environmental
properties management, LLC

March 12, 2012

Mr. Ken Kalman
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

Re: Cimarron Environmental Response Trust
Unresolved Site Decommissioning Issues

Dear Mr. Kalman:
Environmental Properties Management LLC (EPM) is preparing a license amendment request (currently scheduled for submittal during the fourth quarter of 2012) which includes a groundwater remediation plan. Two issues related to the completion of certain aspects of site decommissioning remain unresolved. These two issues must be resolved to enable EPM to plan its remaining decommissioning activities to achieve license termination. Those two issues are:

1. Technitium-99 in groundwater
2. Decommissioning Status of Various Media in Subarea F

This submittal summarizes the work performed to address each of these issues and requests that NRC review the referenced submittals and either document that decommissioning is complete or provide sufficient guidance that EPM can address whatever further work is required for each in the upcoming license amendment request.

Technitium-99 in Groundwater
Environmental monitoring performed in the 1980s identified elevated gross beta activity in groundwater. Gross beta activity observed in groundwater at some locations was far too high relative to the gross alpha activity to attribute to the uranium known to be present in groundwater. By 1996, it had been determined that technetium-99 (Tc-99) was the source of this elevated beta activity, and that the Tc-99 had entered the uranium fuel production process in uranium hexafluoride received from the Department of Energy's Paducah site. In a letter dated October 9, 1996, Cimarron Corporation (Cimarron) notified NRC of the presence of Tc-99 in groundwater at the site.

In a December 2, 1996 response, NRC notified Cimarron that Tc-99 in groundwater would have to be addressed in the site decommissioning program, and that the possession of Tc-99 may be in violation of the license.

In a March 13, 1997 letter, NRC referenced the current EPA standard for beta particles, which requires that "the average annual concentration in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 mrem/yr". It was NRC's intent to apply the 4 mrem/yr dose limit, based on a drinking water scenario, to groundwater at the Cimarron site. In that letter, NRC stated "…for Tc-99, the maximum contamination level that should be used for comparison and compliance is 3,790 pCi/l."

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In an April 22, 1997 letter, NRC notified Cimarron that a license amendment to authorize possession of Tc-99 would not be required, noting that decommissioning of licensed facilities must include radionuclides not specifically listed on the license.

In Section 9 of the July 30, 1998 Decommissioning Plan Groundwater Evaluation Report, Cimarron maintained that data indicates that Tc-99 is below the 3,790 pCi/l limit, and that remediation for Tc-99 should not be needed.

In a March 12, 2002 letter, NRC stated that release of Subarea G from the license would be withheld until Tc-99 in groundwater is addressed in the U-Pond #1 area, U-Pond #2 area, Burial Area #1, and any other areas where Cimarron believed Tc-99 could be present at elevated concentrations in groundwater.

In the September 24, 2002 Technitium-99 Site Impact Evaluation and Proposed Groundwater Assessment Work Plan, Cimarron stated that Tc-99 was an issue in groundwater in only two areas: uranium waste pond #1 (U-Pond #1) and uranium waste pond #2 (U-Pond #2). It proposed a field investigation to complete the assessment of Tc-99 in groundwater.

In a November 13, 2002 letter, NRC approved the workplan for the U-Pond #1 and U-Pond #2 areas, and expressed concern regarding Tc-99 in groundwater at Burial Area #1.

The December 30, 2003 Technitium-99 Groundwater Assessment Report presented the results of the Tc-99 assessment performed in the U-Pond #1 and U-Pond #2 areas, and stated that Tc-99 was not present in other areas (including Burial Area #1) at concentrations above laboratory detection limits. The report noted that the two locations yielding the highest Tc-99 concentrations were Well 1336A and Seep 1208. Well 1336A had never yielded Tc-99 above 3,790 pCi/l, and Seep 1208 had sometimes exceeded the limit. It was noted that the seep is a collection area for surface water yielding highly variable results, and that the wells upgradient from Seep 1208 yielded Tc-99 at concentrations far below the 3,790 pCi/l limit.

