRITE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	24.8		27.3		30.3		35.5		34.7	
PB-210	PCI/L	0.0	1.4	0.0	1.2	0.4	1.1	0.3	0.9	0.8	0.9
PH	SU	7.97		8.47		8.59		8.59		8.59	
PHOSPHATE	MG/L	0.30		0.30		< 0.1		< 0.1		< 0.1	
PO-210	PCI/L	0.0	0.4	0.4	0.6	0.0	0.5	0.0	0.6	0.0	0.6
POTASSIUM	MG/L	2.68		2.04		1.87		1.83		1.95	
RA-226	PCI/L	0.3	0.3	0.1	0.2	0.0	0.1	0.0	0.1	0.0	0.1
RA-228	PCI/L	0.6	0.8	0.0	1.2	0.5	0.7	0.8	3.3	1.1	1.0
SELENIUM	MG/L	< 0.002		0.001		0.002		0.003		0.003	
SILICA	MG/L	8.8		11.0		8.00		8.17		8.28	
SILVER	MG/L	-		-		-		-		-	
SODIUM	MG/L	33.5		19.1		39.5		31.8		31.6	
STRONTIUM	MG/L	0.68		0.54		0.845		0.845		0.840	
SULFATE	MG/L	120.		75.		150.		138.		139.	
SULFIDE	MG/L	-		-		< 0.1		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	9.5		12.5		22.5		22.5		22.5	
TH-230	PCI/L	0.8	0.9	0.2	0.6	0.0	0.4	0.4	0.5	0.0	0.3
THALLIUM	MG/L	-		-		-		-		-	

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID SAMPLE ID AND LOG DATE 550-01 03/19/87 PARAMETER VALUE+/-UNCERTAINTY	550-01 05/14/87 PARAMETER VALUE+/-UNCERTAINTY	550-01 07/06/87 PARAMETER VALUE+/-UNCERTAINTY	550-02 09/06/87 PARAMETER VALUE+/-UNCERTAINTY	550-03 09/06/87 PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	< 0.005	< 0.005	< 0.003	< 0.003	< 0.003
TOTAL SOLIDS	MG/L	303.	226.	394.	379.	374.
URANIUM	MG/L	0.0040	< 0.0003	0.0042	0.0016	0.0042
VANADIUM	MG/L	< 0.2	< 0.01	0.01	< 0.01	0.01
ZINC	MG/L	0.007	< 0.005	< 0.005	< 0.005	< 0.005

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 550-04 09/06/87		550-05 09/06/87		550-01 10/07/88		550-01 04/20/89		550-02 04/20/89	
		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	126.		126.		142.		105.		105.	
ALUMINUM	MG/L	0.05		0.06		-		< 0.1		< 0.1	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		0.3		0.3	
ANTIMONY	MG/L	0.007		0.003		< 0.003		< 0.003		< 0.003	
ARSENIC	MG/L	0.003		0.002		0.02		< 0.01		< 0.01	
BARIUM	MG/L	0.09		0.09		< 0.1		< 0.1		< 0.1	
BERYLLIUM	MG/L	-		-		-		< 0.01		< 0.01	
BORON	MG/L	0.05		0.06		-		< 0.1		< 0.1	
BROMIDE	MG/L	< 0.1		< 0.1		-		< 0.1		< 0.1	
CADMIUM	MG/L	< 0.005		< 0.005		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	64.8		64.4		80.0		57.0		157.	
CHLORIDE	MG/L	1.89		11.8		16.		7.4		6.1	
CHROMIUM	MG/L	< 0.01		< 0.01		0.03		< 0.01		< 0.01	
COBALT	MG/L	< 0.01		< 0.01		< 0.05		< 0.05		< 0.05	
CONDUCTANCE	UMHO/CM	450.		450.		480.		270.		270.	
COPPER	MG/L	< 0.01		< 0.01		< 0.02		< 0.02		< 0.02	
CYANIDE	MG/L	-		-		-		< 0.01		< 0.01	
FLUORIDE	MG/L	0.25		0.25		0.3		0.3		0.3	
GROSS ALPHA	PCI/L	0.0	2.2	1.4	3.2	4.0	3.6	3.3	2.2	4.2	2.2
GROSS BETA	PCI/L	4.3	3.1	7.5	3.0	6.1	1.8	3.4	1.3	3.4	1.3
IRON	MG/L	< 0.01		< 0.01		< 0.03		< 0.03		< 0.03	
LEAD	MG/L	< 0.01		< 0.01		0.02		< 0.01		< 0.01	
MAGNESIUM	MG/L	12.2		12.2		15.9		9.60		8.83	
MANGANESE	MG/L	0.02		0.02		-		0.01		0.01	
MERCURY	MG/L	0.0002		0.0003		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	0.04		< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	< 0.01		0.01		-		< 0.04		< 0.04	
NITRATE	MG/L	< 0.1		< 0.1		7.6		1.7		1.7	
NITRITE	MG/L	< 0.1		< 0.1		-		-		-	
NO2 & NO3	MG/L	-		-		< 1.0		-		-	
ORG. CARBON	MG/L	36.2		32.9		-		25.3		26.0	
PB-210	PCI/L	1.1	0.6	0.7	1.0	-		0.0	0.6	0.7	0.6
PH	SU	8.59		8.59		8.03		8.31		8.31	
PHOSPHATE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
PO-210	PCI/L	0.0	0.6	0.1	0.6	-		0.3	0.4	0.3	0.4
POTASSIUM	MG/L	1.89		2.14		2.5		1.6		1.6	
RA-226	PCI/L	0.1	0.2	0.0	0.1	0.3	0.2	-		-	
RA-228	PCI/L	0.0	1.1	0.3	1.2	0.2	0.7	0.0	0.7	0.2	0.7
SELENIUM	MG/L	0.002		0.003		0.019		< 0.005		< 0.005	
SILICA	MG/L	8.34		8.26		-		7.		7.	
SILVER	MG/L	-		-		< 0.01		< 0.01		< 0.01	
SODIUM	MG/L	31.7		36.8		46.9		21.0		19.9	
STRONTIUM	MG/L	0.850		0.885		0.9		0.5		0.4	
SULFATE	MG/L	141.		150.		221.		98.		97.	
SULFIDE	MG/L	< 0.1		< 0.1		-		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	22.5		22.5		17.0		15.		15.	
TH-230	PCI/L	0.0	0.3	0.0	0.4	0.3	0.4	0.0	0.3	0.1	0.4
THALLIUM	MG/L	-		-		-		< 0.01		< 0.01	

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 550-04 09/04/87 PARAMETER VALUE+/-UNCERTAINTY	550-05 09/04/87 PARAMETER VALUE+/-UNCERTAINTY	550-01 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	550-01 04/20/89 PARAMETER VALUE+/-UNCERTAINTY	550-02 04/20/89 PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	< 0.003	< 0.003		< 0.005	< 0.005
TOTAL SOLIDS	MG/L	384.	325.	507.	304.	289.
URANIUM	MG/L	0.0040	0.0040	0.0031	0.0043	0.0044
VANADIUM	MG/L	0.01	0.01	0.01	0.02	0.02
ZINC	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 550-03 04/20/89		550-04 04/20/89		550-05 04/20/89		551-01 03/19/87		551-01 05/17/87	
		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	105.		105.		105.		123.		88.	
ALUMINUM	MG/L	< 0.1		< 0.1		< 0.1		0.2		0.13	
AMMONIUM	MG/L	0.3		0.3		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	< 0.003		< 0.003		< 0.003		0.008		0.018	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		0.004		< 0.001	
BARIUM	MG/L	< 0.1		< 0.1		< 0.1		0.1		0.06	
BERYLLIUM	MG/L	< 0.01		< 0.01		< 0.01		-		-	
BORON	MG/L	< 0.1		< 0.1		< 0.1		0.10		0.02	
BROMIDE	MG/L	< 0.1		< 0.1		< 0.1		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001		0.004	
CALCIUM	MG/L	50.3		49.1		49.8		40.9		39.8	
CHLORIDE	MG/L	6.1		4.7		4.7		6.1		4.1	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		0.02	
COBALT	MG/L	< 0.05		< 0.05		< 0.05		< 0.05		< 0.01	
CONDUCTANCE	UMHO/CM	270.		270.		270.		330.		190.	
COPPER	MG/L	< 0.02		< 0.02		< 0.02		0.04		< 0.01	
CYANIDE	MG/L	< 0.01		< 0.01		< 0.01		-		-	
FLUORIDE	MG/L	0.2		0.2		0.2		0.21		0.19	
GROSS ALPHA	PCI/L	0.7	1.8	5.5	2.3	2.4	2.0	-		-	
GROSS BETA	PCI/L	1.8	1.3	6.1	1.4	3.1	1.3	-		-	
IRON	MG/L	< 0.03		< 0.03		< 0.03		0.03		0.05	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.001		0.02	
MAGNESIUM	MG/L	8.71		8.56		8.70		13.3		7.73	
MANGANESE	MG/L	0.01		0.01		0.01		0.02		0.02	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		-		-	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.1		< 0.01	
NICKEL	MG/L	< 0.04		< 0.04		< 0.04		0.03		< 0.01	
NITRATE	MG/L	1.8		1.5		1.8		< 0.1		0.8	
NITRITE	MG/L	-		-		-		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	14.4		27.0		28.6		18.8		29.6	
PB-210	PCI/L	0.2	0.6	0.1	0.6	0.3	0.6	0.4	1.8	0.0	1.0
PH	SU	8.31		8.31		8.31		8.24		8.08	
PHOSPHATE	MG/L	< 0.1		< 0.1		< 0.1		0.30		0.31	
PO-210	PCI/L	0.0	0.4	0.0	0.4	0.0	0.3	0.0	0.2	0.0	0.4
POTASSIUM	MG/L	1.4		1.4		1.3		2.69		1.79	
RA-226	PCI/L	-		-		-		0.1	0.2	0.0	0.1
RA-228	PCI/L	0.0	0.7	0.5	0.8	0.1	0.3	0.0	0.9	0.0	1.0
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.002		< 0.001	
SILICA	MG/L	7.		7.		7.		8.9		10.2	
SILVER	MG/L	< 0.01		< 0.01		< 0.01		-		-	
SODIUM	MG/L	19.6		19.2		19.6		41.6		16.8	
STRONTIUM	MG/L	0.4		0.5		0.5		0.66		0.48	
SULFATE	MG/L	99.		98.		99.		131.		71.	
SULFIDE	MG/L	< 0.1		< 0.1		< 0.1		-		-	
TEMPERATURE	C - DEGREE	15.		15.		15.		2.		12.0	
TH-230	PCI/L	0.0	0.3	0.0	0.3	0.0	0.2	0.4	0.8	0.1	0.6
THALLIUM	MG/L	< 0.01		< 0.01		< 0.01		-		-	

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE				
		550-03 04/20/89	550-04 04/20/89	550-05 04/20/89	551-01 03/19/87	551-01 05/17/87
		PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	272.	284.	268.	323.	221.
URANIUM	MG/L	0.0042	0.0042	0.0045	0.0025	< 0.0003
VANADIUM	MG/L	0.02	0.02	0.02	< 0.2	< 0.01
ZINC	MG/L	< 0.005	< 0.005	< 0.005	0.008	< 0.005

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 551-01 09/06/87 PARAMETER VALUE+/-UNCERTAINTY	551-01 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	551-01 04/20/89 PARAMETER VALUE+/-UNCERTAINTY	552-01 03/19/87 PARAMETER VALUE+/-UNCERTAINTY	552-01 05/17/87 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	423.	121.	204.	116.	101.
ALUMINUM	MG/L	0.08	-	< 0.1	0.2	0.06
AMMONIUM	MG/L	< 0.1	< 0.1	0.3	< 0.1	< 0.1
ANTIMONY	MG/L	< 0.003	< 0.003	0.008	< 0.003	0.021
ARSENIC	MG/L	0.003	0.01	0.03	0.004	< 0.001
BARIUM	MG/L	0.09	< 0.1	< 0.1	< 0.1	0.06
BERYLLIUM	MG/L	-	-	< 0.01	-	-
BORON	MG/L	0.05	-	0.3	0.08	0.02
BROMIDE	MG/L	< 0.1	-	< 0.1	-	-
CADMIUM	MG/L	< 0.005	< 0.001	0.002	< 0.001	0.006
CALCIUM	MG/L	64.3	70.4	433.	47.2	40.4
CHLORIDE	MG/L	11.8	13.	94.	3.9	4.0
CHROMIUM	MG/L	< 0.01	0.03	< 0.01	< 0.01	0.02
COBALT	MG/L	< 0.01	< 0.05	< 0.05	< 0.05	< 0.01
CONDUCTANCE	UMHO/CM	269.	390.	4200.	430.	185.
COPPER	MG/L	< 0.01	< 0.02	0.02	0.01	< 0.01
CYANIDE	MG/L	-	-	< 0.01	-	-
FLUORIDE	MG/L	0.24	0.3	1.0	0.21	0.18
GROSS ALPHA	PCI/L	1.3 2.9	5.0 3.3	58. 34.	-	-
GROSS BETA	PCI/L	4.6 3.3	6.2 1.8	53. 18.	-	-
IRON	MG/L	0.02	< 0.03	0.45	0.05	0.03
LEAD	MG/L	< 0.01	< 0.01	0.02	< 0.001	0.02
MAGNESIUM	MG/L	12.5	13.1	128.	12.7	7.61
MANGANESE	MG/L	0.02	-	0.36	0.02	< 0.01
MERCURY	MG/L	< 0.0002	< 0.0002	< 0.0002	-	-
MOLYBDENUM	MG/L	< 0.01	< 0.01	< 0.01	< 0.1	< 0.01
NICKEL	MG/L	< 0.01	-	< 0.04	0.01	< 0.01
NITRATE	MG/L	0.4	2.6	54.	< 0.1	0.4
NITRITE	MG/L	< 0.1	-	-	< 0.1	< 0.1
NO2 & NO3	MG/L	-	< 1.0	-	-	-
ORG. CARBON	MG/L	35.7	-	51.5	30.7	26.7
PB-210	PCI/L	0.9 1.3	-	0.8 0.7	0.0 1.4	0.2 1.2
PH	SU	8.40	7.75	8.16	7.94	8.22
PHOSPHATE	MG/L	< 0.1	< 0.1	< 0.1	0.30	0.30
PO-210	PCI/L	0.2 0.7	-	0.4 0.4	0.0 0.4	0.0 0.5
POTASSIUM	MG/L	1.84	2.7	17.2	2.60	1.90
RA-226	PCI/L	0.0 0.2	0.1 0.1	-	0.1 0.2	0.0 0.1
RA-228	PCI/L	0.0 0.7	0.0 0.7	0.0 0.7	0.0 1.1	0.9 4.8
SELENIUM	MG/L	0.003	0.015	0.038	< 0.002	< 0.001
SILICA	MG/L	7.94	-	6.	8.9	11.1
SILVER	MG/L	-	< 0.01	< 0.01	-	-
SODIUM	MG/L	42.7	44.2	1040.	34.1	17.2
STRONTIUM	MG/L	0.865	0.9	4.5	0.74	0.47
SULFATE	MG/L	163.	172.	1000.	125.	67.
SULFIDE	MG/L	< 0.1	-	< 0.1	-	-
TEMPERATURE	C - DEGREE	21.2	14.9	22.	8.	12.0
TH-230	PCI/L	0.0 0.4	0.1 0.4	0.1 0.4	0.0 0.5	0.1 0.4
THALLIUM	MG/L			0.01	-	-

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/27/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 551-01 09/05/87 PARAMETER VALUE+/-UNCERTAINTY	551-01 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	551-01 04/20/89 PARAMETER VALUE+/-UNCERTAINTY	552-01 03/19/87 PARAMETER VALUE+/-UNCERTAINTY	552-01 05/17/87 PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	< 0.003	-	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	397.	421.	6050.	342.	207.
URANIUM	MG/L	0.0015	0.0023	0.0482	0.0012	< 0.0003
VANADIUM	MG/L	0.01	0.01	0.04	< 0.2	< 0.01
ZINC	MG/L	< 0.005	0.16	0.010	< 0.005	< 0.005

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 552-01 09/24/87		552-01 10/07/88		552-01 04/22/89		553-01 03/17/87		553-01 05/17/87	
		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	129.		84.		59.		102.		98.	
ALUMINUM	MG/L	0.07		-		< 0.1		< 0.1		0.05	
AMMONIUM	MG/L	< 0.1		< 0.1		0.3		< 0.1		< 0.1	
ANTIMONY	MG/L	0.004		< 0.003		< 0.003		< 0.003		0.020	
ARSENIC	MG/L	0.002		0.01		< 0.01		0.002		0.001	
BARIUM	MG/L	0.07		< 0.1		< 0.1		0.2		0.05	
BERYLLIUM	MG/L	-		-		< 0.01		-		-	
BORON	MG/L	0.05		-		< 0.1		0.10		0.05	
BROMIDE	MG/L	< 0.1		-		< 0.1		-		-	
CADMIUM	MG/L	< 0.005		< 0.001		< 0.001		< 0.001		0.006	
CALCIUM	MG/L	62.6		71.2		55.5		45.9		39.9	
CHLORIDE	MG/L	10.6		13.		6.1		5.0		3.8	
CHROMIUM	MG/L	< 0.01		0.03		< 0.01		0.01		0.02	
COBALT	MG/L	< 0.01		< 0.05		< 0.05		< 0.05		< 0.01	
CONDUCTANCE	UMHO/CM	338.		410.		225.		270.		180.	
COPPER	MG/L	< 0.01		< 0.02		< 0.02		0.01		< 0.01	
CYANIDE	MG/L	-		-		< 0.01		-		-	
FLUORIDE	MG/L	0.25		0.3		0.3		0.21		0.19	
GROSS ALPHA	PCI/L	0.9	2.7	3.0	3.1	2.5	2.0	-		-	
GROSS BETA	PCI/L	2.0	3.1	7.6	1.7	1.9	1.3	-		-	
IRON	MG/L	< 0.01		0.03		< 0.03		0.05		0.02	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.001		0.02	
MAGNESIUM	MG/L	12.0		12.7		9.20		12.4		7.45	
MANGANESE	MG/L	0.03		-		0.02		0.01		0.01	
MERCURY	MG/L	0.0006		< 0.0002		< 0.0002		-		-	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.1		< 0.01	
NICKEL	MG/L	0.01		-		< 0.04		0.02		< 0.01	
NITRATE	MG/L	< 0.1		1.4		1.9		< 0.1		0.4	
NITRITE	MG/L	< 0.1		-		-		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		< 1.0		-		-		-	
ORG. CARBON	MG/L	-		-		21.0		33.7		29.4	
PB-210	PCI/L	-		-		0.0	0.6	0.0	1.4	0.2	1.0
PH	SU	8.55		7.73		8.28		8.34		8.21	
PHOSPHATE	MG/L	< 0.1		< 0.1		< 0.1		0.25		0.26	
PO-210	PCI/L	-		-		0.0	0.3	0.0	0.4	0.7	0.6
POTASSIUM	MG/L	1.72		2.2		1.6		2.60		1.9	
RA-226	PCI/L	-		0.1	0.1	-		0.0	0.2	0.0	0.1
RA-228	PCI/L	-		0.5	0.8	0.0	0.7	0.0	1.2	0.0	5.1
SELENIUM	MG/L	0.002		0.013		< 0.005		< 0.002		< 0.001	
SILICA	MG/L	7.25		-		7.		8.8		10.8	
SILVER	MG/L	-		< 0.01		< 0.01		-		-	
SODIUM	MG/L	39.2		41.1		20.4		29.9		16.4	
STRONTIUM	MG/L	0.870		0.9		0.5		0.73		0.45	
SULFATE	MG/L	150.		179.		93.		124.		70.	
SULFIDE	MG/L	< 0.1		-		< 0.1		-		-	
TEMPERATURE	C - DEGREE	16.1		14.5		13.		7.		10.0	
TH-230	PCI/L	-		0.0	0.3	0.0	0.3	0.3	0.8	0.1	0.6
THALLIUM	MG/L	-		-		< 0.01		-		-	

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 552-01 09/21/87	552-01 10/07/88	552-01 04/22/89	553-01 03/17/87	553-01 05/17/87
		PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	-	-	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	388.	414.	296.	328.	214.
URANIUM	MG/L	0.0042	0.0020	0.0011	0.0005	< 0.0003
VANADIUM	MG/L	0.01	0.01	0.02	< 0.2	< 0.01
ZINC	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 553-01 09/20/87		553-01 10/09/88		553-01 04/04/89		554-01 03/19/87		554-01 05/16/87	
		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	130.		118.		119.		113.		98.	
ALUMINUM	MG/L	0.10		-		< 0.1		0.1		0.06	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	< 0.003		< 0.003		0.003		< 0.003		0.016	
ARSENIC	MG/L	0.002		0.01		< 0.01		0.002		< 0.001	
BARIUM	MG/L	0.08		< 0.1		< 0.1		0.2		0.06	
BERYLLIUM	MG/L	-		-		< 0.01		-		-	
BORON	MG/L	0.06		-		< 0.1		0.06		0.01	
BROMIDE	MG/L	< 0.1		-		< 0.1		-		-	
CADMIUM	MG/L	< 0.005		< 0.001		< 0.001		< 0.001		0.005	
CALCIUM	MG/L	63.0		70.1		58.8		46.2		40.0	
CHLORIDE	MG/L	11.8		13.		10.		5.0		3.4	
CHROMIUM	MG/L	< 0.01		0.03		< 0.01		< 0.01		0.02	
COBALT	MG/L	< 0.01		< 0.05		< 0.05		< 0.05		< 0.01	
CONDUCTANCE	UMHO/CM	356.		395.		270.		290.		185.	
COPPER	MG/L	< 0.01		< 0.02		< 0.02		< 0.01		< 0.01	
CYANIDE	MG/L	-		-		< 0.01		-		-	
FLUORIDE	MG/L	0.25		0.3		0.3		0.22		0.19	
GROSS ALPHA	PCI/L	3.7	3.1	0.5	2.7	1.0	2.3	-		-	
GROSS BETA	PCI/L	19.	4.	6.5	1.7	3.8	1.4	-		-	
IRON	MG/L	0.02		< 0.03		0.04		< 0.03		0.04	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.001		0.02	
MAGNESIUM	MG/L	12.2		13.7		12.9		12.4		7.48	
MANGANESE	MG/L	0.02		-		0.01		0.02		0.01	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		-		-	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.1		< 0.01	
NICKEL	MG/L	< 0.01		-		< 0.04		0.02		< 0.01	
NITRATE	MG/L	< 0.1		1.4		2.1		< 0.1		0.8	
NITRITE	MG/L	< 0.1		-		-		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		< 1.0		-		-		-	
ORG. CARBON	MG/L	-		-		20.4		29.0		25.5	
PB-210	PCI/L	-		-		1.0	0.7	0.0	2.2	1.4	1.2
PH	SU	8.68		7.74		8.43		8.07		8.22	
PHOSPHATE	MG/L	< 0.1		0.1		< 0.1		0.30		0.31	
PO-210	PCI/L	-		-		0.9	0.5	0.0	0.3	0.0	0.5
POTASSIUM	MG/L	1.95		2.9		2.11		2.46		1.70	
RA-226	PCI/L	-		0.1	0.1	0.1	0.2	0.0	0.2	0.0	0.1
RA-228	PCI/L	-		0.0	0.7	0.0	1.0	0.0	0.9	0.0	0.8
SELENIUM	MG/L	0.003		0.013		< 0.005		< 0.002		< 0.001	
SILICA	MG/L	7.36		-		8.		7.2		10.8	
SILVER	MG/L	-		< 0.01		< 0.01		-		-	
SODIUM	MG/L	42.7		46.7		32.1		29.7		19.8	
STRONTIUM	MG/L	0.870		0.9		0.6		0.71		0.46	
SULFATE	MG/L	156.		179.		125.		124.		71.	
SULFIDE	MG/L	< 0.1		-		< 0.1		-		-	
TEMPERATURE	C - DEGREE	15.7		13.5		11.		8.		11.5	
TH-230	PCI/L	-		0.0	0.2	0.0	0.3	0.4	0.7	0.0	0.4
THALLIUM	MG/L	-		-		< 0.01		-		-	

SURFACE WATER QUALITY DATA BY LOCATION
SITE: CHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 553-01 09/20/87 PARAMETER VALUE+/-UNCERTAINTY	553-01 10/09/88 PARAMETER VALUE+/-UNCERTAINTY	553-01 04/04/89 PARAMETER VALUE+/-UNCERTAINTY	554-01 03/19/87 PARAMETER VALUE+/-UNCERTAINTY	554-01 05/16/87 PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	-	-	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	399.	414.	330.	305.	229.
URANIUM	MG/L	0.0013	0.0023	0.0015	0.0010	0.0003
VANADIUM	MG/L	0.01	0.01	< 0.01	< 0.2	< 0.01
ZINC	MG/L	< 0.005	0.008	0.017	< 0.005	< 0.003

