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Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department
of Public Health
and Environment

October 17, 2011

Mr. John Hamrick
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Subject: Soil Remediation Plan for Site Decommissioning and License Termination, Criterion 6(6) Review

Mr. Hamrick,

In our letter of May 13, 2011 we stated that the Division would provide comment on the Criterion 6(6) derivation of soil cleanup limits and Final Status Survey Plan under separate cover. This letter addresses staff review of the Criterion 6(6) portion of the subject document.

Basically, the approach taken by Cotter in the report is use of RESRAD OFFSITE and a scenario of rural residential farmer over a 1,000 year time frame to calculate the site-specific clean up values for Th-230 and U-tot. Ingrowth of Th-230 into Ra-226 is limiting and supersedes the calculated value.

We have the following general and specific comments for your consideration.

General Comments:

1. License condition 29.1 remains and emphasizes that the site will be cleaned ALARA below the limits derived through the Criterion 6(6) process for uranium, thorium and radium. As such, it is our determination that the 15 pCi/g subsurface limits are not ALARA, and while not rescinded, should not be relied upon. Note that EPA guidance uses the surface standard in setting the benchmark dose, not the subsurface standard.¹ Please note we refer to this EPA guidance often in this letter. We also note Cotter did not use the subsurface criteria in deriving the benchmark doses. The State agrees with Cotter that the subsurface standard is not ALARA.
2. The Division is willing to accept use of RESRAD-OFFSITE, although it is not discussed in NRC guidance, such as Appendix E of NUREG 1569, the most recent document addressing Criteria 6(6) to come from NRC (we note that Appendix E is almost identical to Appendix H of NUREG-1620 R1, 2003).² Unit staff discussed the use of RESRAD-OFFSITE with the NRC Decommissioning Branch. While they have not evaluated the model with respect to Criterion 6(6), they did not provide any reason not to be able to accept its use, provided the scenarios and parameters were appropriately selected and

¹ See "Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR 40 Appendix A, I, Criterion 6(6)" Directive no. 9200.4-35 dated April 11, 2000.

² The one notable difference is in shielding factors and occupancy factors which are relevant in Cotter's case.

- justified, particularly the location of the receptors. Cotter demonstrated adequately that the location(s) modeled represent the reasonably maximally exposed individual, assuming failure of institutional controls since they placed the receptors in the mill area and evaluated a large area (> 300 acres).
3. Since the Criteria 6(6) rule is a requirement of Colorado regulation it is assumed that it will also be an ARAR under CERCLA. The report only speaks to UMTRA closure requirements and is silent on the CERCLA (Superfund) requirements. Since protectiveness is a requirement under CERCLA in order to remove the site from the National Priorities List, demonstration of protectiveness, here defined as 10^{-4} risk, must also be demonstrated. It is not clear to us that the 25.8 mrem dose from radium-226 used in the benchmark exercise will be acceptable to EPA. Note that the EPA guidance states: "If a site-specific dose assessment indicates that the radium benchmark dose will be above 15 mrem/y EDE, the dose limit that EPA generally considers minimally acceptable under CERCLA, then the NRC rule should generally not be used to establish cleanup levels at that CERCLA site. EPA has previously determined that dose limits greater than 15 mrem/y generally will not provide a protective basis for establishing preliminary remediation goals (PRGs) under CERCLA." Unless Cotter is willing to establish more stringent cleanup goals under CERCLA, it is suggested that the model be revisited, and the assumptions evaluated such that the radium benchmark dose is reduced to less than 15 mrem/y. The EPA guidance emphasizes that the risk assessment must show protectiveness to at least 10^{-4} .
 4. Additionally, the EPA guidance notes that if "supplemental standards" (sic) are applied, the Criteria 6(6) rule does not apply. We note here that supplemental standards don't apply at Title II sites, however, any areas Cotter will propose to not remediate that does not meet the surface soils standard i.e., windblown areas, will need specific approval from the NRC Commissioners, and serious consideration must be given to adequately characterizing those areas and conducting thorough risk assessments showing that the areas will be protective without remediation or justifying through reasons of ecological damage, as to why they may remain.
 5. The assumption must be that the site is released for unrestricted use (except for the portion going to DOE).
 6. Since Cotter has processed thoriated ores over the years, and has an inventory of thoriated ore still on site, Th-230 and Th-232 soil concentrations should be evaluated and summed and compared to the radium standard of 5 pCi/g standard independently of the concentration limits for those radionuclides calculated using the benchmark dose.
 7. Cotter acknowledges that the sum of ratios calculation must be addressed since more than one radionuclide is present. There can be instances where the radium cleanup standard would be less than 5 pCi/g due to contributions from the thorium series and uranium isotopes.³
 8. It is reasonable to assume that land use restrictions will be in place for the foreseeable future, the evaluation needs to recognize that the performance period for protecting future receptors is essentially perpetual. It is not possible to assume land use patterns and behaviors for more than about 100 years.⁴ Therefore, conservative assumptions need to be evaluated to determine if it would change the limits for thorium and uranium. The report does assume institutional controls fail, but does not consider the full family farm scenario as a bounding scenario (see below).
 9. It is also plausible, based on past history of the area, that an industrial scenario would be feasible. The industrial scenario should be evaluated, and if more limiting than the chosen scenario should also be presented.
 10. NUREG-1757, Vol. 2 discusses screening scenarios, bounding scenarios, and reasonable scenarios (it is geared for the License Termination Rule and not Criterion 6(6), but the discussion is relevant.) Since no durable institutional controls have yet been defined for areas to be free released, we cannot just assume they will be in place. Therefore, it is recommended that in addition to the sensitivity analysis, a bounding scenario be modeled, which would be the full family farm (all pathways but radon considered) to provide

³ See "Implementation of Benchmark Dose Approach at FUSRAP Sites", Julie Peterson and Brian Hearty, USAEOE. Proceedings of Waste Management 01.

