May 26, 2005

Mr. Ray Plieness, Acting Manager
U.S. Department of Energy
Grand Junction Office
2597 B¾ Road
Grand Junction, CO 81503

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - SITE OBSERVATIONAL WORK PLAN AND PRELIMINARY FINAL GROUND WATER COMPLIANCE ACTION PLAN FOR THE SLICK ROCK, COLORADO, UMTRA PROJECT SITE

Dear Mr. Plieness:

By letter dated April 19, 2002, the U.S. Department of Energy (DOE) submitted the *Site Observational Work Plan for the Slick Rock, Colorado, UMTRA Project Site*, and by letter dated June 11, 2003, the *Preliminary Final Ground Water Compliance Action Plan for the Slick Rock, Colorado, UMTRA Project Sites*. The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the documents, using the *Standard Review Plan for the Review of DOE Plans for Achieving Regulatory Compliance at Sites With Contaminated Ground Water Under Title I of the Uranium Mill Tailings Radiation Control Act* (NUREG-1724, draft, 2000) and finds that it needs additional information in order to complete its review. The information needed is identified in the enclosure.

If you have any questions concerning this letter, please contact me, either by telephone at (301) 415-6629, or by e-mail at mhf1@nrc.gov.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

/RA/

Myron Fliegel
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No.: WM-86

Enclosure: Request for Additional Information

cc: M. Tucker, DOE
W. Naugle, Colorado

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Fuel Cycle Facilities Branch
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Docket No.: WM-86
Enclosure: Request for Additional Information
cc: M. Tucker, DOE
W. Naugle, Colorado
DISTRIBUTION : FCFB r/f J. Whitten/RIV

*see previous concurrence **ML051400043**

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DATE	5/19/05		5/26/05		5/20/05		5/26/05	

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REQUEST FOR ADDITIONAL INFORMATION
SLICK ROCK, COLORADO, UMTRA PROJECT SITE

1. Site Observation Work Plan for the Slick Rock, Colorado, UMTRA Site, April 2002

Comment No. 1A. Please expand the discussion of local ground water use in Section 3.2.2. During a recent site visit by NRC personnel, several residences were identified in the vicinity of the Slick Rock site. The source of drinking water at these residences does not appear to be addressed in the report. Please provide a map showing the location of all residences in the vicinity of the site and an itemized table containing available information on the source of each residence's water supply (e.g., well permit number, well installation date, well construction details, etc.). Please include information on the source of all the data provided on the map and table. In addition, please address the health risk of ground water consumption to the residents with respect to the contaminants identified in the alluvial aquifer at the Slick Rock site.

Basis: 40 CFR 192.02 (c)(3)(ii) requires that when determining concentration limits, the proximity and withdrawal rates of ground water users, and the potential for health risks caused by human exposure to constituents should be considered. NUREG-1724 (page 1-3) acceptance criteria states that Site Characterizations should contain information pertaining to surrounding water uses including identification of potential receptors of present or future ground-water and surface-water contamination.

Comment No. 1B. Section 4.3 (page 4-9) states that all (subpile) soil samples were collected from above the water table. Comparison of subpile soil sample depths with ground water elevation data from nearby wells indicates that a portion of the deeper subpile samples were collected from below the water table. For example, during the period September 2000 to May 2001, ground water levels from East Processing Site monitoring well 302 varied between 6.07 to 6.76 feet below ground surface (data adjusted from datum). Consequently, the 5 to 8 feet below ground surface samples from nearby subpile soil sampling points 261 through 264 would appear to have been collected, in part, from below the water table. Several West Processing Site deeper subpile soil samples also appear to have been collected from below the water table.

Please reconcile this apparent contradiction and address the impact of using saturated samples to assess the magnitude of the residual contaminant source in the vadose zone.

Basis: 40 CFR 192.12 (c)(1) requires that "The Secretary shall determine which of the constituents listed in Appendix I to Part 192 are present in or could reasonably be derived from residual radioactive material at the site." NUREG-1724 (page 1-4) acceptance criteria includes, as one of the specific pieces of information to be provided: "Unsaturated zones, through which contaminants may be conveyed to the water bearing units, are described."

Comment No. 1C. Uranium and water level data from monitoring well location 510 (located within the former West Processing Site tailings area) show a correlation between rising water levels and a "spike" in uranium concentrations (specifically, see May 17, 2000 data). Please address the potential for uranium mobilization during saturation of shallow subpile soils.