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/87

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 554-01 09/04/87 PARAMETER VALUE+/-UNCERTAINTY	554-01 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	554-02 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	554-03 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	554-04 10/07/88 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	123.	114.	114.	114.	114.
ALUMINUM	MG/L	0.08	-	-	-	-
AMMONIUM	MG/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
ANTIMONY	MG/L	0.004	< 0.003	< 0.003	< 0.003	< 0.003
ARSENIC	MG/L	0.003	0.01	< 0.01	0.01	0.01
BARIUM	MG/L	0.09	< 0.1	< 0.1	< 0.1	< 0.1
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.06	-	-	-	-
BROMIDE	MG/L	< 0.1	-	-	-	-
CADMIUM	MG/L	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	63.0	69.1	69.4	69.7	69.0
CHLORIDE	MG/L	13.0	13.	13.	13.	13.
CHROMIUM	MG/L	< 0.01	0.03	0.03	0.03	0.03
COBALT	MG/L	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05
CONDUCTANCE	UMHO/CM	470.	425.	425.	425.	425.
COPPER	MG/L	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
CYANIDE	MG/L	-	-	-	-	-
FLUORIDE	MG/L	0.25	0.3	0.3	0.3	0.3
GROSS ALPHA	PCI/L	0.8 2.9	4.6 3.0	8.0 3.5	3.4 2.9	7.7 3.6
GROSS BETA	PCI/L	5.7 3.4	6.7 1.6	7.1 1.6	4.8 1.5	8.9 1.9
IRON	MG/L	< 0.01	< 0.03	< 0.03	< 0.03	< 0.03
LEAD	MG/L	< 0.01	0.01	< 0.01	< 0.01	0.01
MAGNESIUM	MG/L	11.7	12.1	12.2	13.0	13.1
MANGANESE	MG/L	0.02	-	-	-	-
MERCURY	MG/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
MOLYBDENUM	MG/L	< 0.01	< 0.01	< 0.01	0.01	< 0.01
NICKEL	MG/L	< 0.01	-	-	-	-
NITRATE	MG/L	< 0.1	< 1.0	< 1.0	< 1.0	< 1.0
NITRITE	MG/L	< 0.1	-	-	-	-
NO2 & NO3	MG/L	-	< 1.0	< 1.0	< 1.0	< 1.0
ORG. CARBON	MG/L	37.1	-	-	-	-
PB-210	PCI/L	0.0 1.2	-	-	-	-
PH	SU	8.54	7.83	7.83	7.83	7.83
PHOSPHATE	MG/L	< 0.1	0.1	0.1	0.1	< 0.1
PO-210	PCI/L	0.0 0.6	-	-	-	-
POTASSIUM	MG/L	2.00	2.3	2.5	2.9	2.8
RA-226	PCI/L	0.0 0.1	0.2 0.2	0.1 0.1	0.2 0.2	0.0 0.1
RA-228	PCI/L	0.0 0.9	0.5 0.7	0.4 0.8	0.2 0.8	0.6 0.8
SELENIUM	MG/L	0.003	0.013	0.007	0.010	0.009
SILICA	MG/L	8.07	-	-	-	-
SILVER	MG/L	-	< 0.01	< 0.01	< 0.01	< 0.01
SODIUM	MG/L	44.9	38.7	41.5	44.4	44.9
STRONTIUM	MG/L	0.870	0.8	0.9	0.9	0.9
SULFATE	MG/L	160.	170.	162.	173.	175.
SULFIDE	MG/L	< 0.1	-	-	-	-
TEMPERATURE	C - DEGREE	23.0	14.0	16.	16.	16.
TH-230	PCI/L	0.0 0.3	0.5 0.5	0.0 0.3	0.6 0.5	0.5 0.5
THALLIUM	MG/L	-	-	-	-	-

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 554-01 09/04/87 PARAMETER VALUE+/-UNCERTAINTY	554-01 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	554-02 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	554-03 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	554-04 10/07/88 PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	< 0.003	-	-	-	-
TOTAL SOLIDS	MG/L	393.	409.	400.	370.	417.
URANIUM	MG/L	0.0011	0.0023	0.0023	0.0023	0.0026
VANADIUM	MG/L	0.01	0.01	0.01	0.01	0.01
ZINC	MG/L	< 0.005	0.011	0.005	< 0.005	0.007

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 554-05 10/07/88		554-01 04/22/89		555-01 03/17/87		555-01 05/16/87		555-01 09/20/87	
		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	114.		95.		150.		92.		124.	
ALUMINUM	MG/L	-		< 0.1		0.2		0.05		0.07	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	< 0.003		< 0.003		0.008		0.023		< 0.003	
ARSENIC	MG/L	0.01		< 0.01		0.002		< 0.001		0.003	
BARIUM	MG/L	< 0.1		< 0.1		0.1		0.06		0.08	
BERYLLIUM	MG/L	-		< 0.01		-		-		-	
BORON	MG/L	-		< 0.1		0.07		0.02		0.06	
BROMIDE	MG/L	-		< 0.1		-		-		< 0.1	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		0.005		< 0.005	
CALCIUM	MG/L	72.9		50.0		44.1		41.7		62.0	
CHLORIDE	MG/L	13.		6.1		5.6		3.3		13.0	
CHROMIUM	MG/L	0.03		< 0.01		< 0.01		0.02		< 0.01	
COBALT	MG/L	< 0.05		< 0.05		< 0.05		< 0.01		< 0.01	
CONDUCTANCE	UMHO/CM	425.		200.		265.		195.		375.	
COPPER	MG/L	< 0.02		< 0.02		0.04		< 0.01		< 0.01	
CYANIDE	MG/L	-		< 0.01		-		-		-	
FLUORIDE	MG/L	0.3		0.3		0.22		0.19		0.25	
GROSS ALPHA	PCI/L	4.2	3.0	2.1	1.9	-		-		0.4	2.9
GROSS BETA	PCI/L	6.8	1.6	2.7	1.3	-		-		4.2	3.4
IRON	MG/L	< 0.03		< 0.03		0.14		0.03		< 0.01	
LEAD	MG/L	0.01		< 0.01		< 0.001		0.02		< 0.01	
MAGNESIUM	MG/L	12.6		8.46		12.2		7.35		12.2	
MANGANESE	MG/L	-		0.02		0.02		0.01		0.03	
MERCURY	MG/L	< 0.0002		< 0.0002		-		-		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		< 0.1		< 0.01		0.01	
NICKEL	MG/L	-		< 0.04		0.03		< 0.01		< 0.01	
NITRATE	MG/L	< 1.0		3.4		< 0.1		0.4		< 0.1	
NITRITE	MG/L	-		-		< 0.1		< 0.1		< 0.1	
NO2 & NO3	MG/L	< 1.0		-		-		-		-	
ORG. CARBON	MG/L	-		24.2		33.0		26.2		-	
PB-210	PCI/L	-		0.0	0.6	0.1	1.3	0.5	1.0	-	
PH	SU	7.83		8.24		8.14		8.21		8.75	
PHOSPHATE	MG/L	0.1		< 0.1		0.25		0.33		< 0.1	
PO-210	PCI/L	-		0.0	0.3	0.0	0.4	0.1	0.5	-	
POTASSIUM	MG/L	2.2		1.5		2.72		1.77		1.94	
RA-225	PCI/L	0.0	0.1	-		0.2	0.2	0.0	0.2	-	
RA-228	PCI/L	0.8	0.8	0.0	0.7	0.0	1.1	0.0	1.0	-	
SELENIUM	MG/L	0.005		< 0.005		< 0.002		< 0.001		0.002	
SILICA	MG/L	-		7.		8.5		10.9		6.87	
SILVER	MG/L	< 0.01		< 0.01		-		-		-	
SODIUM	MG/L	40.2		19.5		49.6		19.3		41.8	
STRONTIUM	MG/L	0.9		0.5		0.72		0.45		0.895	
SULFATE	MG/L	168.		94.		122.		73.		153.	
SULFIDE	MG/L	-		< 0.1		-		-		< 0.1	
TEMPERATURE	C - DEGREE	16.		13.		12.		12.0		20.0	
TH-230	PCI/L	1.1	0.6	0.6	0.3	0.5	0.6	0.3	0.6	-	
THALLIUM	MG/L	-		< 0.01		-		-		-	

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 554-05 10/07/88 PARAMETER VALUE+/-UNCERTAINTY	554-01 04/22/89 PARAMETER VALUE+/-UNCERTAINTY	555-01 03/17/87 PARAMETER VALUE+/-UNCERTAINTY	555-01 05/16/87 PARAMETER VALUE+/-UNCERTAINTY	555-01 09/20/87 PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	-	< 0.005	< 0.005	< 0.005	< 0.003
TOTAL SOLIDS	MG/L	409.	28%.	299.	226.	388.
URANIUM	MG/L	0.0023	0.0011	0.0004	0.0009	0.0013
VANADIUM	MG/L	0.01	0.01	< 0.2	< 0.01	0.01
ZINC	MG/L	< 0.005	< 0.005	0.011	< 0.005	< 0.005

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 555-01 10/09/88 PARAMETER VALUE+/-UNCERTAINTY		LOCATION ID - SAMPLE ID AND LOG DATE: 555-01 04/02/89 PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	130.		126.							
ALUMINUM	MG/L	-		< 0.1							
AMMONIUM	MG/L	< 0.1		< 0.1							
ANTIMONY	MG/L	< 0.003		< 0.003							
ARSENIC	MG/L	01.		< 0.01							
BARIUM	MG/L	< 0.1		< 0.1							
BERYLLIUM	MG/L	-		< 0.01							
BORON	MG/L	-		< 0.1							
BROMIDE	MG/L	-		< 0.1							
CADMIUM	MG/L	< 0.001		< 0.001							
CALCIUM	MG/L	72.8		5?.1							
CHLORIDE	MG/L	15.		8.9							
CHROMIUM	MG/L	0.03		< 0.01							
COBALT	MG/L	< 0.05		< 0.05							
CONDUCTANCE	UMHO/CM	410.		280.							
COPPER	MG/L	< 0.02		< 0.02							
CYANIDE	MG/L	-		< 0.01							
FLUORIDE	MG/L	0.3		0.3							
GROSS ALPHA	PCI/L	3.3	3.0	0.0	2.1						
GROSS BETA	PCI/L	6.6	1.7	3.4	1.3						
IRON	MG/L	< 0.03		< 0.03							
LEAD	MG/L	< 0.01		< 0.01							
MAGNESIUM	MG/L	13.1		12.0							
MANGANESE	MG/L	-		0.01							
MERCURY	MG/L	< 0.0002		< 0.0002							
MOLYBDENUM	MG/L	< 0.01		< 0.01							
NICKEL	MG/L	-		< 0.0+							
NITRATE	MG/L	1.2		2.3							
NITRITE	MG/L	-		-							
NO2 & NO3	MG/L	< 1.0		-							
ORG. CARBON	MG/L	-		30.7							
PB-210	PCI/L	-		0.5	0.7						
PH	SU	7.57		8.39							
PHOSPHATE	MG/L	0.1		< 0.1							
PO-210	PCI/L	-		0.2	0.4						
POTASSIUM	MG/L	2.6		1.90							
RA-226	PCI/L	0.1	0.1	0.0	0.2						
RA-228	PCI/L	0.3	0.8	0.1	0.1						
SELENIUM	MG/L	0.010		< 0.005							
SILICA	MG/L	-		7.							
SILVER	MG/L	< 0.01		< 0.01							
SODIUM	MG/L	46.0		29.1							
STRONTIUM	MG/L	0.9		0.6							
SULFATE	MG/L	159.		119.							
SULFIDE	MG/L	-		< 0.1							
TEMPERATURE	C - DEGREE	13.75		10.5							
TH-230	PCI/L	0.2	0.4	0.0	0.3						
THALLIUM	MG/L	-		< 0.01							

SURFACE WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 04/22/89

		LOCATION ID - SAMPLE ID AND LOG DATE	
		555-01 10/09/88	555-01 04/02/89
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TIN	MG/L	-	< 0.005
TOTAL SOLIDS	MG/L	441.	317.
URANIUM	MG/L	0.0023	0.0045
VANADIUM	MG/L	0.01	< 0.01
ZINC	MG/L	< 0.005	< 0.005

MAPPER INPUT FILE: SHP01*UDPSW0100230

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ENTER PRINTER STOP COMMAND - PRESS (CR)(CR)
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GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 09/20/87
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: DAKOTA SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: NOT KNOWN

		LOCATION ID - SAMPLE ID AND LOG DATE									
		648-01 03/17/87		648-01 05/16/87		648-01 09/20/87					
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	81.		65.		66.					
ALUMINUM	MG/L	< 0.1		0.08		0.09					
AMMONIUM	MG/L	0.4		0.5		0.4					
ANTIMONY	MG/L	< 0.003		0.035		0.042					
ARSENIC	MG/L	0.003		< 0.001		0.046					
BARIUM	MG/L	< 0.1		0.01		0.02					
BORON	MG/L	0.25		0.14		0.15					
BROMIDE	MG/L	-		-		< 0.1					
CADMIUM	MG/L	< 0.001		0.008		< 0.005					
CALCIUM	MG/L	105.		111.		107.					
CHLORIDE	MG/L	36.6		56.8		59.0					
CHROMIUM	MG/L	0.02		0.06		< 0.01					
COBALT	MG/L	0.06		< 0.01		< 0.01					
CONDUCTANCE	UMHO/CM	3050.		3325.		2900.					
COPPER	MG/L	0.01		< 0.01		< 0.01					
FLUORIDE	MG/L	2.11		2.12		1.80					
GROSS ALPHA	PCI/L	-		-		1.	11.				
GROSS BETA	PCI/L	-		-		35.	13.				
IRON	MG/L	0.05		0.12		0.02					
LEAD	MG/L	< 0.001		0.05		< 0.01					
MAGNESIUM	MG/L	13.6		13.5		13.4					
MANGANESE	MG/L	0.10		0.10		0.09					
MERCURY	MG/L	-		-		0.0006					
MOLYBDENUM	MG/L	< 0.1		< 0.01		0.03					
NICKEL	MG/L	0.07		< 0.01		< 0.01					
NITRATE	MG/L	< 0.1		0.4		< 0.1					
NITRITE	MG/L	< 0.1		< 0.1		< 0.1					
ORG. CARBON	MG/L	11.5		41.1		14.2					
PB-210	PCI/L	0.0	1.4	0.1	1.2	0.7	0.9				
PH	SU	7.95		8.11		8.11					
PHOSPHATE	MG/L	0.15		0.61		< 0.1					
PO-210	PCI/L	0.3	0.3	0.0	0.4	0.1	0.6				
POTASSIUM	MG/L	7.72		7.79		7.34					
RA-226	PCI/L	0.6	0.3	0.3	0.2	0.3	0.2				
RA-228	PCI/L	1.0	0.9	1.2	1.3	1.0	3.0				
SELENIUM	MG/L	< 0.002		< 0.001		0.046					
SILICA	MG/L	15.1		19.5		14.4					
SODIUM	MG/L	879.		947.		842.					
STRONTIUM	MG/L	11.4		7.50		10.9					
SULFATE	MG/L	2050.		2109.		1960.					
SULFIDE	MG/L	-		-		< 0.1					
TEMPERATURE	C - DEGREE	30.		31.0		30.0					
TH-230	PCI/L	0.0	0.4	0.0	0.4	0.1	0.4				
TIN	MG/L	0.009		< 0.005		0.020					
TOTAL SOLIDS	MG/L	3110.		3400.		3100.					
URANIUM	MG/L	< 0.0003		< 0.0003		< 0.0003					

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
03/17/87 TO 09/20/87
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: DAKOTA SANDSTONE
HYDRAULIC FLOW RELATIONSHIP: NOT KNOWN

		LOCATION ID - SAMPLE ID AND LOG DATE		
		648-01 03/17/87	648-01 05/16/87	648-01 09/20/87
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
VANADIUM	MG/L	< 0.2	< 0.01	0.02
ZINC	MG/L	< 0.005	< 0.005	< 0.005

MAPPER DATA FILE NAME: SHP01*UDPGWQ103098

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ENTER PRINTER STOP COMMAND - PRESS (CR)(CR)

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GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		602-01 10/01/85	602-01 09/18/87	603-01 10/02/85	603-01 09/03/87	603-01 04/06/89
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	302.	231.	185.	1791.	749.
ALUMINUM	MG/L	-	0.29	-	0.59	< 0.1
AMMONIUM	MG/L	31.	41.3	0.7	0.1	< 0.1
ANTIMONY	MG/L	-	0.116	-	0.068	0.071
ARSENIC	MG/L	-	0.008	-	0.082	0.02
BARIUM	MG/L	-	0.02	-	0.01	< 0.1
BERYLLIUM	MG/L	-	-	-	-	< 0.01
BORON	MG/L	0.7	0.48	0.3	1.12	0.6
BROMIDE	MG/L	-	0.1	-	0.6	0.2
CADMIUM	MG/L	< 0.001	< 0.005	< 0.001	< 0.005	0.020
CALCIUM	MG/L	378.	520.	322.	519.	369.
CHLORIDE	MG/L	96.	44.	39.	1060.	880.
CHROMIUM	MG/L	-	< 0.01	-	< 0.01	< 0.01
COBALT	MG/L	-	< 0.01	-	< 0.01	< 0.05
CONDUCTANCE	UMHO/CM	6800.	2700.	2480.	16000.	9500.
COPPER	MG/L	0.04	< 0.01	0.02	0.06	0.05
CYANIDE	MG/L	-	-	-	-	< 0.01
FLUORIDE	MG/L	2.	0.46	1.3	0.65	0.7
GROSS ALPHA	PCI/L	-	200. 40.	-	2300. 300.	1600. 300.
GROSS BETA	PCI/L	-	200. 30.	-	1300. 100.	730. 110.
IRON	MG/L	0.44	2.09	2.05	0.51	0.45
LEAD	MG/L	-	0.01	-	0.03	0.02
MAGNESIUM	MG/L	502.	295.	139.	2487.	1650.
MANGANESE	MG/L	0.99	2.36	2.08	5.73	1.27
MERCURY	MG/L	-	0.0003	-	< 0.0002	< 0.0002
MOLYBDENUM	MG/L	0.16	< 0.01	0.22	0.03	< 0.01
NICKEL	MG/L	-	< 0.01	-	0.02	< 0.04
NITRATE	MG/L	180.	110.	4.	120.	5.3
NITRITE	MG/L	-	< 0.1	-	< 0.1	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	73.5	-	234.	199.
PB-210	PCI/L	-	-	-	-	6.1 1.4
PH	SU	6.96	6.92	7.39	7.47	7.74
PHOSPHATE	MG/L	-	0.46	-	1.65	< 0.1
PO-210	PCI/L	-	0.2 0.7	-	2.2 1.7	0.9 0.7
POTASSIUM	MG/L	66.1	45.1	19.9	99.5	89.9
RA-226	PCI/L	-	0.0 0.1	-	0.0 0.1	0.1 0.2
RA-228	PCI/L	-	1.5 1.6	-	0.3 0.8	0.9 0.9
SELENIUM	MG/L	< 0.005	0.178	< 0.005	0.002	0.452
SILICA	MG/L	-	17.8	-	13.0	9.
SILVER	MG/L	-	-	-	-	< 0.01
SODIUM	MG/L	1170.	351.	318.	7393.	4970.
STRONTIUM	MG/L	-	4.50	-	25.0	13.9
SULFATE	MG/L	4940.	2880.	1780.	23300.	16000.
SULFIDE	MG/L	-	< 0.1	-	< 0.1	< 0.1
TEMPERATURE	C - DEGREE	21.	24.0	18.	23.0	11.5

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		602-01 10/01/85		602-01 09/18/87		603-01 10/02/85		602-01 09/03/87		603-01 04/06/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	-		0.4	0.8	-		0.2	1.1	0.0	0.7
THALLIUM	MG/L	-		-		-		-		0.02	
TIN	MG/L	< 0.005		0.020		< 0.005		0.075		0.011	
TOTAL SOLIDS	MG/L	8100.		4830.		2920.		38000.		27200.	
URANIUM	MG/L	0.789		0.348		0.22		3.93		2.33	
VANADIUM	MG/L	0.2		0.07		0.3		0.47		0.13	
ZINC	MG/L	0.9		0.347		0.63		0.662		0.204	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 06/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		604-01 10/03/85	604-01 09/03/87	605-01 10/04/85	606-01 10/03/85	607-01 10/02/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	460.	339.	427.	296.	1291.
ALUMINUM	MG/L	-	0.31	-	-	-
AMMONIUM	MG/L	0.5	< 0.1	0.5	0.4	4.8
ANTIMONY	MG/L	-	0.068	-	-	-
ARSENIC	MG/L	-	0.017	-	-	-
BARIUM	MG/L	-	0.02	-	-	-
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.6	0.47	0.8	0.6	1.1
BROMIDE	MG/L	-	< 0.1	-	-	-
CADMIUM	MG/L	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	407.	390.	273.	421.	495.
CHLORIDE	MG/L	250.	170.	210.	140.	720.
CHROMIUM	MG/L	-	< 0.01	-	-	-
COBALT	MG/L	-	< 0.01	-	-	-
CONDUCTANCE	UMHO/CM	9500.	3700.	8000.	6500.	14950.
COPPER	MG/L	0.05	0.02	0.08	0.04	0.11
CYANIDE	MG/L	-	-	-	-	-
FLUORIDE	MG/L	7.5	1.15	7.5	5.5	12.
GROSS ALPHA	PCI/L	-	320. 70.	-	-	-
GROSS BETA	PCI/L	-	190. 40.	-	-	-
IRON	MG/L	0.3	0.32	0.06	0.54	1.13
LEAD	MG/L	-	0.03	-	-	-
MAGNESIUM	MG/L	530.	344.	572.	290.	1540.
MANGANESE	MG/L	1.61	1.91	0.11	0.54	2.83
MERCURY	MG/L	-	< 0.0002	-	-	-
MOLYBDENUM	MG/L	0.44	< 0.01	0.36	0.06	0.27
NICKEL	MG/L	-	< 0.01	-	-	-
NITRATE	MG/L	200.	95.	220.	180.	460.
NITRITE	MG/L	-	< 0.1	-	-	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	103.	-	-	-
PB-210	PCI/L	-	-	-	-	-
PH	SU	7.38	7.45	7.23	7.88	6.82
PHOSPHATE	MG/L	-	0.92	-	-	-
PO-210	PCI/L	-	0.0 0.6	-	-	-
POTASSIUM	MG/L	31.5	25.4	44.6	22.2	100.
RA-226	PCI/L	-	0.0 0.1	-	-	-
RA-228	PCI/L	-	0.1 0.9	-	-	-
SELENIUM	MG/L	0.009	0.184	< 0.005	< 0.005	< 0.005
SILICA	MG/L	-	12.9	-	-	-
SILVER	MG/L	-	-	-	-	-
SODIUM	MG/L	2380.	1616.	420.	1570.	4520.
STRONTIUM	MG/L	-	8.35	-	-	-
SULFATE	MG/L	7220.	5096.	3320.	4850.	14300.
SULFIDE	MG/L	-	< 0.1	-	-	-
TEMPERATURE	C DEGREE	17.	18.5	17.	17.	18.

