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40-8907

May 18, 2000

VIA Federal Express

Greg Lyssy
U.S. Environmental Protection Agency
1445 Ross Avenue (6SF-LT)
Dallas, Texas 75202-2733

Re: Church Rock – Procedural Roadmap

Dear Greg:

I have enclosed for your review the "procedural roadmap" letter we discussed in our meeting in Santa Fe on March 3, 2000. The procedural roadmap letter outlines the regulatory framework that would allow UNC to move forward towards our objective of terminating corrective action at the Church Rock facility and transferring the facility to DOE.

The process we recommend is well within the authority of EPA, NMED, NRC and the Navajo Nation, and can be readily implemented. Upon your review and approval of the process, we look forward to working with you to put this decision making framework into practice.

UNC respectfully requests the agreement of the governments to the process we propose. Please call me if you have any questions or would like to discuss this further.

Sincerely,

Roy Blickwedel, P.G.
Remedial Project Manager

cc: [redacted], NRC
Jane Gunn, NRC
Beiling Liu, NMED
Marcy Leavitt, NMED
George Padilla, Navajo Nation EPA
Arlene Luther, Navajo Nation EPA
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NMSS01Public

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May 18, 2000

Greg Lyssy
U. S. Environmental Protection Agency
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Dallas, Texas 75202-2733

Re: Church Rock Facility - Procedural Roadmap

Dear Mr. Lyssy:

This letter follows up our meeting in Santa Fe on March 3, 2000 in which UNC Mining and Milling ("UNC") representatives presented technical information regarding current and anticipated concentrations for the remaining constituents-of-concern (TDS, sulfate and manganese) in Zone 1 outside of the Church Rock facility (the "Facility") boundary. As we explained in the meeting, UNC anticipates that such constituents will remain elevated above background levels identified as applicable or relevant and appropriate requirements ("ARARs") in the Church Rock Site Record of Decision dated September 1988 (the "ROD").

At the March 3 meeting, EPA, NMED and the Navajo EPA (collectively the "Governments") requested that UNC provide the following:

- A letter describing the procedural roadmap that will allow UNC to move towards the objective of terminating corrective action at the Facility and transferring the Facility to DOE; and
- A technical report supporting the data, modeling and other information we provided on March 3rd.

In addition, UNC indicated that we wanted to proceed with the development of a technical analysis for the Southwest Alluvium ("SWA") and Zone 3 that parallels the Zone 1 work that was presented at the meeting on March 3. Finally, we expressed our desire to continue discussions with the Navajo Nation regarding appropriate institutional control mechanisms.

UNC proposed several statutory and regulatory mechanisms at the March 3 meeting that will allow us to move towards our mutual objective of completing remedial action at the Facility, notwithstanding the acknowledged nonattainment of certain ARARs. These mechanisms include:

- Monitored natural attenuation;
- Institutional controls;
- A Superfund Technical Impracticability Waiver (a "TI Waiver");
- NRC Alternate Concentration Limits ("ACL"); and/or
- New Mexico Alternate Abatement Standards ("NMAAS")

As discussed below, it is our opinion that a TI Waiver will best serve the interests of all parties involved and is justified for the Facility under the applicable circumstances and regulatory requirements. This letter provides the requested procedural roadmap that would allow UNC to move through the TI Waiver process so as to allow termination of remedial action at the Facility.

In partial support of a TI Waiver, the data and modeling for Zone 1 show that ground water concentrations of TDS, sulfate and manganese are controlled by the natural geochemistry of the formation. In addition, UNC has approached the Navajo Nation and has begun discussions regarding the placement of institutional controls to preclude ground water use in Zone 1 on a portion of Section 1 within Navajo Tribal Trust Land. Such institutional controls may also be appropriate for a portion of the Southwest Alluvium beneath Navajo Trust land. The requested technical report will provide additional information in support of a TI Waiver determination.

I. Background Information

As described in EPA's September 1998 Five Year Review Report, "background" concentrations of New Mexico groundwater quality standards for TDS, sulfate and manganese that are identified as ARARs in the ROD are exceeded in Zone 1 in certain areas outside of the Facility property boundary beneath Navajo Trust Land. In addition, background concentrations identified in the ROD for sulfate and TDS are exceeded in the Southwest Alluvium outside of the facility property boundary, also beneath Tribal Trust Land. The location of these elevated levels in Zone 1 and the Southwest Alluvium is shown on Figures 1 and 2, respectively.

Because of hydraulic, groundwater exposure and toxicity factors operating in the vicinity of the Facility, ARAR exceedences in the groundwater beneath the Navajo Trust Land shown on Attachment 1 do not pose a substantial present or potential hazard to human health or the environment. It is well documented that the groundwater is not an historic or current drinking water source, and does not directly discharge to the surface. Therefore, the potential for health risks and harm to wildlife caused by exposure to elevated concentrations of groundwater constituents is currently negligible. In addition, groundwater withdrawal rates, historic use patterns, available alternative water sources and applicable treatment requirements demonstrate that groundwater in Zone 1 and the Southwest Alluvium is very unlikely to be used as a drinking water supply in the future. See, e.g., Record of Decision (USEPA, 1988); Earth Tech Letter to NRC re: Zone 1, included as Attachment 1 hereto. Nonetheless, as discussed below, UNC is willing to pursue an appropriate institutional control mechanism with the Navajo Nation to provide additional assurance that such groundwater will not be used as a drinking water source in the future.

Moreover, the constituents presently at issue—TDS, sulfate and manganese—are not, by definition, hazardous. They are not included on either EPA's or NRC's hazardous constituents lists applicable to groundwater. See 40 C.F.R. Pt. 261, App. VIII and 10 C.F.R. Pt. 40, App. A, Criterion 13, respectively. Although EPA has promulgated "secondary maximum contaminant levels" for TDS, sulfate and manganese, these are not health based standards; rather they are intended to address contaminants "that primarily affect the aesthetic qualities relating to the public acceptance of drinking water." 40 C.F.R. § 143.1. Similarly, although NMED has promulgated groundwater standards for TDS, sulfate and manganese, as reflected in the ROD, these standards are not identified as "human health standards" but rather as "other standards for domestic water supply." 20 N.M.A.C. 6.2.3103; ROD, Appendix C, p.3. In fact, under applicable New Mexico regulations, TDS, sulfate and manganese are not defined to be "toxic pollutants" for the purposes of ground and surface water protection. See 20 N.M.A.C. 1101(TT) ("In order to be considered a toxic pollutant a contaminant must be one or a combination of the potential toxic pollutants listed below and be at a concentration shown by scientific information currently available to the public to have potential for causing one or more of the effects listed above." TDS, sulfate and manganese are not listed.).

The Facility is subject to combined NRC and EPA oversight. The Facility is operating under NRC Materials License SUA-1475, and EPA added it to the CERCLA National Priorities List in 1983. On August 26, 1988, EPA and the NRC signed a Memorandum of Understanding ("MOU"), which provides for the coordination of EPA's oversight of remedial action under CERLCA with NRC's oversight of site reclamation under 10 C.F.R. Pt. 40, App. A. Under the MOU, EPA and NRC agreed that the groundwater protection requirements of 10 C.F.R. Pt. 40, App. A, would be the federal ARARs for the site.

Sulfate, TDS and manganese were identified as contaminant-specific groundwater ARARs in EPA's September 1988 Church Rock Record of Decision, with contaminant concentration levels set at "background." The regulatory basis for setting the Facility's groundwater ARARs is summarized as follows:

- The ROD references 40 C.F.R. Pt. 192 as the principle basis for the ARARs;
- 40 C.F.R. § 192.32(a)(2) requires conformance with the groundwater protection standards in 40 C.F.R. § 264.92;
- 40 C.F.R. § 264.92 requires that "hazardous constituents" defined under 40 C.F.R §264.93 do not exceed the concentration limits for such constituents described under 40 C.F.R § 264.94;
- 40 C.F.R. § 264.93(a) defines "hazardous constituents" as constituents listed in 40 C.F.R. Pt. 261, App. VIII that have been detected in groundwater underlying a facility, unless EPA has excluded such constituents under § 264.93(b). § 264.93(b) requires EPA to exclude an App. VIII constituent that is not capable of posing a substantial present or potential hazard to human health or the environment.
- 40 C.F.R. § 264.94(a) requires that concentrations of hazardous constituents established under § 264.93 either: (i) not exceed background levels, (ii) not exceed the values in

> § 264.94, Table 1 for the constituents listed therein (TDS, sulfate and manganese are not listed), or (iii) not exceed an alternate concentration limit ("ACL") established by EPA under § 264.94(b).

