DOE/AL/62350-7D
REV. 1

United States Department of Energy

COMMENTS AND RESPONSES ON THE REMEDIAL ACTION PLAN AND SITE DESIGN FOR STABILIZATION OF THE INACTIVE URANIUM MILL TAILINGS SITE

GRAND JUNCTION, COLORADO

January 1994

Uranium Mill Tailings Remedial Action Project

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COMMENTS AND RESPONSES ON THE REMEDIAL ACTION PLAN AND SITE DESIGN FOR STABILIZATION OF THE INACTIVE URANIUM MILL TAILINGS SITE GRAND JUNCTION, COLORADO

JANUARY 1994

Prepared for
U.S. Department of Energy
UMTRA Project Office
Albuquerque, New Mexico

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UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Jan. 30, 1993
Document: Remedial Action Plan
Reviewer: U.S. Nuclear Regulatory Commission
Comment: 1. TER Issue 12a

Verification that the Colorado River water sampling was conducted during a low-flow period was provided. However, the sampling results indicate that gross alpha exists in concentrations that exceed the EPA's MCLs. The presence of these concentrations of gross alpha may represent a health risk to the water users in the vicinity of the processing site and should be addressed in the RAP.

SECTION 2

Response: Page: NA By: D. Heydenburg Date: Mar. 22, 1993

The proposed EPA groundwater standards establish an MCL for gross alpha particle activity (excluding radon and uranium) of 15 pCi/l. Total gross alpha activity in the water sample is measured in the laboratory and is reported as gross alpha on the water quality data sheets. The parameter value is an approximation, with the parameter uncertainty for the analysis stated in the analytical report and on the water quality data sheets. Net gross alpha on the water quality data sheets is gross alpha excluding uranium (radon is not measured in water samples). Therefore net gross alpha is of concern for regulatory compliance.

Water samples have been collected from the Colorado River at four locations (423 = upstream, 424 and 425 = adjacent to the site, and 426 = downstream) and net gross alpha activity results are available from sampling periods from January 1991 through October 1992 (see attached table). Data reported in the RAP (Table 3.17) include results from only the initial sampling period (January 1991), during which time all net gross alpha activities were approximately twice the MCL, including water from the upstream location (423) (in Table 3.17 location 422 is the same as 423, and 427 is the same as 426). During subsequent sampling periods, net gross alpha activities have been consistently below the MCL with the exception of the sample from location 424 in November 1991 (19.9 pCi/l). Activities at this location have been below the MCL during the next three sampling periods. During the last sampling period in October 1992, activities from all four locations were less than 5 pCi/l.

Based on these results over a period of approximately two years, activities of net gross alpha in the Colorado River do not represent a risk to human health or the environment.

SURFACE WATER QUALITY DATA BY PARAMETER
SITE: GRJ01 GRAND JUNCTION
01/29/91 TO 10/08/92
REPORT DATE: 02/11/93

PARAMETER NAME	LOCATION ID	LOG DATE	SAMPLE ID	UNITS OF MEASURE	PARAMETER PVI	PARAMETER VALUE	PARAMETER FLAGS	DETECTION LIMIT	PARAMETER UNCERTAINTY
GROSS ALPHA	0422	01/29/91	0001	PCI/L		50.1		1.	12.6
	0424	01/30/91	0001			28.6		1.	9.7
	0425	01/30/91	0001			32.5		1.	11.7
	0426	02/22/92	0001			0.0		1.0	18.5
	0427	01/29/91	0001			2.5		1.	6.3
GROSS ALPHA (TOTAL)	0423	01/29/91	N001	PCI/L		31.1		1.	9.7
	0423	09/10/91	0001			18		1.	9
	0423	11/19/91	N001			22		1.	10
	0423	02/19/92	N001			0.0		1.0	16.2
	0423	07/17/92	N001			6.2		6.4	4.9
	0423	10/08/92	N001			1.6	#	11.0	6.8
	0424	08/26/91	0001			6.5		1.	6.4
	0424	08/27/91	0001			6.3		1.	6.6
	0424	11/19/91	N001			32		1.	15
	0424	02/20/92	N001			0.0		1.0	21.1
	0424	07/17/92	N001			8.3		6.4	5.3
	0424	10/08/92	N001			5.2	#	9.0	6.1
	0425	08/26/91	0001			9.0		1.	6.4
	0425	11/19/91	N001			24		1.	12
	0425	02/20/92	N001			0.0		1.0	20.6
	0425	07/17/92	N001			4.1		6.4	4.6
	0425	10/08/92	N001			2.3	#	9.5	6.0
	0426	01/29/91	N001			33.5		1.	10.7
	0426	11/20/91	N001			14		1.	8
	0426	07/17/92	N001			15.4		6.1	6.1
	0426	10/08/92	N001			2.9	#	9.9	6.3
NET GROSS ALPHA *	0422	01/29/91	0001	PCI/L		48.04		-	-
	0424	01/30/91	0001			25.86		-	-
	0425	01/30/91	0001			30.44		-	-
	0426	02/22/92	0001			-4.12		-	-
	0427	01/29/91	0001			0.44		-	-
NET GROSS ALPHA (TOTAL) **	0423	01/29/91	N001	PCI/L		29.73		-	-
	0423	09/10/91	0001			12.17		-	

* NET GROSS ALPHA (GROSS ALPHA - URANIUM) WITH 1 MG URANIUM = 686 PCI
** NET GROSS ALPHA (TOTAL) (TOTAL GROSS ALPHA - TOTAL URANIUM)

PARAMETER VALUE INDICATOR (PVI): < - LESS THAN DETECTION LIMIT

OTHER PARAMETER VALUE FLAGS:
- THE DATA HAS NOT YET UNDERGONE QUALITY CONTROL TESTS.