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		604-01 10/03/85	604-01 09/03/87	605-01 10/04/85	606-01 10/03/85	607-01 10/02/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TH-230	PCI/L	-	0.0 0.5	-	-	-
THALLIUM	MG/L	-	-	-	-	-
TIN	MG/L	< 0.005	0.037	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	11800.	858.	10800.	7970.	24000.
URANIUM	MG/L	0.789	0.411	1.49	0.814	2.5
VANADIUM	MG/L	< 0.01	0.07	0.8	0.6	0.49
ZINC	MG/L	0.767	0.386	0.114	1.37	1.56

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 607-01 09/19/86 PARAMETER VALUE+/-UNCERTAINTY	 607-01 09/01/87 PARAMETER VALUE+/-UNCERTAINTY	 608-01 09/28/85 PARAMETER VALUE+/-UNCERTAINTY	 608-01 09/18/86 PARAMETER VALUE+/-UNCERTAINTY	 608-01 09/22/87 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	620.0	1640.	560.	845.0	1001.
ALUMINUM	MG/L	0.4	0.53	-	0.2	0.61
AMMONIUM	MG/L	0.2	11.2	170.	380.0	516.
ANTIMONY	MG/L	< 0.003	0.039	-	< 0.003	0.129
ARSENIC	MG/L	< 0.01	0.032	-	< 0.01	0.038
BARIUM	MG/L	< 0.1	0.01	-	0.2	0.03
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.6	1.13	1.	0.3	0.71
BROMIDE	MG/L	-	0.5	-	-	0.1
CADMIUM	MG/L	< 0.001	< 0.005	< 0.001	< 0.001	< 0.005
CALCIUM	MG/L	550.0	510.	327.	457.0	510.
CHLORIDE	MG/L	490.0	800.	170.	340.0	510.
CHROMIUM	MG/L	0.08	< 0.01	-	0.09	< 0.01
COBALT	MG/L	0.15	< 0.01	-	0.14	< 0.01
CONDUCTANCE	UMHO/CM	8000.0	10050.	7000.	8750.0	7000.
COPPER	MG/L	0.08	0.05	0.05	0.08	0.03
CYANIDE	MG/L	< 0.01	-	-	< 0.01	-
FLUORIDE	MG/L	1.5	0.34	10.	0.8	0.51
GROSS ALPHA	PCI/L	-	1600. 300.	-	-	2000. 300.
GROSS BETA	PCI/L	-	780. 130.	-	-	1100. 100.
IRON	MG/L	0.15	0.03	0.18	0.15	< 0.01
LEAD	MG/L	< 0.01	0.05	-	< 0.01	0.03
MAGNESIUM	MG/L	467.0	1849.	1170.	1580.0	2349.
MANGANESE	MG/L	1.42	3.10	2.65	4.84	6.62
MERCURY	MG/L	< 0.0002	< 0.0002	-	< 0.0002	< 0.0002
MOLYBDENUM	MG/L	0.14	< 0.01	0.2	0.10	0.01
NICKEL	MG/L	0.11	0.04	-	0.14	0.05
NITRATE	MG/L	840.0	840.	1800.	410.0	365.
NITRITE	MG/L	< 0.1	< 0.1	-	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	180.	387.	-	220.	285.
PB-210	PCI/L	1.3 1.1	-	-	7.9 0.8	-
PH	SU	7.35	7.09	7.09	6.85	6.72
PHOSPHATE	MG/L	< 0.1	1.32	-	< 0.1	1.30
PO-210	PCI/L	0.3 1.3	0.3 1.3	-	1.5 1.1	1.1 1.5
POTASSIUM	MG/L	112.0	82.4	89.3	141.0	150.
RA-226	PCI/L	0.1 0.3	0.1 0.1	-	0.3 0.4	0.0 0.1
RA-228	PCI/L	0.0 0.9	1.2 0.8	-	0.2 1.0	0.2 0.9
SELENIUM	MG/L	0.022	0.434	< 0.005	< 0.005	0.250
SILICA	MG/L	7.	14.9	-	7.	11.7
SILVER	MG/L	< 0.01	-	-	< 0.01	-
SODIUM	MG/L	3400.0	3583.	1390.	1220.0	2642.
STRONTIUM	MG/L	16.6	15.0	-	12.4	15.8
SULFATE	MG/L	8660.0	12800.	6570.	9650.0	15400.
SULFIDE	MG/L	< 0.1	< 0.1	-	< 0.1	< 0.1
TEMPERATURE	C - DEGREE	18.5	21.5	17.	21.0	22.0

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		607-01 09/17/86		607-01 09/01/87		608-01 09/28/85		608-01 09/18/86		608-01 09/22/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	1.5	2.9	0.2	1.0	-		1.0	1.1	1.9	1.6
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	< 0.005		0.040		< 0.005		0.020		0.035	
TOTAL SOLIDS	MG/L	16000.0		24000.		11300.		16800.0		26000.	
URANIUM	MG/L	0.834		1.96		1.78		1.72		3.30	
VANADIUM	MG/L	0.21		0.45		0.4		0.21		0.47	
ZINC	MG/L	0.728		[illegible]		0.215		0.151		0.425	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		608-02 09/22/87		608-03 09/22/87		608-04 09/22/87		608-05 09/22/87		608-01 04/03/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	1001.		1001.		1001.		1001.		1138.	
ALUMINUM	MG/L	0.61		0.61		0.61		0.62		< 0.1	
AMMONIUM	MG/L	546.		542.		542.		555.		460.	
ANTIMONY	MG/L	0.077		0.078		0.084		0.077		0.037	
ARSENIC	MG/L	0.032		0.041		0.040		0.037		0.03	
BARIUM	MG/L	0.03		0.03		0.03		0.03		< 0.1	
BERYLLIUM	MG/L	-		-		-		-		< 0.01	
BORON	MG/L	0.74		0.73		0.74		0.74		0.4	
BROMIDE	MG/L	< 0.1		< 0.1		0.1		< 0.1		< 0.1	
CADMIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005		0.018	
CALCIUM	MG/L	540.		505.		503.		501.		449.	
CHLORIDE	MG/L	540.		500.		525.		515.		490.	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	< 0.01		< 0.01		< 0.01		0.02		< 0.05	
CONDUCTANCE	UMHO/CM	7000.		7000.		7000.		7000.		8500.	
COPPER	MG/L	0.03		0.03		0.03		0.03		0.03	
CYANIDE	MG/L	-		-		-		-		< 0.01	
FLUORIDE	MG/L	0.50		0.49		0.50		0.54		0.4	
GROSS ALPHA	PCI/L	1800.	300.	2000.	300.	2100.	300.	2000.	300.	1600.	300.
GROSS BETA	PCI/L	800.	110.	1000.	100.	860.	110.	1100.	100.	1200.	100.
IRON	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		0.16	
LEAD	MG/L	0.03		0.01		0.02		0.04		< 0.01	
MAGNESIUM	MG/L	2393.		2354.		2397.		2390.		2350.	
MANGANESE	MG/L	7.05		7.08		7.10		7.23		7.16	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	0.03		< 0.01		0.01		0.06		< 0.01	
NICKEL	MG/L	0.04		0.05		0.04		0.05		0.06	
NITRATE	MG/L	3840.		3810.		3810.		3950.		3900.	
NITRITE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		-	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	311.		306.		303.		342.		298.	
PB-210	PCI/L	-		-		-		-		1.2	1.2
PH	SU	6.72		6.72		6.72		6.72		6.88	
PHOSPHATE	MG/L	1.57		1.53		1.55		1.41		< 0.1	
PO-210	PCI/L	0.5	0.9	1.1	1.2	0.5	0.9	0.4	0.9	1.1	0.7
POTASSIUM	MG/L	162.		161.		163.		166.		185.	
RA-226	PCI/L	0.2	0.2	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.2
RA-228	PCI/L	1.4	0.8	1.3	1.4	0.6	0.9	1.2	1.5	0.2	0.8
SELENIUM	MG/L	0.230		0.228		0.233		0.246		0.088	
SILICA	MG/L	12.3		12.2		12.4		12.6		9.	
SILVER	MG/L	-		-		-		-		< 0.01	
SODIUM	MG/L	2621.		2621.		2632.		2628.		2410.	
STRONTIUM	MG/L	15.3		15.5		15.4		15.5		14.1	
SULFATE	MG/L	13300.		13300.		13300.		13490.		13400.	
SULFIDE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	22.0		22.0		22.0		22.0		11.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		608-02 09/22/87		608-03 09/22/87		608-04 09/22/87		608-05 09/22/87		608-01 04/03/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	1.4	1.4	1.6	1.6	2.0	1.5	0.2	1.2	0.1	0.6
THALLIUM	MG/L	-		-		-		-		0.02	
TIN	MG/L	0.041		0.035		0.035		0.037		0.046	
TOTAL SOLIDS	MG/L	25600.		26000.		26300.		26400.		26500.	
URANIUM	MG/L	3.25		3.16		3.16		3.07		3.73	
VANADIUM	MG/L	0.17		0.18		0.18		0.18		0.16	
ZINC	MG/L	0.135		0.144		0.141		0.150		0.133	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/27/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 609-01 09/29/85 PARAMETER VALUE+/-UNCERTAINTY	609-01 09/17/86 PARAMETER VALUE+/-UNCERTAINTY	609-01 09/21/87 PARAMETER VALUE+/-UNCERTAINTY	610-01 09/29/85 PARAMETER VALUE+/-UNCERTAINTY	610-01 09/18/86 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	595.	820.0	1039.	380.	348.0
ALUMINUM	MG/L	-	0.2	0.73	-	0.3
AMMONIUM	MG/L	180.	390.0	568.	26.	30.0
ANTIMONY	MG/L	-	< 0.003	0.055	-	< 0.003
ARSENIC	MG/L	-	< 0.01	0.034	-	< 0.01
BARIUM	MG/L	-	0.1	0.04	-	< 0.1
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.7	0.3	0.75	7.1	0.5
BROMIDE	MG/L	-	-	0.1	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001
CALCIUM	MG/L	306.	427.0	504.	511.	563.0
CHLORIDE	MG/L	150.	310.0	520.	210.	260.
CHROMIUM	MG/L	-	0.06	< 0.01	-	0.06
COBALT	MG/L	-	0.14	< 0.01	-	0.12
CONDUCTANCE	UMHO/CM	7500.	9000.0	5690.	9000.	7000.0
COPPER	MG/L	0.04	0.07	0.05	0.04	0.05
CYANIDE	MG/L	-	< 0.01	-	-	< 0.01
FLUORIDE	MG/L	8.7	0.8	0.49	10.	0.7
GROSS ALPHA	PCI/L	-	-	2200. 300.	-	-
GROSS BETA	PCI/L	-	-	990. 120.	-	-
IRON	MG/L	0.1	0.13	< 0.01	0.13	0.10
LEAD	MG/L	-	< 0.01	0.03	-	< 0.01
MAGNESIUM	MG/L	950.	1550.0	2479.	885.	1100.0
MANGANESE	MG/L	2.73	7.18	8.04	1.17	1.53
MERCURY	MG/L	-	< 0.0002	< 0.0002	-	< 0.0002
MOLYBDENUM	MG/L	0.09	0.09	0.01	0.05	0.09
NICKEL	MG/L	-	0.14	0.05	-	0.10
NITRATE	MG/L	1600.	410.0	4000.	3600.	410.0
NITRITE	MG/L	-	< 0.1	< 0.1	-	< 0.1
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	200.	347.	-	88.
PB-210	PCI/L	-	7.1 0.8	-	-	8.5 1.0
PH	SU	7.01	6.87	6.77	7.09	7.09
PHOSPHATE	MG/L	-	< 0.1	1.47	-	< 0.1
PO-210	PCI/L	-	1.8 1.1	0.6 1.4	-	0.8 0.7
POTASSIUM	MG/L	80.9	137.0	166.	72.4	99.4
RA-226	PCI/L	-	0.2 0.3	0.0 0.1	-	0.1 0.2
RA-228	PCI/L	-	0.5 1.2	0.0 1.0	-	0.4 0.7
SELENIUM	MG/L	< 0.005	< 0.005	0.228	< 0.005	< 0.005
SILICA	MG/L	-	7.	13.0	-	7.
SILVER	MG/L	-	< 0.01	-	-	< 0.01
SODIUM	MG/L	878.	910.0	2637.	1540.	870.0
STRONTIUM	MG/L	-	11.3	15.0	-	7.9
SULFATE	MG/L	4850.	3930.0	13400.	4460.	4000.0
SULFIDE	MG/L	-	< 0.1	< 0.1	-	< 0.1
TEMPERATURE	C - DEGREE	17.	22.5	22.9	19.	23.5

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/29/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		609-01 09/29/85	609-01 09/17/86	609-01 09/21/87	610-01 09/29/85	610-01 09/18/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TH-230	PCI/L	-	2.0 1.4	0.6 1.1	-	0.9 0.8
THALLIUM	MG/L	-	-	-	-	-
TIN	MG/L	< 0.005	0.025	0.030	< 0.005	0.010
TOTAL SOLIDS	MG/L	10500.	15800.0	26800.	12000.	12700.0
URANIUM	MG/L	1.4	2.17	3.04	1.52	1.03
VANADIUM	MG/L	0.3	0.23	0.20	0.3	0.20
ZINC	MG/L	0.147	0.203	0.211	0.138	0.073

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/27/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		610-01 09/21/87		610-01 04/03/89		611-01 09/29/85		611-01 09/19/87		612-01 09/29/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	471.		424.		287.		591.		213.	
ALUMINUM	MG/L	9.77		< 0.1		-		0.34		-	
AMMONIUM	MG/L	37.4		82.		19.		21.9		4.	
ANTIMONY	MG/L	0.103		0.009		-		0.004		-	
ARSENIC	MG/L	0.028		0.02		-		0.028		-	
BARIUM	MG/L	0.03		< 0.1		-		0.02		-	
BERYLLIUM	MG/L	-		< 0.01		-		-		-	
BORON	MG/L	3.75		0.4		1.7		0.81		0.3	
BROMIDE	MG/L	< 0.1		< 0.1		-		0.1		-	
CADMIUM	MG/L	< 0.005		0.007		< 0.001	<	0.005	<	0.001	
CALCIUM	MG/L	507.		464.		385.		464.		161.	
CHLORIDE	MG/L	300.		340.		190.		416.		44.	
CHROMIUM	MG/L	< 0.01		< 0.01		-	<	0.01		-	
COBALT	MG/L	< 0.01		< 0.05		-	<	0.01		-	
CONDUCTANCE	UMHO/CM	4900.		6250.		7000.		4940.		1250.	
COPPER	MG/L	0.05		0.07		0.04	<	0.01	<	0.02	
CYANIDE	MG/L	-		< 0.01		-		-		-	
FLUORIDE	MG/L	0.59		0.5		8.		0.57		1.	
GROSS ALPHA	PCI/L	870.	140.	780.	190.	-		770.	120.	-	
GROSS BETA	PCI/L	540.	80.	740.	80.	-		630.	60.	-	
IRON	MG/L	< 0.01		0.14		0.46		0.08		0.04	
LEAD	MG/L	0.01		< 0.01		-		0.02		-	
MAGNESIUM	MG/L	1173.		1300.		622.		722.		48.1	
MANGANESE	MG/L	2.27		2.42		0.87		1.72		0.66	
MERCURY	MG/L	0.0002		< 0.0002		-	<	0.0002		-	
MOLYBDENUM	MG/L	0.02		< 0.01		0.1	<	0.01		0.2	
NICKEL	MG/L	0.01		< 0.04		-		0.02		-	
NITRATE	MG/L	1770.		2700.		2000.		1110.		4.	
NITRITE	MG/L	< 0.1		-		-	<	0.1		-	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	147.		190.		-		175.		-	
PB-210	PCI/L	-		0.3	0.6	-		-		-	
PH	SU	6.91		6.98		7.17		6.90		7.46	
PHOSPHATE	MG/L	1.42		< 0.1		-		0.65		-	
PO-210	PCI/L	0.6	0.7	0.4	0.4	-		0.2	0.6	-	
POTASSIUM	MG/L	93.6		127.		57.2		56.4		13.9	
RA-226	PCI/L	0.1	0.2	0.0	0.1	-		0.0	0.1	-	
RA-228	PCI/L	0.4	1.2	0.6	0.8	-		0.0	1.3	-	
SELENIUM	MG/L	0.158		0.065	< 0.005			0.222	<	0.005	
SILICA	MG/L	14.1		10.	-			14.5		-	
SILVER	MG/L	-		< 0.01	-			-		-	
SODIUM	MG/L	1576.		1500.	1790.			1979.		229.	
STRONTIUM	MG/L	9.55		10.0	-			12.0		-	
SULFATE	MG/L	7070.		7000.	5430.			6950.		809.	
SULFIDE	MG/L	< 0.1		< 0.1	-		<	0.1		-	
TEMPERATURE	C DEGREE	23.3		17.	18.5			23.0		18.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/87 TO 04/27/89
REPORT DATE: 05/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		610-01 09/21/87		610-01 04/03/89		611-01 09/29/85		611-01 09/19/87		612-01 09/29/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.1	0.7	0.0	0.5	-		1.0	1.0	-	
THALLIUM	MG/L	-		0.02		-		-		-	
TIN	MG/L	0.048		0.035		< 0.005		0.045		< 0.005	
TOTAL SOLIDS	MG/L	45500.		16200.		10000.		12300.		1470.	
URANIUM	MG/L	0.920		1.92		0.704		0.719		0.14	
VANADIUM	MG/L	0.17		0.11		0.4		0.10		0.4	
ZINC	MG/L	0.054		0.070		0.092		0.013		0.041	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/02/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		612-01 09/17/86		612-01 09/17/87		612-01 04/03/89		613-01 09/30/85		613-01 09/13/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	291.0		273.		291.		390.		548.0	
ALUMINUM	MG/L	0.2		0.14		< 0.1		-		0.3	
AMMONIUM	MG/L	21.0		16.8		< 0.1		56.		57.0	
ANTIMONY	MG/L	< 0.003		0.042		0.004		-		< 0.003	
ARSENIC	MG/L	< 0.01		0.004		< 0.01		-		< 0.01	
BARIUM	MG/L	0.2		0.04		< 0.1		-		0.1	
BERYLLIUM	MG/L	-		-		< 0.01		-		-	
BORON	MG/L	0.3		0.19		< 0.1		2.5		0.3	
BROMIDE	MG/L	-		< 0.1		< 0.1		-		-	
CADMIUM	MG/L	< 0.001		< 0.005		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	192.0		208.		194.		488.		547.0	
CHLORIDE	MG/L	24.		47.8		27.		240.		280.0	
CHROMIUM	MG/L	0.04		< 0.01		< 0.01		-		0.05	
COBALT	MG/L	< 0.05		< 0.01		< 0.05		-		0.14	
CONDUCTANCE	UMHO/CM	2000.0		1800.		1975.		7000.		7750.0	
COPPER	MG/L	0.02		< 0.01		< 0.02		0.05		0.09	
CYANIDE	MG/L	< 0.01		-		< 0.01		-		< 0.01	
FLUORIDE	MG/L	0.8		0.74		0.7		10.		0.8	
GROSS ALPHA	PCI/L	-		140.	20.	160.	20.	-		-	
GROSS BETA	PCI/L	-		110.	10.	82.	7.	-		-	
IRON	MG/L	0.15		< 0.01		0.08		0.07		0.10	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		-		< 0.01	
MAGNESIUM	MG/L	85.2		75.6		75.0		801.		1250.0	
MANGANESE	MG/L	3.39		3.50		0.41		2.88		2.61	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		-		< 0.0002	
MOLYBDENUM	MG/L	0.10		0.03		< 0.01		0.15		0.11	
NICKEL	MG/L	< 0.04		< 0.01		< 0.04		-		0.13	
NITRATE	MG/L	160.0		< 0.1		51.		300.		320.0	
NITRITE	MG/L	< 0.1		< 0.1		-		-		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	74.		79.0		54.3		-		170.	
PB-210	PCI/L	1.4	0.7	-		0.6	0.7	-		4.3	1.2
PH	SU	7.42		7.02		7.23		7.2		6.97	
PHOSPHATE	MG/L	< 0.1		0.34		< 0.1		-		< 0.1	
PO-210	PCI/L	0.0	0.5	1.0	0.7	1.1	0.5	-		1.9	0.9
POTASSIUM	MG/L	31.6		20.2		11.3		66.3		127.0	
RA-226	PCI/L	0.2	0.2	0.0	0.1	0.1	0.1	-		0.5	0.4
RA-228	PCI/L	0.7	0.8	0.5	0.9	0.0	0.8	-		0.8	0.9
SELENIUM	MG/L	< 0.005		0.020		0.062		< 0.		< 0.005	
SILICA	MG/L	10.		14.8		13.		-		9.	
SILVER	MG/L	< 0.01		-		< 0.01		-		< 0.01	
SODIUM	MG/L	302.0		235.		133.		1400.		1280.0	
STRONTIUM	MG/L	2.0		2.10		1.7		-		12.2	
SULFATE	MG/L	1160.0		1150.		736.		7110.		8040.0	
SULFIDE	MG/L	< 0.1		< 0.1		< 0.1		-		< 0.1	
TEMPERATURE	C DEGREE	22.0		22.5		13.		17.		22.0	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
07/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		612-01 09/17/86		612-01 09/19/87		612-01 04/03/89		613-01 09/30/85		613-01 09/18/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	0.0	0.4	0.0	0.3	0.0	0.2	-		1.5	0.9
THALLIUM	MG/L	-		-		< 0.01		-		-	
TIN	MG/L	< 0.005		0.018		0.011		< 0.005		< 0.005	
TOTAL SOLIDS	MG/L	1990.0		2000.		1520.		12700.		14200.0	
URANIUM	MG/L	0.192		0.165		0.263		1.44		1.80	
VANADIUM	MG/L	0.23		0.04		0.02		0.6		0.16	
ZINC	MG/L	0.021		< 0.005		0.011		0.091		0.133	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 06/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		613-01 09/18/87	614-01 09/30/85	614-01 09/18/87	614-01 10/11/88	614-01 04/03/89
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	440.	541.	426.	406.	406.
ALUMINUM	MG/L	0.43	-	0.41	-	< 0.1
AMMONIUM	MG/L	90.3	88.	44.5	56.	57.
ANTIMONY	MG/L	0.003	-	0.068	0.027	0.007
ARSENIC	MG/L	0.019	-	0.016	0.05	< 0.01
BARIUM	MG/L	0.02	-	0.03	< 0.1	< 0.1
BERYLLIUM	MG/L	-	-	-	-	< 0.01
BORON	MG/L	0.65	11.	0.69	-	0.3
BROMIDE	MG/L	0.2	-	< 0.1	-	< 0.1
CADMIUM	MG/L	< 0.005	< 0.001	< 0.005	0.002	0.008
CALCIUM	MG/L	514.	470.	478.	407.	428.
CHLORIDE	MG/L	230.	310.	205.	240.	250.
CHROMIUM	MG/L	< 0.01	-	< 0.01	0.20	< 0.01
COBALT	MG/L	< 0.01	-	< 0.01	0.06	< 0.05
CONDUCTANCE	UMHO/CM	4320.	12000.	4275.	8500.	6400.
COPPER	MG/L	0.02	0.07	0.01	0.03	< 0.02
CYANIDE	MG/L	-	-	-	-	< 0.01
FLUORIDE	MG/L	0.60	9.	0.53	0.6	0.5
GROSS ALPHA	PCI/L	980. 110.	-	920. 110.	620. 150.	650. 160.
GROSS BETA	PCI/L	640. 40.	-	650. 40.	280. 60.	430. 70.
IRON	MG/L	< 0.01	0.13	< 0.01	0.15	0.12
LEAD	MG/L	0.03	-	0.01	< 0.01	< 0.01
MAGNESIUM	MG/L	1021.	1230.	962.	1136.	974.
MANGANESE	MG/L	4.82	5.01	4.17	-	3.51
MERCURY	MG/L	< 0.0002	-	< 0.0002	0.0003	< 0.0002
MOLYBDENUM	MG/L	< 0.01	0.38	0.02	0.23	< 0.01
NICKEL	MG/L	0.01	-	0.03	-	< 0.04
NITRATE	MG/L	1060.	1200.	886.	1120.	1200.
NITRITE	MG/L	< 0.1	-	< 0.1	-	-
NO2 & NO3	MG/L	-	-	-	250.	-
ORG. CARBON	MG/L	125.	-	130.	-	94.1
PB-210	PCI/L	-	-	-	-	0.1 0.6
PH	SU	6.94	6.92	6.89	6.85	7.04
PHOSPHATE	MG/L	0.98	-	0.31	< 0.1	< 0.1
PO-210	PCI/L	0.9 0.7	-	0.6 0.6	-	0.7 0.4
POTASSIUM	MG/L	71.5	85.5	77.5	933.	69.9
RA-226	PCI/L	0.1 0.2	-	0.1 0.1	0.1 0.1	0.0 0.1
RA-228	PCI/L	0.5 1.0	-	1.1 1.2	1.1 0.8	0.2 0.9
SELENIUM	MG/L	0.203	< 0.005	0.173	0.430	0.066
SILICA	MG/L	14.7	-	15.6	-	11.
SILVER	MG/L	-	-	-	0.03	< 0.01
SODIUM	MG/L	1164.	2290.	1110.	1330.	1990.
STRONTIUM	MG/L	8.70	-	8.50	8.1	7.5
SULFATE	MG/L	4930.	9400.	4870.	7230.	6630.
SULFIDE	MG/L	< 0.1	-	< 0.1	-	< 0.1
TEMPERATURE	C - DEGREE	22.9	16.5	21.0	20.0	11.

