

February 10, 2005

Mr. Steve Tarlton, Unit Manger  
Radiation Management Unit  
Hazardous Materials and Waste Management Division  
Colorado Department of Public Health  
and Environment (CDPHE)  
4300 Cherry Creek Drive South  
Denver, Colorado 80246-1530

Dear Mr. Tarlton,

I am responding to your October 1, 2004 submittal requesting our review and comment on the draft Completion Review Report (CRR) for the license termination of the Durita Uranium Mill Site (Colorado Radioactive Materials License # 317-02). We appreciate the opportunity to comment on this draft version of the CRR and we look forward to working with your staff to facilitate the submittal of the final CRR.

We have reviewed the draft CRR in accordance with the criteria in the Office of State and Tribal Programs (STP) Procedure *SA-900: Termination of Uranium Milling Licenses in Agreement States*. STP Procedure SA-900 describes NRC's review process for making the determination that all applicable standards and requirements have been met prior to Agreement State uranium milling license termination, as required by 10 CFR 150.15a(a) and Section 274c of the Atomic Energy Act of 1954, as amended (Act).

We appreciate CDPHE's effort to follow the suggested format in STP Procedure SA-900. Enclosed is a list of our comments on the draft CRR that we request be addressed before your submittal of the final CRR. We are prepared to hold a teleconference (or meeting) with you and your staff to discuss our comments and to assist you in resolving the comments prior to your submittal of the final CRR. We would appreciate receiving your response, to these comments, within 90 days of the date of this letter. Please let us know if you need additional time.

If you have any questions on the comments, or if you would like to schedule a teleconference or meeting, please contact me, or Terry Brock of my staff at 301-415-2323; Email: [tab2@nrc.gov](mailto:tab2@nrc.gov).

Sincerely,

/RA/

Paul H. Lohaus, Director  
Office of State and Tribal Programs

Enclosure:  
As stated

Mr. Steve Tarlton, Unit Manger  
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Hazardous Materials and Waste Management Division  
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Paul H. Lohaus, Director  
Office of State and Tribal Programs

Enclosure:  
As stated

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U.S. Nuclear Regulatory Commission (NRC) Review Comments  
of the  
Colorado Department of Public Health and the Environment's (CDPHE)  
Draft Completion Review Report (CRR)  
for the  
License Termination of the Durita Uranium Mill Site (RML 317-02).

The NRC staff, in its review of the Draft CRR for the Durita Uranium Mill Site, followed procedures, guidance, and criteria found in STP Procedure SA-900 "Termination of Uranium Milling Licenses in Agreement States." Based on the review, staff offers the following four general and thirty-seven specific comments for your review and resolution. In the *Specific Comments* section we request each identified issue be addressed in the final CRR or explained to us for resolution.

General Comments

The reviewers believe the organization of the document can be improved to help better present the findings and determinations in the final CRR. Some examples follow:

- (1) Section III "Description of Remedial Actions" appears to be a subordinate heading, but it appears to be presented as a main heading.
- (2) Page 6, Section 2, "Geotechnical Stability," this section contains subsections that address site history, operations, general design features, and erosion protection. It would be helpful to have the general information and a detailed description of the site before the discussion of contamination cleanup in Section 1.3.
- (3) Page 9, Section 2.1.8, "Surface Restoration," provides information on erosion protection and soil cover characteristics rather than surface restoration.
- (4) Design features are discussed in several pieces and places. It was difficult to follow what was accomplished.

One suggestion that may help organize the report is to develop a table of "applicable standards and requirements related to topics discussed in the CRR", similar to Table B-1 in STP Procedure SA-900 Appendix B, page B-6. We believe the addition of this table will help future reviewers and readers of the CRR to succinctly find the most relevant sections of the CRR.

Specific Comments

The specific comments on the draft CRR are divided into four technical review areas:

(1) geotechnical stability; (2) surface water protection and erosion control; (3) radiation cleanup and control, and radon emanation; and (4) groundwater remediation.

ENCLOSURE

## I. Geotechnical Stability

Our review of the Geotechnical Stability section of the CRR indicates that all applicable standards and requirements have been met for this section. However, the following additional information, or areas of comment, need to be addressed to provide a more substantial basis or understanding of the bases used by CDPHE in making its' determination.

Comment	Section of CRR	Reviewer Comment	Comment Resolution
1	Page 5, Section II.1.3, paragraphs 2 and 3	Additional information regarding the treatment of uncrushable debris could be provided to assure that long-term stability is attainable.	
2	Page 8, Section III.2.1.4, paragraph 3	How does the measured total settlement compare to the estimate? If the numbers vary, provide discussion regarding the reason(s).	
3	Page 8, Section III.2.1.5, paragraph 2	How was the temporary cover placed and compacted?	
4	Page 9, Section III.2.1.6, paragraph 1	Additional discussion regarding the nature of the solidified and neutralized contaminants would be relevant and helpful.	
5	Page 11, Section III.2.1.9, paragraph 3:	The history of frost penetration is not as relevant as the potential for the penetration depth to vary in the next 200 years. A statistical approach to confirm likely worst-case future frost penetration would be consistent with previous work by others and is recommended. However, the frost protection design does appear to be robust.	
6	Page 14, Section III.2.1.11, paragraph 1	A brief discussion of the requirements for liquefaction (loose, saturated granular materials) would be helpful. The state can likely show that the conditions conducive to liquefaction are highly unlikely to occur.	
7	Page 17, Section III.3.3, paragraph 3	It should be confirmed that compaction test locations and records are available for review.	