SAMPLE ID CODES:
0001 - FILTERED SAMPLE (.45 MICRONS)
N001 - UNFILTERED SAMPLE

SURFACE WATER QUALITY DATA BY PARAMETER
SITE: GRJ01 GRAND JUNCTION
01/29/91 TO 10/08/92
REPORT DATE: 02/11/93

PARAMETER NAME	LOCATION ID	LOG DATE	SAMPLE ID	UNITS OF MEASURE	PARAMETER PVI	VALUE	FLAGS	DETECTION LIMIT	PARAMETER UNCERTAINTY
NET GROSS ALPHA (TOTAL) **	0423	11/19/91	N001	PCI/L		13.01		-	-
	0423	02/19/92	N001			-2.74		-	-
	0423	07/17/92	N001			5.51		-	-
	0423	10/08/92	N001			-1.83		-	-
	0424	08/26/91	0001			-0.98		-	-
	0424	08/27/91	0001			-0.42		-	-
	0424	11/19/91	N001			19.93		-	-
	0424	02/20/92	N001			-3.43		-	-
	0424	07/17/92	N001			7.61		-	-
	0424	10/08/92	N001			3.14		-	-
	0425	08/26/91	0001			3.03		-	-
	0425	11/19/91	N001			14.67		-	-
	0425	02/20/92	N001			-2.74		-	-
	0425	07/17/92	N001			3.76		-	-
	0425	10/08/92	N001			-0.44		-	-
	0426	01/29/91	N001			30.07		-	-
	0426	11/20/91	N001			4.67		-	-
	0426	07/17/92	N001			14.71		-	-
	0426	10/08/92	N001			-0.53		-	-
URANIUM	0422	01/29/91	0001	MG/L		0.003		0.001	-
	0424	01/30/91	0001			0.004		0.001	-
	0425	01/30/91	0001			0.003		0.001	-
	0426	02/22/92	0001			0.006		0.001	-
	0427	01/29/91	0001			0.003		0.001	-
URANIUM (TOTAL)	0423	01/29/91	N001	MG/L		0.002		0.001	-
	0423	09/10/91	0001			0.0085		0.0003	-
	0423	11/19/91	N001			0.0131		0.0003	-
	0423	02/19/92	N001			0.004		0.001	-
	0423	07/17/92	N001			0.001		0.001	-
	0423	10/08/92	N001			0.005	#	0.001	-
	0424	08/26/91	0001			0.0109		0.0003	-
	0424	08/27/91	0001			0.0098		0.0003	-
	0424	11/19/91	N001			0.0176		0.0003	-
	0424	02/20/92	N001			0.005		0.001	-
	0424	07/17/92	N001			0.001		0.001	-
	0424	10/08/92	N001			0.003	#	0.001	-

** NET GROSS ALPHA (TOTAL) (TOTAL GROSS ALPHA - TOTAL URANIUM)

PARAMETER VALUE INDICATOR (PVI): < - LESS THAN DETECTION LIMIT

OTHER PARAMETER VALUE FLAGS:
- THE DATA HAS NOT YET UNDERGONE QUALITY CONTROL TESTS.

SAMPLE ID CODES:
0001 - FILTERED SAMPLE (.45 MICRONS)
N001 - UNFILTERED SAMPLE

SURFACE WATER QUALITY DATA BY PARAMETER
SITE: GRJ01 GRAND JUNCTION
01/29/91 TO 10/08/92
REPORT DATE: 02/11/93

PARAMETER NAME	LOCATION ID	LOG DATE	SAMPLE ID	UNITS OF MEASURE	PARAMETER PVI	PARAMETER VALUE	PARAMETER FLAGS	DETECTION LIMIT	PARAMETER UNCERTAINTY
URANIUM (TOTAL)	0425	08/26/91	0001	MG/L		0.0087		0.0003	-
	0425	11/19/91	N001			0.0136		0.0003	-
	0425	02/20/92	N001			0.004		0.001	-
	0425	07/17/92	N001		<	0.001		0.001	-
	0425	10/08/92	N001			0.004	#	0.001	-
	0426	01/29/91	N001			0.005		0.001	-
	0426	11/20/91	N001			0.0136		0.0003	-
	0426	07/17/92	N001			0.001		0.001	-
	0426	10/08/92	N001			0.005	#	0.001	-

PARAMETER VALUE INDICATOR (PVI): < - LESS THAN DETECTION LIMIT

OTHER PARAMETER VALUE FLAGS:
- THE DATA HAS NOT YET UNDERGONE QUALITY CONTROL TESTS.

SAMPLE ID CODES:
0001 - FILTERED SAMPLE (.45 MICRONS)
N001 - UNFILTERED SAMPLE

DATA FILE NAME: M:\DART\GRJ01\SWQ10002.DAT

Plans for Implementation:

None.

RESPONSE ADDENDUM

Response: Open Issue 12a By: D. Heydenburg Date: Jun. 15, 1993

Water samples were collected from four locations along the Colorado River during six sampling rounds during the period from January 1991 through October 1992 (Figure 1). The samples were analyzed for gross alpha activity, and values were reported as net gross alpha activity (gross alpha minus uranium and radon). Two of these sampling rounds (January 1991 and February 1992) were during periods of relatively low flow in the Colorado River, based on stream flow data from the USGS gaging station near the Colorado-Utah state line (Table 1 and Figure 2).

During the January 1991 sampling round, activities of net gross alpha were approximately two times the MCL of 15 pCi/l (Table 1 and Figure 2). Activities for the upstream (423) and downstream (426) samples were both 30 pCi/l. These were the highest activities noted. The daily mean discharge value for the Colorado River was 2460 ft^3/s on 29 January 1991 when the samples were taken. The minimum flow for this water year was 1590 ft^3/s on 24 December 1990 and the maximum flow was 19200 ft^3/s on 16 June 1991 (Table 2 and Figure 3).

During the February 1992 sampling round, activities of net gross alpha were less than zero. This is because parameter values for gross alpha were 0.0 plus or minus parameter uncertainties ranging from 16 to 21. When activities of uranium are taken out, resulting net gross alpha activities were less than zero. The parameter values of 0.0 for gross alpha were a result of the uncertainty in count statistics and are within the margin of error of the analysis. Therefore, these samples were taken at a minimum stage of river flow and were the lowest activities noted. The daily mean discharge value for the Colorado River was 2700 ft^3/s on 02 February 1992 when the samples were taken. The minimum flow for this water year was 2650 ft^3/s from 18-20 January 1992, and the maximum flow was 15800 ft^3/s on 28 May 1992 (record in UMTRA Project file for this water year complete through 11 June 1992) (Table 2 and Figure 3).