GROSS WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/20/82 TO 04/27/89
REPORT DATE: 08/01/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		613-01 09/18/87		614-01 09/30/85		614-01 09/18/87		614-01 10/11/88		614-01 04/03/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY
TH-230	PCI/L	1.2	1.1	-		0.4	0.9	0.5	0.7	0.3	0.5
THALLIUM	MG/L	-		-		-		-		0.01	
TIN	MG/L	0.049		< 0.005		0.049		-		0.024	
TOTAL SOLIDS	MG/L	11900.		14590.		11200.		12300.		12100.	
URANIUM	MG/L	0.804		1.78		0.830		1.24		1.30	
VANADIUM	MG/L	0.13		0.5		0.12		0.11		0.10	
ZINC	MG/L	0.102		0.248		0.077		0.313		0.087	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 06/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		615-01 10/01/85	615-01 09/10/87	615-01 04/03/89		616-01 10/01/85		616-01 09/15/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	473.	489.	768.		216.		247.0	
ALUMINUM	MG/L	-	0.46	< 0.1		-		0.2	
AMMONIUM	MG/L	90.	190.	209.		6.1		1.0	
ANTIMONY	MG/L	-	0.074	0.049		-	<	0.003	
ARSENIC	MG/L	-	0.021	0.03		-	<	0.01	
BARIUM	MG/L	-	0.03	< 0.1		-		0.1	
BERYLLIUM	MG/L	-	-	< 0.01		-		-	
BORON	MG/L	4.9	0.92	0.6		0.5		0.3	
BROMIDE	MG/L	-	0.1	< 0.1		-		-	
CADMIUM	MG/L	< 0.001	< 0.005	0.013		< 0.001	<	0.001	
CALCIUM	MG/L	406.	510.	390.		177.		310.0	
CHLORIDE	MG/L	240.	385.	610.		16.		32.	
CHROMIUM	MG/L	-	< 0.01	< 0.01		-		0.01	
COBALT	MG/L	-	0.02	< 0.05		-		0.06	
CONDUCTANCE	UMHO/CM	10500.	5610.	10000.		1650.		2000.0	
COPPER	MG/L	0.05	0.01	0.03		0.02	<	0.02	
CYANIDE	MG/L	-	-	< 0.01		-	<	0.01	
FLUORIDE	MG/L	8.5	0.39	0.3		1.1		0.6	
GROSS ALPHA	PCI/L	-	1200. 20.	1900. 300.		-		-	
GROSS BETA	PCI/L	-	960. 70.	1200. 100.		-		-	
IRON	MG/L	0.08	< 0.01	0.16		< 0.03		0.03	
LEAD	MG/L	-	0.03	< 0.01		-	<	0.01	
MAGNESIUM	MG/L	1340.	1252.	1370.		46.3		86.7	
MANGANESE	MG/L	5.77	5.81	9.38		0.48		0.92	
MERCURY	MG/L	-	< 0.0002	< 0.0002		-	<	0.0002	
MOLYBDENUM	MG/L	0.14	< 0.01	0.03		0.25		0.14	
NICKEL	MG/L	-	< 0.01	0.04		-	<	0.04	
NITRATE	MG/L	1100.	1570.	3300.		9.		160.0	
NITRITE	MG/L	-	< 0.1	-		-	<	0.1	
NO2 & NO3	MG/L	-	-	-		-		-	
ORG. CARBON	MG/L	-	165.	143.		-		65.	
PB-210	PCI/L	-	-	1.1 0.7		-		5.2	2.1
PH	SU	7.01	6.88	6.99		7.2		7.13	
PHOSPHATE	MG/L	-	1.04	< 0.1		-	<	0.1	
PO-210	PCI/L	-	1.1 1.0	3.3 1.0		-		0.0	0.5
POTASSIUM	MG/L	103.	121.	165.		18.4		22.8	
RA-226	PCI/L	-	0.7 0.2	0.6 0.2		-		0.4	0.3
RA-228	PCI/L	-	0.5 1.3	0.0 0.9		-		0.2	1.0
SELENIUM	MG/L	< 0.005	0.255	0.007		< 0.005	<	0.005	
SILICA	MG/L	-	15.4	10.		-		10.	
SILVER	MG/L	-	-	< 0.01		-	<	0.1	
SODIUM	MG/L	3720.	2107.	1650.		216.		288.0	
STRONTIUM	MG/L	-	10.1	14.0		-		2.6	
SULFATE	MG/L	5100.	9939.	4230.		887.		1400.0	
SULFIDE	MG/L	-	< 0.1	< 0.1		-	<	0.1	
TEMPERATURE	C - DEGREE	20.	23.5	17.5		20.		22.0	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/87
REPORT DATE: 02/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		615-01 10/01/85		615-01 09/18/87		615-01 04/03/89		616-01 10/01/85		616-01 03/15/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	-		0.0	0.6	0.0	0.6	-		0.0	0.4
THALLIUM	MG/L	-		-		0.02		-		-	
TIN	MG/L	< 0.005		0.089		0.062		< 0.005		< 0.005	
TOTAL SOLIDS	MG/L	14700.		17200.		28200.		1530.		2350.0	
URANIUM	MG/L	1.52		1.64		4.07		0.142		0.184	
VANADIUM	MG/L	0.6		0.14		0.16		0.6		0.16	
ZINC	MG/L	0.044		0.006		0.021		0.033		0.047	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		616-01 09/18/87		616-01 04/04/89		617-01 10/01/85		617-01 09/18/87		617-01 04/04/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	348.		295.		423.		407.		387.	
ALUMINUM	MG/L	0.25		< 0.1		-		0.45		< 0.1	
AMMONIUM	MG/L	14.2		17.		100.		129.		120.	
ANTIMONY	MG/L	0.080		0.007		-		0.068		0.004	
ARSENIC	MG/L	0.009		< 0.01		-		0.013		0.01	
BARIUM	MG/L	0.04		< 0.1		-		0.02		< 0.1	
BERYLLIUM	MG/L	-		< 0.01		-		-		< 0.01	
BORON	MG/L	0.32		0.3		0.8		0.63		0.36	
BROMIDE	MG/L	< 0.1		0.1		-		< 0.1		< 0.1	
CADMIUM	MG/L	< 0.005		0.004		< 0.001		< 0.005		0.005	
CALCIUM	MG/L	514.		445.		352.		462.		428.	
CHLORIDE	MG/L	86.3		65.		92.		82.6		100.	
CHROMIUM	MG/L	< 0.01		< 0.01		-		< 0.01		< 0.01	
COBALT	MG/L	< 0.01		< 0.05		-		< 0.01		< 0.05	
CONDUCTANCE	UMHO/CM	2450.		2600.		6000.		3420.		3800.	
COPPER	MG/L	< 0.01		< 0.02		0.04		0.02		< 0.02	
CYANIDE	MG/L	-		< 0.01		-		-		< 0.01	
FLUORIDE	MG/L	0.42		0.5		1.8		0.24		0.2	
GROSS ALPHA	PCI/L	230.	40.	180.	40.	-		320.	50.	300.	60.
GROSS BETA	PCI/L	200.	20.	140.	20.	-		290.	30.	190.	20.
IRON	MG/L	< 0.01		0.09		0.04		< 0.01		0.09	
LEAD	MG/L	0.01		< 0.01		-		0.03		< 0.01	
MAGNESIUM	MG/L	138.		286.		437.		504.		467.	
MANGANESE	MG/L	1.93		3.34		4.5		5.92		5.12	
MERCURY	MG/L	< 0.0002		< 0.0002		-		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		0.3		< 0.01		< 0.01	
NICKEL	MG/L	< 0.01		< 0.04		-		< 0.01		< 0.04	
NITRATE	MG/L	25.7		1.8		88.		25.7		50.	
NITRITE	MG/L	< 0.1		-		-		< 0.1		-	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	95.0		89.4		-		120.		82.6	
PB-210	PCI/L	-		0.0	0.7	-		-		0.6	0.8
PH	SU	7.00		7.09		7.06		6.85		6.93	
PHOSPHATE	MG/L	0.45		< 0.1		-		0.98		< 0.1	
PO-210	PCI/L	0.9	0.7	2.5	0.6	-		0.9	0.7	0.2	0.4
POTASSIUM	MG/L	26.2		40.2		63.5		54.4		57.1	
RA-226	PCI/L	0.1	0.2	0.0	0.1	-		0.1	0.2	0.0	0.1
RA-228	PCI/L	0.4	1.4	0.3	0.9	-		0.8	1.6	0.8	1.0
SELENIUM	MG/L	0.027		0.015		< 0.005		0.077		0.019	
SILICA	MG/L	17.6		15.		-		17.1		14.	
SILVER	MG/L	-		< 0.01		-		-		< 0.01	
SODIUM	MG/L	366.		431.		1120.		630.		615.	
STRONTIUM	MG/L	4.25		4.8		-		5.90		5.3	
SULFATE	MG/L	2250.		2880.		4760.		4650.		4140.	
SULFIDE	MG/L	< 0.1		< 0.1		-		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	20.5		12.		21.		22.0		13.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
07/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		616-01 09/18/87		616-01 04/04/89		617-01 10/01/85		617-01 09/18/87		617-01 04/04/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.3	0.8	0.0	0.3	-		0.0	0.9	0.0	0.3
THALLIUM	MG/L	-		< 0.01		-		-		< 0.01	
TIN	MG/L	0.075		0.009		< 0.005		0.036		0.007	
TOTAL SOLIDS	MG/L	3900.		4940.		7570.		21300.		6890.	
URANIUM	MG/L	0.433		0.305		0.509		0.355		0.373	
VANADIUM	MG/L	0.07		0.06		0.4		0.12		0.07	
ZINC	MG/L	0.064		0.098		0.039		0.009		0.009	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		618-01 10/01/85	618-02 10/01/85	618-03 10/01/85	618-04 10/01/85	618-05 10/01/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY	PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	400.	400.	400.	400.	400.
ALUMINUM	MG/L	-	-	-	-	-
AMMONIUM	MG/L	130.	110.	110.	100.	120.
ANTIMONY	MG/L	-	-	-	-	-
ARSENIC	MG/L	-	-	-	-	-
BARIUM	MG/L	-	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.9	0.8	0.7	0.7	0.6
BROMIDE	MG/L	-	-	-	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	364.	345.	367.	381.	395.
CHLORIDE	MG/L	88.	87.	89.	90.	91.
CHROMIUM	MG/L	-	-	-	-	-
COBALT	MG/L	-	-	-	-	-
CONDUCTANCE	UMHO/CM	7000.	7000.	7000.	7000.	7000.
COPPER	MG/L	0.04	0.03	0.04	0.04	0.04
CYANIDE	MG/L	-	-	-	-	-
FLUORIDE	MG/L	1.9	1.9	1.9	1.8	1.8
GROSS ALPHA	PCI/L	-	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-	-
IRON	MG/L	0.04	0.06	0.05	0.05	0.05
LEAD	MG/L	-	-	-	-	-
MAGNESIUM	MG/L	507.	496.	507.	532.	530.
MANGANESE	MG/L	6.9	6.11	5.69	5.92	5.71
MERCURY	MG/L	-	-	-	-	-
MOLYBDENUM	MG/L	0.3	0.4	0.1	0.4	0.3
NICKEL	MG/L	-	-	-	-	-
NITRATE	MG/L	75.	67.	58.	59.	100.
NITRITE	MG/L	-	-	-	-	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-	-
PB-210	PCI/L	-	-	-	-	-
PH	SU	6.94	6.94	6.94	6.94	6.94
PHOSPHATE	MG/L	-	-	-	-	-
PO-210	PCI/L	-	-	-	-	-
POTASSIUM	MG/L	70.2	69.5	70.3	69.7	68.9
RA-226	PCI/L	-	-	-	-	-
RA-228	PCI/L	-	-	-	-	-
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
SILICA	MG/L	-	-	-	-	-
SILVER	MG/L	-	-	-	-	-
SODIUM	MG/L	1080.	1200.	1170.	459.	1030.
STRONTIUM	MG/L	-	-	-	-	-
SULFATE	MG/L	5070.	5450.	5489.	3770.	5070.
SULFIDE	MG/L	-	-	-	-	-
TEMPERATURE	C - DEGREE	20.	20.	20.	20.	20.

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		618-01 10/01/85	618-02 10/01/85	618-03 10/01/85	618-04 10/01/85	618-05 10/01/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TH-230	PCI/L	-	-	-	-	-
THALLIUM	MG/L	-	-	-	-	-
TIN	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	8130.	8090.	8070.	8050.	8070.
URANIUM	MG/L	0.548	0.742	0.703	0.602	0.611
VANADIUM	MG/L	0.5	0.6	0.4	0.6	0.6
ZINC	MG/L	0.034	0.03	0.026	0.028	0.029

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		618-01 09/18/87		618-01 10/11/88		619-01 10/02/85		619-01 09/19/87		619-02 09/19/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	344.		340.		950.		778.		778.	
ALUMINUM	MG/L	0.74		-		-		1.15		0.53	
AMMONIUM	MG/L	124.		110.		43.		83.9		80.	
ANTIMONY	MG/L	0.042		0.010		-		0.084		0.045	
ARSENIC	MG/L	0.006		0.03		-		0.053		0.053	
BARIUM	MG/L	0.03		< 0.1		-		0.03		0.02	
BERYLLIUM	MG/L	-		-		-		-		-	
BORON	MG/L	0.65		-		18.		1.49		1.41	
BROMIDE	MG/L	< 0.1		-		-		0.1		0.1	
CADMIUM	MG/L	< 0.005		0.001		< 0.001		< 0.005		< 0.005	
CALCIUM	MG/L	474.		446.		437.		490.		486.	
CHLORIDE	MG/L	63.9		85.		720.		552.		565.	
CHROMIUM	MG/L	< 0.01		0.15		-		< 0.01		< 0.01	
COBALT	MG/L	< 0.01		< 0.05		-		0.01		< 0.01	
CONDUCTANCE	UMHO/CM	3190.		4900.		25000.		5700.		5700.	
COPPER	MG/L	0.06		< 0.02		0.1		0.10		0.04	
CYANIDE	MG/L	-		-		-		-		-	
FLUORIDE	MG/L	0.23		0.2		14.		0.38		0.38	
GROSS ALPHA	PCI/L	350.	50.	240.	50.	-		1700.	300.	870.	240.
GROSS BETA	PCI/L	270.	30.	130.	20.	-		1100.	100.	1200.	100.
IRON	MG/L	< 0.01		0.11		0.15		< 0.01		< 0.01	
LEAD	MG/L	0.01		< 0.01		-		0.03		0.02	
MAGNESIUM	MG/L	461.		424.		1206.		1859.		1985.	
MANGANESE	MG/L	5.97		-		5.12		8.33		8.02	
MERCURY	MG/L	< 0.0002		0.0002		-		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		0.10		0.27		< 0.01		< 0.01	
NICKEL	MG/L	< 0.01		-		-		0.01		0.03	
NITRATE	MG/L	42.0		27.		790.		1550.		1520.	
NITRITE	MG/L	< 0.1		-		-		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		6.1		-		-		-	
ORG. CARBON	MG/L	100.		-		-		210.		210.	
PB-210	PCI/L	-		-		-		-		-	
PH	SU	6.89		6.83		7.26		6.96		6.96	
PHOSPHATE	MG/L	0.69		< 0.1		-		1.22		0.78	
PO-210	PCI/L	0.9	0.7	-		-		1.3	1.1	1.1	1.0
POTASSIUM	MG/L	49.0		62.6		161.		109.		118.	
RA-226	PCI/L	0.0	0.1	0.0	0.1	-		0.0	0.1	0.1	0.1
RA-228	PCI/L	1.1	0.9	0.7	0.8	-		1.0	1.0	0.6	1.1
SELENIUM	MG/L	0.064		0.069		< 0.005		0.372		0.350	
SILICA	MG/L	17.2		-		-		14.7		14.0	
SILVER	MG/L	-		< 0.02		-		-		-	
SODIUM	MG/L	550.		524.		7860.		3025.		3235.	
STRONTIUM	MG/L	5.30		4.5		-		9.65		9.80	
SULFATE	MG/L	4270.		3960.		17200.		12100.		12300.	
SULFIDE	MG/L	< 0.1		-		-		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	20.8		20.0		20.		20.1		20.1	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/27/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		618-01 09/18/87		618-01 10/11/88		619-01 10/02/85		619-01 09/19/87		619-02 09/19/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	0.3	0.8	0.3	0.5	-		2.1	1.6	1.8	1.6
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	0.033		-		< 0.005		0.051		0.045	
TOTAL SOLIDS	MG/L	9340.		5930.		32600.		22900.		24700.	
URANIUM	MG/L	0.415		0.424		3.05		2.34		2.34	
VANADIUM	MG/L	0.16		0.07		0.6		0.27		0.17	
ZINC	MG/L	< 0.005		0.016		0.146		0.078		0.076	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 619-03 09/19/87 PARAMETER VALUE+/-UNCERTAINTY	619-04 09/19/87 PARAMETER VALUE+/-UNCERTAINTY	619-05 09/19/87 PARAMETER VALUE+/-UNCERTAINTY	619-01 04/05/89 PARAMETER VALUE+/-UNCERTAINTY	620-01 10/02/85 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	778.	778.	770.	1240.	1160.
ALUMINUM	MG/L	0.51	0.50	0.50	< 0.1	-
AMMONIUM	MG/L	90.3	80.	80.	81.	10.
ANTIMONY	MG/L	0.077	0.119	0.177	0.042	-
ARSENIC	MG/L	0.038	0.035	0.043	0.05	-
BARIUM	MG/L	0.02	0.02	0.02	< 0.1	-
BERYLLIUM	MG/L	-	-	-	< 0.01	-
BORON	MG/L	1.37	1.36	1.43	0.9	1.2
BROMIDE	MG/L	0.1	0.1	0.1	0.4	-
CADMIUM	MG/L	< 0.005	< 0.005	< 0.005	0.020	< 0.001
CALCIUM	MG/L	380.	481.	481.	429.	466.
CHLORIDE	MG/L	528.	545.	540.	800.	500.
CHROMIUM	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	-
COBALT	MG/L	< 0.01	< 0.01	0.02	< 0.05	-
CONDUCTANCE	UMHO/CM	5700.	5700.	5700.	12500.	13000.
COPPER	MG/L	0.02	0.02	0.02	0.04	0.07
CYANIDE	MG/L	-	-	-	< 0.01	-
FLUORIDE	MG/L	0.37	0.36	0.37	0.3	8.7
GROSS ALPHA	PCI/L	970. 200.	1300. 200.	1400. 200.	2700. 300.	-
GROSS BETA	PCI/L	1000. 100.	1000. 100.	1100. 100.	1100. 100.	-
IRON	MG/L	< 0.01	< 0.01	< 0.01	0.17	0.11
LEAD	MG/L	0.03	0.02	0.03	0.02	-
MAGNESIUM	MG/L	1724.	1696.	1738.	2240.	1220.
MANGANESE	MG/L	7.66	7.67	8.03	8.65	5.1
MERCURY	MG/L	< 0.0002	0.0002	0.0003	< 0.0002	-
MOLYBDENUM	MG/L	< 0.01	< 0.01	< 0.01	< 0.01	0.16
NICKEL	MG/L	< 0.01	< 0.01	< 0.01	< 0.04	-
NITRATE	MG/L	1540.	1580.	1540.	1600.	700.
NITRITE	MG/L	< 0.1	< 0.1	< 0.1	-	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	200.	205.	210.	29.3	-
PB-210	PCI/L	-	-	-	1.8 0.7	-
PH	SU	6.96	6.96	6.96	6.94	6.83
PHOSPHATE	MG/L	0.08	1.21	1.14	< 0.1	-
PO-210	PCI/L	1.8 1.2	1.6 1.2	1.4 1.2	0.6 0.6	-
POTASSIUM	MG/L	109.	109.	117.	148.	80.1
RA-226	PCI/L	0.2 0.2	0.0 0.1	0.1 0.2	0.0 0.2	-
RA-228	PCI/L	1.1 1.2	0.9 1.4	1.4 2.0	0.8 0.9	-
SELENIUM	MG/L	0.362	0.337	0.344	0.456	< 0.005
SILICA	MG/L	13.8	13.9	14.4	12.	-
SILVER	MG/L	-	-	-	< 0.01	-
SODIUM	MG/L	2810.	2759.	2831.	3540.	3290.
STRONTIUM	MG/L	9.55	9.40	9.50	10.8	-
SULFATE	MG/L	12300.	12400.	12200.	15000.	10600.
SULFIDE	MG/L	< 0.1	< 0.1	< 0.1	< 0.1	-
TEMPERATURE	C - DEGREE	20.1	20.1	20.1	13.5	17.

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/26/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		619-03 09/19/87		619-04 09/19/87		619-05 09/19/87		619-01 04/05/89		620-01 10/02/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY	PARAMETER VALUE +/-	UNCERTAINTY
TH-230	PCI/L	0.0	1.1	1.0	1.3	1.3	1.5	0.3	0.8	-	
THALLIUM	MG/L	-		-		-		0.02		-	
TIN	MG/L	0.042		0.044		0.040		0.040		< 0.005	
TOTAL SOLIDS	MG/L	22400.		22400.		22200.		26300.		19200.	
URANIUM	MG/L	2.16		2.23		2.34		3.14		1.71	
VANADIUM	MG/L	0.16		0.16		0.16		0.16		0.4	
ZINC	MG/L	0.079		0.075		0.083		0.108		0.056	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		620-01 09/16/86		620-01 08/30/87		620-01 04/05/89		620-02 04/05/89		620-03 04/05/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	1172.0		1405.		1148.		1168.		1168.	
ALUMINUM	MG/L	0.3		0.51		< 0.1		< 0.1		< 0.1	
AMMONIUM	MG/L	18.0		11.2		2.6		2.5		2.6	
ANTIMONY	MG/L	< 0.003		0.205		0.026		0.039		0.038	
ARSENIC	MG/L	< 0.01		0.049		0.01		0.02		0.05	
BARIUM	MG/L	0.1		0.01		< 0.1		< 0.1		< 0.1	
BERYLLIUM	MG/L	-		-		< 0.01		< 0.01		< 0.01	
BORON	MG/L	0.6		1.09		0.8		0.8		0.7	
BROMIDE	MG/L	-		< 0.1		0.2		0.4		0.2	
CADMIUM	MG/L	< 0.001		< 0.005		0.015		0.014		0.013	
CALCIUM	MG/L	580.		549.		374.		374.		364.	
CHLORIDE	MG/L	750.0		719.		640.		650.		650.	
CHROMIUM	MG/L	0.11		< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	0.27		0.02		< 0.05		< 0.05		< 0.05	
CONDUCTANCE	UMHO/CM	11000.0		9500.		7500.		7500.		7500.	
COPPER	MG/L	0.09		0.05		0.03		0.03		0.03	
CYANIDE	MG/L	< 0.01		-		< 0.01		< 0.01		< 0.01	
FLUORIDE	MG/L	0.4		0.20		0.3		0.3		0.3	
GROSS ALPHA	PCI/L	-		1600.	300.	920.	190.	780.	170.	960.	190.
GROSS BETA	PCI/L	-		1100.	200.	610.	70.	590.	70.	550.	70.
IRON	MG/L	0.21		< 0.01		0.14		0.15		0.15	
LEAD	MG/L	< 0.01		0.04		< 0.01		0.01		< 0.01	
MAGNESIUM	MG/L	1980.0		1980.		1480.		1490.		1500.	
MANGANESE	MG/L	8.80		6.53		3.45		3.44		3.32	
MERCURY	MG/L	< 0.0002		0.0003		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	0.13		0.05		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	0.25		0.06		0.07		0.06		0.07	
NITRATE	MG/L	840.0		12.0		330.		400.		320.	
NITRITE	MG/L	< 0.1		< 0.1		-		-		-	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	290.		345.		40.1		21.7		134.	
PB-210	PCI/L	2.8	1.2	-		0.3	1.3	1.9	1.0	1.2	1.0
PH	SU	6.83		6.77		6.87		6.87		6.87	
PHOSPHATE	MG/L	< 0.1		0.62		< 0.1		< 0.1		< 0.1	
PO-210	PCI/L	2.3	1.5	1.4	1.5	0.9	0.7	2.7	0.9	2.0	0.9
POTASSIUM	MG/L	106.0		81.5		71.4		71.4		68.3	
RA-226	PCI/L	0.0	0.3	0.0	0.1	0.0	0.2	0.0	0.2	0.0	0.2
RA-228	PCI/L	0.7	1.1	0.9	1.3	0.0	0.9	0.6	1.0	0.3	1.0
SELENIUM	MG/L	0.020		0.361		0.348		0.302		0.308	
SILICA	MG/L	6.		12.3		11.		11.		11.	
SILVER	MG/L	< 0.01		-		< 0.01		< 0.01		< 0.01	
SODIUM	MG/L	3720.0		3584.		2490.		2530.		2540.	
STRONTIUM	MG/L	17.2		14.0		9.3		9.3		9.4	
SULFATE	MG/L	14300.0		14500.		10500.		10600.		10200.	
SULFIDE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	13.0		16.0		10.		10.		10.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		620-01 09/16/86		620-01 08/30/87		620-01 04/05/89		620-02 04/05/89		620-03 04/05/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	1.0	2.8	0.2	1.1	0.0	0.7	0.0	0.7	0.0	0.6
THALLIUM	MG/L	-				0.02		0.02		0.02	
TIN	MG/L	0.060		1.03		0.007		< 0.005		0.009	
TOTAL SOLIDS	MG/L	26600.0		24400.		17300.		17300.		17300.	
URANIUM	MG/L	2.34		2.11		1.60		1.53		1.62	
VANADIUM	MG/L	0.23		0.16		0.12		0.12		0.12	
ZINC	MG/L	0.101		0.038		0.054		0.059		0.049	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
02/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		620-06 04/05/89		620-05 04/05/89		621-01 02/02/85		621-01 09/15/86		621-01 09/01/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	1168.		1168.		837.		1299.0		1370.	
ALUMINUM	MG/L	< 0.1		< 0.1		-		0.3		0.52	
AMMONIUM	MG/L	2.5		2.5		13.		13.0		9.0	
ANTIMONY	MG/L	0.038		0.039		-		< 0.003		0.205	
ARSENIC	MG/L	0.04		0.05		-		< 0.01		0.041	
BARIUM	MG/L	< 0.1		< 0.1		-		< 0.1		0.01	
BERYLLIUM	MG/L	< 0.01		< 0.01		-		-		-	
BORON	MG/L	0.7		0.8		1.4		0.3		1.08	
BROMIDE	MG/L	0.4		0.2		-		-		0.2	
CADMIUM	MG/L	0.017		0.014		< 0.001		< 0.001		< 0.005	
CALCIUM	MG/L	366.		376.		417.		562.		547.	
CHLORIDE	MG/L	650.		650.		400.		710.0		732.	
CHROMIUM	MG/L	< 0.01		< 0.01		-		0.11		< 0.01	
COBALT	MG/L	< 0.05		< 0.05		-		0.23		0.02	
CONDUCTANCE	UMHO/CM	7500.		7500.		10000.		10000.0		10800.	
COPPER	MG/L	0.03		0.03		0.06		0.09		0.04	
CYANIDE	MG/L	< 0.01		< 0.01		-		< 0.01		-	
FLUORIDE	MG/L	0.3		0.3		7.5		0.3		0.20	
GROSS ALPHA	PCI/L	2100.	200.	4200.	200.	-		-		2000.	300.
GROSS BETA	PCI/L	880.	90.	560.	80.	-		-		1100.	200.
IRON	MG/L	0.45		0.45		0.07		0.20		< 0.01	
LEAD	MG/L	< 0.01		< 0.01		-		< 0.01		0.03	
MAGNESIUM	MG/L	1490.		1520.		810.		1890.0		2142.	
MANGANESE	MG/L	3.40		3.50		4.32		5.21		7.04	
MERCURY	MG/L	< 0.0002		< 0.0002		-		< 0.0002		0.0003	
MOLYBDENUM	MG/L	< 0.01		< 0.01		0.1		0.15		0.02	
NICKEL	MG/L	0.07		0.07		-		0.22		0.05	
NITRATE	MG/L	320.		330.		700.		2400.0		1200.	
NITRITE	MG/L	-		-		-		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	20.2		67.8		-		240.		344.	
PB-210	PCI/L	0.8	1.0	0.0	1.1	-		3.9	1.3	-	
PH	SU	6.87		6.87		6.91		6.82		6.83	
PHOSPHATE	MG/L	< 0.1		< 0.1		-		< 0.1		0.51	
PO-210	PCI/L	3.0	0.9	2.9	0.9	-		2.0	1.5	0.6	1.4
POTASSIUM	MG/L	69.7		72.1		66.6		110.0		88.5	
RA-226	PCI/L	0.3	0.3	0.1	0.2	-		0.3	0.4	0.0	0.1
RA-228	PCI/L	0.8	0.8	0.8	0.8	-		0.6	0.9	0.7	1.4
SELENIUM	MG/L	0.314		0.343		< 0.005		0.023		0.329	
SILICA	MG/L	11.		11.		-		7.		12.3	
SILVER	MG/L	< 0.01		< 0.01		-		< 0.01		-	
SODIUM	MG/L	2520.		2570.		2770.		3520.0		3738.	
STRONTIUM	MG/L	9.3		9.5		-		14.5		14.5	
SULFATE	MG/L	10700.		10500.		3700.		13500.0		14700.	
SULFIDE	MG/L	< 0.1		< 0.1		-		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	10.		10.		17.		17.9		16.4	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		620-04 04/05/89		620-05 04/05/89		621-01 10/02/85		621-01 09/15/86		621-01 09/01/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	0.2	0.8	0.0	0.5	-		0.0	2.2	4.0	2.4
THALLIUM	MG/L	0.02		0.02		-		-		-	
TIN	MG/L	0.008		0.007		< 0.005		0.060		1.34	
TOTAL SOLIDS	MG/L	17400.		17200.		15800.		25400.0		25000.	
URANIUM	MG/L	1.64		1.60		1.31		2.39		2.19	
VANADIUM	MG/L	0.12		0.12		0.47		0.26		0.16	
ZINC	MG/L	0.051		0.054		0.091		0.204		0.066	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		422-01 10/02/85	422-02 10/02/85	422-03 10/02/85	422-04 10/02/85	422-05 10/02/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	964.	964.	964.	964.	964.
ALUMINUM	MG/L	-	-	-	-	-
AMMONIUM	MG/L	11.	17.	15.	11.	11.
ANTIMONY	MG/L	-	-	-	-	-
ARSENIC	MG/L	-	-	-	-	-
BARIUM	MG/L	-	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.8	1.4	1.6	1.5	1.7
BROMIDE	MG/L	-	-	-	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	564.	475.	464.	468.	428.
CHLORIDE	MG/L	580.	570.	570.	2200.	2200.
CHROMIUM	MG/L	-	-	-	-	-
COBALT	MG/L	-	-	-	-	-
CONDUCTANCE	UMHO/CM	12000.	12000.	12000.	12000.	12000.
COPPER	MG/L	0.07	0.09	0.08	0.09	0.09
CYANIDE	MG/L	-	-	-	-	-
FLUORIDE	MG/L	12.	9.	9.2	9.7	9.7
GROSS ALPHA	PCI/L	-	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-	-
IRON	MG/L	0.14	0.1	0.11	0.1	0.1
LEAD	MG/L	-	-	-	-	-
MAGNESIUM	MG/L	1280.	1080.	1090.	1050.	1540.
MANGANESE	MG/L	2.39	3.59	3.51	3.58	3.66
MERCURY	MG/L	-	-	-	-	-
MOLYBDENUM	MG/L	< 0.01	0.2	0.2	0.2	0.2
NICKEL	MG/L	-	-	-	-	-
NITRATE	MG/L	840.	1100.	1100.	1100.	750.
NITRITE	MG/L	-	-	-	-	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-	-
PB-210	PCI/L	-	-	-	-	-
PH	SU	7.04	7.04	7.04	7.04	7.04
PHOSPHATE	MG/L	-	-	-	-	-
PO-210	PCI/L	-	-	-	-	-
POTASSIUM	MG/L	90.6	87.7	84.	83.2	65.6
RA-226	PCI/L	-	-	-	-	-
RA-228	PCI/L	-	-	-	-	-
SELENIUM	MG/L	0.006	< 0.005	< 0.005	< 0.005	< 0.005
SILICA	MG/L	-	-	-	-	-
SILVER	MG/L	-	-	-	-	-
SODIUM	MG/L	3200.	4190.	4260.	5210.	4720.
STRONTIUM	MG/L	-	-	-	-	-
SULFATE	MG/L	10900.	11000.	11000.	11600.	11600.
SULFIDE	MG/L	-	-	-	-	-
TEMPERATURE	C - DEGREE	17.5	17.5	17.5	17.5	17.5