Thus, under this scheme, groundwater chemicals specifically defined as "hazardous constituents" must not exceed either background levels, maximum concentration levels for certain listed constituents, or ACLs. NRC's groundwater regulations in 10 C.F.R. Pt. 40, App. A (Criteria 5 and 13) derive groundwater protection standards according to the same framework. Significantly, TDS, sulfate and manganese are not listed among the more than 500 "hazardous constituents" identified under either EPA's groundwater regulations at 40 C.F.R. Pt. 261, App. VIII, or NRC's groundwater protection regulations at 10 C.F.R. Pt. 40, App. A, Criterion 13.

While it is unclear from the ROD what the historic basis was for including background levels of TDS, sulfate and manganese as ARARs, UNC does not desire to revisit this CERCLA issue now. We do want to emphasize, however, that there is no EPA or NRC regulatory requirement that we could identify that requires attainment of background levels for these constituents in Zone 1 or the Southwest Alluvium outside of the facility boundary. Rather, we have assumed, for purposes of the analysis below only, that "background levels" of TDS, sulfate and manganese must be attained as New Mexico groundwater quality ARARs under the EPA ROD.

II. Procedural Roadmap

The EPA 1988 Record of Decision expressly recognized that it may be "technically impracticable" to attain certain groundwater cleanup standards set forth in the ROD:

> The goal of the selected remedy is to restore groundwater outside the tailings disposal area to concentrations dictated by Federal and State standards, or background, to the maximum extent practicable and to the extent necessary to adequately protect public health and the environment. . . . However, operational results may demonstrate that it is technically impractical to achieve all cleanup levels in a reasonable time period, and a waiver to meeting certain contaminant-specific applicable or relevant and appropriate requirements (ARARs) may require re-evaluation as a result.

ROD, Appendix A.

Our presentation at the March 3 meeting provided a preview of the technical rational for a technical impracticability determination for sulfate, manganese and TDS in Zone 1. We believe that issuance of a TI Waiver by EPA, in consultation with the Governments as appropriate, and in combination with monitored natural attenuation ("MNA"), is the proper mechanism for evaluating whether active groundwater remedial action should cease at the Facility. Briefly, a TI Waiver is appropriate for the Facility because: (i) it is consistent with CERCLA, and (ii) the requisite TI analysis satisfies the analyses required under NMAAS and NRC ACL determinations.

The statutory basis for and scope of a TI Waiver, as well as the criteria for evaluating and granting a TI Waiver, are shown in Table 1. We have also identified in Table 1 the statutory/regulatory basis, scope and criteria for ACLs under 10 C.F.R. Pt. 40, App. A and 40 C.F.R. Pt. 192, as well as for NMAAS under 20 N.M.C.A.§ 6.2.4103.F. Table 2 identifies the substantial overlap among criteria that must be met for a TI Waiver, ACL, or NMAAS. Tables 3 and 4 identify program specific criteria that are not addressed by NRC's ACL requirements or EPA's TI waiver. As shown on the Tables, satisfying the detailed requirements for a Technical Impracticability Waiver under CERCLA will generally also satisfy the requirements for an ACL or NMAAS.

Section 121(d)(4)(C) of CERCLA and 40 C.F.R. § 300.430(f)(1)(ii)(C) of the NCP expressly recognize that ARARs may be waived if it is technically impracticable from an engineering perspective to achieve the ARARs. EPA has also published its own "Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration," OSWER Directive 9234.2-25 (September 1993) (the "TI Guidance").

We want to reiterate that no ACL determination is required for the Facility under the applicable regulations because TDS, sulfate and manganese are not listed hazardous constituents. Nevertheless, as shown in the Tables, the TI Waiver analysis fully satisfies NRC ACL requirements. Additionally, the TI Waiver analysis comprehensively covers, and in fact surpasses, the criteria for obtaining a NMAAS.

UNC wishes to clarify that all groundwater quality requirements, including NMAAS, are being implemented at the Facility as ARARs pursuant to Section 121(d) of CERCLA. Although, under Section 121(e) of CERCLA, federal, state and local permits are not required for response actions under CERCLA, the substantive portions of such permitting programs do qualify as ARARs. See 40 C.F.R. § 300.5. See also Preamble to the Final NCP, 55 Fed. Reg. 8756-8757 (March 8, 1990). Likewise, any variance or exemption provisions included in state and local permitting programs, such as the NMAAS, are ARARs. See Preamble to the Final NCP, 55 Fed. Reg. 4781 (March 8, 1990). This means that satisfaction of either the substantive conditions or the requirements associated with a variance or exemption provision is a legitimate means of attaining an ARAR. Id.

It follows that a TI Waiver for concentrations of TDS, sulfate and manganese would not be legally required for the Facility to the extent that UNC meets the substantive requirements for NMAAS for these constituents under the State groundwater regulations. Nonetheless, UNC proposes to use the TI Waiver approach because it provides for the most comprehensive evaluation of site transport, fate and exposure conditions.

In contrast to the substantive requirements of state and local permitting programs, and the provisions for the exemption thereof, the associated administrative procedures necessary for obtaining permits are not ARARs. See Preamble to the Final NCP, 55 Fed. Reg. 8756. For example, State required consultations, permit issuance procedures, hearings, enforcement and documentation, reporting and record keeping requirements cannot be imposed under CERCLA as ARARs. The CERCLA program has its own set of administrative procedures that assure proper implementation of the statute. Accordingly, additional or conflicting administrative

requirements could result in delay or confusion. See Preamble to the Final NCP, 55 Fed. Reg. 8756-8757 (March 8, 1990); Compliance With Other Laws Manual, Vol. pp. 1-11 through 1-12. Therefore, NMAAS petition and hearing requirements are not ARARs under CERCLA, and are not necessary or appropriate for the present CERCLA remedial action. UNC emphasizes again, however, that the substantive requirements for NMAAS determination will be met at the Facility.

Finally, UNC notes that only requirements "with respect to any hazardous substance, pollutant, or contaminant" are ARARs. 42 U.S.C. § 9621(d)(2) Sulfate and TDS are not hazardous substances identified in EPA's list of hazardous substances in 40 C.F.R. Table 302.4. Therefore, ARARs applicable to these constituents in groundwater at the Facility are not strictly appropriate.

III. Submittals and Approvals

If the above approach is acceptable to the Governments, UNC proposes to prepare technical reports demonstrating how the criteria for obtaining a TI Waiver have been attained for sulfate, TDS and manganese in Zone 1 and for sulfate and TDS in the Southwest Alluvium. With respect to the Southwest Alluvium, UNC will submit a separate proposal to temporarily shut down the Southwest Alluvium wells combined with extensive monitoring to demonstrate that the extraction system is having no further impact on reduction of concentration levels of constituents of concern. As shown on Tables 1-4, by satisfying the requirements for a TI Waiver, these technical reports will also satisfy the substantive requirements for NMAAS and NRC ACLs. In accordance with CERCLA, UNC anticipates that EPA will make a determination whether a TI Waiver is appropriate in full consultation with the State, NMED and the Navajo Nation.

UNC is committed to simultaneously pursuing appropriate institutional controls to prevent use of groundwater on Tribal Trust Lands adjacent to the facility in Section 1 for Zone 1 for the Southwest Alluvium, as appropriate. As we expressed in our meeting, we hope to have conceptual agreement upon, if not final approval of, the institutional controls within six months. As part of this process, UNC will meet with BIA, Navajo representatives and directly impacted Chapters. UNC will submit appropriate applications or requests for resolutions depending upon the final mechanism selected. As we have indicated, UNC currently favors an "environmental right-of-way" as the preferable means of institutional control, but is open to other alternatives.

Following review of the TI Waiver, EPA, in consultation with the State and the Navajo Nation would determine whether a ROD modification or an ESD is necessary to incorporate the TI Waiver. UNC notes that an ESD may be appropriate since the 1988 ROD recognized a TI Waiver as a contingency. EPA would then issue the ESD or ROD amendment in accordance with the appropriate public participation requirements under CERCLA and the NCP.

Prior to issuance of the ESD or ROD amendment, NRC would provide EPA and UNC with a written determination that it concurs with the TI Waiver, and that the TI Waiver satisfies the substantive requirements for an ACL. No license amendment will be required because sulfate, manganese and TDS are not hazardous constituents under the current NRC License or under 10 C.F.R. Pt. 40, App. A.

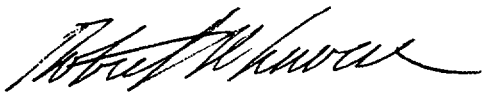
Similarly, NMED would provide EPA with its determination that the substantive requirements for NMAAS have been met, and that NMED concurs with EPA's TI Waiver. As discussed above, the procedural requirements (e.g. petition and hearing before the Commission) for NMAAS are not themselves ARARs, and thus are not operative here. Also, to the extent that NMED agrees that an NMAAS is acceptable, EPA does not legally need to approve a TI Waiver, because the NMAAS will itself be attained as an ARAR. However, we propose to use the TI Waiver because it provides the most comprehensive analysis of criteria, including the criteria for an Alternate Abatement Standard.