Evaluation of results for net gross alpha activities in surface water of the Colorado River indicate that activities are generally below the MCL of 15 pCi/l, particularly during the last three sampling rounds, one of which was during a very low flow stage of the river. Activities of net gross alpha at the upstream location are often approximately the same as, or greater than activities at the near-site and downstream locations (Figure 1). Based on the information available, it has been determined that activities of net gross alpha in surface water of the Colorado River are not necessarily a result of uranium processing activities, and do not represent a risk to human health and the environment.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Jan. 30, 1993
Document: Remedial Action Plan
Reviewer: U.S. Nuclear Regulatory Commission
Comment: 1. TER Issue 12c

DOE has provided information on their well inventory; however, the NRC staff concludes that the information provided to date is insufficient to assess the potential impacts on existing water users. To evaluate the potential impacts of contamination on the existing wells and current and prospective water users in the vicinity of the processing site, the well inventory needs to be expanded to include existing nearby wells located downstream from the processing site. At least one well on the south side of the Colorado River should be included. The inventory may initially include downstream wells that are closest to the processing site, but may progressively expand to include other wells further downstream, unless the collected data indicate conclusively that the existing and potential water users further downstream will not be adversely impacted by contamination from the processing site.

SECTION 2

Response: Page: 552, Att. 3 By: D. Heydenburg Date: Mar. 22, 1993

The DOE performed a survey of existing domestic wells in the vicinity of the Grand Junction processing site during 1991 to assess the potential impact on existing users of groundwater from the shallow alluvial aquifer. The area surveyed extended north and west (downgradient) of the site, as shown by the approximate areal extent of the uranium distribution plume in groundwater in the alluvium with concentrations in excess of 0.060 mg/l (Figure 3.10). This area was selected because it is representative of the area potentially affected by site-related groundwater contamination. The uranium concentration cutoff appears to be conservative since the statistical maximum background groundwater concentration for uranium is 0.084 mg/l.

The survey included collection and inspection of records from the state of Colorado (well permit records), the city of Grand Junction Water Service, and the Ute Water District. The survey also included field inspection of the area, and personal contact with representatives of the state and water supply entities and many individuals in the area. Results of the survey show that residents and businesses are supplied with water from the city of Grand Junction or the Ute Water District, and there is no evidence of the existence of domestic wells or the use of groundwater from the shallow alluvial aquifer for water supply in the area surveyed. Based on this information, existing and potential water users in the vicinity of the processing site are not at risk of being impacted by site-related contamination in

groundwater. Information generated during the well inventory survey is available in the permanent site files at the UMTRA Project Office.

The area on the south side of the Colorado River was not included in the survey because of 1) the results of the survey on the north side of the river (the area most likely to be affected), 2) the fact that shallow groundwater in the alluvium discharges into the river, and 3) the fact that the southern limit of the "cobble aquifer" (alluvial aquifer in the RAP), defined in a study by the Bureau of Reclamation (BOR, 1986), extends primarily north of the Colorado River, with Mancos Shale cropping out along the south side of the river. This would minimize the potential for any site-related contamination in groundwater from migrating south of the river and impacting human health and the environment.

Plans for Implementation:

The detailed statement above has been ir orporated as Section 4.1.5, Attachment 3 of the RAP.

RESPONSE ADDENDUM

Response: Open Issue 12c By: D. Heydenburg Date: Jun. 15, 1993

- With reference to the NRC Open Issue 12c (NRC letter of 30 Jan 1993), the DOE submitted a response in March 1993 that explained the results of the existing well survey conducted in the vicinity of the Grand Junction processing site. Also, a new section (Section 4.1.5 - Well Inventory) was added to Attachment 3 of the RAP.

- Results of the survey showed that residents and businesses are supplied with water from the city of Grand Junction or the Ute Water District, and there is no evidence of the existence of domestic wells or the use of groundwater from the shallow alluvial aquifer for water supply in the area surveyed.

- Municipal water is derived from surface water on Grand Mesa or from the Gunnison River during dry spells. Any groundwater used in the Grand Junction area is from deep confined aquifers.

- Analytical results of samples from four locations in the Colorado River in the vicinity of the processing site indicate that the processing site is not a source of contamination for river water.

- Using a lower concentration for uranium (0.044 mg/l) to determine the outline of the area surveyed would not increase the area surveyed significantly and would probably not affect the results, since groundwater from the shallow alluvial aquifer is not used as a water resource. Uranium was used as an indicator of the extent of the contaminant plume resulting from the processing site because uranium is the only hazardous constituent identified in groundwater downgradient from the site.

- The reason that groundwater on the south side of the Colorado River was not included in the survey was mentioned in Section 4.1.5.

RESPONSE ADDENDUM

Response: Page: Open Issue 12c By: T. Monks Date: Jan. 20, 1994

INTRODUCTION

The purposes of this addendum are to clearly define NRC open issue 12c, summarize previous work performed in resolving the above open issue, and provide more recent conclusive data supporting previous work.

SUMMARY OF PREVIOUS WORK

April 1991, Initial Water Use Survey

In April 1991, the DOE performed a water use survey of the Grand Junction area. Upon completion of this survey, the conclusion was made that there were no persons in the vicinity of the processing site who were drinking water from the shallow alluvial aquifer. This conclusion was drawn from various sources of information, including visual physical inspection, personal contact with owners of approximately 40 percent of the properties in the area, review of the state of Colorado well permit records, review of the city of Grand Junction water service records, and review of Ute Water District records.

March 1991, Initial Response to NRC Open Issue 12c

See the Section 2 response above.