Basis: 40 CFR 192.12 (c)(1) requires that "The Secretary shall determine which of the constituents listed in Appendix I to Part 192 are present in or could reasonably be derived from residual radioactive material at the site." NUREG-1724 (page 1-9)

acceptance criteria states that existing sources of ground-water contamination should be defined in terms of location and rate of entry into the subsurface.

Comment No. 1D. Please provide site-specific information on the hydrogeologic and water quality conditions of the Entrada Sandstone, and Morrison and Summerville Formations underneath the East Processing Site. Hydrogeologic information should include the formations' ability to transmit water; and evidence of faulting, fracturing, or other secondary porosity features should be addressed. Information on water quality conditions should address the presence or absence of East Processing Site alluvial aquifer contaminants in these bedrock formations.

Basis: 40 CFR 192.12 (c)(1) requires that a monitoring program shall be carried out that is adequate to define background water quality and the areal extent and magnitude of ground water contamination. NUREG-1724 (page 1-4) acceptance criteria states that information on geological characteristics that may affect ground-water flow beneath the former mill site should be provided. Examples of pertinent geologic characteristics include identification of significant faulting in the area, fracture and joint orientation, and spacing for the underlying bedrock, and geomorphology of soil and sedimentary deposits.

Comment No. 1E. Please address the following contradiction: the average hydraulic gradient given for the Entrada Aquifer (0.0125 ft/ft, page 5-11) does not correspond to data presented in Figure 5-5, page 5-13. Using the estimated contours as a basis, the Entrada aquifer gradient appears to vary between 0.02 to 0.025 ft/ft, which results in an average linear velocity of between 0.2 to 0.25 feet/day.

Basis: NUREG-1724 (page 1-5) acceptance criteria states that horizontal components of hydraulic gradient should be estimated by measurement of the distance between contour intervals on hydraulic head contour maps.

Comment No. 1F. The use of the same hydraulic conductivity value for both the East and West Processing Sites (i.e., considering the alluvial aquifer as a homogenous system) in the ground water flow model (Appendix H, Section 4.2) appears to be inconsistent with both the aquifer test results (Appendix G) and lithologic descriptions in boring logs for each area (Appendix B). Although it is acknowledged that the Well 306 aquifer test may not have adequately stressed the aquifer, the results are not inconsistent with lithologic descriptions from wells in and in the vicinity of the test. The tested East Processing Site wells (i.e., 306, 307, 308, and 327), which also exhibit elevated levels of uranium, reportedly contained 15% clay and silt in their alluvial matrix. In contrast, the tested West Processing Site wells, from which the selected hydraulic conductivity appears to have been derived, appear to be installed in more permeable areas, where gravels and sands with some silt dominate the lithology. Please address the appropriateness of assuming a homogeneous system with respect to hydraulic conductivity and the impact of the apparent presence of lower permeable zones (particularly at the East Processing Site) on the flushing times presented in Appendix H.

Basis: NUREG-1724 (page 1-5) acceptance criteria includes estimates of hydraulic properties of the underlying aquifer. In addition, the effectiveness of natural flushing in achieving cleanup standards is demonstrated using flow and transport models (NUREG-1724, page 4-4).

Comment No. 1G. The source of the aromatic hydrocarbon plume, as shown in Figure 5-22 (page 5-67) of *Site Observation Work Plan for the Slick Rock, Colorado, UMTRA Site* (DOE 2002), has not been adequately delineated. During a recent site visit by NRC personnel, non-aqueous phase liquid (NAPL) was identified in well 319. In addition, historical ground water quality data has indicated that benzene, toluene, ethylbenzene, and xylenes (BTEX) were the highest in well 332. Please provide information on the location, chemical composition (e.g., product type), and chemical concentration of the source of the BTEX contamination detected in the ground water in the vicinity of wells 319 and 332.

Basis: 40 CFR 192.12 (c)(1) requires that "The Secretary shall determine which of the constituents listed in Appendix I to Part 192 are present in or could reasonably be derived from residual radioactive material at the site." NUREG-1724 (page 1-9) acceptance criteria states that existing sources of ground-water contamination should be defined in terms of location and rate of entry into the subsurface.

Comment No. 1H. During a recent site visit by NRC personnel, NAPL was observed in well 319. Please provide information on the sampling protocol for collecting ground water samples in a well containing NAPL. Also, please provide thickness measurements of the NAPL plume. It should be noted that well construction data for 319 indicates the well is screened from 4.55 to 14.58 feet below ground surface. Water level data between September 2000 and 2004 indicates that the water table has been as high as 5.28 feet below ground surface (data adjusted from datum). Consequently, during high water table conditions, it does not appear that the well 319 well screen can capture the full vertical extent of free product in the subsurface.