The Navajo Nation and UNC would enter into an appropriate agreement for an institutional control, and would obtain necessary approvals from the Navajo EPA and Resources Committee of the Navajo Nation Council and the BIA. The Navajo Nation would provide EPA with a written determination that it concurs with the TI waiver.

IV. Request for Approval of Approach

UNC believes that the above described procedural roadmap is well within the authority of all of the Governments, and can readily be implemented. UNC is committed to providing the Governments with the technical and legal documentation necessary to accomplish our objective of completing corrective action at the Facility. We understand that the Governments are not currently in a position, without such documentation, to make final determinations with respect to a TI Waiver. We request, however, your agreement to the above described process so that we will have a procedural roadmap for decision making and final action at the Facility.

Very truly yours,



Robert W. Lawrence
For
Davis, Graham & Stubbs LLP

RWL/cw
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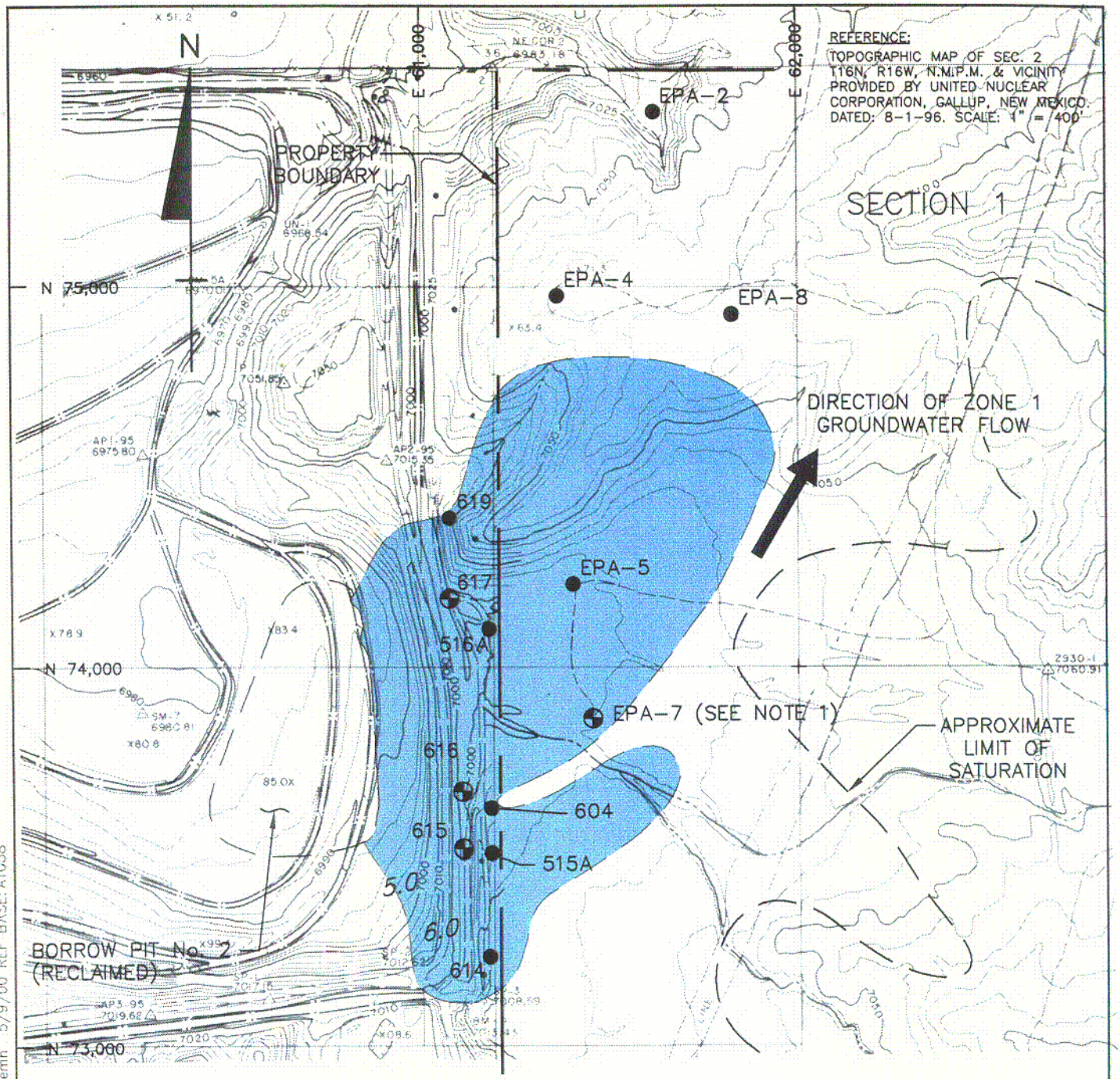
Beiling Liu, NMED
Marcy Leavitt, NMED
George Padilla, Navajo Nation EPA
Brent Moore, Navajo Nation EPA
Arlene Luther, Navajo Nation EPA
Suzie duPont, Earth Tech
Larry Bush, UNC



LEGEND:

614 ● MONITORING WELL LOCATION AND DESIGNATION

617 ⊕ REVISED EAST PUMP-BACK WELL LOCATION AND DESIGNATION

APPROXIMATE AREA IMPACTED BY TAILINGS SEEPAGE

NOTE:

1. WELL EPA-7 SERVED AS BOTH A PUMP-BACK AND MONITORING WELL FROM SEPTEMBER 1990 TO OCTOBER 1994 WHEN IT COULD NO LONGER BE PUMPED DUE TO PLUGGING.

SCALE

400 0 400 FEET

FIGURE 1
APPROXIMATE CURRENT EXTENT OF SEEPAGE IMPACTS IN ZONE 1

PREPARED FOR:

UNC MINING AND MILLING
GALLUP, NEW MEXICO

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1	05/12/00	ISSUED FOR PROCEDURAL ROADMAP LETTER	EMH		

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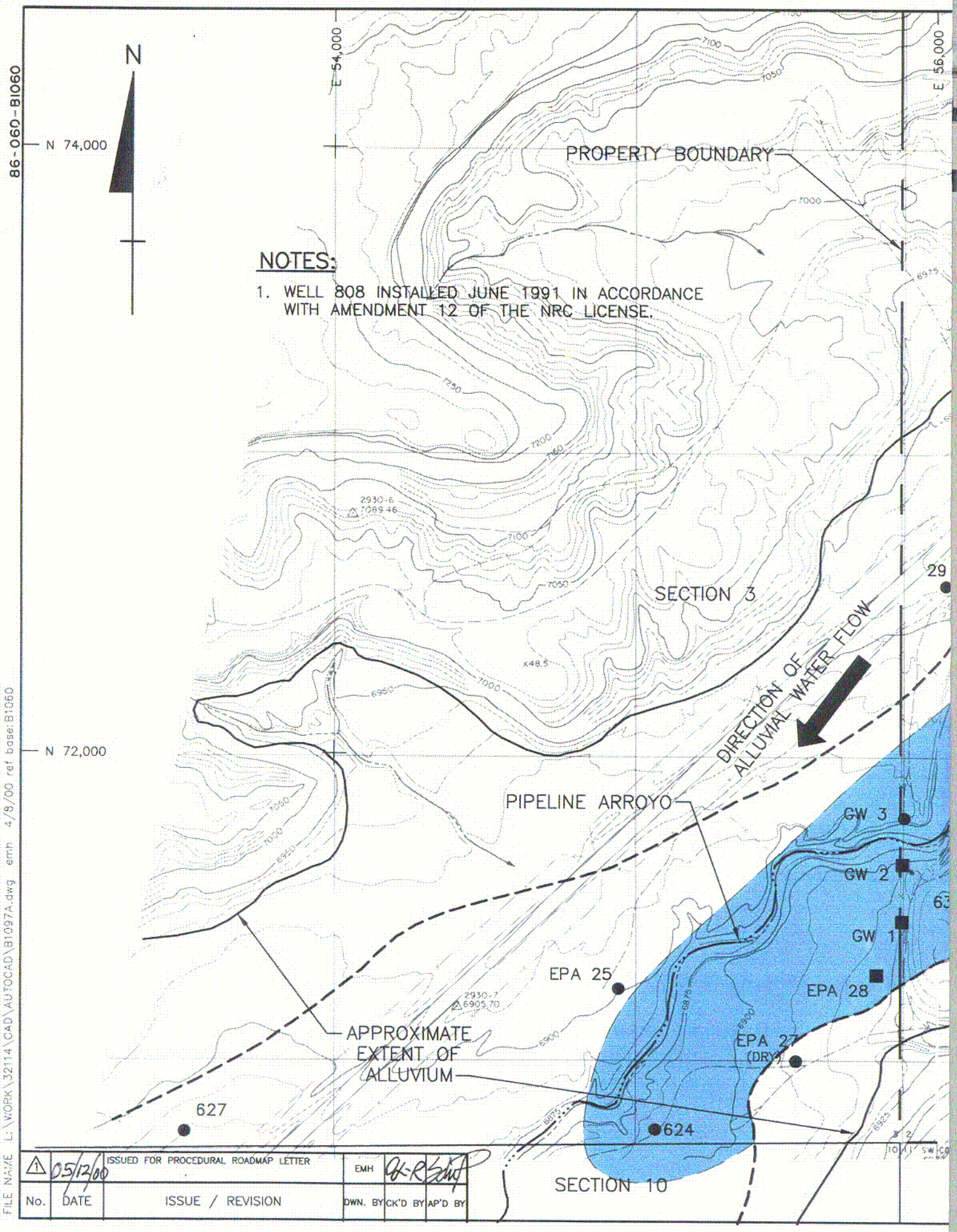