In a May 21, 2004 letter, NRC provided notes on a May 4, 2004 meeting at NRC headquarters, conducted to discuss groundwater remediation at the Cimarron facility. NRC stated, "NRC staff maintained its position that Tc-99 does not have to be listed on the license but, it does have to be removed or stabilized to meet the 4 mrem/yr dose criteria incorporated by reference in the SDMP action plan. … Using the International Commission on Radiological Protection (ICRP) 26/30 methodology (Federal Guidance Report 11), the NRC staff equated 4 mrem to a concentration of 3790 pCi/1. NRC staff has since been using that as the "NRC derived concentration" in correspondence with Cimarron. Using ICRP 2, EPA's MCL for Tc-99 is 900 pCi/1. During this

meeting NRC staff stated that it will continue to use the NRC derived concentration of 3,790 pCi/1 as the release criteria for the Cimarron site."

NRC commented on the December 30, 2003 Technitium-99 Groundwater Assessment Report in a letter dated November 24, 2004. NRC's sole comment on the report was, "The licensee should not abandon any of the monitoring wells used in this assessment at this time." This indicated that, although NRC did not dispute the contention that Tc-99 would not require remediation, NRC was not yet willing to "close the books" on Tc-99 at the Cimarron site.

During July and August 2004, Cimarron sampled numerous wells at the Cimarron site, and submitted the analytical results to NRC on November 5, 2004. In a letter dated December 24, 2004, Cimarron stated that none of the analytical results exceeded 3,790 pCi/l, and proposed to modify the environmental monitoring program for Tc-99. Cimarron maintained that it was time to conduct a post-decommissioning monitoring program for Tc-99. The letter proposed that Wells 1312 and 1336A be sampled for eight consecutive quarters and analyzed for Tc-99.

In a letter dated May 2, 2005, NRC rejected Cimarron's December 24, 2004 proposal. In particular, NRC noted the lack of data from locations downgradient from Wells 1312 and 1336A, and emphasized the need for delineation of Tc-99 in the downgradient direction. NRC said that a site-wide, comprehensive groundwater monitoring program for uranium and Tc-99 needed to be implemented.

Cimarron had already begun a site-wide comprehensive groundwater assessment, and on August 10, 2005, submitted Site-Wide Groundwater Assessment Review. This report identified all potential sources of groundwater on site, described the installation of monitoring wells at locations downgradient from those sources, and reported the analytical results of samples collected from those locations. None of the locations downgradient from Wells 1312 or 1336A, or from additional wells installed near U-Pond #2, yielded Tc-99 concentrations above 3,790 pCi/l.

From 2002 through 2006, Well 1336A was sampled fifteen times, and the samples were submitted for Tc-99 analysis; the highest concentration of Tc-99 in any of those samples was 1,060 pCi/l. Seep 1208 was also sampled fifteen times; although some of the results reported in 2002 and 2003 exceeded 3,790 pCi/l, the concentration of Tc-99 at this location exhibited a declining trend. The concentration of Tc-99 had not exceeded 3,790 pCi /l since 2003, and the decline in concentration with time was demonstrated, with no concentrations exceeding 3,000 pCi/l in the three samples collected during 2005 and 2006.

Because of the conclusions reached in the Site-Wide Groundwater Assessment Review, Cimarron submitted an August 31, 2007 request that NRC release Cimarron from continued monitoring for Tc-99 and approve the abandonment of monitoring wells installed for the assessment of Tc-99 in groundwater.

In a letter dated August 20, 2008, NRC approved the removal of numerous wells from continued monitoring, as well as their abandonment. Included in the list of wells were monitor wells 1312 and 1336A, the two wells that had in the past yielded the highest concentrations of Tc-99 in groundwater. These two wells have not yet been abandoned.

