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12 October 2012

Ms. Yolande Norman
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Mail Stop T-8F5
11545 Rockville Pike
Rockville, MD 20852

Ms. Janet Brooks
Superfund Division (6SF-RL)
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1220
Dallas, TX 75202

Subject: Zone 3 Remedy Operations – Church Rock, New Mexico

Dear Ms. Norman and Ms. Brooks:

This correspondence is to provide notification that UNC has terminated the alkalinity injection at well IW-A under the Zone 3 Pilot Injection Program (Remedial Design Report, Chester Engineers, May 2010), and which has been underway since April 2011. UNC continues to conduct extraction in accordance with the report and subsequent modifications as warranted to maintain sustainable pumping rates and best meet the objectives of the pilot remediation program. The reason for terminating alkalinity injection is described below.

The initial target injection rate was 1 gallon per minute (gpm). During the May 2012 Technical Meeting in Albuquerque, it was reported that the average injection rate had been reduced by half (to 0.46 gpm) as of March 2012. Furthermore, the operational objective to keep the IW-A water level approximately 10 to 20 ft below the top of the casing was being met, but at gradually decreasing injection rates. On June 29, 2012, the injection was terminated because the injection rate had decreased such that the operational objective and target injection rate could no longer be maintained. This was not an unexpected result. The objective of the program had always been to promote the containment and treatment of seepage-impacted waters with the understanding that it would help to mitigate the impacts, but would eventually reach a point where diminishing well yields or injection-rate capacity would not support further benefit. It had also been recognized from the outset that the program might delay or minimize the migration of seepage-impacts, but that it would not result in the attainment of groundwater protection standards everywhere within the Zone 3 impacted area.

The observed increase in uranium concentration at monitoring well MW-6 from 0.082 mg/l in July 2011 to 0.321 mg/l in July 2012 (Attachment A) provides an additional, compelling reason

to permanently terminate the injection of alkalinity. There are two possible explanations for the increase in uranium concentration:

1. The remedial system is drawing-in background water (post-mining/pre-tailings in origin) which contains higher uranium concentrations than either the MCL or seepage-impacted water (N.A. Water Systems, October 2008, Revised Submittal – Calculation of Background Statistics with Comparison Values; and N.A. Water Systems, December 5, 2008, Revised Submittal – Estimated UCL95 Statistics and EPCs in Impacted Groundwater). While the July 2011 uranium concentration in water from MW-6 is within the range of typical seepage-impacted uranium concentrations, the July 2012 data is within the higher concentration range reported for the Zone 3 background water and may represent background water migrating eastward into areas of impacted water in response to extraction system operation. This explanation is supported by comparing isoconcentration plots for uranium in Zone 3 from 2002 versus 2011 (Attachment B) in which it visually appears that background water has gradually migrated eastward toward the center of remedial pumping that has been in place since 2005.

   This explanation is inversely analogous to the reasons that prompted the termination of pumping at the former pump-back wells (pre-2001) because their position along the western flank of Zone 3 seepage-impacted water caused seepage-impacted water to be drawn towards the unimpacted or background parts of Zone 3 (see license amendment request date May 19, 2000 and NRC's license amendment #31 dated December 29, 2000). With the revised, post-2005 pumping systems at the northern, leading-edge of the Zone 3 impacted area, the reverse condition is occurring; background water is being drawn into areas previously occupied by seepage impacted water.

2. The uranium increase could also be related to the influence of the sodium bicarbonate (NaHCO3) amended water that has been injected at well IW-A. The concentrations of sodium and bicarbonate at well MW-6 have increased significantly since the injection of alkalinity-amended water began at IW-A, and the formation of stable uranyl-carbonate complexes is well known to enable uranium to remain dissolved in water at higher loadings than might occur with less bicarbonate.

Some combination of both reasons likely explains the uranium concentration data; and because the relative contribution of each cause is unknown, UNC recommends that the injection of alkalinity-amended water be permanently discontinued. It also seems prudent to consider the benefit, or lack thereof, with respect to operating the extraction system, particularly if it is primarily inducing the eastward migration of background water in contrast to collecting seepage-impacted water.

For the time being, UNC continues to operate the extraction well system in Northern Zone 3. The current extraction system status is as follows:

- Well NW-1 is no longer being operated as an extraction well because well performance declined such that a useful pumping rate can no longer be maintained. Well recharge is sufficient only to fulfill the monthly sampling volume requirements for determining field parameters.
- The target pumping rate for well NW-2 was increased from 0.5 gpm to 1 gpm (1440 gallons per day or gpd) in early June 2012 to compensate for the reduction in NW-1 and NW-4 pumping.
- Well NW-4 is currently producing about 100 gpd, which is about half of its June pumping capacity.
- PB-2 is producing about 75 gpd.
- Well capacities will inevitably decline further with loss of saturated thickness.