June 1993, NRC Response to DOE Response

The NRC's response to open issue 12c indicated that they thought the DOE's response was limited to providing previously submitted information about their well inventory in the processing site area. The NRC felt that an acceptable response had not been submitted. The NRC stated that the well inventory needed to be expanded to include existing nearby wells and current and prospective water users in the vicinity of the processing site, including one such well on the south side of the Colorado River. The NRC also stated that the inventory may initially include only downstream wells that are closest to the processing site, but may progressively expand to include other wells further downstream, unless the collected data indicate conclusively that existing and potential water users further downstream will not be adversely affected by contamination from the processing site.

July 1993, Response to NRC

The following response to NRC open issue 12c was submitted by the DOE in July 1993:

> "Results of the well survey conducted by the DOE in the vicinity of the Grand Junction processing site showed that residences and businesses are supplied with water from the city of Grand Junction or the Ute Water District, and there is no evidence of the existence of domestic wells or the use of groundwater from the

shallow alluvial aquifer for water supply in the area surveyed. Based on this information, existing water users in the vicinity of the processing site are not at risk of being impacted by site-related contamination in shallow alluvial groundwater."

Upon review of the above response, the NRC remained unsatisfied with the previous water use results and thus continued to consider open issue 12c as unresolved.

RECENT (DECEMBER 1993) WATER USE SURVEY

In order to show more conclusively that there is no domestic use of near-surface groundwater within one mile west of the Grand Junction processing site, a second water use survey was conducted by the DOE. This survey consisted of three primary activities; 1) a phone call to the NRC to agree on a field approach to solve the problem; 2) a meeting with the Colorado Division of Water Resources concerning water use and permitted wells downgradient of the site; and 3) field reconnaissance several miles west of the site to confirm that there is no apparent domestic water use.

Phone Call to NRC

A phone call was placed to the NRC Grand Junction site hydrologist to agree on an approach to solve the problem (see phone log, Attachment A). The NRC site hydrologist stated that we could resolve the open issue by sampling the downgradient well closest to the site. If water quality results from this well show no processing site-related contamination, the issue would then be considered resolved. If the closest well were contaminated, we would then sample the next closest well to the processing site.

Meeting with Colorado Division of Water Resources

On December 8, 1993, at 9 a.m., a meeting was held with Mr. Wayne Wells, Senior Water Commissioner of the Division 5 Field Office of the Colorado Division of Water Resources, Grand Junction, Colorado. During this meeting, the data base of all permitted wells within several miles downgradient and cross gradient of the Grand Junction processing site was researched. The objective was to identify at least one permitted, potential domestic use, reasonably shallow (less than several hundred feet deep) well downgradient from the site that could be sampled. The DOE sampling team was in the process of sampling processing site wells and was readily available to sample a well as soon as it could be located.

Mr. Wells printed copies of all permitted well records within several miles downgradient and cross gradient of the site (see the well records, Attachment B). The well information was then analyzed (well by well), starting with the closest well to the site. The analysis showed that there were no permitted wells of any kind located within the area of the Grand Junction contaminant plume. As the attached letter (Attachment C) from Mr. Wells indicates, most of the wells that showed up in the data base, located within several miles of the site, are used for monitoring purposes. According to Mr. Wells, many of these are uncased boreholes. Other wells, noted as being used for domestic purposes, were completed to greater depths (greater than 300 feet) and were outside the contaminated area.

Field Reconnaissance

Since examination of records of permitted wells in the vicinity of the processing site did not indicate the presence of wells that could reasonably be affected by contaminants migrating downgradient from the processing site, a field reconnaissance was conducted several miles west of the site. Special attention was given to properties located within a one-mile radius. Residents or employees of businesses within one-quarter mile of the processing site were personally contacted to gain information on water use. If residents or employees were not present, nearby residents were asked to provide information. If an observation indicated the possible presence of a well, at properties located greater than one-quarter mile west of the processing site, they were investigated. Usually, residents or employees were available for questioning. Every individual who was questioned stated that they did not receive water from a well and knew of no one locally who did.

When the field survey was completed, it was concluded that the sampling team should not take a sample because no domestic-use wells were present in the uppermost aquifer that would potentially receive processing-related contaminated water from the alluvial aquifer. The only wells that were indicated as domestic-use wells were located greater than one mile downgradient from the area influenced by processing activities and are too deep to be affected.

CONCLUSIONS

Results of the recent water use survey are consistent with previous results. Detailed examination of current data bases and intensive field reconnaissance downgradient and cross gradient from the processing site indicate that there are no known users of alluvial groundwater downgradient from the area affected by processing site activities.

It was concluded that there are presently no identifiable domestic use wells completed in the alluvial aquifer or any near surface water bearing unit within one mile downgradient from the processing site.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Jan. 30, 1993
Document: Remedial Action Plan
Reviewer: U.S. Nuclear Regulatory Commission
Comment: 2. TER Issue 17

Issue 17 identified the staff's request that the RAP include some form of cell performance monitoring to ensure there is no movement of contaminants to the nearby paleochannels. The DOE response did not provide this information, nor were the arguments presented adequate to resolve this issue. For the reasons previously discussed in the February 18, 1992, letter, the staff concludes that a commitment to monitor the cell performance is necessary. Details of the plan can be provided in the Long-Term Surveillance Plan.

SECTION 2

Response: Page: 21, Att. 4 By: D. Heydenburg Date: Mar. 22, 1993

Performance monitoring of the disposal cell at the Cheney site to ensure there is no migration of contaminants to paleochannels in the area is not considered necessary for the following reasons:

- Small quantities of groundwater occur in isolated narrow alluvial paleochannels incised into the upper surface of the eroded and weathered Mancos Shale bedrock. Three separate groundwater flow systems (I, II, and III) were identified in paleochannels in the vicinity of the disposal cell, with only the northernmost system (I) having sustained flow downgradient (to the west) of the disposal cell (Figure 3.14). There appears to be limited hydraulic interconnection within paleochannel systems.