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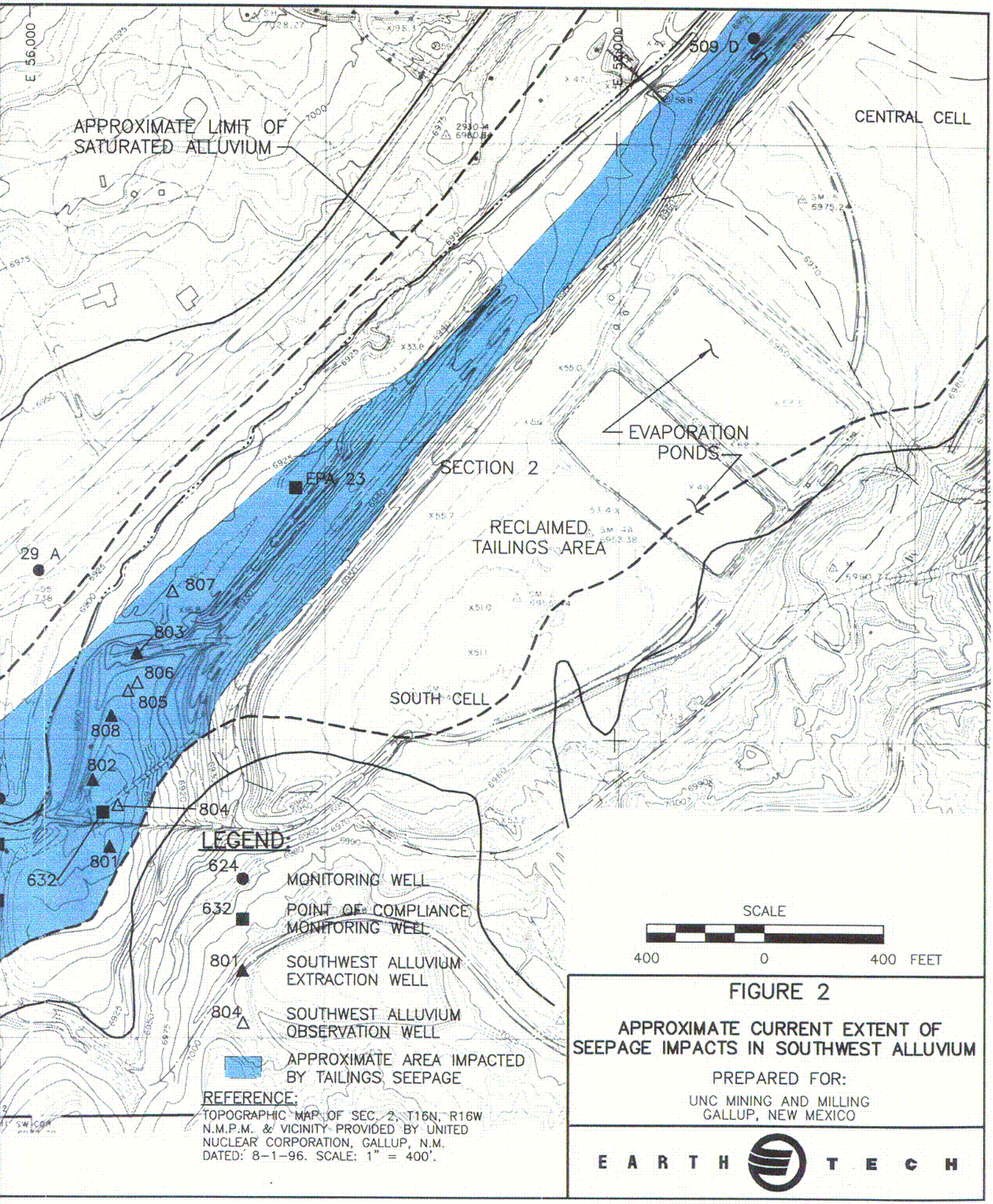

FIGURE 2

APPROXIMATE CURRENT EXTENT OF SEEPAGE IMPACTS IN SOUTHWEST ALLUVIUM

PREPARED FOR:

UNC MINING AND MILLING
GALLUP, NEW MEXICO

EARTH TECH

5575 DTC Parkway, Suite 200, Englewood, Colorado 80111-3016

ATTACHMENT 1

September 20, 1999

Jane E. Gunn
Nuclear Regulatory Commission
Mail Stop T7J8
Washington, DC 20555

Re: Request to Eliminate Zone 1 Groundwater in Section 1 as a Point of Exposure
United Nuclear Corporation Church Rock Site
Gallup, New Mexico

Dear Ms. Gunn:

Telephone
303.694.6660
Facsimile
303.694.4410

Earth Tech, Inc., on behalf of United Nuclear Corporation (UNC), requests that the Zone 1 groundwater located east of the property boundary in Section 1 be eliminated from consideration as a point of exposure (POE) for use in developing alternate concentration limits (ACL). The basis for granting this request is that the quality and quantity of the Zone 1 natural water in this area precludes it from beneficial use either with or without treatment, thereby excluding it as a viable POE.

ACLs rely on natural attenuation mechanisms to reduce constituent concentrations between the point of compliance (POC) and the POE. It is not possible to develop ACLs where the POC and POE are co-located because there is no distance over which the attenuation can occur. This is the condition for Zone 1 because the POC wells are located within or immediately adjacent to Section 1, which has been considered a Zone 1 POE.

To resolve this issue and allow us to develop Zone 1 ACLs, UNC proposed that the Zone 1 POE be revised to only be the Section 36 northern property boundary and to eliminate the portion of Zone 1 in Section 1 from consideration as a POE. This approach was discussed with you and Dr. Beiling Liu of the New Mexico Environment Department during our 3 June 1999 conference call, whereupon you requested we provide supporting information for our proposal.

This letter provides the supporting information for our assertion that the Zone 1 background water is not usable and, therefore, not a viable POE. Included is a summary of the water treatment alternatives evaluation explaining why treating the background water is not feasible. While this letter focuses on the usability of the Zone 1 background water, the discussion of background water as a potable water source may also apply to Zone 3 and the Southwest Alluvium.

WATER USABILITY AND TREATMENT EVALUATION PROCESS

ASSUMPTIONS

To evaluate the usability of the Zone 1 water as a potable water source, Earth Tech developed the following assumptions about the use of the water, volumes of water needed, starting and ending water quality for treatment, and type of treatment system.

1. **Water Use.** The water was assumed to be used for residential supply for a family of four. This use would include cooking, drinking, bathing, washing, and other incidental uses such as for gardening, pets, and livestock.

2. **Water Volume.** The water volume required was assumed to be 250 gallons per day (gpd). Two hundred gpd of this volume is based on a water supply guideline of 50 gpd for domestic use for each member of a family or household listed in the *Water Well Handbook* (Anderson 1989). An additional 50 gpd was added for incidentals such as gardening, pets, and livestock.

3. **Starting Water Quality.** Starting water quality was assumed to be the background concentrations for nitrate, sulfate, and total dissolved solids (TDS) presented by the NRC in its 1996 report on background and agreed to by the NMED and the U.S Environmental Protection Agency (EPA). Current agency accepted background concentrations are nitrate at 190 milligrams per liter (mg/L), sulfate at 2,125 mg/L, and TDS at 4,800 mg/L. These concentrations were presented by the NRC as an intentionally conservative representation of background water quality because of the technical complexities of establishing a background water quality population. On page 14 of the 1996 Background Report NRC stated that "setting background is difficult to do with confidence." The NRC 1996 Background Report also pointed out that the background concentrations could increase because the system in all three formations is "effectively drying out."