The current pumping system efficiency for removal of seepage-impacted water versus background water is approximately 60 percent and is expected to decline with time as progressively more background water is drawn into areas formerly occupied by seepage-impacted water. The pumping efficiency concept was considered at the May 2012 technical meeting, with respect to Part III of the Site-Wide Supplemental Feasibility Study (SWSFS). The concept of "targeted extraction" was presented as an element of the Zone 3 remedy for certain remedial alternatives. The goal of targeted extraction would be to establish impacted water removal targets in advance that would represent removal of impacted water to a reasonably achievable endpoint. Targets could be based on measurable metrics such as pumping efficiency or a percentage reduction in average saturated thickness. The definition of "a reasonably achievable endpoint" would consider the following concepts:

- Goundwater computer model predictions showing the marginalization of the seepage-impacted water by background water (Chester Engineers, October 2012).
- The impossibility of removing all of the impacted water from Zone 3 due to critical reductions in saturated thickness.
- Background water remediation is not the objective of the corrective action program.
- Protectiveness of human health and the environment.

UNC, together with the NRC and EPA, will want to discuss how this development is going to influence decisions regarding hydraulic containment and targeted extraction by the Zone 3 extraction/injection systems; and in particular, with respect to remedy development as per the source materials license and in the SWSFS Parts II and III. With respect to CERCLA, UNC urges the EPA to consider this development in accordance with the principles and findings found in Appendix A of the 1988 Record of Decision:

> *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 protect public health and the environment. A program of regular performance evaluations, required as part of the selected remedy, will provide a measure of how well this remedial alternative meets modeling and design expectations. The performance evaluation program may indicate that the response objectives have been met and the remedy is complete. 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. Operational results may also demonstrate significant declines in pumping rates with time due to insufficient natural recharge of the aquifers. The probability of significant reductions in the saturated thickness of aquifers at the site must be considered during performance evaluations since much of the water underlying the tailings disposal area is the result of mine water and tailings discharge, both of which no longer occur. In the event that saturated thicknesses cease to support pumping, remedial activity would be discontinued or adjusted to appropriate levels.*

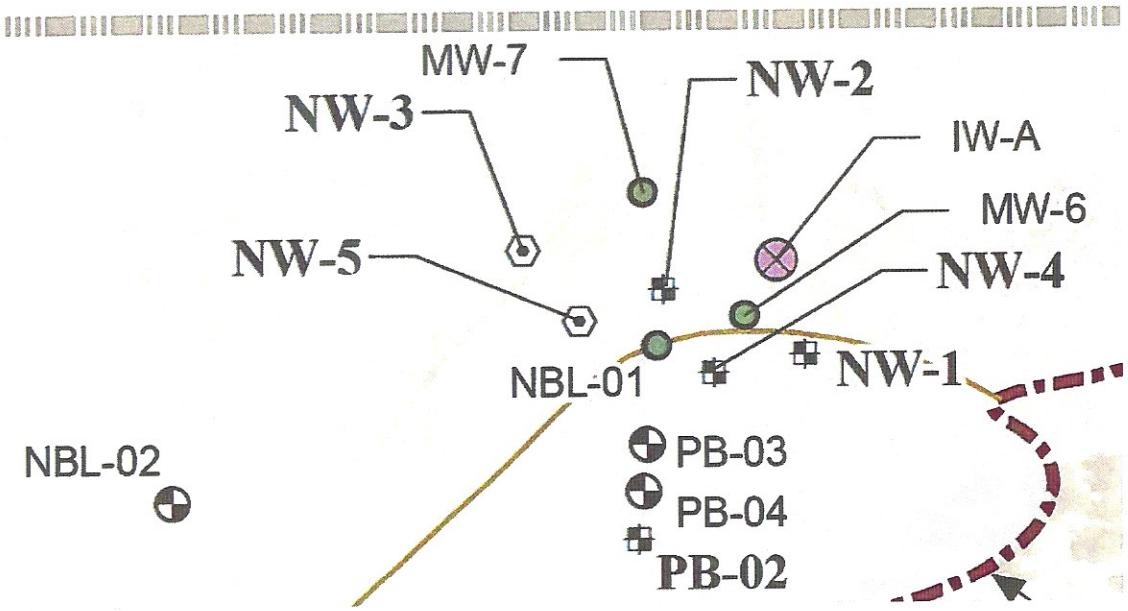
Sincerely,

Roy Blickwedel

Roy Blickwedel
Remedial Project Manager

cc: Larry Bush
Mark Jancin
attachments

Attachment A
Location map and analytical results for well MW-6



UNC Mining and Milling ChurchRock Operations
GroundWater Monitoring Summary: Zone 3 Monitor Wells