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/27/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		622-01 10/02/85	622-02 10/02/85	622-03 10/02/85	622-04 10/02/85	622-05 10/02/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TH-230	PCI/L	-	-	-	-	-
THALLIUM	MG/L	-	-	-	-	-
TIN	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	19900.	20300.	20000.	20000.	20200.
URANIUM	MG/L	1.7	2.03	1.99	1.82	1.84
VANADIUM	MG/L	0.5	0.84	0.6	0.46	0.45
ZINC	MG/L	0.437	0.394	0.43	0.434	0.426

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 622-01 09/16/86 PARAMETER VALUE+/-UNCERTAINTY	622-01 09/01/87 PARAMETER VALUE+/-UNCERTAINTY	623-01 10/03/85 PARAMETER VALUE+/-UNCERTAINTY	623-01 09/01/87 PARAMETER VALUE+/-UNCERTAINTY	624-01 10/03/85 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	1466.0	1666.	739.	995.	840.
ALUMINUM	MG/L	0.4	0.54	-	0.49	-
AMMONIUM	MG/L	15.0	10.3	90.	47.7	110.
ANTIMONY	MG/L	< 0.003	0.226	-	0.188	-
ARSENIC	MG/L	< 0.01	0.059	-	0.064	-
BARIUM	MG/L	0.1	0.02	-	0.02	-
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.3	1.21	0.9	1.12	1.6
BROMIDE	MG/L	-	0.3	-	0.2	-
CADMIUM	MG/L	< 0.001	< 0.005	< 0.001	< 0.005	< 0.001
CALCIUM	MG/L	540.	591.	545.	535.	524.
CHLORIDE	MG/L	730.0	817.	530.	634.	600.
CHROMIUM	MG/L	0.09	< 0.01	-	< 0.01	-
COBALT	MG/L	0.23	< 0.01	-	0.01	-
CONDUCTANCE	UMHO/CM	10750.0	9000.	13000.	11500.	15500.
COPPER	MG/L	0.11	0.07	0.05	0.03	0.06
CYANIDE	MG/L	< 0.01	-	-	-	-
FLUORIDE	MG/L	0.4	0.25	10.	0.24	10.
GROSS ALPHA	PCI/L	-	1900. 300.	-	1600. 300.	-
GROSS BETA	PCI/L	-	1300. 200.	-	960. 150.	-
IRON	MG/L	0.20	< 0.01	0.12	< 0.01	0.13
LEAD	MG/L	< 0.01	0.03	-	0.03	-
MAGNESIUM	MG/L	1570.0	2305.	1090.	1709.	1310.
MANGANESE	MG/L	3.71	4.37	6.06	7.98	6.33
MERCURY	MG/L	< 0.0002	0.0003	-	0.0002	-
MOLYBDENUM	MG/L	0.13	0.08	< 0.01	< 0.01	< 0.01
NICKEL	MG/L	0.21	0.06	-	0.03	-
NITRATE	MG/L	2400.0	660.	940.	1770.	1200.
NITRITE	MG/L	< 0.1	< 0.1	-	< 0.1	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	230.	53.2	-	256.	-
PB-210	PCI/L	3.4 1.3	-	-	-	-
PH	SU	6.80	6.80	6.92	6.83	6.85
PHOSPHATE	MG/L	< 0.1	0.74	-	0.67	-
PO-210	PCI/L	2.3 1.5	-	-	2.4 1.7	-
POTASSIUM	MG/L	124.0	92.0	111.	105.	118.
RA-226	PCI/L	0.4 0.4	0.1 0.1	-	0.2 0.2	-
RA-228	PCI/L	0.9 1.0	1.7 1.6	-	2.1 1.8	-
SELENIUM	MG/L	0.041	0.395	0.006	0.780	0.006
SILICA	MG/L	8.	16.1	-	16.3	-
SILVER	MG/L	< 0.01	-	-	-	-
SODIUM	MG/L	3200.0	3756.	3230.	3348.	3430.
STRONTIUM	MG/L	15.2	15.5	-	12.0	-
SULFATE	MG/L	10600.0	14900.	10600.	12400.	11500.
SULFIDE	MG/L	< 0.1	< 0.1	-	< 0.1	-
TEMPERATURE	C - DEGREE	21.0	18.5	19.5	20.5	19.5

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/87 TO 04/22/89
REPORT DATE: 05/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		622-01 09/16/86		622-01 09/01/87		623-01 10/03/85		623-01 09/01/87		624-01 10/03/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	2.0	3.1	4.2	2.2	-		0.7	1.1	-	
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	0.059		1.48		< 0.005		1.03		< 0.005	
TOTAL SOLIDS	MG/L	22400.0		26000.		18400.		22400.		20900.	
URANIUM	MG/L	2.50		3.07		1.44		1.67		1.56	
VANADIUM	MG/L	0.24		0.17		0.8		0.15		0.5	
ZINC	MG/L	0.973		0.740		0.044		0.013		0.04	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 06/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		624-01 09/18/86		624-01 09/01/87		624-01 04/04/89		625-01 10/03/85		625-01 09/03/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	879.0		960.		1374.		726.		1091.	
ALUMINUM	MG/L	0.3		0.51		< 0.1		-		0.50	
AMMONIUM	MG/L	15.0		71.		27.		46.		42.6	
ANTIMONY	MG/L	< 0.003		0.162		0.036		-		0.174	
ARSENIC	MG/L	< 0.01		0.056		0.02		-		0.052	
BARIUM	MG/L	< 0.1		0.02		< 0.1		-		0.02	
BERYLLIUM	MG/L	-		-		< 0.01		-		-	
BORON	MG/L	0.3		1.05		0.9		0.9		1.10	
BROMIDE	MG/L	-		< 0.1		0.4		-		< 0.1	
CADMIUM	MG/L	< 0.001		< 0.005		0.013		< 0.001		< 0.005	
CALCIUM	MG/L	550.		556.		382.		520.		543.	
CHLORIDE	MG/L	750.0		658.		730.		530.		646.	
CHROMIUM	MG/L	0.10		< 0.01		< 0.01		-		< 0.01	
COBALT	MG/L	0.19		< 0.01		< 0.05		-		0.01	
CONDUCTANCE	UMHO/CM	11000.0		10200.		11000.		12500.		11200.	
COPPER	MG/L	0.08		0.02		0.03		0.07		0.04	
CYANIDE	MG/L	< 0.01		-		< 0.01		-		-	
FLUORIDE	MG/L	0.3		0.20		0.3		10.		0.27	
GROSS ALPHA	PCI/L	-		1500.	300.	2200.	300.	-		1500.	300.
GROSS BETA	PCI/L	-		1100.	100.	840.	110.	-		1200.	100.
IRON	MG/L	0.16		< 0.01		1.01		0.1		< 0.01	
LEAD	MG/L	< 0.01		0.03		0.02		-		0.03	
MAGNESIUM	MG/L	1580.0		1853.		1930.		1110.		1736.	
MANGANESE	MG/L	8.85		8.11		7.14		5.15		7.40	
MERCURY	MG/L	< 0.0002		0.0002		< 0.0002		-		0.0003	
MOLYBDENUM	MG/L	0.15		< 0.01		< 0.01		< 0.01		< 0.01	
NICKEL	MG/L	0.15		0.02		< 0.04		-		0.02	
NITRATE	MG/L	2500.0		2220.		950.		890.		1620.	
NITRITE	MG/L	< 0.1		< 0.1		-		-		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	250.		268.		34.5		-		62.7	
PB-210	PCI/L	2.7	1.3	-		0.9	1.3	-		-	
PH	SU	6.93		6.82		6.93		7.12		6.86	
PHOSPHATE	MG/L	< 0.1		0.64		< 0.1		-		0.79	
PO-210	PCI/L	0.5	1.1	1.1	1.4	0.9	0.7	-		2.0	1.6
POTASSIUM	MG/L	125.0		97.5		113.		109.		100.	
RA-226	PCI/L	0.5	0.4	0.0	0.1	0.0	0.1	-		0.0	0.1
RA-228	PCI/L	1.3	1.3	1.3	0.9	0.2	0.8	-		1.1	1.1
SELENIUM	MG/L	0.011		0.976		0.381		0.096		0.764	
SILICA	MG/L	8.		15.8		14.		-		17.0	
SILVER	MG/L	< 0.01		-		< 0.01		-		-	
SODIUM	MG/L	3200.0		3532.		3240.		3030.		3325.	
STRONTIUM	MG/L	12.5		13.0		10.0		-		12.0	
SULFATE	MG/L	10600.0		12700.		12500.		10100.		12300.	
SULFIDE	MG/L	< 0.1		0.1		< 0.1		-		0.1	
TEMPERATURE	C DEGREE	20.0		18.9		13.		21.		22.0	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 01/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		624-01 09/18/86		624-01 09/01/87		624-01 04/04/89		625-01 10/03/85		625-01 09/03/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	1.0	2.P	1.1	1.4	0.0	0.7	-		2.0	1.7
THALLIUM	MG/L	-		-		0.01		-		-	
TIN	MG/L	0.040		1.32		0.014		< 0.005		1.39	
TOTAL SOLIDS	MG/L	22400.0		23700.		22700.		18400.		22600.	
URANIUM	MG/L	1.34		1.84		2.57		1.44		2.11	
VANADIUM	MG/L	0.26		0.15		0.14		0.5		0.15	
ZINC	MG/L	0.055		< 0.005		< 0.005		0.063		0.010	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/23/85 TO 04/22/87
REPORT DATE: 05/03/87

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		626-01 10/03/85		626-01 09/01/87		626-02 09/01/87		626-03 09/01/87		626-04 09/01/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	874.		829.		829.		829.		829.	
ALUMINUM	MG/L	-		0.36		0.39		0.39		0.38	
AMMONIUM	MG/L	0.7		< 0.1		< 0.1		4.6		< 0.1	
ANTIMONY	MG/L	-		0.084		0.119		0.116		0.133	
ARSENIC	MG/L	-		0.033		0.039		0.027		0.036	
BARIUM	MG/L	-		0.01		0.02		0.02		0.02	
BERYLLIUM	MG/L	-		-		-		-		-	
BORON	MG/L	0.9		0.79		0.80		0.81		0.84	
BROMIDE	MG/L	-		0.1		< 0.1		< 0.1		< 0.1	
CADMIUM	MG/L	< 0.001		< 0.005		< 0.005		< 0.005		< 0.005	
CALCIUM	MG/L	533.		428.		434.		437.		438.	
CHLORIDE	MG/L	730.		395.		401.		401.		401.	
CHROMIUM	MG/L	-		< 0.01		< 0.01		< 0.01		< 0.01	
COBALT	MG/L	-		0.02		< 0.01		0.01		< 0.01	
CONDUCTANCE	UMHO/CM	13000.		4520.		4570.		4520.		4520.	
COPPER	MG/L	0.08		0.03		0.03		0.03		0.03	
CYANIDE	MG/L	-		-		-		-		-	
FLUORIDE	MG/L	10.		0.56		0.58		0.56		0.56	
GROSS ALPHA	PCI/L	-		650.	160.	940.	470.	1000.	200.	790.	150.
GROSS BETA	PCI/L	-		470.	80.	440.	90.	550.	80.	480.	90.
IRON	MG/L	0.1		< 0.01		< 0.01		< 0.01		< 0.01	
LEAD	MG/L	-		0.03		0.01		0.01		0.02	
MAGNESIUM	MG/L	921.		906.		921.		934.		933.	
MANGANESE	MG/L	4.06		4.01		4.09		4.18		4.30	
MERCURY	MG/L	-		0.0002		0.0002		0.0002		0.0002	
MOLYBDENUM	MG/L	0.1		< 0.01		0.02		0.08		0.02	
NICKEL	MG/L	-		0.03		0.03		0.03		0.03	
NITRATE	MG/L	10.		190.		190.		150.		150.	
NITRITE	MG/L	-		< 0.1		< 0.1		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	-		227.		222.		228.		232.	
PB-210	PCI/L	-		-		-		-		-	
PH	SU	7.22		7.02		7.02		7.02		7.02	
PHOSPHATE	MG/L	-		0.61		0.43		0.30		0.51	
PO-210	PCI/L	-		0.6	1.3	0.6	1.3	0.3	1.3	1.1	1.4
POTASSIUM	MG/L	51.8		40.0		40.0		40.5		41.5	
RA-226	PCI/L	-		0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
RA-228	PCI/L	-		1.0	1.2	0.0	1.3	0.0	1.5	0.3	1.2
SELENIUM	MG/L	0.026		0.225		0.223		0.229		0.219	
SILICA	MG/L	-		13.4		13.4		13.4		13.8	
SILVER	MG/L	-		-		-		-		-	
SODIUM	MG/L	3900.		2574.		2549.		2544.		2567.	
STRONTIUM	MG/L	-		13.2		13.0		13.0		13.0	
SULFATE	MG/L	11300.		8629.		8649.		8700.		8830.	
SULFIDE	MG/L	-		< 0.1		< 0.1		< 0.1		< 0.1	
TEMPERATURE	C DEGREE	18.		17.5		17.5		17.5		17.5	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/26/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE							
		626-01 10/03/85	626-01 09/01/87		626-02 09/01/87		626-03 09/01/87		626-04 09/01/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	-		0.0	0.6	1.5	1.2	1.0	1.0	1.2	1.1
TRANSLTIUM	MG/L	-		-		-		-		-	
TIN	MG/L	< 0.005		0.934		0.547		0.664		0.888	
TOTAL SOLIDS	MG/L	18700.		14100.		13900.		14100.		13900.	
URANIUM	MG/L	1.64		1.22		1.16		1.08		1.12	
VANADIUM	MG/L	0.5		0.11		0.11		0.11		0.11	
ZINC	MG/L	0.476		0.094		0.093		0.096		0.100	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 06/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		626-05 09/01/87		626-01 04/05/89		627-01 10/03/85		627-01 09/14/86		627-01 09/16/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY		PARAMETER VALUE +/- UNCERTAINTY	
ALKALINITY	MG/L CACO3	829.		403.		459.		593.0		330.	
ALUMINUM	MG/L	0.39		< 0.1		-		0.3		0.32	
AMMONIUM	MG/L	5.8		< 0.1		1.6		0.6		< 0.1	
ANTIMONY	MG/L	0.130		0.022		-		< 0.003		0.026	
ARSENIC	MG/L	0.034		0.01		-		< 0.01		0.016	
BARIUM	MG/L	0.02		< 0.1		-		< 0.1		0.02	
BERYLLIUM	MG/L	-		< 0.01		-		-		-	
BORON	MG/L	0.85		0.4		0.6		0.3		0.49	
BROMIDE	MG/L	0.1		0.2		-		-		< 0.1	
CADMIUM	MG/L	< 0.005		0.003		< 0.001		< 0.001		< 0.005	
CALCIUM	MG/L	440.		326.		344.		549.0		410.	
CHLORIDE	MG/L	414.		220.		180.		430.0		157.	
CHROMIUM	MG/L	< 0.01		< 0.01		-		0.04		< 0.01	
COBALT	MG/L	< 0.01		< 0.05		-		0.12		< 0.01	
CONDUCTANCE	UMHO/CM	4520.		4650.		8000.		6500.0		3690.	
COPPER	MG/L	0.03		0.02		0.04		0.05		0.02	
CYANIDE	MG/L	-		< 0.01		-		< 0.01		-	
FLUORIDE	MG/L	0.56		0.7		7.		0.6		0.56	
GROSS ALPHA	PCI/L	830.	150.	270.	90.	-		-		420.	90.
GROSS BETA	PCI/L	540.	80.	240.	50.	-		-		230.	60.
IRON	MG/L	< 0.01		0.40		0.08		0.10		< 0.01	
LEAD	MG/L	0.01		< 0.01		-		< 0.01		0.01	
MAGNESIUM	MG/L	938.		527.		485.		696.0		436.	
MANGANESE	MG/L	4.48		2.08		3.87		5.92		3.11	
MERCURY	MG/L	0.0003		< 0.0002		-		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	0.01		< 0.01		0.13		0.11		0.01	
NICKEL	MG/L	0.03		< 0.04		-		0.10		0.01	
NITRATE	MG/L	150.		23.		180.		220.0		75.0	
NITRITE	MG/L	< 0.1		-		-		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	224.		116.		-		130.		86.6	
PB-210	PCI/L	-		0.8	0.6	-		1.7	2.1	-	
PH	SU	7.02		7.21		7.07		7.13		7.15	
PHOSPHATE	MG/L	0.46		< 0.1		-		< 0.1		0.53	
PB-210	PCI/L	2.6	1.7	0.2	0.4	-		0.1	0.9	0.1	1.3
POTASSIUM	MG/L	43.0		35.3		30.3		46.7		26.0	
RA-226	PCI/L	0.0	0.1	0.1	0.2	-		0.4	0.4	0.1	0.1
RA-228	PCI/L	0.6	1.4	0.3	0.9	-		0.2	1.1	0.3	1.3
SELENIUM	MG/L	0.240		0.072		< 0.005		0.053		0.176	
SILICA	MG/L	14.1		11.		-		7.		11.4	
SILVER	MG/L	-		< 0.01		-		< 0.01		-	
SODIUM	MG/L	2553.		1510.		2050.		2500.0		1683.	
STRONTIUM	MG/L	13.0		7.2		-		17.4		9.25	
SULFATE	MG/L	9100.		5520.		6340.		8340.0		5480.	
SULFIDE	MG/L	< 0.1		< 0.1		-		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	12.5		11.		17.		19.0		16.2	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
07/29/87 TO 04/22/87
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		626-05 07/01/87		626-01 04/05/89		627-01 10/03/85		627-01 09/14/86		627-01 09/16/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	0.0	0.6	0.1	0.5	-		0.7	1.0	0.3	0.8
THALLIUM	MG/L	-		0.01		-		-		-	
TIN	MG/L	0.592		0.007		< 0.005		< 0.005		0.645	
TOTAL SOLIDS	MG/L	14400.		8650.		40500.		13700.0		8630.	
URANIUM	MG/L	1.10		0.560		0.67		0.948		0.388	
VANADIUM	MG/L	0.11		0.08		0.39		0.27		0.08	
ZINC	MG/L	0.104		0.073		0.04		0.065		0.039	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		628-01 10/04/85	628-02 10/04/85	628-03 10/04/85	628-04 10/04/85	628-05 10/04/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	422.	422.	422.	422.	422.
ALUMINUM	MG/L	-	-	-	-	-
AMMONIUM	MG/L	1.6	1.2	1.	1.3	1.2
ANTIMONY	MG/L	-	-	-	-	-
ARSENIC	MG/L	-	-	-	-	-
BARIUM	MG/L	-	-	-	-	-
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.6	0.5	0.6	0.7	0.5
BROMIDE	MG/L	-	-	-	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	327.	372.	387.	388.	400.
CHLORIDE	MG/L	180.	180.	180.	180.	180.
CHROMIUM	MG/L	-	-	-	-	-
COBALT	MG/L	-	-	-	-	-
CONDUCTANCE	UMHO/CM	7000.	7000.	7000.	7000.	7000.
COPPER	MG/L	0.04	0.03	0.03	0.03	0.03
CYANIDE	MG/L	-	-	-	-	-
FLUORIDE	MG/L	5.5	6.5	5.7	7.2	7.5
GROSS ALPHA	PCI/L	-	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-	-
IRON	MG/L	0.1	0.07	0.07	0.04	0.07
LEAD	MG/L	-	-	-	-	-
MAGNESIUM	MG/L	398.	379.	384.	388.	408.
MANGANESE	MG/L	2.15	1.65	1.65	1.65	1.65
MERCURY	MG/L	-	-	-	-	-
MOLYBDENUM	MG/L	0.2	0.05	0.1	0.1	0.23
NICKEL	MG/L	-	-	-	-	-
NITRATE	MG/L	160.	160.	160.	140.	140.
NITRITE	MG/L	-	-	-	-	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	-	-	-	-
PB-210	PCI/L	-	-	-	-	-
PH	SU	7.18	7.18	7.18	7.18	7.18
PHOSPHATE	MG/L	-	-	-	-	-
PO-210	PCI/L	-	-	-	-	-
POTASSIUM	MG/L	27.1	40.6	41.	41.2	41.
RA-226	PCI/L	-	-	-	-	-
RA-228	PCI/L	-	-	-	-	-
SELENIUM	MG/L	0.01	0.007	0.006	0.006	0.006
SILICA	MG/L	-	-	-	-	-
SILVER	MG/L	-	-	-	-	-
SODIUM	MG/L	1970.	1570.	1760.	1840.	1700.
STRONTIUM	MG/L	-	-	-	-	-
SULFATE	MG/L	5810.	5020.	5810.	5526.	5430.
SULFIDE	MG/L	-	-	-	-	-
TEMPERATURE	C DEGREE	17.	17.	17.	17.	17.