   For evaluating treatment options, some additional cations and anions in concentrations typically found in the Zone 1 background water were included. Table 1 lists the starting background water quality concentrations.

4. **Ending Water Quality.** Ending water quality was assumed to meet drinking water standards, as listed in Table 1.

5. **Type of Treatment System.** The treatment system was assumed to be one commonly used for single residence, private homeowner applications. Examples are systems provided by nationally recognized companies such as Culligan® and Rainsoft™, which have off-the-shelf components and are simple to operate.

TABLE 1. Water Quality Standards

Constituent	Starting Water Quality Background Concentration	Ending Water Quality Treatment Standard
Nitrate	190 mg/L	10 mg/L
Sulfate	2,125 mg/L	600 mg/L
Total Dissolved Solids	4,800 mg/L	1,000 mg/L
Sodium	220 mg/L	-
Potassium	8.0 mg/L	-
Calcium	500 mg/L	-
Magnesium	320 mg/L	-
Manganese	2.6 mg/L	0.05 mg/L
Bicarbonate	200 mg/L	-
Chloride	250 mg/L	250 mg/L
pH	6.6 Standard Units	6 to 9 Standard Units

VENDORS CONTACTED

Three New Mexico-based vendors who supply residential water treatment systems were requested to provide the components and costs for a system to treat the background water to the drinking water standards listed above. They were provided with the water quality data in Table 1 and were told to assume that total available water supply would be about 500 gpd, assuming conservatively that a typical treatment system would be only 50 percent efficient. In other words, 500 gpd would have to be treated to provide 250 gpd of potable water for use. The vendors contacted were:

Enchanted Waters, LLC. (Enchanted Waters), a Rainsoft™ distributor in Albuquerque, New Mexico.

Southwest Water Conditioning, Inc. (SWCI), a Culligan® distributor in Albuquerque, New Mexico.

High Desert Water Stores in Alamogordo, New Mexico.

The first two vendors responded to our request by providing information on treatment system components but not costs. The third vendor declined to respond. Both vendors who responded said that it is neither technically feasible nor cost effective to treat water of this quality for residential use. As a result, they did not provide any cost quotes. The factory representative from Enchanted Waters indicated that the water quality is indicative of wastewater, not potable water, and that we should contact a wastewater treatment contractor. The SWCI vendor categorized the water as "seriously problematic water" that is nearly impossible to effectively treat with standard commercially available residential treatment equipment. Therefore, he recommended that we seek an alternative water source. Following is a discussion of the issues associated with treating the water as presented by SWCI. A copy of SWCI's written response to our request is enclosed.

Water Treatment Issues
SWCI considered a three-stage treatment process consisting of:

- Cation exchange to reduce calcium and magnesium concentrations;
- Anion exchange to reduce sulfate and nitrate concentrations; and
- Reverse osmosis (RO) to reduce TDS concentration.

The first stage treats the water using a water softener to remove calcium and magnesium. It reduces the calcium and magnesium by ion exchange with either sodium or potassium. Sulfate and nitrate would pass through during this stage of treatment, and TDS would remain essentially the same or increase due to the process being one of ion exchange rather than ion removal.

The second stage of treatment removes nitrate and sulfate. According to SWCI, nitrate and sulfate removal is usually accomplished with an anion exchange process that uses an anionic resin (as opposed to a cationic resin that is used for a standard softener) that is regenerated with sodium chloride (NaCl) salt. In the anion exchange process, sulfate, nitrate, and other anions are removed from the water in exchange for chloride on the ion exchange resin. Because of the naturally high concentrations of nitrate and sulfate in the background water, chloride concentrations in the treated water would be about 2,500 mg/L, which is 10 times the drinking water standard of 250 mg/L. This treated water would be very corrosive, would no longer be potable, and would require treatment before it could be used or disposed.

The third stage of treatment reduces background TDS concentrations using an RO unit. The third treatment stage is required because neither the softening (cation exchange) or anion exchange processes remove TDS. However, the background TDS concentration of 4,800 mg/L is approximately 1,800 mg/L above the maximum concentration of 3,000 mg/L recommended for proper RO operation. The RO could reduce the TDS concentration but would require a booster pump and frequent filter and module changes. As a result, RO unit operations would be extremely expensive and impracticable for residential application.

Equipment and Wastewater Disposal Requirements

Based on information provided by SWCI, a hypothetical system could be designed to treat the water; however, the equipment needed to treat this water is not standard equipment that is normally provided for residential water treatment. SWCI indicated that because of the size of the equipment and the extra supplies required (such as large numbers of RO filters), the system could not be installed under the sink but would have to be housed in a large area such as a garage or a separate, weatherproof building. Also, the system would require a lot of maintenance, particularly for the RO unit, that would be well beyond what a typical homeowner is expected to handle.

The system would also generate at least 250 gpd of wastewater that would have to be handled by the homeowner. Because of potentially high salt concentrations, this wastewater could not be discharged to the ground surface. As a result, the wastewater would require at least temporary storage until it could be transported for disposal. Therefore, cost and operation requirements are far beyond those normally expended for a residential water supply.

Water Volume Requirements

Assuming a treatment system could be installed and successfully operated by a homeowner, a sufficient supply of water would still be needed to provide the 250 gpd of treated potable water. The water volume needed would depend on the efficiency of the treatment system. The efficiency of these systems, particularly the RO unit, is typically much less than 100 percent, which means that additional water volume would be required to provide sufficient potable water.

For example, the efficiency of the RO unit with the high concentration of TDS in the background water would probably be no more than 50 percent. This means that for every gallon of water processed, half would be wastewater and half would be potable water. Therefore, a well installed in this portion of Zone 1 would have to produce

about 500 gpd. This volume equates to an average pumping rate of 0.35 gallons per minute (gpm).

Based on average Zone 1 corrective action pumping rates for the past five years (shown in Table 2), the 0.35-gpm average pumping rate cannot be achieved in this portion of Zone 1. Also, the corrective action wells are located along the western edge of Section 1 closest to the recharge area where the saturated thickness is greatest. The saturated thickness declines to the east in Section 1, indicating that a well located through most of Section 1 will have even less water available to pump.

TABLE 2. Average Pumping Rates for Zone 1 Extraction Wells

Well No.	1994	1995	1996	1997	1998	Average
615	0.20	0.21	0.19	0.16	0.15	0.18
616	0.18	0.15	0.19	0.12	0.58	0.24
617	0.10	0.13	0.11	0.10	0.09	0.11
EPA 7	0.21	NA	NA	NA	NA	NA

Note:
NA = Well EPA 7 is no longer pumping because it was plugged by mineral precipitation.

Additional water volume would be needed to account for the inefficiency of the other parts of the treatment system. Therefore, the productivity of Zone 1 in this area of Section 1 would not be sufficient to supply the total volume of water needed, with treatment, to supply a household of four.

SUMMARY

In summary, the natural ground water quality in this portion of Zone 1 is not suitable for a potable water supply even with the use of maximum treatment technology. Groundwater supply development in Section 1 would require drilling a well into an aquifer beneath Zone 1 of the Gallup Formation, such as the Dakota Formation, where it is possible to tap potable quality water with yields sufficient to support a domestic water supply. Neither of these conditions exist in Zone 1 of the Gallup Formation in Section 1. In fact, the quality of the background water in this portion of Zone 1 is so poor that after treatment it would not produce an adequate supply to meet domestic requirements.

Therefore, UNC requests an NRC determination that Zone 1 groundwater in Section 1 be eliminated from consideration as a POE in an ACL application; and,

instead, that the northern property boundary of Section 36 be established as the first possible POE for Zone 1.

If you have any questions or need additional information, please call me at (303) 804-2367.

Very truly yours,
Earth Tech, Inc.