- Recharge to the paleochannels is very limited, and there is no occurrence of any discharge of groundwater from the paleochannels to the surface in the vicinity of the disposal site. The loss of groundwater in the paleochannels is expected to result from gradual percolation into the adjacent or underlying fractured bedrock, and possibly from evapotranspiration. The only occurrence of paleochannel groundwater becoming exposed is where a re-entrant gully has deeply incised a regional drainage (Creek "C") upgradient from the disposal site. Yield of groundwater from the paleochannels is insignificant.

- The paleochannels are not considered the uppermost aquifer beneath the site.

- The disposal cell has been located and designed to restrict migration of any potentially contaminated seepage to isolated paleochannels peripheral to the cell (no paleochannels

are beneath or immediately adjacent to the disposal cell) or to the land surface in the area.

- It is not likely that leachate from the disposal cell could move a sufficient lateral distance to reach paleochannels in the area. There is also evidence that any potential leachate migrating from the disposal cell would percolate into the surrounding weathered/fractured bedrock (Mancos Shale) rather than preferentially seeking the paleochannels.

- Even if leachate somehow did get into the paleochannels, it should not cause any significant impact to human health or the environment.

- The configuration and location of paleochannels in the area is such that it would be extremely difficult to install a monitor well network that 1) would encounter groundwater, and 2) would provide data even remotely representative of any potential leachate migration conditions downgradient from the disposal site. Extensive trenching to the top of the Mancos Shale would be required to locate paleochannels, and then to locate areas within the paleochannels that were saturated to the point of yielding representative and meaningful groundwater samples.

- Existing or anticipated use of shallow groundwater in the paleochannels in the vicinity of the Cheney disposal site is minimal because of 1) the limited availability and/or yield to a well, 2) the poor quality of the groundwater, and 3) the low population density resulting in low demand for water. The existing and future potential risk to human health and the environment resulting from potential seepage of leachate from the disposal cell appears to be nonexistent.

In summary, monitoring the performance of the disposal cell or groundwater in the vicinity would not provide any information of use to protect human health or the environment, or enhance regulatory compliance.

Plans for Implementation:

The detailed statement above has been incorporated into Section 3.4, Attachment 4 of the RAP.

RESPONSE ADDENDUM

Response: Open Issue 17 By: D. Heydenburg Date: Jun. 15, 1993

In order to address the NRC comment on OPEN ISSUE 17, Section 3.4 in Attachment 4 of the RAP will be revised as shown below. The section will discuss the rationale for not monitoring the Class III groundwater in the uppermost aquifer (Section 3.4.1), will provide for an indirect monitoring program to assess and evaluate potential interactions of disposal cell performance and any groundwater in the alluvial paleochannels (Section 3.4.2), and will mention groundwater monitoring at the processing site.

3.4 GROUNDWATER MONITORING PROGRAM

3.4.1 Uppermost aquifer

Groundwater in the uppermost aquifer (Dakota Sandstone) beneath the Cheney disposal site is not a current or potential source of drinking water and meets the EPA criterion for Class III (limited use) designation because the concentration of TDS is in excess of 10,000 mg/l (40 CFR 192.11(e)(1)). Post-closure monitoring of groundwater in the uppermost aquifer is not proposed because of the Class III designation. Also, any groundwater at depth is protected because it is hydrogeologically isolated from potential seepage of leachate from the disposal cell by approximately 750 feet of confining shales and sandstones of the Mancos Shale, and there is an upward vertical gradient from confined groundwater in the Dakota.

3.4.2 Alluvial paleochannels

Small quantities of groundwater occur in isolated narrow alluvial paleochannels incised into the upper surface of the eroded and weathered Mancos Shale bedrock (see Section 3.2.3 of Attachment 3 of the RAP). Recharge to the paleochannels is very limited, and there is no evidence of discharge of groundwater from the paleochannels to the surface in the vicinity of the disposal site. Also, it is unlikely that groundwater from the paleochannels would enter the disposal cell and cause any impact. Existing or anticipated use of shallow groundwater in the paleochannels is minimal because of the insignificant yield to a well and the low population density resulting in low demand for water.

The disposal cell has been located and designed to restrict migration of any potentially contaminated seepage to isolated paleochannels peripheral to the cell (no paleochannels are beneath or immediately adjacent to the disposal cell) or to the land surface in the area. It is not likely that leachate from the disposal cell would move a sufficient lateral distance to reach paleochannels in the area. There is also evidence that any potential leachate migrating from the disposal cell would percolate into the surrounding weathered/fractured bedrock (Mancos Shale) rather than preferentially seeking the paleochannels. Even if leachate did get into the paleochannels, it should not cause any significant impact to human health and the environment.

Although it seems very unlikely that the seepage of leachate from the disposal cell will interact with groundwater in the alluvial paleochannels and impact human health and the environment, an indirect monitoring program will be implemented as a best management practice to provide an indication that the disposal cell is operating as designed and that human health and the environment are being protected to the extent required and practicable.

The monitoring program would consist of two monitor wells located in paleochannels downgradient from the disposal cell (adjacent to the northwest and southwest corners of the cell - Figure 2.1). The monitor wells would be screened in the basal part of the paleochannels to monitor the presence and variability of water in the system. Water levels would be measured periodically to detect changes in groundwater quantity, which could result from natural recharge or from seepage of leachate from the disposal cell. Water samples from the monitor wells could be analyzed periodically for anticipated hazardous constituents to determine if groundwater in the paleochannels is being affected by leachate from the cell. If any excursions are noted, the data would be evaluated and assessed to determine the extent of the potential impact and risk involved, and mitigating measures would be considered in conjunction with discussions with the NRC. Details of the monitoring program will be discussed in the long-term surveillance plan.