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/29/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		628-01 10/04/85	628-02 10/04/85	628-03 10/04/85	628-04 10/04/85	628-05 10/04/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TH-230	PCI/L	-	-	-	-	-
THALLIUM	MG/L	-	-	-	-	-
TIN	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	9400.	9550.	9240.	9420.	9250.
URANIUM	MG/L	0.526	0.555	0.597	0.492	0.577
VANADIUM	MG/L	0.6	0.5	0.7	0.3	0.7
ZINC	MG/L	0.051	0.046	0.049	0.045	0.048

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		628-01 09/16/87		628-01 04/05/89		629-01 10/03/85		629-01 08/30/87		629-01 04/18/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	399.		277.		324.		425.		116.	
ALUMINUM	MG/L	0.33		< 0.1		-		0.30		< 0.1	
AMMONIUM	MG/L	< 0.1		< 0.1		0.6		2.5		< 0.1	
ANTIMONY	MG/L	0.009		0.028		-		0.016		0.006	
ARSENIC	MG/L	0.020		< 0.01		-		0.005		< 0.01	
BARIUM	MG/L	0.01		< 0.1		-		0.02		< 0.1	
BERYLLIUM	MG/L	-		< 0.01		-		-		< 0.01	
BORON	MG/L	0.51		0.2		0.5		0.34		0.2	
BROMIDE	MG/L	< 0.1		< 0.1		-		< 0.1		< 0.1	
CADMIUM	MG/L	< 0.005		0.002		< 0.001		< 0.005		0.003	
CALCIUM	MG/L	418.		400.		547.		395.		420.	
CHLORIDE	MG/L	193.		130.		180.		72.		75.	
CHROMIUM	MG/L	< 0.01		< 0.01		-		< 0.01		< 0.01	
COBALT	MG/L	< 0.01		< 0.05		-		< 0.01		< 0.05	
CONDUCTANCE	UMHO/CM	3240.		4000.		7006.		3750.		3300.	
COPPER	MG/L	0.02		0.02		0.04		0.01		< 0.02	
CYANIDE	MG/L	-		< 0.01		-		-		< 0.01	
FLUORIDE	MG/L	0.58		1.0		6.7		1.4		1.4	
GROSS ALPHA	PCI/L	300.	80.	230.	60.	-		68.	21.	39.	26.
GROSS BETA	PCI/L	230.	60.	130.	20.	-		52.	17.	35.	14.
IRON	MG/L	< 0.01		0.08		0.08		< 0.01		0.07	
LEAD	MG/L	0.01		< 0.01		-		< 0.01		< 0.01	
MAGNESIUM	MG/L	493.		232.		337.		83.7		76.8	
MANGANESE	MG/L	3.05		1.31		0.59		0.39		0.18	
MERCURY	MG/L	0.0002		< 0.0002		-		0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		0.01		0.1		0.02		0.01	
NICKEL	MG/L	0.02		< 0.04		-		< 0.01		< 0.04	
NITRATE	MG/L	105.		38.		180.		86.8		60.	
NITRITE	MG/L	< 0.1		-		-		< 0.1		-	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	112.		72.5		-		35.8		34.8	
PB-210	PCI/L	-		0.0	0.5	-		0.7	0.9	0.5	1.6
PH	SU	7.16		7.35		7.23		7.40		7.44	
PHOSPHATE	MG/L	0.55		< 0.1		-		0.27		< 0.1	
PO-210	PCI/L	0.0	1.1	0.4	0.4	-		0.0	0.7	0.6	0.4
POTASSIUM	MG/L	27.0		21.5		23.5		17.7		13.7	
RA-226	PCI/L	0.0	0.1	0.0	0.1	-		0.0	0.1	0.0	0.1
RA-228	PCI/L	0.0	1.2	0.0	0.9	-		0.1	1.5	0.2	0.9
SELENIUM	MG/L	0.208		0.066		< 0.005		0.104		0.047	
SILICA	MG/L	11.8		11.		-		12.5		11.	
SILVER	MG/L	-		< 0.01		-		-		-	
SODIUM	MG/L	1889.		1310.		1660.		1021.		804.	
STRONTIUM	MG/L	9.75		5.6		-		6.39		5.9	
SULFATE	MG/L	6260.		4460.		5550.		3339.		3280.	
SULFIDE	MG/L	< 0.1		< 0.1		-		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	17.5		9.		15.		21.2		14.5	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		628-01 09/16/87		628-01 04/05/89		629-01 10/03/85		629-01 08/30/87		629-01 04/18/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.1	0.8	0.0	0.3	-		0.1	0.7	0.0	0.3
THALLIUM	MG/L	-		0.02		-		-		0.01	
TIN	MG/L	0.592		0.008		< 0.005		0.239		0.028	
TOTAL SOLIDS	MG/L	9720.		6750.		18600.		5090.		4790.	
URANIUM	MG/L	0.405		0.314		0.551		0.0316		0.0299	
VANADIUM	MG/L	0.08		0.06		0.4		0.08		0.05	
ZINC	MG/L	0.028		0.032		0.08		0.029		0.033	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		630-01 10/04/85	630-01 09/15/86	630-01 08/30/87	631-01 09/30/85	631-02 09/30/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	303.	170.0	124.	422.	422.
ALUMINUM	MG/L	-	0.1	0.51	-	-
AMMONIUM	MG/L	0.3	0.6	2.5	0.2	0.2
ANTIMONY	MG/L	-	< 0.003	0.009	-	-
ARSENIC	MG/L	-	< 0.01	0.005	-	-
BARIUM	MG/L	-	0.1	0.03	-	-
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.8	0.3	0.36	0.6	0.5
BROMIDE	MG/L	-	-	< 0.1	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001
CALCIUM	MG/L	498.	417.0	416.	510.	436.
CHLORIDE	MG/L	180.	69.0	73.	150.	150.
CHROMIUM	MG/L	-	0.01	< 0.01	-	-
COBALT	MG/L	-	0.07	< 0.01	-	-
CONDUCTANCE	UMHO/CM	7000.	4250.0	3300.	4300.	4300.
COPPER	MG/L	0.04	0.03	0.05	0.03	0.03
CYANIDE	MG/L	-	< 0.01	-	-	-
FLUORIDE	MG/L	6.2	1.3	1.4	1.6	1.7
GROSS ALPHA	PCI/L	-	-	37. 18.	-	-
GROSS BETA	PCI/L	-	-	29. 18.	-	-
IRON	MG/L	0.09	0.06	< 0.01	0.31	0.32
LEAD	MG/L	-	< 0.01	< 0.01	-	-
MAGNESIUM	MG/L	330.	184.0	94.7	229.	221.
MANGANESE	MG/L	0.41	0.62	0.32	8.62	8.53
MERCURY	MG/L	-	< 0.0002	0.0002	-	-
MOLYBDENUM	MG/L	0.05	0.11	0.04	0.2	< 0.01
NICKEL	MG/L	-	0.06	< 0.01	-	-
NITRATE	MG/L	180.	160.0	97.5	4.	13.
NITRITE	MG/L	-	< 0.1	< 0.1	-	-
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	10.	36.7	-	-
PB-210	PCI/L	-	0.0 2.1	1.5 1.0	-	-
PH	SU	7.22	7.36	7.32	6.96	6.96
PHOSPHATE	MG/L	-	< 0.1	0.46	-	-
PO-210	PCI/L	-	0.0 0.5	0.0 0.7	-	-
POTASSIUM	MG/L	23.9	24.5	17.8	12.3	12.3
RA-226	PCI/L	-	0.1 0.2	0.1 0.2	-	-
RA-228	PCI/L	-	0.3 1.3	0.6 1.8	-	-
SELENIUM	MG/L	< 0.005	0.021	0.110	< 0.005	< 0.005
SILICA	MG/L	-	7.	12.0	-	-
SILVER	MG/L	-	< 0.01	-	-	-
SODIUM	MG/L	1700.	1110.0	1021.	748.	828.
STRONTIUM	MG/L	-	5.9	6.35	-	-
SULFATE	MG/L	5390.	3710.0	3220.	3040.	3040.
SULFIDE	MG/L	-	< 0.1	< 0.1	-	-
TEMPERATURE	C - DEGREE	15.5	24.0	21.5	19.	19.

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/26/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		630-01 10/04/85	630-01 09/15/86	630-01 08/30/87	631-01 09/30/85	631-02 09/30/85
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TH-230	PCI/L	-	0.2 0.6	0.0 0.5	-	-
THALLIUM	MG/L	-	-	-	-	-
TIN	MG/L	< 0.005	< 0.005	0.237	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	8960.	5540.0	5460.	5340.	5330.
URANIUM	MG/L	0.5	0.184	0.0307	0.0459	0.0459
VANADIUM	MG/L	0.5	0.20	0.12	0.4	0.5
ZINC	MG/L	0.088	0.094	0.025	0.073	0.071

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		631-03 09/30/85	631-04 09/30/85	631-05 09/30/85	631-01 09/20/86	631-02 09/20/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	422.	422.	422.	486.0	486.0
ALUMINUM	MG/L	-	-	-	0.2	0.2
AMMONIUM	MG/L	0.3	0.2	0.2	< 0.1	< 0.1
ANTIMONY	MG/L	-	-	-	< 0.003	< 0.003
ARSENIC	MG/L	-	-	-	< 0.01	< 0.01
BARIUM	MG/L	-	-	-	< 0.1	< 0.1
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.5	0.6	0.5	0.4	0.4
BROMIDE	MG/L	-	-	-	-	-
CADMIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	MG/L	492.	553.	443.	550.0	550.0
CHLORIDE	MG/L	150.	150.	150.	240.0	240.0
CHROMIUM	MG/L	-	-	-	0.05	0.05
COBALT	MG/L	-	-	-	0.07	0.07
CONDUCTANCE	UMHO/CM	4300.	4300.	4300.	3800.0	3800.0
COPPER	MG/L	0.03	0.03	0.03	0.03	0.03
CYANIDE	MG/L	-	-	-	< 0.01	< 0.01
FLUORIDE	MG/L	1.6	1.5	1.5	0.4	0.4
GROSS ALPHA	PCI/L	-	-	-	-	-
GROSS BETA	PCI/L	-	-	-	-	-
IRON	MG/L	0.31	0.3	0.3	0.60	0.60
LEAD	MG/L	-	-	-	< 0.01	< 0.01
MAGNESIUM	MG/L	237.	239.	234.	300.0	300.0
MANGANESE	MG/L	9.12	8.88	8.88	9.60	9.60
MERCURY	MG/L	-	-	-	< 0.0002	< 0.0002
MOLYBDENUM	MG/L	0.22	0.1	0.25	0.08	0.08
NICKEL	MG/L	-	-	-	0.04	0.04
NITRATE	MG/L	13.	6.	12.	< 1.0	< 1.0
NITRITE	MG/L	-	-	-	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	-	-	-	130.	130.
PB-210	PCI/L	-	-	-	1.5 1.0	0.3 0.8
PH	SU	6.96	6.96	6.96	7.04	7.04
PHOSPHATE	MG/L	-	-	-	< 0.1	< 0.1
PO-210	PCI/L	-	-	-	0.0 0.5	0.0 0.5
POTASSIUM	MG/L	12.5	12.5	12.5	13.8	13.8
RA-226	PCI/L	-	-	-	0.2 0.2	0.2 0.2
RA-228	PCI/L	-	-	-	0.3 0.9	0.3 1.0
SELENIUM	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
SILICA	MG/L	-	-	-	9.	9.
SILVER	MG/L	-	-	-	< 0.01	< 0.01
SODIUM	MG/L	735.	710.	820.	750.0	750.0
STRONTIUM	MG/L	-	-	-	5.7	5.7
SULFATE	MG/L	3050.	3090.	3090.	3460.0	3440.0
SULFIDE	MG/L	-	-	-	< 0.1	< 0.1
TEMPERATURE	C - DEGREE	19.	19.	19.	20.5	20.5

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		631-03 09/30/85	631-04 09/30/85	631-05 09/30/85	631-01 09/20/86	631-02 09/20/86
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
TH-230	PCI/L	-	-	-	0.0 0.4	0.0 0.5
THALLIUM	MG/L	-	-	-	-	-
TIN	MG/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
TOTAL SOLIDS	MG/L	5330.	5360.	5390.	5940.0	5920.0
URANIUM	MG/L	0.0159	0.0155	0.0167	0.0185	0.0174
VANADIUM	MG/L	< 0.01	0.4	< 0.01	0.20	0.20
ZINC	MG/L	0.078	0.065	0.074	0.020	0.020

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		631-03 09/20/86		631-04 09/20/86		631-05 09/20/86		631-01 08/30/87		632-01 09/29/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	486.0		486.0		486.0		447.		376.	
ALUMINUM	MG/L	0.2		0.2		0.2		0.92		-	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		6.8		0.2	
ANTIMONY	MG/L	< 0.003		< 0.003		< 0.003		0.008		-	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		0.011		-	
BARIUM	MG/L	< 0.1		< 0.1		< 0.1		0.03		-	
BERYLLIUM	MG/L	-		-		-		-		-	
BORON	MG/L	0.4		0.4		0.4		0.59		0.6	
BROMIDE	MG/L	-		-		-		0.3		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.005		< 0.001	
CALCIUM	MG/L	550.0		550.0		550.0		559.		430.	
CHLORIDE	MG/L	240.0		240.0		240.0		188.		130.	
CHROMIUM	MG/L	0.05		0.05		0.05		< 0.01		-	
COBALT	MG/L	0.07		0.07		0.07		< 0.01		-	
CONDUCTANCE	UMHO/CM	3800.0		3800.0		3800.0		3600.		3900.	
COPPER	MG/L	0.03		0.03		0.03		0.08		0.03	
CYANIDE	MG/L	< 0.01		< 0.01		< 0.01		-		-	
FLUORIDE	MG/L	0.4		0.4		0.4		0.4		1.5	
GROSS ALPHA	PCI/L	-		-		-		16.	16.	-	
GROSS BETA	PCI/L	-		-		-		27.	18.	-	
IRON	MG/L	0.60		0.60		0.60		0.85		0.1	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		-	
MAGNESIUM	MG/L	300.0		300.0		300.0		242.		187.	
MANGANESE	MG/L	9.60		9.60		9.60		7.72		6.44	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		0.0002		-	
MOLYBDENUM	MG/L	0.08		0.08		0.08		0.02		0.06	
NICKEL	MG/L	0.04		0.04		0.04		< 0.01		-	
NITRATE	MG/L	< 1.0		< 1.0		< 1.0		8.9		3.	
NITRITE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		-	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	130.		130.		130.		128.		-	
PB-210	PCI/L	0.9	0.8	1.2	0.8	0.8	0.7	0.7	0.9	-	
PH	SU	7.04		7.04		7.04		7.02		7.72	
PHOSPHATE	MG/L	< 0.1		< 0.1		< 0.1		0.50		-	
PO-210	PCI/L	0.0	0.5	0.0	0.5	0.0	0.4	0.0	0.6	-	
POTASSIUM	MG/L	13.8		13.8		13.8		12.3		13.3	
RA-226	PCI/L	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.1	-	
RA-228	PCI/L	0.4	1.2	0.2	0.7	0.5	0.8	0.0	1.0	-	
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		0.027		< 0.005	
SILICA	MG/L	9.		9.		9.		16.4		-	
SILVER	MG/L	< 0.01		< 0.01		< 0.01		-		-	
SODIUM	MG/L	750.0		750.0		750.0		759.		714.	
STRONTIUM	MG/L	5.7		5.7		5.7		5.89		-	
SULFATE	MG/L	3440.0		3480.0		3410.0		3360.		2750.	
SULFIDE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		-	
TEMPERATURE	C - DEGREE	20.5		20.5		20.5		18.1		20.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/20/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		631-03 09/20/86		631-04 09/20/86		631-05 09/20/86		631-01 08/30/87		632-01 09/29/85	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.0	0.5	0.7	0.7	0.1	0.5	0.0	0.5	-	
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	< 0.005		< 0.005		< 0.005		0.203		< 0.005	
TOTAL SOLIDS	MG/L	5900.0		5940.0		5870.0		5800.		4690.	
URANIUM	MG/L	0.0479		0.0487		0.0480		0.0400		0.047	
VANADIUM	MG/L	0.20		0.20		0.20		0.19		0.41	
ZINC	MG/L	0.020		0.020		0.020		< 0.005		0.02	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPSJCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		632-01 09/20/86		632-02 09/20/86		632-03 09/20/86		632-04 09/20/86		632-05 09/20/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	406.0		406.0		406.0		406.0		406.0	
ALUMINUM	MG/L	0.3		0.3		0.3		0.3		0.3	
AMMONIUM	MG/L	0.2		0.2		0.2		0.2		0.2	
ANTIMONY	MG/L	< 0.003		< 0.003		< 0.003		< 0.003		< 0.003	
ARSENIC	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		< 0.01	
BARIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
BERYLLIUM	MG/L	-		-		-		-		-	
BORON	MG/L	0.7		0.7		0.7		0.7		0.7	
BROMIDE	MG/L	-		-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001		< 0.001	
CALCIUM	MG/L	550.0		550.0		550.0		550.0		550.0	
CHLORIDE	MG/L	200.0		200.0		200.0		200.0		200.0	
CHROMIUM	MG/L	0.05		0.05		0.05		0.05		0.05	
COBALT	MG/L	0.08		0.08		0.08		0.08		0.08	
CONDUCTANCE	UMHO/CM	3800.0		3800.0		3800.0		3800.0		3800.0	
COPPER	MG/L	0.02		0.02		0.02		0.02		0.02	
CYANIDE	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		< 0.01	
FLUORIDE	MG/L	0.4		0.4		0.4		0.4		0.4	
GROSS ALPHA	PCI/L	-		-		-		-		-	
GROSS BETA	PCI/L	-		-		-		-		-	
IRON	MG/L	0.70		0.70		0.70		0.70		0.70	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		< 0.01	
MAGNESIUM	MG/L	260.0		260.0		260.0		260.0		260.0	
MANGANESE	MG/L	8.80		8.80		8.80		8.80		8.80	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	0.15		0.15		0.15		0.15		0.15	
NICKEL	MG/L	0.05		0.05		0.05		0.05		0.05	
NITRATE	MG/L	< 1.0		< 1.0		< 1.0		< 1.0		< 1.0	
NITRITE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	90.		90.		90.		90.		90.	
PB-210	PCI/L	0.2	0.9	0.0	0.8	0.0	0.9	0.0	0.9	0.5	0.6
PH	SU	7.16		7.16		7.16		7.16		7.16	
PHOSPHATE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
PO-210	PCI/L	0.0	0.5	0.0	0.6	0.0	0.5	0.0	0.6	0.0	0.5
POTASSIUM	MG/L	15.9		15.9		15.9		15.9		15.9	
RA-226	PCI/L	0.6	0.3	0.8	0.4	0.4	0.3	0.6	0.3	0.6	0.4
RA-228	PCI/L	1.4	1.0	0.3	1.1	0.9	1.2	0.6	0.8	0.0	0.8
SELENIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005	
SILICA	MG/L	10.		10.		10.		10.		10.	
SILVER	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		< 0.01	
SODIUM	MG/L	750.0		750.0		750.0		750.0		750.0	
STRONTIUM	MG/L	5.5		5.5		5.5		5.5		5.5	
SULFATE	MG/L	3390.0		3400.0		3400.0		3380.0		3390.0	
SULFIDE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
TEMPERATURE	C - DEGREE	21.5		21.5		21.5		21.5		21.5	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/20/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		632-01 09/20/86		632-02 09/20/86		632-03 09/20/86		632-04 09/20/86		632-05 09/20/86	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.0	0.4	0.1	0.5	0.3	0.6	0.2	0.5	0.0	0.4
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005	
TOTAL SOLIDS	MG/L	5770.0		5750.0		5700.0		5750.0		5700.0	
URANIUM	MG/L	0.0157		0.0188		0.0154		0.0162		0.0152	
VANADIUM	MG/L	0.11		0.11		0.11		0.11		0.11	
ZINC	MG/L	0.020		0.020		0.020		0.020		0.020	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/27/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		632-01 09/01/87		632-01 11/12/87		633-01 10/04/85		633-01 04/19/89		638-01 03/19/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	428.		469.		940.		408.		578.	
ALUMINUM	MG/L	0.26		0.28		-		< 0.1		0.2	
AMMONIUM	MG/L	3.6		< 0.1		2.2		< 0.1		0.6	
ANTIMONY	MG/L	< 0.003		0.043		-		0.006		< 0.003	
ARSENIC	MG/L	0.010		0.010		-		< 0.01		0.005	
BARIUM	MG/L	0.03		0.02		-		< 0.1		< 0.1	
BERYLLIUM	MG/L	-		-		-		< 0.01		-	
BORON	MG/L	0.59		0.52		0.9		0.2		0.21	
BROMIDE	MG/L	0.5		0.03		-		< 0.1		-	
CADMIUM	MG/L	< 0.005		< 0.005		< 0.001		0.002		< 0.001	
CALCIUM	MG/L	489.		530.		354.		159.		321.	
CHLORIDE	MG/L	179.		169.		370.		72.		248.	
CHROMIUM	MG/L	< 0.01		< 0.01		-		< 0.01		0.02	
COBALT	MG/L	< 0.01		< 0.01		-		< 0.05		0.10	
CONDUCTANCE	UMHO/CM	3000.		3500.		10500.		3100.		2400.	
COPPER	MG/L	< 0.01		0.02		0.06		0.02		0.05	
CYANIDE	MG/L	-		-		-		< 0.01		-	
FLUORIDE	MG/L	0.3		0.35		8.7		2.0		0.49	
GROSS ALPHA	PCI/L	20.	25.	15.	34.	-		56.	23.	-	
GROSS BETA	PCI/L	11.	26.	24.	21.	-		23.	11.	-	
IRON	MG/L	0.17		0.66		0.04		0.08		0.34	
LEAD	MG/L	< 0.01		0.02		-		< 0.01		< 0.001	
MAGNESIUM	MG/L	249.		264.		587.		35.2		85.4	
MANGANESE	MG/L	8.47		8.83		0.2		0.03		11.0	
MERCURY	MG/L	0.0002		< 0.0002		-		< 0.0002		-	
MOLYBDENUM	MG/L	< 0.01		0.14		0.2		< 0.01		< 0.1	
NICKEL	MG/L	< 0.01		< 0.01		-		< 0.04		0.10	
NITRATE	MG/L	7.5		0.4		240.		1.5		< 0.1	
NITRITE	MG/L	< 0.1		< 0.1		-		-		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	119.		70.9		-		34.3		33.8	
PB-210	PCI/L	0.5	1.0	0.0	1.2	-		0.0	0.6	4.3	1.0
PH	SU	7.08		7.10		7.6		8.72		7.34	
PHOSPHATE	MG/L	0.74		8.9		-		< 0.1		0.15	
PO-210	PCI/L	0.1	0.8	0.0	0.4	-		0.0	0.3	0.0	0.4
POTASSIUM	MG/L	11.5		10.4		18.1		9.4		7.32	
RA-226	PCI/L	0.0	0.1	0.1	0.2	-		0.0	0.1	0.6	0.3
RA-228	PCI/L	0.2	1.3	0.5	2.4	-		0.2	0.9	0.5	1.2
SELENIUM	MG/L	0.028		0.021		< 0.005		0.011		< 0.002	
SILICA	MG/L	19.1		17.3		-		< 2.		12.5	
SILVER	MG/L	-		-		-		< 0.01		-	
SODIUM	MG/L	754.		640.		2750.		875.		950.	
STRONTIUM	MG/L	5.60		4.80		-		10.2		4.80	
SULFATE	MG/L	3290.		3040.		7670.		2420.		2160.	
SULFIDE	MG/L	< 0.1		< 0.1		-		< 0.1		-	
TEMPERATURE	C - DEGREE	20.0		18.		20.		24.		13.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/26/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		632-01 09/01/87		632-01 11/12/87		633-01 10/04/85		633-01 04/19/89		638-01 03/19/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-	UNCERTAINTY	PARAMETER VALUE+/-	UNCERTAINTY	PARAMETER VALUE+/-	UNCERTAINTY	PARAMETER VALUE+/-	UNCERTAINTY	PARAMETER VALUE+/-	UNCERTAINTY
TH-230	PCI/L	0.3	0.8	0.0	0.4	-		0.0	0.3	0.8	0.9
THALLIUM	MG/L	-		-		-		0.01		-	
TIN	MG/L	0.196		0.025		< 0.005		0.032		0.009	
TOTAL SOLIDS	MG/L	5480.		5490.		13000.		3650.		4260.	
URANIUM	MG/L	0.0093		0.0167		7.21		0.0260		0.0139	
VANADIUM	MG/L	0.07		0.07		0.3		0.03		< 0.1	
ZINC	MG/L	< 0.005		0.006		3.82		< 0.005		9.52	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 638-01 05/14/87 PARAMETER VALUE+/-UNCERTAINTY	638-01 09/25/87 PARAMETER VALUE+/-UNCERTAINTY	638-01 10/09/88 PARAMETER VALUE+/-UNCERTAINTY	638-01 04/20/89 PARAMETER VALUE+/-UNCERTAINTY	639-01 03/19/87 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	521.	254.	180.	250.	604.
ALUMINUM	MG/L	0.06	0.08	-	< 0.1	0.1
AMMONIUM	MG/L	< 0.1	< 0.1	0.4	0.4	< 0.1
ANTIMONY	MG/L	0.103	< 0.003	< 0.003	< 0.003	< 0.003
ARSENIC	MG/L	0.004	0.005	0.02	< 0.01	0.005
BARIUM	MG/L	0.03	0.05	< 0.1	< 0.1	< 0.1
BERYLLIUM	MG/L	-	-	-	< 0.01	-
BORON	MG/L	0.14	0.11	-	< 0.1	0.66
BROMIDE	MG/L	-	< 0.1	-	< 0.1	-
CADMIUM	MG/L	0.010	< 0.005	< 0.001	0.002	< 0.001
CALCIUM	MG/L	125.	54.3	82.2	113.	483.
CHLORIDE	MG/L	222.	26.5	41.	90.	225.
CHROMIUM	MG/L	0.06	< 0.01	0.03	< 0.01	0.03
COBALT	MG/L	< 0.01	< 0.01	< 0.05	< 0.05	0.12
CONDUCTANCE	UMHO/CM	3300.	680.	800.	1700.	3450.
COPPER	MG/L	< 0.01	< 0.01	< 0.02	< 0.02	0.02
CYANIDE	MG/L	-	-	-	< 0.01	-
FLUORIDE	MG/L	0.66	0.55	0.5	0.5	0.58
GROSS ALPHA	PCI/L	-	2.0 5.6	1.3 5.0	4.0 6.9	-
GROSS BETA	PCI/L	-	7.5 4.8	7.7 2.5	14. 4.	-
IRON	MG/L	1.93	0.01	4.20	7.08	0.09
LEAD	MG/L	0.06	< 0.01	< 0.01	< 0.01	< 0.001
MAGNESIUM	MG/L	43.2	19.3	27.0	33.6	319.
MANGANESE	MG/L	4.34	1.65	-	3.10	5.92
MERCURY	MG/L	-	0.0007	< 0.0002	< 0.0002	-
MOLYBDENUM	MG/L	0.03	< 0.01	0.01	< 0.01	< 0.1
NICKEL	MG/L	0.02	< 0.01	-	< 0.04	0.13
NITRATE	MG/L	0.4	< 0.1	< 1.0	0.7	< 0.1
NITRITE	MG/L	< 0.1	< 0.1	-	-	< 0.1
NO2 & NO3	MG/L	-	-	< 1.0	-	-
ORG. CARBON	MG/L	162.	65.9	-	63.3	8.9
PB-210	PCI/L	1.0 0.6	0.0 1.0	-	0.1 0.7	1.5 1.3
PH	SU	7.97	7.38	6.62	6.70	7.24
PHOSPHATE	MG/L	1.43	< 0.1	< 0.1	< 0.1	0.15
PO-210	PCI/L	0.0 0.5	0.0 0.6	-	0.1 0.4	0.0 0.4
POTASSIUM	MG/L	3.81	3.81	3.5	3.8	5.30
RA-226	PCI/L	0.2 0.2	0.2 0.2	0.1 0.2	-	0.1 0.2
RA-228	PCI/L	0.4 1.4	0.4 1.1	0.3 0.7	0.0 0.7	0.8 0.9
SELENIUM	MG/L	< 0.001	0.010	0.015	< 0.005	< 0.002
SILICA	MG/L	17.0	14.3	-	11.	16.9
SILVER	MG/L	-	-	< 0.01	< 0.01	-
SODIUM	MG/L	838.	137.	138.	268.	1100.
STRONTIUM	MG/L	2.10	0.950	1.2	1.2	8.00
SULFATE	MG/L	1320.	235.	402.	744.	3200.
SULFIDE	MG/L	-	< 0.1	-	< 0.1	-
TEMPERATURE	C - DEGREE	18.5	18.9	15.9	18.	11.0