Comment	Section of CRR	Reviewer Comment	Comment Resolution
8	Page 17, Section III.3.3, paragraph 5	How was it determined that “all chemical reactions had taken place”? Discuss the relevance of this statement.	

## II. Surface Water Hydrology and Erosion Protection

Our review of the Surface Water Hydrology and Erosion Protection section of the CRR indicates that additional information is needed to provide sufficient information on the bases used by CDPHE in making its’ determination that the site will meet Criteria 1, 4, and 6. This information is needed to help us in making our determination that all applicable standards and requirements have been met for this section. The following comments should be addressed in the next version of the CRR or in the Comment Resolution section provided.

Comment	Section of CRR	Reviewer Comment	Comment Resolution
1	Page 11, Section III.2.1.9	The specifics of the <i>probable maximum precipitation</i> (PMP) storm event were not included in the summary. The parameter used to determine and calculate the precipitation should be discussed.	
2	Page 11, Section III.2.1.9	The basis of the <i>probable maximum flood</i> (PMF) should be included. The methods used to establish a PMF from the PMP and the variables used should be included in the documentation.	
3	Page 11, Section III.2.1.9	The methodology used to size erosion control should be clarified. The Horten method was applied to some areas of the site requiring rock. It should be clarified what methods were used to determine the need and size of erosion protection for all areas of the project site.	
4	Page 24, Section III.5.1	The methods used to determine the amount of rock cover along with the assumptions should be discussed.	

<b>Comment</b>	<b>Section of CRR</b>	<b>Reviewer Comment</b>	<b>Comment Resolution</b>
5	Page 24, Section III.5.1	The methods used to determine the amount of scour protection required should be included in the review. In addition, variables, including the design flows and all other variables used in the calculations, should be discussed for applicability to the design.	
6	Page 24, Section III.5.1	Explain the basis for determining the tributary area riprap including design flow, methodology and results.	
7	Page 24, Section III.5.1	The erosion protection requirements referred to in the last paragraph of the section should be summarized. A summary of changes and why the changes are necessary should also be included.	
8	Page 24, Section III.5.2	Any areas where water flow will converge should be considered and discussed for additional erosion protection.	
9	Page 24, Section III.5.2	Specific characteristics of the draw should be stated including flow characteristics, time of concentration and drainage area.	
10	Page 24, Section III.5.2	State what methods were used to establish the geometry of the channels.	
11	Page 24, Section III.5.2	The methods for determining the magnitude and the routing of the PMF should be included in the report.	
12	Page 25, Section III.5.4	Analysis of the cover should be discussed and should include the method by which a vegetated cover was deemed satisfactory.	
13	Page 26, Section III.5.5	Please expand on the reason that the cover materials utilized during construction were deemed acceptable.	
14	Page 26, Section III.5.5	Please expand on the methods used in construction that were observed and considered acceptable.	
15	Page 26, Section III.5.5	Please clarify that the testing requirements that the materials met where specified in an approved reclamation plan.	

Comment	Section of CRR	Reviewer Comment	Comment Resolution
16	Page 26, Section III.5.5	Discuss whether the remaining mancos shale top surface ("upper 2-4 inches") was considered as a source of sediment to the channel and whether capacity would be effected.	
17	Page 27, Section III.5.6	Monster Engineering evaluated the sedimentation and concurred with the conclusion. The evaluation should be provided in more detail (what analysis was performed, etc.). The methods used to evaluate the conclusion should be stated.	

### III. Radiation Cleanup and Control / Radon Emanation

Our review of the Radiation Cleanup and Control / Radon Emanation section of the CRR indicates that additional information is needed to provide sufficient information on the bases used by CDPHE in making its' determination that all applicable standards and requirements have been met. The following comments should be addressed in the next version of the CRR or in the Comment Resolution section provided.