3.4.3 Processing site

Groundwater samples will be collected semiannually from selected monitor wells at the Grand Junction processing site, until completion of disposal activities, to monitor the effects of the remedial action on water quality. Groundwater monitoring during the interim between completion of disposal activities and start of groundwater remediation will be determined and implemented under the groundwater restoration phase of the Project.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Jan. 30, 1993
Document: Remedial Action Plan
Reviewer: U.S. Nuclear Regulatory Commission
Comment: 3. TER Issue 20

The RAP should be revised to indicate that a PID will be submitted which includes a detailed site-specific procedure for the cobbly soil analysis (bulk radionuclide determination in cobbly soil). The revised Remedial Action Selection Report (RAS), Section 6.5.3 (page 58), merely states that the Ra-226 concentration would be corrected using a site-specific application of the approved procedures. The DOE response to NRC comments that was dated August 18, 1992, stated that the site-specific procedure will be issued as a Class II PID. NRC staff has not received such a PID, even though most of the excavation at the processing site is complete. The possibility exists that a Class I PID, requiring NRC concurrence, may be justified. The PID should be submitted now, and should contain detailed information on the site-specific procedure including: 1) any proposed modifications to the generic procedure; and 2) discussion of the option chosen. Examples of options that should be discussed include whether test pits or running average will be used for the statistical mass partition function, and whether grid-specific or statistical methods will be used for site verification.

SECTION 2

Response: Page: 58, RAS By: J. B. Baird Date: Mar. 17, 1993

A statistical mass partition function has been developed through test pit analysis at Grand Junction, Site-Specific Analysis of the Cobbly Soils at the Grand Junction Processing Site, and the lower 95 percent confidence limit for the average mass partition function will be used at the site for bulk radionuclide determination, excavation control, and site verification where indicated.

Plans for Implementation:

The last paragraph, Section 6.5.3, page 58, has been revised.

In addition, the following reference has been added to the list of references on page 61:

DOE (U.S. Department of Energy), 1992. Site-Specific Analysis of the Cobbly Soils at the Grand Junction Processing Site, UMTRA-DOE/AL-050128.0000, DOE UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Jan. 30, 1993
Document: Remedial Action Plan
Reviewer: U.S. Nuclear Regulatory Commission
Comment: 4. TER Issue 21

The RAP needs to indicate the frequency of thorium analysis required during verification. The RAS revised Section 6.5.3 (page 60) indicates that four percent of all verification samples will be sent to an independent laboratory for verification of the Th-230 concentration. Based on ongoing Th-230 issues at other sites, NRC staff considers 4 percent to be inappropriate for the necessary level of confidence for sites which are known to have elevated Th-230 concentrations deeper than the radium contamination. NRC staff is aware that DOE is preparing a generic policy paper on thorium. Th-230 cleanup policy and procedures will be established for this and other sites through NRC's review/concurrence of that document.

SECTION 2

Response: Page: 60, RAS By: J. B. Baird Date: Feb. 24, 1993

DOE has transmitted a draft generic policy paper for Th-230 verification sampling to NRC. The final policy will be established through the NRC review/concurrence process. The following protocol has been proposed:

1. Excavate bulk Th-230 concentrations to a 1000-year corrected bulk Ra-226 concentration of 5 or 15 pCi/g (as appropriate) in 15-cm layers near the surface (i.e., within approximately 8 feet).

2. Halt all excavations at the level of the saturated zone.

3. For deeply buried material, stop excavations when the RAECOM computer code, using site-specific parameters, calculates a Rn-222 flux of 3.9 pCi/m^2s.

4. Perform verification sampling for bulk Th-230 in all grids underneath raffinate pits or other areas suspected of having a mechanism to preferentially mobilize Th-230 over Ra-226.

5. Perform verification sampling for bulk Th-230 in one out of every 25 (or 4 percent) of the grids in all other areas (except in windblown and ore storage areas).

Plans for Implementation:

The third paragraph on page 60 of Section 6.5.3 has been revised.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Jan. 30, 1993
Document: Remedial Action Plan
Reviewer: U.S. Nuclear Regulatory Commission
Comment: 5

By letter dated July 21, 1992, DOE submitted PID 05-S-46 providing a revised barrier design. NRC staff comments on this PID were issued by letter dated August 21, 1992, and as yet remain unresolved. Because of the uncertainty of the radon barrier design, and the fact that it is already being reviewed by PID process, the RAP should be revised to indicate that a final radon cover design will be submitted as a Class I PID for NRC review and concurrence when the final material parameters and configuration are known. The submittal should be made prior to any placement of material.

SECTION 2

Response: Page: NA By: J. B. Baird Date: Mar. 17, 1993

The RAC provided a response to the NRC comments on PID 05-S-46, Revision 1, in proposed PID 05-S-53.

Plans for Implementation:

The latter PID will be deleted and the final design will be incorporated into Revision 2 of PID 05-S-46. The revised PID will be submitted to NRC as a Class I PID for review and concurrence.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Sep. 25, 1992
Document: Remedial Action Plan
Reviewer: Colorado Department of Health
Comment: 1

DOE has recommended no Point of Compliance (POC):

In previous comments on the RAP, CDH has expressed concern about the lack of performance monitoring of the Cheney Disposal Cell. We find DOE's response to this concern unacceptable. We still find that there is a need for performance monitoring at Cheney. Our primary concerns are:

A. During excavation of the disposal cell a paleochannel was discovered in the northwest corner of the cell. The cell was relocated and the paleochannel reconstructed. DOE has not demonstrated that the reconstruction of the channel resulted in restoration of flow that will not interfere with cell performance. In addition, because of the 1000 year design life of the cell, it must be demonstrated that changes in flow in the paleochannels will not impact the cell. Monitoring should be performed to prove that flow has been restored, and that changes in flow will not interfere with the cell.

B. The groundwater compliance strategy is based in part on the performance of the cell cover and the ability of the Mancos to accept and contain seepage within discontinuous fractures. Monitoring should be performed to demonstrate that the cover is performing as designed and that the Mancos is accepting seepage as predicted.

SECTION 2

Response: Page: 21, Att. 4 By: D. Heydenburg Date: Mar. 22, 1993

No point of compliance (POC) has been recommended at the Cheney disposal site because no post-closure groundwater monitoring has been proposed. Monitoring has not been proposed because groundwater in the uppermost aquifer (Dakota Sandstone) beneath the disposal site is hydrogeologically isolated from any potential seepage of leachate from the cell by approximately 750 feet of confining low permeability shales and sandstones of the Mancos Shale, and groundwater in the Dakota is of limited use (Class III) because of poor water quality.