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		638-01 05/14/87		638-01 09/25/87		638-01 10/09/88		638-01 04/20/89		639-01 03/19/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	17.	3.	0.0	0.4	0.0	0.4	0.2	0.4	0.0	0.6
THALLIUM	MG/L	-		-		-		< 0.01		-	
TIN	MG/L	< 0.005		0.006		-		< 0.005		0.008	
TOTAL SOLIDS	MG/L	2770.		656.		822.		1380.		6860.	
URANIUM	MG/L	0.0085		0.0024		0.0023		0.0046		0.0370	
VANADIUM	MG/L	0.02		0.02		0.01		0.02		< 0.1	
ZINC	MG/L	1.64		0.562		0.661		0.469		6.83	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		639-02 03/19/87		639-03 03/19/87		639-04 03/19/87		639-05 03/19/87		639-01 05/14/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	604.		604.		604.		604.		350.	
ALUMINUM	MG/L	0.1		-		0.1		0.1		0.13	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	< 0.003		-		< 0.003		< 0.003		0.172	
ARSENIC	MG/L	0.005		-		0.005		0.005		0.003	
BARIUM	MG/L	0.1		-		0.1		0.1		0.03	
BERYLLIUM	MG/L	-		-		-		-		-	
BORON	MG/L	0.61		0.55		0.68		0.39		0.35	
BROMIDE	MG/L	-		-		-		-		-	
CADMIUM	MG/L	< 0.001		< 0.001		< 0.001		< 0.001		0.025	
CALCIUM	MG/L	486.		485.		485.		487.		309.	
CHLORIDE	MG/L	219.		219.		219.		220.		82.9	
CHROMIUM	MG/L	0.03		0.03		0.03		0.03		0.12	
COBALT	MG/L	0.13		0.13		0.14		0.14		0.02	
CONDUCTANCE	UMHO/CM	3150.		3150.		3150.		3150.		1825.	
COPPER	MG/L	0.02		0.02		0.03		0.02		0.01	
CYANIDE	MG/L	-		-		-		-		-	
FLUORIDE	MG/L	0.59		-		0.58		0.59		0.64	
GROSS ALPHA	PCI/L	-		-		-		-		-	
GROSS BETA	PCI/L	-		-		-		-		-	
IRON	MG/L	0.10		0.10		0.10		0.10		0.23	
LEAD	MG/L	< 0.001		< 0.001		< 0.001		< 0.001		0.14	
MAGNESIUM	MG/L	320.		320.		320.		320.		143.	
MANGANESE	MG/L	7.00		6.95		6.97		6.93		4.11	
MERCURY	MG/L	-		-		-		-		-	
MOLYBDENUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		0.06	
NICKEL	MG/L	0.11		0.11		0.12		0.12		0.05	
NITRATE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		5.7	
NITRITE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
NO2 & NO3	MG/L	-		-		-		-		-	
ORG. CARBON	MG/L	138.		140.		140.		142.		98.1	
PB-210	PCI/L	1.0	1.0	0.9	1.2	0.6	1.2	1.2	0.8	1.0	0.6
PH	SU	7.24		7.24		7.24		7.24		7.40	
PHOSPHATE	MG/L	0.10		-		0.10		0.10		3.53	
PO-210	PCI/L	0.0	0.4	0.0	0.4	0.0	0.4	0.0	0.4	0.0	0.3
POTASSIUM	MG/L	5.43		5.40		5.41		5.42		3.48	
RA-226	PCI/L	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.2	0.0	0.2
RA-228	PCI/L	0.1	0.8	0.5	1.0	0.0	1.0	0.5	1.2	0.0	0.9
SELENIUM	MG/L	< 0.002		< 0.002		< 0.002		< 0.002		< 0.001	
SILICA	MG/L	20.3		20.5		20.6		20.9		19.1	
SILVER	MG/L	-		-		-		-		-	
SODIUM	MG/L	1070.		1070.		1070.		1070.		528.	
STRONTIUM	MG/L	7.95		7.97		7.95		7.95		3.60	
SULFATE	MG/L	3840.		3840.		3840.		3840.		1880.	
SULFIDE	MG/L	-		-		-		-		-	
TEMPERATURE	C - DEGREE	11.0		11.0		11.0		11.0		15.0	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/26/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		639-02 03/19/87		639-03 03/19/87		639-04 03/19/87		639-05 03/19/87		639-01 05/14/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.1	0.7	0.0	0.6	0.0	0.5	0.0	0.6	44.	4.
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	0.010		0.010		0.010		0.010		< 0.005	
TOTAL SOLIDS	MG/L	6820.		6820.		6820.		6820.		3210.	
URANIUM	MG/L	0.0311		0.0314		0.0236		0.0281		0.0109	
VANADIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		0.05	
ZINC	MG/L	11.2		10.7		11.7		10.9		2.38	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 639-02 05/14/87 PARAMETER VALUE+/-UNCERTAINTY	639-03 05/14/87 PARAMETER VALUE+/-UNCERTAINTY	639-04 05/14/87 PARAMETER VALUE+/-UNCERTAINTY	639-05 05/14/87 PARAMETER VALUE+/-UNCERTAINTY	639-01 09/25/87 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	350.	350.	350.	350.	538.
ALUMINUM	MG/L	0.12	0.12	0.13	0.12	0.27
AMMONIUM	MG/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
ANTIMONY	MG/L	0.172	0.172	0.167	0.172	0.026
ARSENIC	MG/L	0.002	0.002	0.002	0.002	0.032
BARIUM	MG/L	0.03	0.03	0.03	0.03	0.04
BERYLLIUM	MG/L	-	-	-	-	-
BORON	MG/L	0.34	0.34	0.34	0.34	0.59
BROMIDE	MG/L	-	-	-	-	< 0.1
CADMIUM	MG/L	0.024	0.025	0.025	0.025	< 0.005
CALCIUM	MG/L	342.	342.	341.	342.	426.
CHLORIDE	MG/L	83.1	83.0	83.0	83.1	168.
CHROMIUM	MG/L	0.12	0.13	0.12	0.12	< 0.01
COBALT	MG/L	0.02	0.02	0.02	0.02	< 0.01
CONDUCTANCE	UMHO/CM	1825.	1825.	1825.	1825.	2600.
COPPER	MG/L	0.01	0.01	0.01	0.01	< 0.01
CYANIDE	MG/L	-	-	-	-	-
FLUORIDE	MG/L	0.66	0.66	0.66	0.66	0.55
GROSS ALPHA	PCI/L	-	-	-	-	27. 27.
GROSS BETA	PCI/L	-	-	-	-	28. 22.
IRON	MG/L	0.23	0.23	0.23	0.23	3.80
LEAD	MG/L	0.15	0.15	0.15	0.15	< 0.01
MAGNESIUM	MG/L	145.	145.	145.	144.	267.
MANGANESE	MG/L	4.20	4.20	4.20	4.20	6.04
MERCURY	MG/L	-	-	-	-	0.0003
MOLYBDENUM	MG/L	0.07	0.07	0.07	0.07	0.01
NICKEL	MG/L	0.05	0.05	0.05	0.05	< 0.01
NITRATE	MG/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
NITRITE	MG/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	107.	109.	107.	108.	120.
PB-210	PCI/L	1.4 0.9	2.1 0.8	0.9 0.7	0.8 0.7	2.3 1.1
PH	SU	7.40	7.40	7.40	7.40	7.26
PHOSPHATE	MG/L	3.59	3.57	3.58	3.59	0.63
PO-210	PCI/L	0.0 0.5	0.0 0.5	0.1 0.5	0.1 0.5	0.0 0.6
POTASSIUM	MG/L	3.16	3.15	3.14	3.16	6.95
RA-226	PCI/L	0.0 0.2	0.3 0.2	0.0 0.1	0.2 0.2	0.1 0.2
RA-228	PCI/L	0.2 1.4	0.0 1.2	0.0 1.1	0.0 1.0	0.6 1.2
SELENIUM	MG/L	< 0.001	< 0.001	< 0.001	< 0.001	0.123
SILICA	MG/L	19.1	19.0	18.7	18.9	19.0
SILVER	MG/L	-	-	-	-	-
SODIUM	MG/L	495.	494.	495.	495.	875.
STRONTIUM	MG/L	3.57	3.59	3.58	3.58	5.25
SULFATE	MG/L	1840.	1840.	1840.	1840.	3170.
SULFIDE	MG/L	-	-	-	-	< 0.1
TEMPERATURE	C - DEGREE	15.0	15.0	15.0	15.0	20.0

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/21/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		639-02 05/14/87		639-03 05/14/87		639-04 05/14/87		639-05 05/14/87		639-01 09/25/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	1.0	0.8	0.2	0.6	0.4	0.6	0.0	0.5	0.2	0.8
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	< 0.005		< 0.005		< 0.005		< 0.005		0.016	
TOTAL SOLIDS	MG/L	3120.		3150.		3060.		3170.		5380.	
URANIUM	MG/L	0.0071		0.0109		0.0093		0.0089		0.0191	
VANADIUM	MG/L	0.05		0.05		0.05		0.05		0.07	
ZINC	MG/L	2.55		2.55		2.55		2.55		2.31	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		639-02 09/25/87		639-03 09/25/87		639-04 09/25/87		639-05 09/25/87		639-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	538.		538.		538.		538.		488.	
ALUMINUM	MG/L	0.22		0.21		0.22		0.26		-	
AMMONIUM	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
ANTIMONY	MG/L	0.006		0.007		0.008		0.008		0.013	
ARSENIC	MG/L	0.033		0.034		0.035		0.036		0.04	
BARIUM	MG/L	0.04		0.04		0.04		0.04		< 0.1	
BERYLLIUM	MG/L	-		-		-		-		-	
BORON	MG/L	0.60		0.61		0.63		0.63		-	
BROMIDE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		-	
CADMIUM	MG/L	< 0.005		< 0.005		< 0.005		< 0.005		< 0.001	
CALCIUM	MG/L	467.		431.		430.		431.		502.	
CHLORIDE	MG/L	180.		185.		192.		190.		220.	
CHROMIUM	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		0.15	
COBALT	MG/L	< 0.01		< 0.01		< 0.01		-		< 0.05	
CONDUCTANCE	UMHO/CM	2600.		2600.		2600.		2600.		1100.	
COPPER	MG/L	< 0.01		< 0.01		< 0.01		< 0.01		< 0.02	
CYANIDE	MG/L	-		-		-		-		-	
FLUORIDE	MG/L	0.54		0.55		0.56		0.59		0.5	
GROSS ALPHA	PCI/L	12.	25.	14.	25.	9.	27.	30.	27.	36.	39.
GROSS BETA	PCI/L	33.	21.	3.	22.	36.	23.	8.	23.	34.	19.
IRON	MG/L	2.09		2.09		2.08		2.05		11.7	
LEAD	MG/L	< 0.01		< 0.01		< 0.01		0.03		< 0.01	
MAGNESIUM	MG/L	286.		266.		266.		266.		384.	
MANGANESE	MG/L	5.71		5.68		5.78		5.80		-	
MERCURY	MG/L	< 0.0002		< 0.0002		< 0.0002		< 0.0002		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.01		0.01		< 0.01		0.11	
NICKEL	MG/L	< 0.04		< 0.04		< 0.04		< 0.04		-	
NITRATE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		< 1.0	
NITRITE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		-	
NO2 & NO3	MG/L	-		-		-		-		< 1.0	
ORG. CARBON	MG/L	137.		140.		141.		140.		-	
PB-210	PCI/L	0.7	1.1	1.9	1.1	0.3	1.1	1.5	1.0	-	
PH	SU	7.26		7.26		7.26		7.26		6.98	
PHOSPHATE	MG/L	0.63		0.37		0.52		0.67		< 0.1	
PO-210	PCI/L	0.0	0.6	0.0	0.6	0.0	0.5	0.0	0.5	-	
POTASSIUM	MG/L	6.06		7.16		3.33		7.08		8.2	
RA-226	PCI/L	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
RA-228	PCI/L	0.0	2.0	1.0	2.3	0.0	2.5	0.0	2.3	0.2	0.7
SELENIUM	MG/L	0.129		0.132		0.134		0.142		0.097	
SILICA	MG/L	18.3		18.2		18.6		18.7		-	
SILVER	MG/L	-		-		-		-		0.02	
SODIUM	MG/L	820.		880.		883.		893.		840.	
STRONTIUM	MG/L	5.35		5.30		5.35		5.35		6.3	
SULFATE	MG/L	3240.		3210.		3210.		3240.		3500.	
SULFIDE	MG/L	< 0.1		< 0.1		< 0.1		< 0.1		-	
TEMPERATURE	C - DEGREE	20.0		20.0		20.0		20.0		14.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		639-02 09/25/87		639-03 09/25/87		639-04 09/25/87		639-05 09/25/87		639-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	0.0	0.7	0.1	0.8	0.3	0.6	1.3	1.1	0.1	0.4
THALLIUM	MG/L	-		-		-		-		-	
TIN	MG/L	0.021		-		0.028		0.023		-	
TOTAL SOLIDS	MG/L	5620.		5610.		5670.		5630.		6400.	
URANIUM	MG/L	0.0217		0.0274		0.0216		0.0228		0.0366	
VANADIUM	MG/L	0.07		0.07		0.07		0.08		0.07	
ZINC	MG/L	2.03		2.00		2.00		1.99		0.621	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 639-01 04/20/89 PARAMETER VALUE+/-UNCERTAINTY	640-01 03/19/87 PARAMETER VALUE+/-UNCERTAINTY	640-01 09/24/87 PARAMETER VALUE+/-UNCERTAINTY	640-01 04/19/89 PARAMETER VALUE+/-UNCERTAINTY	641-01 03/18/87 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	422.	823.	742.	548.	1853.
ALUMINUM	MG/L	< 0.1	0.2	0.34	< 0.1	< 0.1
AMMONIUM	MG/L	0.3	0.3	< 0.1	3.0	< 0.1
ANTIMONY	MG/L	0.008	< 0.003	0.029	0.013	< 0.003
ARSENIC	MG/L	0.02	0.006	0.079	0.04	0.011
BARIUM	MG/L	< 0.1	< 0.1	0.01	< 0.1	< 0.1
BERYLLIUM	MG/L	< 0.01	-	-	< 0.01	-
BORON	MG/L	0.5	0.96	0.74	0.4	0.52
BROMIDE	MG/L	< 0.1	-	< 0.1	0.1	-
CADMIUM	MG/L	0.003	0.002	< 0.005	0.007	< 0.001
CALCIUM	MG/L	502.	461.	399.	365.	535.
CHLORIDE	MG/L	160.	360.	315.	240.	749.
CHROMIUM	MG/L	< 0.01	0.05	< 0.01	< 0.01	0.11
COBALT	MG/L	< 0.05	0.21	< 0.01	< 0.05	0.33
CONDUCTANCE	UMHO/CM	3500.	9000.	5500.	4600.	16500.
COPPER	MG/L	0.02	0.07	0.01	0.02	0.09
CYANIDE	MG/L	< 0.01	-	-	< 0.01	-
FLUORIDE	MG/L	0.4	0.50	0.50	0.5	0.44
GROSS ALPHA	PCI/L	30. 29.	-	38. 68.	120. 80.	-
GROSS BETA	PCI/L	25. 16.	-	20. 53.	75. 39.	-
IRON	MG/L	27.0	0.11	< 0.01	2.52	0.18
LEAD	MG/L	< 0.01	< 0.001	< 0.01	< 0.01	0.003
MAGNESIUM	MG/L	348.	758.	680.	488.	1850.
MANGANESE	MG/L	4.08	5.58	6.96	3.25	0.31
MERCURY	MG/L	< 0.0002	-	< 0.0002	< 0.0002	-
MOLYBDENUM	MG/L	< 0.01	< 0.1	0.05	< 0.01	< 0.1
NICKEL	MG/L	< 0.04	0.22	0.02	< 0.04	0.39
NITRATE	MG/L	< 0.1	4.0	3.5	39.	2.6
NITRITE	MG/L	-	< 0.1	< 0.1	-	< 0.1
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	110.	220.	188.	149.	295.
PB-210	PCI/L	1.1 1.2	1.3 1.3	0.0 1.3	0.0 0.6	4.3 4.4
PH	SU	6.98	7.36	7.75	7.35	7.57
PHOSPHATE	MG/L	< 0.1	0.30	0.52	0.2	0.30
PO-210	PCI/L	0.0 0.3	0.0 0.7	0.0 0.8	0.1 0.4	0.0 1.0
POTASSIUM	MG/L	5.9	33.6	24.4	23.4	36.5
RA-226	PCI/L	-	0.0 0.2	0.1 0.2	0.2 0.2	0.1 0.2
RA-228	PCI/L	0.0 0.8	0.3 0.8	0.0 1.3	0.2 0.9	0.0 1.0
SELENIUM	MG/L	0.047	< 0.002	0.325	0.065	< 0.002
SILICA	MG/L	16.	10.0	11.5	8.	12.1
SILVER	MG/L	< 0.01	-	-	< 0.01	-
SODIUM	MG/L	570.	2330.	2629.	1860.	5760.
STRONTIUM	MG/L	4.1	10.5	8.70	6.9	13.8
SULFATE	MG/L	3440.	7770.	8190.	6920.	18000.
SULFIDE	MG/L	< 0.1	-	< 0.1	< 0.1	-
TEMPERATURE	C - DEGREE	18.5	4.5	22.2	14.	7.5

GROUND WATER QUALITY DATA BY LOCATION
SITE: CHEPROK
09/28/85, TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		639-01 04/20/89		640-01 03/19/87		640-01 09/24/87		640-01 04/19/89		641-01 03/18/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.0	0.3	0.0	0.5	0.4	1.2	0.0	0.4	0.0	1.3
THALLIUM	MG/L	< 0.01		-		-		0.02		-	
TIN	MG/L	< 0.005		0.008		0.026		0.035		0.010	
TOTAL SOLIDS	MG/L	5490.		15200.		12900.		10400.		29900.	
URANIUM	MG/L	0.0156		0.0153		0.182		0.0890		1.79	
VANADIUM	MG/L	0.07		< 0.1		0.09		0.07		< 0.1	
ZINC	MG/L	0.350		6.80		3.19		1.91		6.97	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		641-01 05/14/87		641-01 09/24/87		641-01 10/09/88		641-01 04/18/89		642-01 03/19/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	1564.		1561.		2325.		1042.		842.	
ALUMINUM	MG/L	0.38		0.42		-		< 0.1		0.1	
AMMONIUM	MG/L	0.4		< 0.1		< 0.1		< 0.1		0.8	
ANTIMONY	MG/L	0.622		0.019		0.098		0.048		< 0.003	
ARSENIC	MG/L	0.003		0.003		0.32		0.04		0.007	
BARIUM	MG/L	0.09		0.03		< 0.1		< 0.1		< 0.1	
BERYLLIUM	MG/L	-		-		-		< 0.01		-	
BORON	MG/L	0.96		1.20		-		0.7		0.19	
BROMIDE	MG/L	-		< 0.1		-		< 0.1		-	
CADMIUM	MG/L	0.077		< 0.005		0.007		0.010		0.001	
CALCIUM	MG/L	438.		439.		404.		415.		620.	
CHLORIDE	MG/L	723.		825.		1280.		510.		483.	
CHROMIUM	MG/L	0.24		< 0.01		0.23		< 0.01		0.07	
COBALT	MG/L	0.07		0.01		0.09		< 0.05		0.23	
CONDUCTANCE	UMHO/CM	6500.		6000.		27500.		10000.		11500.	
COPPER	MG/L	0.03		< 0.01		0.03		< 0.02		0.06	
CYANIDE	MG/L	-		-		-		< 0.01		-	
FLUORIDE	MG/L	0.50		0.52		0.5		0.5		0.30	
GROSS ALPHA	PCI/L	-		750.	170.	1700.	400.	1100.	200.	-	
GROSS BETA	PCI/L	-		470.	100.	420.	150.	490.	80.	-	
IRON	MG/L	3.19		< 0.01		0.25		2.19		0.12	
LEAD	MG/L	0.48		0.03		0.10		0.01		< 0.001	
MAGNESIUM	MG/L	1190.		1353.		2510.		1070.		1280.	
MANGANESE	MG/L	11.2		11.3		-		2.31		2.14	
MERCURY	MG/L	-		< 0.0002		0.0002		< 0.0002		-	
MOLYBDENUM	MG/L	0.30		0.06		0.41		< 0.01		< 0.1	
NICKEL	MG/L	0.17		0.03		-		< 0.04		0.26	
NITRATE	MG/L	< 0.1		< 0.1		< 1.0		< 1.0		1110.	
NITRITE	MG/L	< 0.1		< 0.1		-		-		< 0.1	
NO2 & NO3	MG/L	-		-		3.3		-		-	
ORG. CARBON	MG/L	120.		350.		-		269.		158.	
PB-210	PCI/L	3.2	1.2	0.8	1.1	-		1.0	0.6	3.3	1.4
PH	SU	7.40		7.73		7.91		7.60		7.57	
PHOSPHATE	MG/L	10.8		0.77		< 0.1		< 0.1		0.30	
PO-210	PCI/L	0.4	1.0	0.9	1.2	-		1.7	0.8	0.0	0.8
POTASSIUM	MG/L	17.3		36.6		97.7		58.1		25.7	
RA-226	PCI/L	0.2	0.2	0.3	0.3	0.0	0.2	0.0	0.2	0.4	0.3
RA-228	PCI/L	0.7	1.9	0.4	2.2	1.0	1.4	0.1	0.7	0.0	1.1
SELENIUM	MG/L	< 0.001		0.577		1.67		0.105		< 0.002	
SILICA	MG/L	18.2		13.0		-		12.		15.9	
SILVER	MG/L	-		-		0.02		< 0.01		-	
SODIUM	MG/L	5200.		5175.		7499.		3430.		2480.	
STRONTIUM	MG/L	12.2		10.8		15.6		11.4		13.9	
SULFATE	MG/L	14100.		14400.		21000.		12500.		9470.	
SULFIDE	MG/L	-		0.1		-		< 0.1		-	
TEMPERATURE	C - DEGREE	16.0		20.0		29.0		16.		7.5	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/87 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LPC DATE									
		641-01 05/14/87		641-01 09/24/87		641-01 10/09/88		641-01 04/18/89		642-01 03/19/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
TH-230	PCI/L	60.	10.	0.7	1.1	0.4	0.6	0.0	0.5	3.3	1.5
THALLIUM	MG/L	-		-		-		0.02		-	
TIN	MG/L	< 0.005		0.052		-		0.042		0.009	
TOTAL SOLIDS	MG/L	22300.		24300.		38800.		19300.		21600.	
URANIUM	MG/L	0.487		1.59		2.34		1.31		0.726	
VANADIUM	MG/L	0.11		0.13		0.16		0.10		< 0.1	
ZINC	MG/L	6.70		3.58		1.12		0.333		6.98	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/87