Comment	Section of CRR	Reviewer Comment	Comment Resolution
1	Page 8, Section III.2.1.4, first paragraph, last sentence	There appears to be a discrepancy between this section where rock is used as cover for the cells (referring to leach tanks and closure cell), yet in section 2.1.5, second paragraph, a vegetative cover is utilized as the final cover over the ponds and the leach tanks (this is also repeated in section 3.) Are these sections discussing the raffinate or evaporation ponds, or both?	
2	Pages 8-10	There is limited discussion of decommissioning the four raffinate ponds (Figure 2), unless these are referred to as process-liquid storage ponds as found on page 14, section 3, instead of the six waste liquid evaporation ponds. Please clarify and use consistent language to describe the ponds.	
3	Page 11, Section III.2.1.9, second paragraph	The radon emanation discussion addresses only one cell (with a cover thickness of 5.28 feet). This seems to describe the heap tanks as the closure cell and is said to have 3 feet of soil and 6 inches of rock cover (page 9, second paragraph and page 51, last paragraph). Please address the radon emanation for all the cells.	
4	Page 11, Section III.2.1.9, third paragraph	The CRR indicates a frost depth of 2 feet or less for the site (regional data indicates at least 4 ft likely). Apparently the radon flux model did not use density and porosity input values for the upper cover soil that were modified to reflect the degradation by freeze-thaw damage over the years. Even if this revised modeling shows that the long-term radon flux results meet the limit for the heap tanks (maybe not for the closure cell), the assumed degree of conservatism is not there.	



Comment	Section of CRR	Reviewer Comment	Comment Resolution
5	Page 17, Section III.3.3, first paragraph	The soil samples were taken on 100-meter grids, which suggests one sample representing 2500 m <sup>2</sup> was used to demonstrate compliance with a 100 m <sup>2</sup> standard, or demonstration of conformance relied heavily on the gamma survey. Since U-nat and Th-230 would not be detected by gamma surveys, the soil sampling design and results for these radionuclides should be mentioned on this page, or the appropriate section referenced.	
6	Page 19, Section III.4.1, second paragraph, first sentence	The seven agglomerator head samples were tested six times to set cleanup criteria for some heavy metals. Explain why these samples were chosen. Also, there appears to be a contradiction in that vanadium was tested in these samples, yet the fourth sentence says vanadium analysis was not conducted, then in the next sentence, a cleanup criterion for vanadium is provided. It also appears that the Th-230 and Ra-226 background values were based on only three samples. How are these average values representative of the entire area?	
7	Page 22, Section III.4.4	Some areas were remediated for Th-230, but the volume of Th-230 contaminated soil is not indicated (bottom of page 22, an additional four feet of material removed in the pond for Th-230). If appreciable amounts of Th-230 (significantly above 14 pCi/g) are in any cell, the 1000-year Ra-226 value would need to be used in the model to estimate the long-term radon flux.	
8	Page 23, Section III.4.5.1	Radon flux was measured at 138 locations according to EPA Method 115. There are apparently three heap tank cells and the closure cell that contain byproduct material. Method 115 states that at least 100 radon flux measurements be taken on each disposal cell. Please clarify or explain this variance.	

<b>Comment</b>	<b>Section of CRR</b>	<b>Reviewer Comment</b>	<b>Comment Resolution</b>
9	Page 23, Section III.4.5.1	The language will need to be changed to reflect that the RADON code was used and is not a dose assessment code, but a radon flux code. We acknowledge the language in the sample CRR in appendix B of SA-900 will need to be changed to be more accurate and to reflect this comment.	
10	Page 51, Criterion 6	The leach tank soil covers are reported as at least 4 feet thick and the closure cell cover at least 2.5 feet thick (presumably there is a thicker layer over the higher source term.) However, this does not support the value of 5.28-foot cover thickness mentioned in second paragraph of section 2.1.9. The average thickness of these various soil covers should be stated in this criterion, in addition to the minimum and maximum thickness values.	

#### IV. Groundwater Remediation

Our review of the Groundwater Remediation section of the CRR indicates that additional information is needed to provide sufficient information on the bases used by CDPHE in making its' determination that all applicable standards and requirements have been met. The following comments should be addressed in the next version of the CRR or in the Comment resolution section provided.

<b>Comment</b>	<b>Section of CRR</b>	<b>Reviewer Comment</b>	<b>Comment Resolution</b>
1	Page 29, Section III.6.2.1	The report states that the groundwater detection monitoring program was changed to a compliance monitoring program. Why did this occur? The report states earlier that the wells did not show releases of constituents, however, typically a groundwater monitoring program is only changed from detection to compliance monitoring when a leak has been detected.	

Comment	Section of CRR	Reviewer Comment	Comment Resolution
2	Page 30, Section III.6.2.2	The report states that constituents of concern were uranium, radium 226, radium 228, thorium 230, arsenic, nickel, and thallium. The report states earlier that the wells did not show releases of constituents, so it is unclear why these constituents are of concern.	

## TECHNICAL REVIEWERS

<u>Name</u>	<u>Area Covered</u>
Terry Brock, Ph.D. Health Physicist, STP	Project Manager
Elaine S. Brummet, Ph.D. Health Physicist, NMSS	Radiation Cleanup and Control, Radon Emanation
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Daniel S. Rom Geotechnical Engineer, NMSS	Geotechnical Stability
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### Note:

NMSS: Office of Nuclear Material Safety and Safeguards  
STP: Office of State and Tribal Programs