Performance monitoring of the disposal cell at the Cheney site to ensure there is no migration of contaminants to paleochannels in the area is not considered necessary for the following reasons:

- Small quantities of groundwater occur in isolated narrow alluvial paleochannels incised into the upper surface of the eroded and weathered Mancos Shale bedrock. Three separate groundwater flow systems (I, II, and III) were identified in paleochannels in the vicinity of the disposal cell, with only the northernmost system (I) having sustained flow downgradient (to the west) of the disposal cell (Figure 3.14). There appears to be limited hydraulic interconnection within paleochannel systems.

- Recharge to the paleochannels is very limited, and there is no occurrence of any discharge of groundwater from the paleochannels to the surface in the vicinity of the site. The loss of groundwater in the paleochannels is expected to result from gradual percolation into the adjacent or underlying fractured bedrock, and possibly from evapotranspiration. The only occurrence of paleochannel groundwater becoming exposed is where a re-entrant gully has deeply incised a regional drainage (Creek "C") upgradient from the site. Yield of groundwater from the paleochannels is insignificant.

- The paleochannels are not considered the uppermost aquifer beneath the site.

- The disposal cell has been located and designed to restrict migration of any potentially contaminated seepage to isolated paleochannels peripheral to the cell (no paleochannels are beneath or immediately adjacent to the disposal cell) or to the land surface in the area.

- It is not likely that leachate from the disposal cell could move a sufficient lateral distance to reach paleochannels in the area. There is also evidence that any potential leachate migrating from the disposal cell would percolate into the surrounding weathered/fractured bedrock (Mancos Shale) rather than preferentially seeking the paleochannels.

- Even if leachate somehow did get into the paleochannels, it should not cause any significant impact to human health or the environment.

- The configuration and location of paleochannels in the area is such that it would be extremely difficult to install a monitor well network that 1) would encounter groundwater, and 2) would provide data even remotely representative of any potential leachate migration conditions downgradient from the disposal site. Extensive trenching to the top of the Mancos Shale would be required to locate paleochannels, and then to locate areas within the paleochannels that were saturated to the point of yielding representative and meaningful groundwater samples.

- Existing or anticipated use of shallow groundwater in the paleochannels in the vicinity of the Cheney disposal site is minimal because of 1) the limited availability and/or yield to a well, 2) the poor quality of the groundwater, and 3) the low population density resulting in low demand for water. The existing and future potential risk to human health and the environment resulting from potential seepage of leachate from the disposal cell appears to be nonexistent.

In summary, monitoring the performance of the disposal cell or groundwater in the vicinity would not provide any information of use to protect human health or the environment, or enhance regulatory compliance.

Plans for implementation:

The detailed statement above has been incorporated into Section 3.4, Attachment 4 of the RAP.

UMTRA DOCUMENT REVIEW FORM

SECTION 1

Site: Grand Junction, Colorado Date: Sep. 25, 1992
Document: Remedial Action Plan
Reviewer: Colorado Department of Health
Comment: 2

The request by CDH to include a more specific discussion on institutional controls in the RAP was an attempt to spur some thought about this issue in terms of both what types of controls might be appropriate, and how these controls would be instituted. DOE's suggestion that a fence would be built around the site (this would not be consistent with the planned use of this land), and the failure to acknowledge the need for local government participation, shows that such thought has not occurred. It is our feeling that the real institutional control decisions will be made independently of the RAP, during CDH's negotiation and implementation of land use agreements with the State or local government entities. At that time we will work out the types of controls which are appropriate, and any local ordinances which might be required. These controls will become conditions of the easement or title. DOE and NRC are required to concur on these land use agreements, and will be able to have additional input at that time. Therefore, we will consider your response adequate for purposes of finalizing the RAP. We would suggest that under (3) of your revised text, that the wording be changed to "efforts will be made to prevent groundwater use through institutional controls" since at this time you cannot guarantee such prevention of use.

SECTION 2

Response: Page: 23, Att. 4 By: D. Heydenburg Date: Mar. 22, 1993

The CDH letter of Sep. 25, 1992, indicates that the DOE's previous response on this issue is acceptable. However, the CDH's suggested change in wording is appropriate.

Plans for Implementation:

The text has been revised in accordance with CDH's suggestion.

ATTACHMENT A

PHONE LOG

PHONE LOG

MEMORANDUM

Phone Call

FROM Tod Monks

TO Latiff NRC GRJ SITE Hydrologist DATE Dec 2, 1993

SUBJECT Water USE Survey Scope REF

IN VICINITY OF GRJ processing Site

SHEET NO 1/1

Called NRC site hydrologist to ask for clarification regarding scope of work to clarify NRC open Issue 12 c

I asked Latiff what would satify the NRC on Issue 12c (downgradient)

He stated that they would be satisfied if we sampled the closest potential domestic use well to the site and analytical results showed the well to be free of processing related contamination. However if the well showed the presence of contamination, we would then be expected to Sample the next closest well until results showed no contamination . . . .

COPIES TO ATTACHMENTS

REPLY TO: 3232 W. VIRGINIA, PHOENIX, ARIZONA 85009 • PH. (602) 272-6848

ATTACHMENT B

WELL RECORDS

23, 15, 14, 10 ~~23, 14, 15, 23, 24~~

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Across River

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Across River

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NE	NE	08	010S	0010W	U	COORS CERAMICS CO.	33357	M	285411B
NE	NE	08	010S	0010W	U	COORS CERAMICS CO.	33358	M	285411C
NE	NE	08	010S	0010W	U	COORS CERAMICS CO.	33359	M	285411D
SW	NE	08	010S	0010W	U	MESA COUNTY	37607	F	316046A
NE	NW	08	010S	0010W	U	A & G PARTNERSHIP	38095	F	319305
SE	NW	08	010S	0010W	U	ELAM CNSTR INC	25870	F	214429
		09	010S	0010W	U	CITY MARKET	18138	MH	18138A
NW	NE	09	010S	0010W	U	LINNEMAN F H	2664	F	9116473
SW	NE	09	010S	0010W	U	COORS PORCELIAN COMPANY	33463	M	9116602
SW	NE	09	010S	0010W	U	COORS PORCELIAN COMPANY	33465	M	9116604
SW	NE	09	010S	0010W	U	COORS PORCELAIN CO.	33466	M	286144B
SW	NE	09	010S	0010W	U	COORS PORCELAIN CO.	33464	M	286144C
SW	NE	09	010S	0010W	U	COORS PORCELAIN CO.	33466	M	286144B
SW	NE	09	010S	0010W	U	COORS PORCELAIN CO.	33464	M	286144C
SW	NE	09	010S	0010W	U	QUIKRETE	20256	MH	20256
NW	NW	09	010S	0010W	U	EQUITABLE REAL ESTATE INV MGT	18387	MH	18387
SE	SE	10	010S	0010W	U	AMOCO OIL CO	18248	MH	18248