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE: 642-01 05/29/87 PARAMETER VALUE+/-UNCERTAINTY	642-01 09/23/87 PARAMETER VALUE+/-UNCERTAINTY	642-01 04/18/89 PARAMETER VALUE+/-UNCERTAINTY	643-01 03/19/87 PARAMETER VALUE+/-UNCERTAINTY	643-01 09/24/87 PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	521.	959.	859.	1727.	1418.
ALUMINUM	MG/L	0.20	0.53	< 0.1	0.1	0.52
AMMONIUM	MG/L	0.3	0.6	0.3	1.0	5.0
ANTIMONY	MG/L	0.372	0.032	0.048	< 0.003	0.142
ARSENIC	MG/L	0.002	0.129	0.05	0.006	0.003
BARIUM	MG/L	0.04	0.02	< 0.1	< 0.1	< 0.01
BERYLLIUM	MG/L	-	-	< 0.01	-	-
BORON	MG/L	0.19	0.64	0.5	0.32	0.76
BROMIDE	MG/L	-	0.2	< 0.1	-	< 0.1
CADMIUM	MG/L	0.053	< 0.005	0.002	< 0.001	< 0.005
CALCIUM	MG/L	444.	494.	441.	549.	470.
CHLORIDE	MG/L	348.	830.	720.	3780.	2790.
CHROMIUM	MG/L	0.20	< 0.01	< 0.01	0.14	< 0.01
COBALT	MG/L	0.04	0.01	< 0.05	0.60	< 0.01
CONDUCTANCE	UMHO/CM	4500.	7250.	12000.	30500.	10490.
COPPER	MG/L	0.02	0.02	0.03	0.19	0.04
CYANIDE	MG/L	-	-	< 0.01	-	-
FLUORIDE	MG/L	0.37	0.39	0.3	0.63	0.70
GROSS ALPHA	PCI/L	-	730. 150.	740. 160.	-	2100. 400.
GROSS BETA	PCI/L	-	380. 120.	330. 70.	-	1100. 200.
IRON	MG/L	0.13	< 0.01	0.68	0.37	0.02
LEAD	MG/L	0.31	0.04	< 0.01	< 0.001	0.03
MAGNESIUM	MG/L	499.	2083.	1780.	3730.	3153.
MANGANESE	MG/L	3.00	9.48	7.77	0.31	2.20
MERCURY	MG/L	-	0.0002	< 0.0002	-	0.0002
MOLYBDENUM	MG/L	0.15	0.03	< 0.01	< 0.1	0.02
NICKEL	MG/L	0.11	0.01	0.04	0.71	0.05
NITRATE	MG/L	930.	2520.	2000.	709.	454.
NITRITE	MG/L	< 0.1	0.4	-	< 0.1	< 0.1
NO2 & NO3	MG/L	-	-	-	-	-
ORG. CARBON	MG/L	130.	240.	237.	349.	300.
PB-210	PCI/L	1.1 0.7	1.1 1.1	0.2 0.6	21. 2.	1.7 1.3
PH	SU	7.45	7.71	7.34	8.02	7.85
PHOSPHATE	MG/L	7.49	0.69	< 0.1	0.30	1.01
PO-210	PCI/L	0.0 0.4	0.0 0.8	0.4 0.4	4.5 1.7	2.0 1.4
POTASSIUM	MG/L	7.08	27.9	32.2	42.1	40.6
RA-226	PCI/L	0.0 0.1	0.1 0.2	0.0 0.1	0.0 0.2	0.0 0.1
RA-228	PCI/L	0.7 1.1	0.0 1.6	0.0 1.6	0.1 1.3	0.0 1.6
SELENIUM	MG/L	< 0.001	0.520	0.137	0.008	0.010
SILICA	MG/L	48.3	13.8	10.	12.2	4.99
SILVER	MG/L	-	-	< 0.01	-	-
SODIUM	MG/L	1910.	4506.	3040.	14200.	10464.
STRONTIUM	MG/L	7.25	5.5	11.4	18.1	18.0
SULFATE	MG/L	5270.	15800.	13200.	36900.	30200.
SULFIDE	MG/L	-	0.1	< 0.1	-	0.1
TEMPERATURE	C - DEGREE	15.	22.0	16.5	8.5	20.0

GROUND WATER QUALITY DATA BY LOCATION
SITE: CHIPROCK
09/29/85 TO 04/22/87
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		642-01 05/20/87		642-01 09/23/87		642-01 04/18/89		643-01 03/19/87		643-01 09/24/87	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
TH-230	PCI/L	21.	8.	0.0	1.0	0.0	0.6	1.0	1.0	4.4	2.2
THALLIUM	MG/L	-		-		0.02		-		-	
TIN	MG/L	< 0.005		0.043		0.043		0.048		0.351	
TOTAL SOLIDS	MG/L	9880.		26600.		23300.		64200.		48800.	
URANIUM	MG/L	0.194		1.32		1.70		4.32		3.07	
VANADIUM	MG/L	0.08		0.16		0.14		< 0.1		0.18	
ZINC	MG/L	4.12		1.36		0.361		14.6		0.205	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		642-01 04/18/89		644-01 03/18/87		644-01 05/20/87		644-01 09/23/87		644-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	1276.		749.		865.		857.		617.	
ALUMINUM	MG/L	< 0.1		0.1		0.45		0.56		-	
AMMONIUM	MG/L	0.2		0.5		0.9		1.3		0.6	
ANTIMONY	MG/L	0.093		< 0.003		0.742		0.039		0.046	
ARSENIC	MG/L	0.05		0.019		0.002		0.082		0.15	
BARIUM	MG/L	< 0.1		< 0.1		0.01		0.02		< 0.1	
BERYLLIUM	MG/L	< 0.01		-		-		-		-	
BORON	MG/L	0.5		0.13		0.56		0.73		-	
BROMIDE	MG/L	0.2		-		-		< 0.1		-	
CADMIUM	MG/L	0.002		< 0.001		0.117		< 0.005		0.003	
CALCIUM	MG/L	378.		517.		441.		507.		378.	
CHLORIDE	MG/L	1200.		1310.		1210.		1180.		870.	
CHROMIUM	MG/L	< 0.01		0.11		0.34		< 0.01		0.22	
COBALT	MG/L	< 0.05		0.40		0.13		< 0.01		0.08	
CONDUCTANCE	UMHO/CM	13500.		20000.		10000.		7500.		16000.	
COPPER	MG/L	0.02		0.10		0.05		0.04		0.03	
CYANIDE	MG/L	< 0.01		-		-		-		-	
FLUORIDE	MG/L	0.6		0.46		0.47		0.57		0.5	
GROSS ALPHA	PCI/L	1300.	300.	-		-		890.	240.	390.	200.
GROSS BETA	PCI/L	570.	100.	-		-		440.	180.	240.	70.
IRON	MG/L	89.0		0.24		0.23		0.02		0.58	
LEAD	MG/L	< 0.01		< 0.001		0.76		0.04		0.02	
MAGNESIUM	MG/L	1700.		3000.		3050.		3253.		2046.	
MANGANESE	MG/L	2.59		0.37		1.66		2.58		-	
MERCURY	MG/L	< 0.0002		-		-		0.0004		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		< 0.1		0.50		0.05		0.31	
NICKEL	MG/L	< 0.04		0.48		0.26		0.02		-	
NITRATE	MG/L	130.		1240.		1200.		5320.		3450.	
NITRITE	MG/L	-		< 0.1		< 0.1		0.3		-	
NO2 & NO3	MG/L	-		-		-		-		780.	
ORG. CARBON	MG/L	311.		207.		127.		190.		-	
PB-210	PCI/L	1.2	1.3	12.	2.	2.6	0.7	1.3	1.0	-	
PH	SU	7.37		8.05		7.62		7.62		7.27	
PHOSPHATE	MG/L	0.2		0.10		14.9		1.03		< 0.1	
PO-210	PCI/L	1.8	0.8	0.0	0.8	0.0	0.9	0.4	1.1	-	
POTASSIUM	MG/L	33.9		25.3		18.3		36.3		48.2	
RA-226	PCI/L	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1
RA-228	PCI/L	0.4	0.8	0.7	1.3	0.1	1.2	0.6	1.8	0.4	0.8
SELENIUM	MG/L	0.168		< 0.002		< 0.001		0.821		0.902	
SILICA	MG/L	5.		12.9		18.9		10.1		-	
SILVER	MG/L	< 0.01		-		-		-		0.02	
SODIUM	MG/L	5110.		3000.		5490.		6470.		3990.	
STRONTIUM	MG/L	10.2		14.6		16.3		17.5		14.0	
SULFATE	MG/L	17300.		16000.		21100.		21300.		17300.	
SULFIDE	MG/L	< 0.1		-		-		0.1		-	
TEMPERATURE	C DEGREE	16.5		8.		15.9		23.9		20.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		643-01 04/18/89		644-01 03/18/87		644-01 05/20/87		644-01 09/23/87		644-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	0.0	0.6	0.3	0.8	50.	10.	4.1	2.1	0.4	0.6
THALLIUM	MG/L	0.02		-		-		-		-	
TIN	MG/L	0.047		0.012		< 0.005		0.268		-	
TOTAL SOLIDS	MG/L	28700.		43100.		41700.		39900.		27000.	
URANIUM	MG/L	1.82		1.63		0.78%		1.41		1.13	
VANADIUM	MG/L	0.12		< 0.1		0.20		0.20		0.15	
ZINC	MG/L	0.033		4.52		3.99		2.25		1.12	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

PARAMETER	UNIT OF MEASURE	LOCATION ID - SAMPLE ID AND LOG DATE 644-01 04/18/89 PARAMETER VALUE +/- UNCERTAINTY	670-01 01/20/88 PARAMETER VALUE +/- UNCERTAINTY	670-01 03/31/88 PARAMETER VALUE +/- UNCERTAINTY	670-01 05/17/88 PARAMETER VALUE +/- UNCERTAINTY	670-01 10/09/88 PARAMETER VALUE +/- UNCERTAINTY
ALKALINITY	MG/L CACO3	528.	377.	-	366.	347.
ALUMINUM	MG/L	< 0.1	-	0.15	-	-
AMMONIUM	MG/L	1.4	< 0.1	< 0.1	< 0.1	0.7
ANTIMONY	MG/L	0.047	-	-	-	0.003
ARSENIC	MG/L	0.04	0.009	0.010	0.007	0.02
BARIUM	MG/L	< 0.1	-	-	-	< 0.1
BERYLLIUM	MG/L	< 0.01	-	-	-	-
BORON	MG/L	0.5	-	-	-	-
BROMIDE	MG/L	< 0.1	-	-	-	-
CADMIUM	MG/L	0.001	-	-	-	< 0.001
CALCIUM	MG/L	429.	358.	343.	276.	210.
CHLORIDE	MG/L	580.	62.2	39.	35.	35.
CHROMIUM	MG/L	< 0.01	-	-	-	0.06
COBALT	MG/L	< 0.05	-	-	-	< 0.05
CONDUCTANCE	UMHO/CM	4100.	1700.	-	1450.	1250.
COPPER	MG/L	0.03	-	-	-	< 0.02
CYANIDE	MG/L	< 0.01	-	-	-	-
FLUORIDE	MG/L	0.5	0.49	0.50	0.48	0.5
GROSS ALPHA	PCI/L	1400. 200.	-	31. 15.	-	16. 10.
GROSS BETA	PCI/L	490. 80.	-	13. 7.	-	12. 4.
IRON	MG/L	0.91	-	-	-	0.61
LEAD	MG/L	< 0.01	-	-	-	< 0.01
MAGNESIUM	MG/L	1430.	117.	94.2	84.6	66.4
MANGANESE	MG/L	1.91	-	-	-	-
MERCURY	MG/L	< 0.0002	-	-	-	< 0.0002
MOLYBDENUM	MG/L	< 0.01	0.06	< 0.01	0.01	0.02
NICKEL	MG/L	< 0.04	-	-	-	-
NITRATE	MG/L	2200.	1.2	1.1	2.3	< 1.0
NITRITE	MG/L	-	< 0.1	-	-	-
NO2 & NO3	MG/L	-	-	0.3	2.3	< 1.0
ORG. CARBON	MG/L	163.	-	107.	-	-
PB-210	PCI/L	0.2 0.6	-	0.0 1.1	-	-
PH	SU	7.66	7.08	-	7.47	6.88
PHOSPHATE	MG/L	< 0.1	-	-	-	< 0.1
PO-210	PCI/L	0.3 0.4	-	0.0 0.6	-	-
POTASSIUM	MG/L	39.0	4.30	2.99	3.33	5.1
RA-226	PCI/L	0.0 0.1	-	0.0 0.1	-	0.0 0.1
RA-228	PCI/L	0.0 0.8	-	0.0 0.8	-	0.6 0.8
SELENIUM	MG/L	0.091	0.014	0.012	0.008	0.015
SILICA	MG/L	11.	19.2	18.6	19.9	-
SILVER	MG/L	< 0.01	-	-	-	< 0.01
SODIUM	MG/L	2610.	343.	179.	152.	116.
STRONTIUM	MG/L	9.3	-	-	-	2.2
SULFATE	MG/L	10000.	1310.	1140.	916.	625.
SULFIDE	MG/L	< 0.1	-	< 0.1	-	-
TEMPERATURE	C - DEGREE	16.5	8.5	-	17.5	20.

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/27/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		644-01 04/18/89		670-01 01/20/88		670-01 03/31/88		670-01 05/17/88		670-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY	PARAMETER VALUE	+/- UNCERTAINTY
TH-230	PCI/L	0.0	0.4	-		0.0	0.4	-		0.0	0.3
THALLIUM	MG/L	0.01		-		-		-		-	
TIN	MG/L	0.033		-		-		-		-	
TOTAL SOLIDS	MG/L	19200.		2440.		2110.		1790.		1360.	
URANIUM	MG/L	1.14		0.0207		0.0237		0.0093		0.0064	
VANADIUM	MG/L	0.13		0.05		0.05		0.01		0.03	
ZINC	MG/L	0.424		-		-		-		0.730	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 06/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		670-01 04/21/89		671-01 01/20/88		671-01 03/31/88		671-01 05/17/88		671-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	338.		379.		-		565.		470.	
ALUMINUM	MG/L	< 0.1		-		0.15		-		-	
AMMONIUM	MG/L	0.8		0.1		0.8		1.1		0.6	
ANTIMONY	MG/L	< 0.003		-		-		-		< 0.003	
ARSENIC	MG/L	< 0.01		0.003		0.010		0.010		0.02	
BARIUM	MG/L	< 0.1		-		-		-		< 0.1	
BERYLLIUM	MG/L	< 0.01		-		-		-		-	
BORON	MG/L	0.2		-		-		-		-	
BROMIDE	MG/L	< 0.1		-		-		-		-	
CADMIUM	MG/L	0.009		-		-		-		< 0.001	
CALCIUM	MG/L	300.		534.		327.		281.		174.	
CHLORIDE	MG/L	36.		469.		260.		92.		34.	
CHROMIUM	MG/L	< 0.01		-		-		-		0.06	
COBALT	MG/L	< 0.05		-		-		-		< 0.05	
CONDUCTANCE	UMHO/CM	1350.		2900.		-		2700.		1425.	
COPPER	MG/L	< 0.02		-		-		-		< 0.02	
CYANIDE	MG/L	< 0.01		-		-		-		-	
FLUORIDE	MG/L	0.5		0.47		0.57		0.58		0.5	
GROSS ALPHA	PCI/L	24.	11.	-		47.	34.	-		21.	11.
GROSS BETA	PCI/L	12.	5.	-		40.	18.	-		19.	5.
IRON	MG/L	1.07		-		-		-		2.02	
LEAD	MG/L	< 0.01		-		-		-		0.01	
MAGNESIUM	MG/L	76.9		217.		137.		114.		80.3	
MANGANESE	MG/L	3.89		-		-		-		-	
MERCURY	MG/L	< 0.0002		-		-		-		< 0.0002	
MOLYBDENUM	MG/L	0.01		0.11		< 0.01		0.01		0.03	
NICKEL	MG/L	< 0.04		-		-		-		-	
NITRATE	MG/L	0.4		141.		1.7		2.0		< 1.0	
NITRITE	MG/L	-		< 0.1		-		-		-	
NO2 & NO3	MG/L	-		-		0.9		2.0		< 1.0	
ORG. CARBON	MG/L	82.6		-		211.		-		-	
PB-210	PCI/L	0.0	0.7	-		0.4	1.2	-		-	
PH	SU	7.45		7.51		-		7.61		7.04	
PHOSPHATE	MG/L	< 0.1		-		-		-		< 0.1	
PO-210	PCI/L	0.0	0.3	-		0.0	0.5	-		-	
POTASSIUM	MG/L	4.1		24.1		14.8		14.5		10.2	
RA-226	PCI/L	-		-		0.2	0.2	-		0.0	0.1
RA-228	PCI/L	0.2	0.2	-		0.2	0.8	-		0.4	0.7
SELENIUM	MG/L	0.011		0.064		0.210		0.021		0.020	
SILICA	MG/L	17.		15.4		20.0		21.1		-	
SILVER	MG/L	< 0.01		-		-		-		< 0.01	
SODIUM	MG/L	128.		1133.		897.		431.		176.	
STRONTIUM	MG/L	2.2		-		-		-		7.1	
SULFATE	MG/L	880.		2750.		2530.		1300.		643.	
SULFIDE	MG/L	1.1		-		0.1		-		-	
TEMPERATURE	C - DEGREE	13.		1.0		-		16.		20.	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/87, TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		670-01 04/21/89		671-01 01/20/88		671-01 03/31/88		671-01 05/17/88		671-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.0	0.3	-		0.4	0.6	-		0.4	0.5
THALLIUM	MG/L	< 0.01		-		-		-		-	
TIN	MG/L	< 0.005		-		-		-		-	
TOTAL SOLIDS	MG/L	1700.		5680.		4860.		2630.		1400.	
URANIUM	MG/L	0.0018		0.0671		0.0287		0.0215		0.0154	
VANADIUM	MG/L	0.03		0.07		0.06		0.01		0.02	
ZINC	MG/L	1.96		-		-		-		1.58	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 to 04/22/89
REPORT DATE: 06/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		671-01 04/21/89		672-01 01/20/88		672-01 03/31/88		672-01 05/17/88		672-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
ALKALINITY	MG/L CACO3	554.		404.		-		416.		322.	
ALUMINUM	MG/L	< 0.1		-		0.09		-		-	
AMMONIUM	MG/L	2.2		< 0.1		< 0.1		< 0.1		0.2	
ANTIMONY	MG/L	0.004		-		-		-		< 0.003	
ARSENIC	MG/L	< 0.01		0.002		0.005		0.003		0.02	
BARIUM	MG/L	< 0.1		-		-		-		< 0.1	
BERYLLIUM	MG/L	< 0.01		-		-		-		-	
BORON	MG/L	0.3		-		-		-		< 0.01	
BROMIDE	MG/L	< 0.1		-		-		-		-	
CADMIUM	MG/L	0.007		-		-		-		< 0.001	
CALCIUM	MG/L	360.		432.		174.		215.		138.	
CHLORIDE	MG/L	51.		76.2		25.		30.		20.	
CHROMIUM	MG/L	< 0.01		-		-		-		0.04	
COBALT	MG/L	< 0.05		-		-		-		< 0.05	
CONDUCTANCE	UMHO/CM	1700.		2350.		-		1550.		1000.	
COPPER	MG/L	< 0.02		-		-		-		< 0.02	
CYANIDE	MG/L	< 0.01		-		-		-		-	
FLUORIDE	MG/L	0.7		0.73		0.58		0.56		0.6	
GROSS ALPHA	PCI/L	21.	12.	-		21.	10.	-		8.2	7.1
GROSS BETA	PCI/L	25.	7.	-		12.	5.	-		9.3	3.2
IRON	MG/L	1.66		-		-		-		3.88	
LEAD	MG/L	< 0.01		-		-		-		-	
MAGNESIUM	MG/L	108.		154.		56.8		72.6		46.2	
MANGANESE	MG/L	2.11		-		-		-		-	
MERCURY	MG/L	< 0.0002		-		-		-		< 0.0002	
MOLYBDENUM	MG/L	< 0.01		0.10		< 0.01		0.02		0.02	
NICKEL	MG/L	< 0.04		-		-		-		-	
NITRATE	MG/L	0.7		4.9		1.7		0.5		< 1.0	
NITRITE	MG/L	-		< 0.1		-		-		-	
NO2 & NO3	MG/L	-		-		0.9		0.5		< 1.0	
ORG. CARBON	MG/L	100.		-		116.		-		-	
PB-210	PCI/L	0.2	0.7	-		0.6	1.1	-		-	
PH	SU	7.16		7.27		-		7.58		6.93	
PHOSPHATE	MG/L	< 0.1		-		-		-		< 0.1	
PO-210	PCI/L	0.0	0.3	-		0.4	0.6	-		-	
POTASSIUM	MG/L	10.5		8.64		4.42		7.15		3.3	
RA-226	PCI/L	-		-		0.0	0.1	-		0.0	0.1
RA-228	PCI/L	0.6	0.9	-		0.2	0.8	-		0.3	0.7
SELENIUM	MG/L	0.014		0.034		0.008		0.006		0.011	
SILICA	MG/L	20.		15.2		17.9		18.3		-	
SILVER	MG/L	< 0.01		-		-		-		< 0.01	
SODIUM	MG/L	176.		573.		139.		150.		96.	
STRONTIUM	MG/L	2.7		-		-		-		1.5	
SULFATE	MG/L	1260.		1970.		407.		649.		413.	
SULFIDE	MG/L	< 0.1		-		< 0.1		-		-	
TEMPERATURE	C - DEGREE	16.		9.0		-		15.5		17.0	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/65 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE									
		671-01 04/21/89		672-01 01/20/88		672-01 03/31/88		672-01 05/17/88		672-01 10/09/88	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY		PARAMETER VALUE+/-UNCERTAINTY	
TH-230	PCI/L	0.0	0.3	-		0.5	0.6	-		0.0	0.3
THALLIUM	MG/L	< 0.01		-		-		-		-	
TIN	MG/L	< 0.005		-		-		-		-	
TOTAL SOLIDS	MG/L	2340.		3540.		1320.		1410.		962.	
URANIUM	MG/L	0.0145		0.0597		0.0151		0.0122		0.0074	
VANADIUM	MG/L	0.04		0.05		0.03		< 0.01		0.02	
ZINC	MG/L	0.073		-		-		-		2.38	

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
09/28/85 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE				
		672-01 04/22/89				
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY	PARAMETER VALUE+/-UNCERTAINTY
ALKALINITY	MG/L CACO3	345.				
ALUMINUM	MG/L	< 0.1				
AMMONIUM	MG/L	< 0.1				
ANTIMONY	MG/L	0.004				
ARSENIC	MG/L	< 0.01				
BARIUM	MG/L	< 0.1				
BERYLLIUM	MG/L	< 0.01				
BORON	MG/L	0.1				
BROMIDE	MG/L	< 0.1				
CADMIUM	MG/L	0.002				
CALCIUM	MG/L	183.				
CHLORIDE	MG/L	19.				
CHROMIUM	MG/L	< 0.01				
COBALT	MG/L	< 0.05				
CONDUCTANCE	UMHO/CM	950.				
COPPER	MG/L	< 0.02				
CYANIDE	MG/L	< 0.01				
FLUORIDE	MG/L	0.6				
GROSS ALPHA	PCI/L	14.	8.			
GROSS BETA	PCI/L	10.	4.			
IRON	MG/L	5.78				
LEAD	MG/L	< 0.01				
MAGNESIUM	MG/L	53.8				
MANGANESE	MG/L	2.19				
MERCURY	MG/L	< 0.0002				
MOLYBDENUM	MG/L	0.02				
NICKEL	MG/L	< 0.04				
NITRATE	MG/L	0.7				
NITRITE	MG/L	-				
NO2 & NO3	MG/L	-				
ORG. CARBON	MG/L	57.8				
PB-210	PCI/L	0.0	0.7			
PH	SU	7.33				
PHOSPHATE	MG/L	< 0.1				
PO-210	PCI/L	0.0	0.3			
POTASSIUM	MG/L	3.3				
RA-226	PCI/L	-				
RA-228	PCI/L	0.0	0.6			
SELENIUM	MG/L	0.005				
SILICA	MG/L	17.				
SILVER	MG/L	< 0.01				
SODIUM	MG/L	90.				
STRONTIUM	MG/L	1.4				
SULFATE	MG/L	482.				
SULFIDE	MG/L	< 0.1				
TEMPERATURE	C - DEGREE	15.				

GROUND WATER QUALITY DATA BY LOCATION
SITE: SHIPROCK
07/28/87 TO 04/22/89
REPORT DATE: 08/03/89

FORMATION OF COMPLETION: ALLUVIUM
HYDRAULIC FLOW RELATIONSHIP: DOWN GRADIENT

		LOCATION ID - SAMPLE ID AND LOG DATE	
		672-01 04/22/89	
PARAMETER	UNIT OF MEASURE	PARAMETER VALUE	+/-UNCERTAINTY
TH-230	PCI/L	0.4	0.5
THALLIUM	MG/L	< 0.01	
TIN	MG/L	< 0.005	
TOTAL SOLIDS	MG/L	4080.	
URANIUM	MG/L	0.0079	
VANADIUM	MG/L	0.03	
ZINC	MG/L	1.27	

MAPPER DATA FILE NAME: SHP01*UDPGWQ103097