May 31, 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 DRAFT GROUND WATER COMPLIANCE ACTION PLAN FOR THE NATURITA, COLORADO, UMTRA PROJECT SITE

Dear Mr. Plieness:

By letter dated May 22, 2002, the U.S. Department of Energy (DOE) submitted the *Site Observational Work Plan for the Naturita, Colorado, UMTRA Project Site*, and by letter dated September 19, 2002, the *Draft Ground Water Compliance Action Plan for the Naturita, 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.

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.

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.

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-66

Enclosure: Request for Additional Information

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

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cc: M. Tucker, DOE
W. Naugle, Colorado
DISTRIBUTION : FCFB r/f J. Whitten/RIV

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REQUEST FOR ADDITIONAL INFORMATION
NATURITA, COLORADO, UMTRA PROJECT SITE

1. Site Observation Work Plan for the Naturita, Colorado, UMTRA Project Site, May 2002

Comment No. 1A. Please reconcile the table of contents (pages iii through iv) with report sections and corresponding pages in the body of the report.

Basis: The table of contents indicates pages for Sections 2.1 through 2.8; however, the body of the report only contains Sections 2.1 through 2.7.

Comment No. 1B. Please reconcile the following contradiction: Section 2.4 (page 2-4) indicates that the proposed compliance strategy for Naturita includes selecting supplemental standards for vanadium and uranium; however, the Ground Water Compliance Strategy Flowchart for uranium and vanadium (Figure 7-2, page 7-5) and Section 7.3.2 indicates application of alternate concentration limits.

Basis: NUREG-1724 (page 4-2) acceptance criteria states that the selection of a restoration strategy conform to the decision tree in Figure 4-1 which was developed by the DOE and has been found acceptable by the NRC.

Comment No. 1C. Section 3.2.1, page 3-1 indicates that the milling process may have utilized fuel oil as a fusing agent. Please provide available information including site locations associated with fuel oil storage and usage, fuel oil storage capacity, and estimates of volumetric usage. In addition, the August 1993 Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Processing Site at Naturita, Colorado, identified low levels of toluene at two locations near the former tailings pile. If historical volatile or semi-volatile organic constituent analysis of the alluvial aquifer at the Naturita site is available, please provide or reference the data and discuss the results.

Basis: 40 CFR 192.02 (c)(1) requires that a determination of which of the constituents listed in Appendix I to Part 192 are present in or reasonable derived from residual radioactive materials. NUREG-1724 (page 1-2) acceptance criteria states that information on wastes generated at the site during milling operations, waste discharge locations, and quantities of waste generated should be provided.

Comment No. 1D. Please expand the discussion of local ground water use in Section 3.2. For example, during a recent site visit by NRC personnel, a residence was identified directly downstream of the Calamity Bridge; however, the source of drinking water at this residence does not appear to be addressed in the report. Please provide a map showing the location of all residences in the vicinity and down gradient 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 data provided on the map and table. In addition, please address the health risk of ground

water consumption to the residences with respect to the contaminants identified in the alluvial aquifer at the Naturita 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. 1E. Please indicate the analytical or other method(s) used to develop the information presented in the following figures: Figure 5-2 - Bedrock Surface Elevations, Figure 5-3 - Thickness of the Alluvium, and Figure 5-4 - Thickness of Saturated Alluvium.

Basis: 40 CFR 192.02 (c)(3)(ii) requires that when considering the present or potential hazard to human health and the environment of alternate concentration limits, the hydrogeological characteristics of the site should be considered. NUREG-1724 (page 1-3) acceptance criteria states that Site Characterizations should contain a description of hydrogeological units that may affect transport of contaminants away from the site via ground-water pathways.

Comment No. 1F. Please provide an estimate of the horizontal hydraulic gradient based on the data and estimated contours presented in Figure 5-5, page 5-13.

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. 1G. Please identify the horizontal, transverse, and vertical hydraulic conductivity values used in the Steady State Deterministic Flow Model (Appendix F, Section 4.2, page F-7). Additionally, the aquifer test document referred to in Section 4.2 of Appendix F does not appear to be listed in the Appendix's reference section. Please supply the reference.

Basis: 40 CFR 192.02 (c)(3)(ii) requires that when considering the present or potential hazard to human health and the environment of alternate concentration limits, the hydrogeological characteristics of the the site should be considered. NUREG-1724 (page 1-5) acceptance criteria states that Site Characterizations should contain estimates of hydraulic properties of the underlying aquifer.

Comment No. 1H. Please reconcile the following contradiction: based on data from numerous slug and bromide tracer tests, Figure 4-18 (page 4-43) indicates that the Naturita site can be divided into higher (southern) and lower (northern) hydraulic conductivity zones. In contrast, the Flow Model in Appendix F appears to treat the entire site as homogeneous with respect to hydraulic conductivity.

Basis: 40 CFR 192.02 (c)(3)(ii) requires that when considering the present or potential hazard to human health and the environment of alternate concentration limits, the hydrogeological characteristics of the site should be considered. NUREG-1724 (page 1-5) acceptance criteria states that Site Characterizations should contain estimates of hydraulic properties of the underlying aquifer.

Comment No. 1I. The extent of tailings related contamination in subpile soils (i.e., soils situated below the former tailings piles) does not appear to have been adequately delineated. As indicated in Section 5.3.1 (page 5-10), the most contaminated ground water on the site is below the former tailings pile area. Moreover, Section 7.3.2 (page 7-8) acknowledges that "persistence of uranium and vanadium in the soils and the presence of a potential continuing source of ground water contamination." However, the description of borehole NAT01 as being located within the area of the former tailings pile Section 4.6.1 (page 4-20) is inconsistent with the historical tailings boundary represented in Figure 5-10 (page 5-81) and Plate 1. Consequently, only one subsoil sample (NAT06) appears to have been collected from the approximately 19-acre former tailings boundary represented in the two site maps referenced above. In addition, please provide the depth of subpile soil samples from NAT01 and NAT06 (the information was not contained in the report text or indicated in their respective well logs). Please provide additional information concerning the presence of residual tailings related contamination in subpile soils at the site.