Suzie du Pont, CEM

Enclosure

cc: Levon Benally, Navajo Superfund
Roy Blickwedel, General Electric
Larry Bush, UNC
Ken Hooks, NRC
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Greg Lyssy, U.S. Environmental Protection Agency

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TABLE 1. MATRIX OF STATUTORY/REGULATORY CRITERIA FOR NON-ATTAINMENT OF ARARs AT URANIUM TAILINGS SITES

I. EPA - Technical Impracticability ("TI") Waiver for ARAR Nonattainment

Statutory/Regulatory Scheme	Scope	Criteria/Components
CERCLA 42 U.S.C. § 9621(d)(4)(c)	EPA may select a remedial action that does not attain ARARs if EPA finds that compliance is technically impracticable from an engineering perspective.	See TI Guidance discussion below.
Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration, OSWER Dir. 9234.2-25 (Sept. 1993)	This guidance provides the basis for EPA to determine whether ground-water restoration is technically impracticable, as well as for establishing alternative remedial strategies. EPA makes determinations of technical impracticability based on site-specific characterization and, where appropriate, remedy performance data. These data should be collected, analyzed, and presented so that the engineering feasibility and reliability of groundwater restoration are fully addressed in a concise and logical manner. Not all of the data or analyses outlined in the guidance will be required at all sites; specific information needs will depend on site conditions and any ongoing remediation efforts. Once ground water restoration is deemed to be technically impracticable, EPA will look to source and exposure controls as part of the alternative remedial strategy. Exposure controls may include institutional controls, such as transfers in title and other land use restrictions that preclude ground water use.	1. The TI evaluation should include the following components: a. Specific ARARs or media cleanup standards for which TI determinations are sought; b. The spatial area over which the TI decision will apply; c. A site conceptual model describing geology, hydrology, ground-water contamination sources, transport and fate; d. Evaluation of the restoration potential of the site, including data and analyses that support any assertion that attainment of ARARs is technically impracticable, including: i. A demonstration that contamination sources have been identified and have been or will be removed and contained to the extent practicable; ii. An analysis of the performance of any ongoing or completed remedial actions; iii. Predictive analyses of the time frame to attain required cleanup levels using available technologies; and iv. A demonstration that no other remedial technologies could attain the cleanup levels within a reasonable time frame. e. Estimates of the cost of the existing or proposed remedy options; and f. Any additional information or analyses that EPA deems necessary for the TI evaluation. 2. Where EPA makes a TI determination, EPA will select an alternative remedial strategy that is technically practicable, protective of human health and the environment, and satisfies applicable statutory and regulatory requirements.

Table 1. Continued

Statutory/Regulatory Scheme	Scope	Criteria/Components
Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, OSWER Dir. 9200.4-17P (May 1999)	This document clarifies EPA's policy on the use of monitored natural attenuation ("MNA") for the cleanup of soil and ground water. The term MNA refers to the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods. Inorganic constituents are included among the contaminants of concern for which MNA may be appropriate. EPA does not view MNA to be a "no action" or "walk away" approach, but rather considers it to be an alternative means of achieving remediation objectives that may be appropriate for specific site circumstances where its use meets the applicable statutory and regulatory requirements. In determining whether MNA is an appropriate remedy at a given site, regulatory authorities should specifically consider whether reliable site-specific mechanisms for implementing institutional controls are available, and if an institution responsible for their monitoring enforcement can be identified.	1. MNA is an appropriate remediation method where its use will be protective of human health and the environment and it will be capable of achieving site-specific remediation objectives within a time frame that is reasonable compared to other alternatives. This is demonstrated through: a. Technical analyses which show that natural attenuation can achieve remediation objectives; b. Performance monitoring; and c. Contingency remedies where appropriate. 2. The evaluation of natural attenuation processes and the decision to rely on MNA should be distinct from the recognition that active restoration of ground water quality is technically impracticable. 3. To demonstrate the efficacy of MNA, site-specific information on the following should be provided: a. Historical data that demonstrate a clear trend of decreasing contaminant concentrations over time; b. Hydrogeologic and geochemical data that indirectly demonstrate the types and rates of natural attenuation processes at the site; and c. Data from field and microcosm studies that directly demonstrate the occurrence of natural attenuation at the site. 4. In determining whether MNA is an appropriate remedy at a given site, regulatory authorities should consider: a. Whether the contaminants can be effectively remediated by natural attenuation processes; b. Whether or not the contaminant plume is stable and the potential for environmental conditions that influence plume stability to change over time; c. Whether human health, drinking water supplies, other ground waters, surface waters, ecosystems, sediments, air, or other environmental resources could be adversely impacted as a consequence of selecting MNA as the remediation option; d. Current and projected demand for the affected resource over the time period the remedy will remain in effect; e. Whether the contamination will exert a long-term detrimental impact on available water supplies or other environmental resources; f. Whether the estimated time frame of remediation is reasonable compared with time frames for more active methods; g. The nature and distribution of sources of contamination and whether these sources have been, or can be, adequately controlled; h. Whether the resulting transformation products present a greater risk than do parent contaminants; i. The impact of existing and proposed active remediation measures upon the MNA components of the remedy; and j. Whether reliable site-specific mechanisms for implementing institutional controls are available, and if an institution responsible for their monitoring enforcement can be identified.

Table 1. Continued

II. NRC - Alternate Concentration Limits ("ACLs")

Statutory/Regulatory Scheme	Scope	Criteria/Components
40 C.F.R. §§ 192.32(a)(2)(iv), 264.93, 264.94, and 264.95	Uranium byproduct materials must generally be managed so as to conform to the ground water protection standards in 40 C.F.R. § 264.94. However, the NRC may establish ACLs that exceed the § 264.94 standards, provided that certain criteria are met. Only listed hazardous constituents ("HC"), as defined in 40 C.F.R. § 261 App. VIII, are subject to these regulations. Sulfate, TDS and manganese are not listed HCs. ACLs must be satisfied at the point of compliance ("POC"), defined under § 264.95 as: a vertical surface located at the hydraulically down gradient limit of the waste management area that extends down into the uppermost aquifer underlying the regulated units. The "waste management area" is the limit projected in the horizontal plane of the area on which waste will be placed during the active life of a regulated unit. These regulations recognize that generic ground water quality standards may be exceeded at the POC when site-specific conditions prevent actual exposure to hazardous constituents at concentrations that cause a present or potential hazard to human health or the environment. Thus, ground water standards may be exceeded at the POC as long as there is no substantial risk created at the Point of Exposure ("POE"). The location of the POE depends on present and future ground water usage patterns, hydrogeologic factors, and the existence of institutional controls. ACLs must also be shown to be as low as reasonably achievable ("ALARA"), given the technical and financial constraints affecting site remediation efforts.	1. The ACLs must be satisfied at the POC. 2. After considering practicable corrective actions, ACLs must be ALARA. 3. The standards in § 264.94(a) must be satisfied at all points at a distance of >500 meters from the edge of the disposal area and/or outside 4. the site boundary. a. §264.94(a) requires that concentration limits be set for HCs established under § 264.93. b. §264.93(a) defines HCs as constituents identified in App. VIII of § 261, unless such constituents have been excluded under § 264.93(b). i. Under § 264.93(b), an App. VIII constituent shall be excluded from the list of HCs specified in a facility's permit if the HC is not capable of posing a substantial present or potential hazard to human health or the environment. The same 19 factors as listed below under § 264.94(b) shall be considered in making this hazard determination. c. TDS, sulfate and manganese are not listed as HCs in § 261, App. VIII. 5. The ACL must be established under the criteria in § 264.94(b). a. The constituent must not pose a substantial present or potential hazard to human health or the environment as long as the ACL is not exceeded. b. In establishing the ACL, the following factors shall be considered: i. Potential adverse effects on ground water quality, considering: (1) The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration; (2) The hydrogeological characteristics of the facility and surrounding land; (3) The quantity of ground water and the direction of ground water flow; (4) The proximity and withdrawal rates of ground water users; (5) The current and future uses of ground water in the area; (6) The existing quality of ground water, including other sources of contamination and their cumulative impact on ground water quality; (7) The potential for health risks caused by human exposure to waste constituents; (8) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and (9) The persistence and permanence of the potential adverse effects; ii. Potential adverse effects on hydraulically-connected surface water quality, considering: (1) The volume and physical and chemical characteristics of the waste in the regulated unit; (2) The hydrogeological characteristics of the facility and surrounding land; (3) The quantity and quality of ground water, and the direction of ground water flow; (4) The patterns of rainfall in the region; (5) The proximity of the regulated unit to surface waters; (6) The current and future uses of surface waters in the area and any water quality standards established for those waters; (7) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface water quality; (8) The potential for health risks caused by human exposure to waste constituents; (9) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and (10) The persistence and permanence of the potential adverse effects.