Analysis of groundwater and surface water for Tc-99 was dropped from the environmental monitoring program in 2009. However, when conducting groundwater assessment for nitrate and fluoride in April 2011, NRC requested that EPM analyze samples obtained from five monitor wells for Tc-99 to "close the books" on Tc-99. NRC had approved the abandonment of all five wells in its August 20, 2008 letter. None of the wells yielded Tc-99 concentrations above 3,790 pCi/l; the highest concentration recorded was 2,030 in Well 1346, and the second highest concentration recorded was 647 pCi/l in Well 1336A.

NRC has begun a departure from their repeatedly stated position that they would use the 3,790 pCi/l concentration as the release criterion for the Cimarron site. NRC has suggested that EPM may need to reduce the concentration of Tc-99 in groundwater to less than 900 pCi/l, the Tc-99 concentration which EPA equates to 4 mrem/yr dose from a drinking water pathway.

Concentrations of Tc-99 in groundwater have been consistently below 3,790 pCi/l since 2004. Out of a total of 258 groundwater samples analyzed for Tc-99, only two samples yielded results exceeding 3,790 pCi/l; both were from Well 1312. The last nineteen samples from these wells yielded less than 1,200 pCi/l Tc-99; eleven of those nineteen samples yielded less than 900 pCi/l Tc-99. Out of a total of 49 surface water samples (Seeps 1206 and 1208) analyzed for Tc-99, eight exceeded 3,790 pCi/l; all were from Seep 1208. The last nine samples collected from this location (since 2003) and analyzed for Tc-99 have yielded less than 3,790 pCi/l, and the concentration at this location has declined to 1,200 pCi/l in 2011. A true groundwater sample cannot be obtained at this location, and the licensee has maintained that groundwater (i.e., drinking water) criteria should not be applied at this location. Attachment 1, "Tc-99 Data from Select Wells" provides Tc-99 concentration data for Wells 1312, 1336A, 1346, and Seep 1208 for NRC review.

EPM requests that NRC provide written confirmation that remediation of groundwater for Tc-99 will not be required at the Cimarron site, that groundwater complies with the release criterion for

Tc-99, and that Tc-99 will not need to be addressed in the groundwater remediation plan, post-remediation monitoring program, or in final status survey plans or reports leading to license termination.

Decommissioning Status of Various Media in Subarea F

Burial Ground #1

Several burial trenches were excavated to open Burial Ground #1 in 1965; placement of waste in the four trenches that comprised Burial Ground #1 began in 1966. The trenches were capped in 1970. From 1986 through 1988, the trenches were excavated, and approximately 2,400 cubic yards of material were shipped to a licensed disposal facility. Over 1,100 cubic yards of less contaminated material were stockpiled near the process buildings for eventual burial in the BTP Option 2 disposal trenches. Final status and confirmatory surveys were performed on the four trenches, which remained open until 1993. From 1988 through 1993, the base of the open trenches was in direct hydraulic connection with Sandstone B. During the five to seven years the trenches remained open, precipitation and surface water runoff into the trenches increased the hydraulic head on this area, "flushing" the dissolved uranium from the trenches toward the Cimarron River alluvial deposits. NRC approved the backfill of the trenches in license amendment No. 9, issued December 28, 1992, and the trenches were backfilled between March and July 1993.

Concrete Rubble

Since decommissioning began in 1976, concrete slabs from various structures and buildings which had been decontaminated had been placed in several areas of the Cimarron site. The slabs had been surveyed in accordance with then-existing criteria before they were broken into manageable sizes and relocated elsewhere on the site. Some of these slabs (termed "rubble") had been placed northeast of Pond #2, the easternmost pond on the site, to control erosion. Both limits for surface contamination and approved survey methods changed over time, and NRC required the licensee to demonstrate that the rubble complied with present decommissioning criteria, using survey methodology stipulated in License Condition 27(c).

On March 10, 1998, Final Status Survey Report for Concrete Rubble in Sub-Area "F" was submitted to NRC. This report presented the results of exposure rate and surface contamination measurements, and based the final determination of compliance with decommissioning criteria on a calculation of the volumetric activity of the concrete rubble.