Basis: 40 CFR 192.12 (c)(1) requires that a monitoring program shall be carried out that is adequate to define the areal extent and magnitude of ground water contamination. NUREG-1724 (page 1-8) acceptance criteria states that the extent of contamination should be delineated in three dimensions.

Comment No. 1I. The extent of the benzene plume, as shown in Figure 5-22, has not been adequately delineated. The absence of datum information for monitoring wells contaminated with aromatic hydrocarbons (i.e., 332, 334, 336, 337, and 338) does not permit an analysis of ground water flow within and immediately down gradient of the BTEX plume. As such, it is not possible to evaluate the hydraulic relationship between monitoring wells within the plume and monitoring wells immediately down gradient of the plume (i.e., down gradient versus cross gradient). Please delineate the nature and present extent of the benzene plume with respect to the source area discussed above. Delineation should include ground water sampling results from within and down gradient of the contamination.

Basis: 40 CFR 192.12(c))(1) requires that a monitoring program shall be carried out that is adequate to define background water quality and the areal extent and magnitude of ground water contamination.

Comment No. 1J. Please provide a quantitative analysis of BTEX degradation at the West Processing Site. Although, recent ground water quality data from well 319 indicates decreasing BTEX concentrations, the presence of NAPL in the well complicates interpretation of the recent sampling results. As a result, the current ground water quality data base in the area of the BTEX plume is inadequate to support a conclusion of microbial induced degradation.

Aerobic degradation of BTEX requires sufficient levels of dissolved oxygen (DO) to be present in the aquifer. Based on the limited dissolved oxygen analytical results from wells within the BTEX plume, only Monitoring Well 333 exhibits a DO concentration (2.6 mg/L) indicative of aerobic conditions. In contrast, Monitoring Wells 319 and 332 have DO levels of 0.0 and 0.2 mg/L, respectively. Typically, sampling results for alkalinity, dissolved oxygen, dissolved carbon dioxide, pH, and temperature can be used to assess the effectiveness of aerobic degradation of BTEX. The NRC staff recognizes that other terminal electron acceptors appear to be present in the alluvial aquifer (e.g., nitrate). If the licensee believes anaerobic degradation of BTEX is occurring, appropriate data and analysis must be presented.

Basis: 40 CFR 192.20 (b)(4) requires that in an assessment of a proposed remedial action, processes that influence future plume movement, including attenuation, should be considered. NUREG-1724 (page 4-4) acceptance criteria states that the effectiveness of natural flushing in achieving cleanup standards should be demonstrated using flow and transport models. For the West Processing Site BTEX plume, the model will need to simulate degradation of aromatic hydrocarbon constituents.

2. Preliminary Final Ground Water Compliance Action Plan for the Slick Rock, Colorado UMTRA Project Sites, June 2003

Comment No. 2A. Please provide a description or reference to the quality assurance procedures used for collecting, handling, and analyzing ground and surface water samples.

Basis: 40 CFR 192.20(b)(4) requires that when 192.12(c)(2) (natural flushing) is invoked, the compliance plan should include a monitoring program sufficient to verify projections of plume movement and attenuation. NUREG-1724 (page 4-5) acceptance criteria states that quality assurance procedures used for collecting, handling, and analyzing samples should be provided.

Comment No. 2B. Based on the latest round of water quality testing at West Processing Site (September 27, 2004) the following aromatic hydrocarbons are present in ground water over their respective National Primary Drinking Water Regulation Maximum Contaminant Levels (MCLs): benzene and toluene. Please provide concentration limits (i.e., Ground Water Protection Standards) and all supporting analysis (including a hazard assessment if an Alternate Concentration Limit is proposed) for each constituent.

Basis: 40 CFR 192.02 (c)(3) (i) requires that concentration limits should be established for Appendix I to Part 192 constituents identified in ground water samples during site characterization sampling. NUREG-1724 (page 2-2) acceptance criteria states that a concentration limit be specified for each hazardous constituent identified.

Comment No. 2C. Please provide more detail concerning the proposed pre-Confirmation Report comparison between modeling predictions and actual ground water conditions (Section 3.3, pages 17 and 20). The information should include the proposed method (e.g., statistical), criteria for determining whether the conditions are “reasonably comparable” with the modeling predictions, and the proposed action if the results of the analysis indicate the model prediction is inaccurate.

Basis: 40 CFR 192.20 (b)(4) requires that “the plan should include a monitoring program sufficient to verify projections of plume movement during the extended cleanup period.”