⁴ See NUREG 1757, Vol.2, Chapter 5, Section I.3, and Appendix M.

context for (primarily) the uranium standard. Again, we concur that thorium will be limited to ingrowth over the performance period and the residential farmer scenario is acceptable for determining the criterion (unless an industrial scenario proves more limiting).

11. Site specific data have been used for the most important parameters.

Specific Comments:

1. Page 1. ¶4. Mention that the site is also on the National Priorities List, and cleanup must demonstrate protectiveness of the environment in addition to the Part 18 standards.
2. Page 1. ¶ 5. Change "Radiation Control Unit" to "Radiation Program."
3. Page 2. Last ¶. DOE will only take possession of the impoundments and perhaps small adjoining areas, but certainly they will not take the entire restricted area. Cotter had previously in earlier environmental assessments anticipated areas of complete free release, which means no institutional controls. DOE may not take custody of portions of sites that are undergoing groundwater remediation, as that is still a remedy in process. If an Alternate Concentration Limit is passed or Monitored Natural Attenuation is chosen as a remedy, that may be a remedy that could invoke release of the surface area. DOE Legacy management does not want to be responsible for large surface areas due to groundwater. Other durable controls will need to be considered over the long-term. What restrictions and institutional controls are currently in place outside of the Lincoln Park area? We recognize that Cotter owns a considerable buffer area around the site and has no intention of selling in the short term, however that is not a durable institutional control. This paragraph should be rewritten.
4. Page 3. First ¶. We disagree that there will be strong opposition to development over the long term. In fact, DOE Legacy Management is addressing and encouraging development on some UMTRA sites, such as at Rifle, where a solar array and wastewater treatment facility has been constructed. Energy development is also a candidate for development around the site, and other UMTRA sites, such as at Grand Junction are seeing residential development encroach near the site much sooner than anticipated. It is our experience that stigma goes down and in some cases disappears soon after site closure. We would also like to point out that residual contamination is limited to the groundwater, and will be largely mitigated in the near term, further reducing stigma. There is no indication that Cotter currently is contributing to negative public health, so it is anticipated that less risk to public health will persist after closure.
5. Page 3. Second ¶. Again, this paragraph shows that the focus is on the near term and not long-term. It is our concern that Cotter is not sufficiently considering the complexities of planning and implementation of durable institutional controls, while we understand that is not the purpose of this report.⁵
6. Page 3. Modeling Code and Parameter Selection. We concur with pathways selected.
7. Page 6. Table A1. The gamma shielding factors in Appendix E and Appendix H have different ranges and may be something to look at in order to bring the radium dose down.
 - a. It is not clear why a site specific evapotranspiration coefficient is not used.
 - b. Cotter has a met station. Why not use site-specific data for annual precipitation. Cotter should be able to use many years worth of data to derive a median value that is representative of site conditions.
 - c. We assume Cotter used FGR 11, 12, 13 settings. Would using ICRP 60 DCFs result in a more realistic dose? CDPHE can approve use of ICRP 60 DCFs with justification, as we have done with RH-300.
 - d. Cotter has stored and handled thoriated materials in the subject area. Until characterization data show otherwise, Cotter must account for the natural thorium series in the modeling exercise.

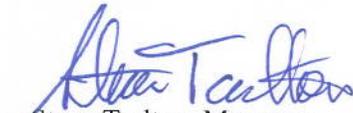
⁵ In addition to NUREG 1757, see "Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance" OSWER Directive 9355.7-18, September 13, 2011 and "Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites." OSWER 9355.0-89, November 2010, Interim Final.

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- e. There is no discussion of the atmospheric transport parameters, such as deposition velocity. Site specific data should be available for more of the soil and atmospheric parameters, such as dry bulk density.
 - f. The default value for the saturated zone in our version of the model appears to be 100 m. The text states 250 m. Is this a sensitive parameter?
 - g. The water use input table is not discussed, nor is the groundwater transport table. Are all the inputs default?
8. Page 7. Results. As noted above, a benchmark dose of 25.8 mrem/y does not meet CERCLA protectiveness.
 9. Page 16. The ASTDR has a more recent version of the toxicological profile for uranium. It should be cited.

Based on the above comments, Cotter must revisit the cleanup standards issue and derive cleanup values that not only meet Part 18 of the Colorado Rules and Regulations Pertaining to Radiation Control, but also CERCLA protectiveness. Since this is the first use of RESRAD OFFSITE we are aware of for calculating Criterion 6(6) values, Cotter must also better document and justify input parameters for the RESRAD OFFSITE model. Feel free to contact me if you have any additional questions at (303) 692-3423 or electronically at steve.tarlton@state.co.us.

Sincerely,



Steve Tarlton, Manager
Radiation Program

SFT:pve

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