Well ID:		MW-6	MW-6	MW-6	MW-6
Collection Date:		7/17/2012	4/10/2012	1/10/2012	10/11/2011
Receive Date:		7/20/2012	4/13/2012	1/13/2012	10/14/2011
Report Date:		9/7/2012	5/24/2012	3/1/2012	11/29/2011
Analyte	RUnits	C12070713-012	C12040742-004	C12010443-003	C11100576-003
Bicarbonate as HCO3	mg/L	454	235	206	191
Calcium	mg/L	378			
Chloride	mg/L	122	38	37	32
Magnesium	mg/L	274			
Nitrogen, Ammonia as N	mg/L	0.72			
Nitrogen, Nitrate+Nitrite as N	mg/L	ND(0.1)			
Potassium	mg/L	11			
Sodium	mg/L	338			
Sulfate	mg/L	2290			
pH	s.u.	6.77	6.45	7.04	7.49
Solids, Total Dissolved TDS @ 180 C	mg/L	3880	3970	3920	4130
Aluminum	mg/L	ND(0.1)			
Beryllium	mg/L	ND(0.001)			
Cadmium	mg/L	0.009			
Cobalt	mg/L	0.06			
Lead	mg/L	ND(0.001)			
Manganese	mg/L	2.86			
Molybdenum	mg/L	11.8			
Nickel	mg/L	0.08			
Uranium	mg/L	0.321			
Vanadium	mg/L	ND(0.1)			
Arsenic-III	mg/L	ND(0.001)			
Selenium-IV	mg/L	ND(0.001)			
Gross Alpha minus Rn & U	pCi/L	2.4			
Gross Alpha minus Rn & U Precision (±)	pCi/L	0.5			
Gross Alpha minus Rn & U MDC	pCi/L	0.3			
Lead 210	pCi/L	0.3			
Lead 210 precision (±)	pCi/L	0.7			
Lead 210 MDC	pCi/L	1.2			
Radium 226	pCi/L	2.5			
Radium 226 precision (±)	pCi/L	0.29			
Radium 226 MDC	pCi/L	0.13			
Radium 228	pCi/L	3.4			
Radium 228 precision (±)	pCi/L	0.91			
Radium 228 MDC	pCi/L	1.2			
Thorium 230	pCi/L	0.005			
Thorium 230 precision (±)	pCi/L	0.07			
Thorium 230 MDC	pCi/L	0.2			
A/C Balance (± 5)	%	-1.84			
Anions	meq/L	58.6			
Cations	meq/L	56.4			
Solids, Total Dissolved Calculated	mg/L	3700			
TDS Balance (0.80 - 1.20)		1.06			
Trihalomethanes, Total	ug/L	ND(0.50)			

****Note: The data presented on this form is intended for summary purposes only. Laboratory approved data is contained within the attached database reports.**

UNC Mining and Milling ChurchRock Operations

GroundWater Monitoring Summary: Zone 3 Monitor Wells

Well ID:		MW-6	MW-6	MW-6
Collection Date:		1/10/2012	10/11/2011	7/19/2011
Receive Date:		1/13/2012	10/14/2011	7/22/2011
Report Date:		3/1/2012	11/29/2011	9/19/2011
Analyte	**RUnits**	**C12010443-003**	**C11100576-003**	**C11070807-010**
Bicarbonate as HCO3	mg/L	206	191	225
Calcium	mg/L			458
Chloride	mg/L	37	32	35
Magnesium	mg/L			328
Nitrogen, Ammonia as N	mg/L			0.35
Nitrogen, Nitrate+Nitrite as N	mg/L			ND(0.5)
Potassium	mg/L			10
Sodium	mg/L			184
Sulfate	mg/L			2610
pH	s.u.	7.04	7.49	7.29
Solids, Total Dissolved TDS @ 180 C	mg/L	3920	4130	3970
Aluminum	mg/L			0.1
Beryllium	mg/L			ND(0.01)
Cadmium	mg/L			ND(0.005)
Cobalt	mg/L			0.11
Lead	mg/L			ND(0.05)
Manganese	mg/L			3.49
Molybdenum	mg/L			5.5
Nickel	mg/L			0.16
Uranium	mg/L			0.0882
Vanadium	mg/L			ND(0.1)
Arsenic-III	mg/L			0.005
Selenium-IV	mg/L			ND(0.001)
Gross Alpha minus Rn & U	pCi/L			1.6
Gross Alpha minus Rn & U Precision (±)	pCi/L			0.4
Gross Alpha minus Rn & U MDC	pCi/L			0.3
Lead 210	pCi/L			-0.5
Lead 210 precision (±)	pCi/L			0.8
Lead 210 MDC	pCi/L			1.3
Radium 226	pCi/L			1.4
Radium 226 precision (±)	pCi/L			0.29
Radium 226 MDC	pCi/L			0.20
Radium 228	pCi/L			2.0
Radium 228 precision (±)	pCi/L			0.58
Radium 228 MDC	pCi/L			0.82
Thorium 230	pCi/L			0.01
Thorium 230 precision (±)	pCi/L			0.09
Thorium 230 MDC	pCi/L			0.2
A/C Balance (± 5)	%			-0.839
Anions	meq/L			59.1
Cations	meq/L			58.1
Solids, Total Dissolved Calculated	mg/L			3770
TDS Balance (0.80 - 1.20)				1.05
Trihalomethanes, Total	ug/L			ND(0.50)