NUREG-1724 (page 4-5) acceptance criteria states that the monitoring program should include or reference action levels that trigger implementation of enhanced monitoring or revisions to cleanup activities (i.e., timeliness and effectiveness of the corrective action).

Comment No. 2D. Please provide signed copies of the environmental covenants for the two areas of Institutional Control proposed for the East and West Processing Sites.

Basis: 40 CFR 192.12 (c)(2)(B) requires that when a natural flushing remedial action is undertaken, institutional controls should be enacted "wherever contamination by listed constituents from residual radioactive materials is found in ground water or is projected to be found." NUREG-1724 (page 4-8) acceptance criteria states that appropriate institutional control should be provided for the site to protect human health and the environment from potential harm while the site is being brought into compliance.

Comment No. 2E. Review of ground water quality data between September 27, 2000 and September 27, 2004 indicates that uranium levels in alluvial monitoring well 311 are increasing and are currently above the 0.030 mg/L National Primary Drinking Water Regulation MCL (Please note that although the UMTRCA standard for uranium is 0.044 mg/L, the NRC must consider the recently promulgated 0.030 mg/L National Primary Drinking Water Regulation MCL for uranium). Well 311, which is located on the opposite side of the Dolores River from the East Processing Site, is not within the area of institutional controls identified in Figure 7.3 of the SOWP. Consequently, it appears that a portion of the uranium plume originating at the East Processing Site is migrating under the Dolores River (contrary to the contaminant transport model results in Appendix H) and expanding outside the area of institutional controls. Please indicate what measures are being taken to address this issue in terms delineating the extent of uranium contamination in the alluvial aquifer on the eastern side of the Dolores River, the predictive capability of the flow and transport model, and currently proposed institutional controls.

Basis: 40 CFR 192.12 (c)(2)(B) requires that when a natural flushing remedial action is undertaken, institutional controls should be enacted "wherever contamination by listed constituents from residual radioactive materials is found in ground water or is projected to be found." NUREG-1724 (page 4-8) acceptance criteria states that appropriate institutional control should be provided for the site to protect human health and the environment from potential harm while the site is being brought into compliance.

Comment No. 2F **Please address** the need for an additional surface water monitoring point in the general area where the East Processing Site uranium plume is migrating under the Dolores River (i.e., up gradient of well 311).

Basis: Review of recent ground water quality data indicates that uranium levels in alluvial monitoring well 311 are increasing and are currently above the 0.030 mg/L MCL. Well 311 is located on the opposite side of the Dolores River from the East Processing Site, indicating that a portion of the uranium plume emanating from the East Processing Site is migrating underneath the river. Consequently, it appears that some portion of uranium plume is likely entering the Dolores River in this area.

3. Application for an Alternate Concentration Limit for the Slick Rock-Union Carbide UMTRA Project Site, April 2002

Comment No. 3A. As indicated in Section 1.2, page 3, the East Processing Site is not fenced and is currently used for livestock grazing. Please indicate what site access control measures will be provided for the East Processing Site. Additionally, please provide an inspection schedule for access controls undertaken at both the East and West Processing Sites.

Basis: NUREG-1724 (page 4-5) acceptance criteria states that appropriate site access controls should be provided and periodically inspected.

Comment No. 3B. Please provide more detail concerning the derivation of the proposed risk-based ACL of 0.18 mg/L for selenium. The information should include all formulas, corresponding input values (e.g., reference dose), and exposure assumptions utilized in its derivation. Of particular concern is that the proposed ACL is in agreement with the selenium Drinking Water Equivalent Level (DWEL) of 0.20 mg/L and the assertion that the ACL is "protective of human health for drinking water in a residential setting." As acknowledged on page 7-2 of the SOWP, the DWEL represents a lifetime exposure concentration protective of adverse non-cancer health effects that assumes <u>all exposure to a contaminant is from drinking water</u>. In practice, the DWEL is multiplied by a relative source contribution (generally 10 to 25 percent) to derive a Lifetime Health Advisory (LHA). The current LHA for selenium is 0.05 mg/L (EPA's 2004 Edition of the Drinking Water Standards and Health Advisories), which is in exact agreement with the National Primary Drinking Water Regulation Maximum Contaminant Level for selenium, and is significantly lower than the proposed ACL.

Basis: 40 CFR 192.02 (c)(3) (ii) permits the establishment of an alternate concentration limit if it is determined that the constituent will not pose a substantial present or potential hazard to human health and the environment as long as the alternate concentration limit is not exceeded and the Commission has concurred. Cited factors to be considered include the potential for health risks caused by human exposure to constituents and the persistence and permanence of the potential adverse effects.