Letter=Choice J F10=Mark 13 PgUp/PgDn=a20 J UpAr/DnAr =a1 JEsc=Quit

EPORT DATE 12/08/93 COLORADO WELL APPLICATIONS AND PERMITS PAGE 4
COLORADO DIVISION OF WATER RESOURCES

RECEIPT	APP DATE	STAT DATE	NP DATE	WELL-X-REFER	TRANS	ACTIV	STAT
235813	05/16/83	/ /	12/04/87	000000	CD AD	CD AD	CD

DIV	CO	FILE NUMBER	WD	BAS	MD	NAME
5	39	11511 AD	72	00	00	TAYLOR GENE D.

DDRESS	ADDRESS2	CITY	ST
		GRAND JUNCTION	CO

Table 6.3 Background radioactivity and radiological conditions at the Grand Junction site

Description	Range[a]	Average[a]
Gamma exposure rate		
Background	7-11 microR/hr	11 microR/hr
Above tailings piles	60-830 microR/hr	NA
Radon-222 in air		
Background concentration	0.70-1.0 pCi/l	0.8 pCi/l
Flux above piles	90-1340 pCi/m^2s	550 pCi/m^2s
Soil radioactivity		
Background Ra-226	1.0-3.4 pCi/g	2.0 pCi/g
Uranium-238	0.6-0.9 pCi/g	0.7 pCi/g
Off-pile Ra-226	2-2689 pCi/g	66.5 pCi/g
Tailings and mill yard Ra-226	5-7589 pCi/g	570 pCi/g

[a]microR/hr = microroentgens per hour.

NA - not available.

A nine-point composite gamma measurement technique may be used in place of a verification soil sample in areas with windblown contamination or where groundwater has seeped into the excavated area. This hand-held verification technique will be site-specific and must be approved by the DOE UMTRA Project Office. The RTRAK mobile detection unit may be used for verification of the contaminated areas that are too large to sample by hand-held detectors.

Supplemental standards may be proposed for wetlands located on the floodplain between the tailings pile and the Colorado River. Supplemental standards may be proposed due to the excessive environmental harm associated with excavating contaminated materials in the wetlands area compared to the negligible potential health benefits projected to be gained from remedial action. Excavation of the wetlands is projected to entail destruction of vegetation and would destroy the unique character of the wetlands without commensurate human health protection.

Final verification surveys will be performed to document average Ra-226 concentrations on all 100-square-meter areas remediated. A minimum of four percent of the grids on the processing site will be verified for Th-230. As a further measure, at least 10 percent of the grids will be assessed for Th-230 where characterization efforts indicate that Th-230 has migrated relative to Ra-226. If the sampling and analysis effort indicates Th-230 concentrations in excess of the guideline, surrounding grids will also be sampled and analyzed for Th-230. []. If Th-230 is encountered in significant concentrations after Ra-226 has been removed to the EPA standards, a supplemental standard under criterion (f) of 40 CFR 192.21 will be imposed. For Th-230 contamination, the supplemental standard will be to reduce the Th-230 concentration to a level such that 1) the Ra-226 concentration in 1000 years, including residual and ingrown Ra-226, will not exceed 15 pCi/g in subsurface soil; or 2) the projected concentration of radon decay products in a house will not exceed 0.02 working levels in 1000 years.

Independent radiological surveillances and health and safety audits will be conducted by the DOE and the Technical Support Contractor during remedial action to ensure that all activities are conducted to meet Federal, state, local, and UMTRA Project standards and guidelines. Quality control and quality assurance requirements and procedures are in place to ensure that adequate cleanup and subsequent verification are properly implemented and documented (DOE, 1990).

6.6 SUMMARY AND CONCLUSIONS

The disposal cell and radon barrier as designed will reduce radon flux to levels below EPA standards stated in 40 CFR 192.02(b). The DOE has committed to clean up the Grand Junction site and associated vicinity properties in accordance with EPA standards, NRC guidelines, and UMTRA Project health and safety requirements.

ATTACHMENT C

LETTER FROM MR. WAYNE WELLS
COLORADO DIVISION OF WATER RESOURCES

Division of Water Resources
Division 5 Field Office
2754 Compass Dr. #326
Grand Junction, Colorado 81506

Mr. Todd Monks;

This letter is to confirm the search process you did on the well data base at our office in Grand Junction. The files you researched are a copy of all permitted wells in Division 5 (Colorado River drainage) and Division 4 (Gunnison River drainage). The permits you were given copies of show that the area you were interested in has mostly monitoring hole permits. The one or two permits that showed up as other than monitoring holes were drilled very deep and I don't know if they would give you the data you need. As was noted when you were in the office, the Colorado River flows west and south of the location you had and we did not look at any permits on the other side of the river because we felt it was a definite dividing line. As was stated earlier this is only wells that are permitted and their could be some unpermitted wells in that area. The only way to find them would be to go house to house and I'm not sure you would find any that are still in use as the City of Grand Junction and Ute Water provide most of the domestic water in that area. There could be some old irrigation wells but they do not show up as permitted wells and may not be used anymore.

If I can be of further assistance please feel free to call.

Sincerely,

Wayne Wells

Wayne Wells
Senior Water Commissioner