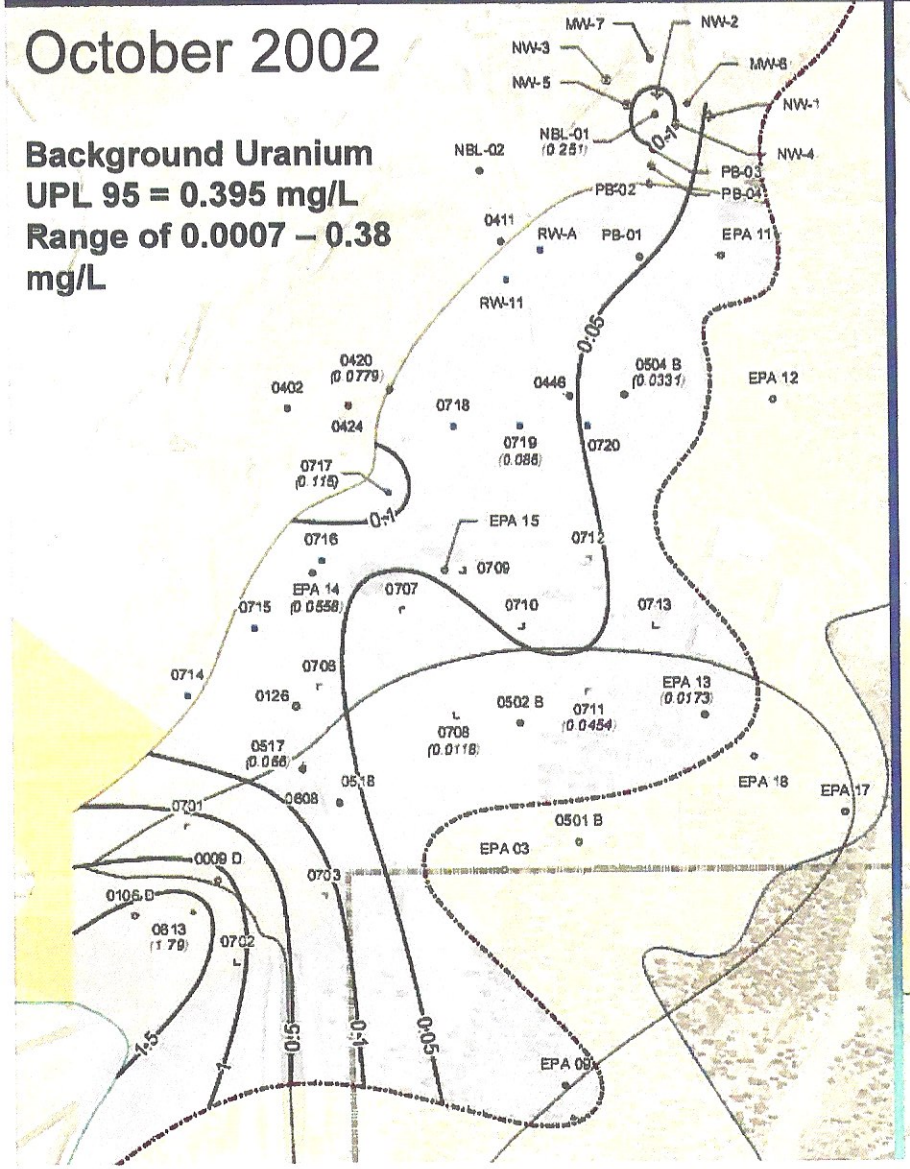
****Note: The data presented on this form is intended for summary purposes only. Laboratory approved data is contained within the attached database reports.**

Attachment B
Isoconcentration maps for Uranium

2002 and 2011 Zone 3 Uranium Isoconcentration Maps (in mg/L)

October 2002

Background Uranium
UPL 95 = 0.395 mg/L
Range of 0.0007 – 0.38 mg/L



October 2011