Table 1. Continued

Statutory/Regulatory Scheme	Scope	Criteria/Components
10 C.F.R. Pt. 40, App. A, Criteria 5(B)(5)(c) and 5(B)(6)	Appendix A establishes technical, financial, ownership, and long-term site surveillance criteria relating to the siting, operation, decontamination, decommissioning, and reclamation of uranium mills and tailings or waste systems and sites at which such mills and systems are located. Uranium byproduct material licensees may propose alternatives to the specific requirements in Appendix A. The NRC may find that proposed alternatives meet the NRC's requirements if the alternatives will achieve a level of stabilization and containment of the sites concerned, and a level of protection for public health, safety, and the environment from hazards associated with the sites, which is equivalent to, to the extent practicable, or more stringent than, the level which would be achieved by the requirements of Appendix A and the standards promulgated by the EPA in 40 C.F.R. § 192.32. All site specific licensing decisions based on the criteria in Appendix A or alternatives proposed by licensees or applicants will take into account the risk to the public health and safety and the environment with due consideration to the economic costs involved and any other factors the NRC determines to be appropriate. In implementing Appendix A, the NRC will consider "practicable" and "reasonably achievable" as equivalent terms. Decisions involving these terms will take into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety.	1. Criterion 5 incorporates the basic ground water protection standards imposed by EPA in 40 C.F.R. § 192.32 2. Criterion 5B(5) requires that, at the POC, the concentration of an HC must not exceed: a. The NRC approved background concentration in the ground water; b. The Table 5C drinking water limits, if applicable; or c. An ACL established by the NRC. 3. Under 5(B)(2), a constituent is an HC only if : a. It is reasonably expected to be in or derived from the byproduct material in the disposal area; b. It has been detected in the ground water in the uppermost aquifer; and c. It is listed in Criterion 13. i. TDS, sulfate and manganese are not listed. 4. Under 5(B)(6), where background concentrations and/or Table 5C limits are not practically achievable at a site, licensees may propose ACLs that present no significant hazard to human health or the environment. 5. The NRC will establish a site specific ACL if it finds that: a. The proposed limit is ALARA, after considering practicable corrective actions; and b. The constituent will not pose a substantial present or potential hazard to human health or the environment as long as the ACL is not exceeded. 6. In making the present and potential hazard finding, the NRC will consider the same factors as considered in establishing ACLs under 40 C.F.R. § 264.94(b) (see above).
10 C.F.R. Pt. 40, App. A, Criterion 11(f)	Title to uranium byproduct material disposal sites, or to land that is essential to the long-term stability of such disposal sites, must be transferred to the United States or the State, at the option of the State. However, this requirement does not apply to any Indian Trust Lands or Tribal Lands. With respect to such Indian lands, the licensee shall enter into arrangements as may be appropriate to assure the long term surveillance of such lands by the United States.	No specific criteria.

Table 1. Continued

Statutory/Regulatory Scheme	Scope	Criteria/Components
NRC ACL Guidance: Alternate Concentration Limits for Title II Uranium Mills, January 1996	This document provides guidance on NRC's interpretation of the regulatory requirements for establishing ACLs in accordance with 10 C.F.R. Pt. 40, App. A. It specifies: (i) implementation guidelines for establishing ACLs; (ii) the necessary components of ACL applications; and (iii) criteria and procedures for the review of ACL applications. The guidance specifically acknowledges that it is the POE that is the critical point for determining whether ground water cleanup levels are sufficiently protective of human health and the environment. So long as there is no exposure to hazardous concentrations of ground water constituents, because of operable attenuation processes, ground water usage patterns, and institutional controls, ACLs at the POC may exceed otherwise applicable ground water cleanup standards. Institutional controls are key in distinguishing the POC from the POE. In addition to being protective of human health and the environment at the POE, ACLs must also be ALARA. Specific guidelines are provided for conducting cost-benefit analyses on different ground corrective action alternatives. The guidance states that it may not be necessary to adopt the most stringent alternative if it can be demonstrated that the cost of implementing such an alternative is too high, compared to the expected benefits.	1. ACL applications must demonstrate that HC concentrations will not pose substantial present or potential hazards to human health or the environment at the POE, and that the ACLs are ALARA considering practicable corrective actions. a. The POC is defined as the site-specific location in the uppermost aquifer where the ground water protection standard must be met. b. The POE is defined as the location(s) where humans, wildlife, or other environmental species could reasonably be exposed to HCs from the ground water. c. Where natural processes such as dilution, dispersion, decay and sorption may attenuate HC concentrations between the POC and the POE, ACLs established at the POC may be greater than appropriate health and environmental concentration limits for such HCs at the POE, and still be protective of human health and the environment. d. A distant POE could be established at a distant property boundary and justified, on the basis that land ownership by the licensee or the long-term care custodian would ensure that no water resource use would exist on the property. In some instances, a distant POE may be established without invoking land ownership or long-term custody, such as where the possibility of human exposure is impossible because the ground water is either inaccessible or unsuitable for use. e. ACLs generally may not be established at sites involving a distant POE unless and until the licensee agrees to transfer title to the land, including any land between the POC and the POE, and the State or Federal Government commits to take such land. (This requirement may not be relevant in this instance where Tribal Trust lands exist and the Navajo Nation may implement institutional controls.) 2. Specific sites where it is not feasible to satisfy the provisions for establishing ACLs that are protective of human health and the environment, such as where corrective action is ineffective, prohibitively expensive, or of an indefinite duration, may be submitted to the NRC as special cases outside the ACL framework, to be addressed on a case-by-case basis. 3. Consistent with the App. A regulations, NRC will establish site-specific ACL standards, provided that: a. The HCs will not pose a substantial present or potential hazard to human health and the environment as long as the ACLs are not exceeded; and b. The proposed ACLs are ALARA after considering practicable corrective actions. 4. An ACL application will be accepted and scheduled for detailed NRC review if: a. The application is justified in consideration of site specific conditions and corrective actions undertaken to meet the otherwise applicable standards; and b. The application provides site specific hazard and corrective action assessments.

Table 1. Continued

Statutory/Regulatory Scheme	Scope	Criteria/Components
		5. The NRC's review of the hazard assessment must verify adequate: a. Characterization of the sources and extent of HC ground water contamination; b. Assessment of HC transport and fate in the ground water and hydraulically connected surface waters; i. The POC and POE are critical monitoring points for this assessment and for determining site-specific attenuation rates. ii. The assessment must show that the HCs will attenuate sufficiently from the proposed ACL levels at the POC to their protective health based values at the POE. c. Assessment of human and environmental exposure to HCs. i. Existing and anticipated site specific water uses should be considered. ii. Site specific water uses should be determined on the basis of: (1) Ground water quality in the area and present uses; (2) Statutory or legal constraints and institutional controls on water use in the area; (3) Federal, state or other ground water classification criteria and guidelines; (4) Applicable water use criteria, standards, and guidelines; and (5) Availability and characteristics of alternate water supplies. 6. The NRC's review of the corrective action assessment must verify adequate: a. Identification of target concentrations levels that are at or below the MCL determined by the hazard assessment; b. Identification of practicable corrective action alternatives and assessment of their technical feasibility, costs, and benefits; c. Selection of appropriate corrective action; and d. Demonstration that the proposed ACLs are ALARA: i. The corrective action assessment should provide information on the costs and benefits of each corrective action alternative. ii. It may not be necessary to adopt the most stringent alternative if it can be demonstrated that the cost of implementing such an alternative is too high, compared to the expected benefits. iii. The direct and indirect benefits of implementing each of the identified corrective actions should be compared with the costs of performing or not performing such measures. iv. The NRC verifies estimates of the current and projected value of pre-contaminated water resources, based on water rights, availability of alternative water supplies, and projected water-use demands. v. Ultimately, the adequacy of the consideration of practicable corrective actions will be evaluated and used to determine whether the proposed corrective action measures satisfy the ALARA requirement.

Table 1. Continued

III. New Mexico Alternate Abatement Standards

Statutory/Regulatory Scheme	Scope	Criteria/Components
20 N.M.A.C. 6.2.4103.E - Technical Infeasibility	These regulations set forth provisions under which persons may propose that compliance with applicable ground water pollution prevention requirements is technically infeasible. These regulations apply to a more extensive list of ground water constituents than do the federal regulations discussed above. A technical infeasibility waiver is available only where constituent concentrations are less than two times the generally applicable ground water pollution abatement standard.	1. Under 4103.B, for ground waters with TDS concentrations <10,000 mg/L, pollution at any place of withdrawal for present or reasonably foreseeable future use must generally be abated to conform with the following standards: a. Toxic pollutants, as defined in 20 N.M.A.C. 6.2.1101, must not be present; i. TDS, sulfate and manganese are <u>not</u> listed as toxic pollutants. b. The standards in 20 N.M.A.C. 6.2.3103 shall be met. i. TDS = 100.0 mg/l ii. Sulfate = 600.0 mg/l iii. Manganese = 0.2 mg/l 2. However, under 4103.F, if a person is unable to fully meet the above standards using commercially accepted abatement technology pursuant to an approved abatement plan, he may propose that abatement standards compliance is technically infeasible. a. Technical infeasibility is demonstrated where projected future reductions in contaminant concentrations over a 20 year period are less than 20%, based on a statistically valid extrapolation. b. A technical infeasibility proposal shall not be approved for any contaminant whose concentration is greater than 200% of the applicable abatement standard. c. If a technical infeasibility proposal cannot be accepted because a contaminant concentration is greater than 200% of the abatement standard, the person may seek: i. Approval of an alternate abatement standard under 20 N.M.A.C. 6.2.4103.F (see below); or ii. A variance pursuant to 20 N.M.A.C. 6.2.1210.
20 N.M.A.C. 6.2.4103.F - Alternate Abatement Standards	These regulations set forth provisions under which persons may petition for approval of alternate abatement standards in lieu of the standards in 4103.B. They come into play when ground water constituent concentrations are more than two times the applicable abatement standard (i.e., when a technical infeasibility proposal cannot be accepted). Although alternate abatement standards may exceed generic ground water quality requirements, they cannot create a present or future hazard to public health or undue damage to property. Thus, site-specific exposure conditions are critical in determining the appropriateness of alternate abatements standards.	1. The New Mexico Water Quality Control Commission may approve alternate abatement standards if: a. Compliance with the abatement standard is not feasible by the maximum use of technology within the economic capability of the responsible person, or there is no reasonable relationship between the economic and social costs and benefits (including attainment of applicable standards) to be obtained; b. The proposed alternative abatement standard is technically achievable and cost-benefit justifiable; and c. Compliance with the proposed alternative abatement standard will not create a present or future hazard to public health or undue damage to property. 2. The petition must specify: a. The water contaminants for which alternative standards are proposed; b. The alternative standards proposed; c. The three-dimensional body of water pollution for which approval is sought; and d. The extent to which the applicable abatement standard is and will be violated. 3. The petition may include a transport, fate and risk assessment in accordance with accepted methods and any other information the petitioner deems necessary to support the petition.