NRC asked questions regarding the survey of the rubble in a May 6, 1998 teleconference. Cimarron responded to those questions in a May 6, 1998 letter. NRC issued written comments on the final status survey report (FSSR) on September 10, 1998, and Cimarron responded to

those comments on October 6, 1998. In a letter dated March 1, 1999, NRC stated that it had no further questions regarding the FSSR for concrete rubble.

NRC demonstrated its approval of the survey methods used for the concrete rubble by amending License Condition 27(c) to read, "For concrete rubble located in Phase II and Phase III subareas, the licensee may use the concentration averaging for concrete rubble as described in submittals dated March 10, 1998, June 15, 1998, and October 6, 1998."

No confirmatory survey has yet been performed for the concrete rubble. However, the July 15, 1998 NRC inspection report stated that NRC's review of the data, instrument calibration and functionality confirmed that the data presented in the final status survey were correct. In a November 3, 1998 inspection report, NRC stated, "Survey data indicated that the concrete slabs that were removed from Sub-Area K and placed in Sub-Area G met the NRC's release criteria for unrestricted use." Because survey methodology, instrumentation, and criteria were the same for Subarea F concrete as for Subarea G concrete, EPM maintains that the concrete in Subarea F should be considered releasable for unrestricted use.

Surface and Subsurface Soil

On July 25, 1995, Cimarron submitted Final Status Survey Plan for Phase II Areas, which includes Subarea F. This final status survey plan presented the plan for the survey of Subarea F, among other areas, addressing only surficial soils, defined as 0-6 inches in depth. NRC issued a request for additional information on October 31, 1996. Cimarron responded to NRC's comments in a letter dated January 28, 1997, and NRC approved the FSSP in a letter dated March 14, 1997.

On September 8, 2005, Cimarron submitted Final Status Survey Report, Subarea F. This report presented the results of the final status survey which had been performed in accordance with the NRC-approved FSSP. This final status survey report included volumetric activity of subsurface soil samples collected from potentially affected areas within Subarea F.

In a letter dated November 30, 2005, NRC identified two concerns related to the September 8 FSSR: volumetric averaging was not used for the subsurface samples included in the report, and the FSSR did not report the results of subsurface investigations performed between the time after the final status survey soil samples were collected and the time the report was submitted. TE second comment related to subsurface soil sampling and analysis that was performed during a groundwater assessment for Burial Area #1 in 2002; a report on which was submitted to NRC in January 2003. NRC requested that Cimarron resubmit a FSSR for Subarea F which included volumetric averaging and the results of subsequent investigations.

Cimarron responded to NRC's comments in a letter dated December 21, 2005. In this response, Cimarron noted that none of the analytical results for subsurface soil samples reported in the final status survey report exceeded the release criterion; consequently, volumetric averaging was not needed to demonstrate compliance with the release limit. Cimarron also stated that analytical results for subsurface soil samples collected during its 2002-2003 investigation in Subarea F (and extending into Subarea C) had already been reported to NRC, and none of those subsurface soil samples exceeded release criteria. Since volumetric averaging was not needed for the FSSR, and all subsequent analyses had already been reported to NRC, the licensee did not believe it appropriate to resubmit an FSSR.

NRC responded to Cimarron's December 21 letter on March 8, 2006, stating that the survey methodology used for subsurface samples in Subarea F was based on NUREG/CR-5849, which was not appropriate for subsurface soil. NRC reiterated its request that Cimarron resubmit an FSSR.

On November 20, 2007, Cimarron submitted Burial Area #1 Subsurface Soil Assessment. This report presented the analytical results from the 1991 final status survey of the open burial trenches, the 1992 confirmatory survey of the open burial trenches, the 1996 samples collected for the Subarea F FSSR, and the 1999 and 2002 groundwater assessment efforts in Burial Area #1.

While subsurface borings are distributed throughout Burial Area #1, extending beyond the area impacted by groundwater, subsurface borings are more closely spaced in the "heart" of the uranium plume. Over 75% of subsurface soil samples were obtained from the immediate area surrounding the burial trenches or within the "heart" of the groundwater plume. Yet not one of over 2,000 subsurface soil samples yielded uranium above the release criteria.

The status of rubble and surface and subsurface soil in Burial Area #1 is key to the development of groundwater remediation and final status survey plans leading to license termination. EPM requests that NRC concur that no further final status surveys need be performed for concrete rubble or surficial soil in Subarea F.

Although EPM believes sufficient information has been obtained to demonstrate that subsurface soil is releasable for unrestricted use, EPM will continue to collect subsurface soil during the installation of groundwater remediation components in Burial Area #1. EPM will scan subsurface soil that is brought to the surface in this area when borings are drilled for well installations, and when soil and/or sandstone are excavated for the BA#1 groundwater extraction trench and when trenches are dug for water transfer lines or utility runs. Should scan readings

Attachment to March 12, 2012 Letter
Technitium-99 in Groundwater Data for Select Monitoring Wells

Location	Date	Result (pCi/l)	Qual
1312	10/21/96	856	
	03/06/97	3,680	
	06/05/97	1,470	
	09/26/97	2,190	
	12/17/97	1,570	
	03/23/98	1,850	
	05/29/98	1,820	
	09/16/98	2,110	
	12/08/98	1,650	
	03/23/99	1,450	
	06/21/99	569	
	09/22/99	919	
	12/01/99	1,410	
	03/28/00	1,350	
	06/28/00	930	
	09/05/00	1,100	
	12/04/00	1,120	
	03/27/01	957	
	06/27/01	747	
	12/03/01	744	
	06/26/02	826	
	06/26/02	824	
	09/23/02	1,030	
	12/11/02	1,030	
	02/24/03	1,260	

Location	Date	Result (pCi/l)	Qual
1312	06/24/03	2,060	
	09/23/03	2,320	
	09/23/03	2,850	
	12/17/03	4,300	
	03/03/04	4,590	
	05/25/04	910	
	08/24/04	607	
	12/14/04	943	
	12/14/04	966	
	12/14/04	876	
	02/22/05	718	
	02/22/05	871	J
	05/24/05	801	
	05/25/05	755	
	09/22/05	1,050	
	12/13/05	1,150	
	02/08/06	915	
	05/23/06	851	
	05/23/06	838	
	09/27/06	1,150	
	12/12/06	785	
	08/16/07	1,050	
	06/24/08	621	
	06/24/08	573	

Attachment to March 12, 2012 Letter
Technitium-99 in Groundwater Data for Select Monitoring Wells

Location	Date	Result (pCi/l)	Qual
1208	05/02/96	4,550	
	03/06/97	3,960	
	06/04/97	2,800	
	09/18/97	3,040	
	12/17/97	2,080	
	03/23/98	2,300	
	05/26/98	1,930	
	09/15/98	2,640	
	12/07/98	1,820	
	03/23/99	2,370	
	06/23/99	1,200	
	09/22/99	3,140	
	11/30/99	3,470	
	03/27/00	4,350	
	06/30/00	14.4	U
	08/21/00	547	
	09/06/00	4,030	
	03/27/01	3,560	
	06/25/01	3,300	
	06/25/01	3,420	
	12/04/01	2,490	
	06/26/02	3,230	
	06/26/02	2,640	
	09/24/02	4,050	
	12/11/02	3,990	
	02/24/03	4,280	
	06/24/03	5,300	
	09/23/03	2,810	
	09/23/03	4,020	
	12/17/03	3,220	
	03/03/04	3,400	
	05/26/04	3,140	
	08/24/04	3,320	
	05/24/05	2,810	
	05/24/06	2,980	
	09/27/06	2,910	
	08/16/07	1,580	
	06/25/08	1,200	

Location	Date	Result (pCi/l)	Qual
1346	04/22/03	291	
	06/19/03	42.6	U
	09/17/03	84.2	
	04/15/11	2,030	