TABLE 2. SIMILARITIES BETWEEN STATUTORY/REGULATORY PROGRAMS

NRC ACL Requirement - 10 C.F.R. Pt. 40. App. A and Guidance	EPA-TI	EPA-MNA	NRC-40 C.F.R. 192.32	NM-Technical Infeasibility	NM-Alternate Abatement
Concentrations of HCs at the POC must not exceed background concentrations, drinking water limits for listed HCs, or ACLs. By definition, TDS, sulfate and manganese are not HCs.	The TI evaluation considers the specific ARARs or media cleanup standards for which a TI determination is sought. TI determinations are not limited to specific classes of constituents.	MNA should be capable of achieving site-specific remediation objectives within a reasonable time frame.	ACLs may be established in lieu of ground water protection standards for HCs defined in 40 C.F.R. § 261, App. VIII. TDS, sulfate and manganese are not listed.	State regulations require that "toxic pollutants" not be present in ground water, and that abatement standards be met, unless a basis exists for a technical infeasibility determination. TDS, sulfate, and manganese are not listed toxic pollutants. However, there are abatement standards for these constituents.	State regulations require that "toxic pollutants" not be present in ground water, and that abatement standards be met, unless a basis exists for an alternate abatement standard determination. TDS, sulfate and manganese are not listed toxic pollutants. However, there are abatement standards for these constituents.
ACL application must demonstrate no hazard at the POE	The alternative remedial strategy shall be protective of human health and the environment.	The MNA review considers whether human health, drinking water supplies, and other environmental resources will be adversely impacted.	The constituent must not pose a substantial present or potential hazard to human health or the environment as long as the ACL is not exceeded. An HC shall be excluded from a facility's permit if the HC is not capable of posing a substantial present or potential hazard to human health or the environment.		Compliance with the proposed alternate abatement standard must not create a present or future hazard to public health.
ACL's must be ALARA.	The TI evaluation requires a demonstration that other remedial technologies could not attain cleanup levels within a reasonable time frame and information on the cost of existing or proposed remedy options.		After considering practicable corrective actions, ACLs must be ALARA.	A TI determination may be made where a person is unable to meet general abatement standards using commercially available accepted abatement technology.	Alternate abatement standards may be approved where: (i) the petitioner demonstrates that compliance with the abatement standard is not feasible by the maximum use of technology within the economic capability of the responsible person, or there is no reasonable relationship between the economic and social costs and benefits (including attainment of applicable standards) to be obtained; and (ii) the proposed alternative abatement standard is technically achievable and cost-benefit justifiable.

Table 2. Continued

NRC ACL Requirement - 10 C.F.R. Pt. 40. App. A and Guidance	EPA-TI	EPA-MNA	NRC-40 C.F.R. 192.32	NM-Technical Infeasibility	NM-Alternate Abatement
ACLs exceeding health and environment concentrations limits may be approved at the POC where natural processes attenuate HC concentrations between the POC and the POE.	The TI evaluation includes consideration of transport and fate processes.	Demonstrating natural attenuation within a reasonable time frame and without impacting human health and the environment is the central focus of MNA.	The 19 factors listed in § 264.94(b) are relied on to determine whether HC's pose a substantial hazard to human health and the environment at the POE, despite elevated concentrations at the POC.		The petitioner may include a transport, fate, and risk assessment and any other information the petitioner deems necessary to support the TI petition.
A distant POE may be established where (i) institutional controls ensure no water usage between the POC and the POE, or (ii) human exposure is impossible because ground water is inaccessible or otherwise unsuitable for use.	The TI evaluation may consider any additional information or analyses that EPA deems necessary. Alternative remedial strategies typically will address exposure control (i.e., institutional controls).	In determining whether MNA is an appropriate remedy, regulatory authorities should consider, among other things, whether reliable site-specific mechanisms for implementing institutional controls are available, and if an institution responsible for their monitoring enforcement can be identified.	The table standards for HCs must be satisfied at all point >500 meters from the edge of the disposal area or outside the site boundary. In establishing the ACL, existing and potential use of groundwater and the resultant exposure potential should be considered. Sulfate, TDS and manganese are not HCs.		The TI petition may include any other information that the petitioner deems necessary to support the TI petition.

TABLE 3. PROGRAM SPECIFIC CRITERIA - Not Addressed by 40 C.F.R. Part 40, App. A

EPA-TI	EPA-MNA	NRC-40 C.F.R. 192.32	NM-Technical Infeasibility	NM-Alternate Abatement
The TI evaluation requires information on the time frame required to attain cleanup levels using available technologies.	Site-specific remediation objectives must be achieved within a time frame that is reasonable compared to other alternatives.		Technical Infeasibility is demonstrated where projected future reductions in contaminant concentrations over a 20 year period are less than 20%, based on a statistically valid extrapolation.	
The TI evaluation requires information that no other remedial technologies could attain cleanup levels within a reasonable time frame.	The MNA analysis requires historical data that demonstrate a clear trend of decreasing contaminant concentrations over time.		A TI proposal shall not be approved for any contaminant whose concentration is greater than 200% of the applicable abatement standard.	
	In determining whether MNA is an appropriate remedy, regulatory authorities should consider whether natural attenuation can effectively remediate the contaminants at the site and whether the contaminant plume is stable over time.			

TABLE 4. PROGRAM SPECIFIC CRITERIA - Not Addressed by EPA TI Guidance

EPA-MNA	NRC-40 C.F.R. 192.32	10 C.F.R. Pt. 40, App. A & Guidance	NM-Technical Infeasibility	NM-Alternate Abatement
The evaluation of natural attenuation processes and the decision to rely on MNA should be distinct from the recognition that active restoration of ground water quality is technically impracticable.	ACLs must be established for HCs and satisfied at the POC, and must be ALARA. Note: these requirements, though not specifically included in the TI Guidance, are effectively covered by the TI Guidance requirement that an alternative remedial strategy be selected that is technically practicable, protective of human health and the environment, satisfies applicable statutory and regulatory requirements, and addresses exposure control, source control, and aqueous plume remediation.	ACLs must established for HCs and satisfied at the POC, and must be ALARA.	Technical Infeasibility is demonstrated where projected future reductions in contaminant concentrations over a 20 year period are less than 20%, based on a statistically valid extrapolation.	
The MNA analysis requires historical data that demonstrate a trend of decreasing contaminant concentrations over time.	The 40 C.F.R. § 264.94(a) standards for HCs must be satisfied at a distance of >500 meters from the edge of the disposal area and/or outside the site boundary. HCs are defined as constituents listed in § 261 App. VIII, unless such constituents are excluded because they are not capable of posing a substantial present or potential hazard to human health or the environment. TDS, sulfate and manganese are not listed HCs.	ACLs generally should not be established at sites involving distant POEs unless adequate institutional controls are in place. Note: this requirement, though not specifically included in the TI Guidance, is effectively covered by the TI Guidance acknowledgment that institutional controls will typically be considered as part of the alternative remedy selection process.	A TI proposal shall not be approved for any contaminant whose concentration is greater than 200% of the applicable abatement standard.	Abatement standards are listed for TDS, sulfate and manganese.
In determining whether MNA is an appropriate remedy, regulatory authorities should consider whether natural attenuation can effectively remediate the contaminants at the site and whether the contaminant plume is stable over time.			Abatement standards are listed for TDS, sulfate and manganese.	