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. Defining the extent of contamination includes investigating residual sources that may still exist in contaminated subsurface soils (NUREG-1724, page 1-9).

Comment No. 1J. Section 5.2.2 (page 5-9) indicates that the alluvial aquifer discharges "back into the San Miguel River north of the site along a 500-foot zone where the river intersects bedrock on the Maupin property." The ground water flow model (Appendix F, page F-8) addressed this reported condition by using a no-flow boundary along the western edge of the alluvial aquifer and intersecting the boundary with the river at the top of the 500-foot discharge zone. However, during a recent site visit by NRC personnel, an inspection of the area indicated that it did not appear to contain outcrops of the Brushy Basin Member of the Morrison Formation (e.g., mud- or siltstones), but rather sandstone boulders originating from higher elevations in the valley on top of the alluvium. These boulders appeared to be associated with either the overlying Burro Canyon Formation or Dakota Sandstone.

The absence of bedrock outcrops in this area could have serious implications to the proposed corrective action. As discussed in Section 8.4 (page 8-14), one of the bases for the selected corrective action is that "contaminants are not expected to migrate beyond the IC area because (1) impermeable bedrock mudstones from the Brushy Basin Member of the Morrison formation are effective barriers to westward migration." The absence of an impermeable bedrock intersecting the river would impact the use of a no-flow boundary in the northern part of the flow model and invalidate the results of the ground water transport model. Consequently, please quantitatively confirm the existence of bedrock outcrops intersecting the river in this area or

verify through ground water sampling that uranium or any other contamination is not and will not migrate along the western side of the San Miguel River beyond this point. If such migration is occurring, please adjust the ground water flow model for the site by using a different boundary condition (i.e., alluvial aquifer continues north along the western side of the San Miguel River). Based upon the results of this work, it may be necessary to revise the Long Term Monitoring Program to include ground water monitoring in this area.

Basis: 40 CFR 192.02(c)(3)(ii) requires that when applying alternate concentration limits, the potential adverse effects on hydraulically-connected surface water quality, including the hydrogeological characteristics of the site and surrounding land should be considered. Correspondingly, NUREG-1724 (page 1-3) identifies "A description of hydrogeological units that may affect transport of contaminants away from the site via ground-water pathways" and estimation of ground-water/surface-water interactions at the sites with nearby streams, rivers, or lakes (page 1-6) as acceptance criteria items.

Comment No. 1K. Monitoring well 0715, an alluvial well located on the east side of the San Miguel River (see Plate 1), reportedly contained 0.080 mg/L uranium (Ground Water Compliance Action Plan, Section 2.5.2, page 2-9), which is over the UMTRCA standard for uranium (0.044 mg/L) and the recently promulgated National Primary Drinking Water Regulation Maximum Contaminant Level (MCL) for uranium (0.030 mg/L). The following issues concerning uranium ground water contamination on the east side of the San Miguel River need to be addressed:

i) Please update the Geospatial Environmental Mapping System (GEMS) for the Naturita Processing site to include the sampling results from well 0715.

ii) Please quantify the nature and extent of uranium contamination in the alluvial aquifer on the east side of the San Miguel River in the vicinity and down gradient of monitoring well 0715.

iii) Please verify the assertion that "any contamination that may exist on the east side of the San Miguel River further downstream from the site, will eventually flow into the river by the time the Calamity Bridge is encountered," (Section 8.4, page 8-15).

Quantification and verification can include further ground water monitoring at well 0715, the installation of additional monitoring wells on the east side of the river, and expanding the present ground water flow and transport model (with appropriate site-specific calibration data) further north and east to include the area around and down gradient of well 0715. Based upon the results of this work, it may be necessary to revise the Long Term Monitoring Program to include ground water monitoring in this area.

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. Moreover, 40 CFR 192.12(c)(3) states that "Compliance with this subpart shall be demonstrated through the monitoring program established under paragraph (c)(1) of this section at those locations not beneath a disposal site and its cover where groundwater contains listed constituents

from residual radioactive material." NUREG-1724 (page 1-8) states that the extent and magnitude of contamination involves determining whether the water quality at a location meets background water quality.

Comment No. 1L. As discussed in Section 5.3.3.2 (pages 5-28 and 5-29) "... millsite contamination and potentially associated ground water contamination could extend as far down gradient as the Calamity Bridge, about 3,750 feet down grade of the mill site." Calamity Bridge is the northern edge of the Institutional Controls Area (Figure 7-8, page 7-19) and as such, the alluvial aquifer directly down gradient of the bridge is a point of exposure for ground water (i.e., outside the area under institutional controls there is no restriction on ground water use). Although it is acknowledged that ground water contamination may exist, no monitoring wells have been placed along the 2,400 foot distance under institutional controls between well 715 and the Calamity Bridge (Plate 1). Please verify that millsite related ground water contamination is not migrating beyond the area of institutional controls. Verification can include the installation of additional monitoring wells and expanding the present ground water flow and transport model (with appropriate site-specific calibration data) to include the area up gradient of the Calamity Bridge. Based upon the results of this work, it may be necessary to revise the Long Term Monitoring Program to include ground water monitoring in this area.

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. Moreover, 40 CFR 192.12(c)(3) states that "Compliance with this subpart shall be demonstrated through the monitoring program established under paragraph (c)(1) of this section at those locations not beneath a disposal site and its cover where groundwater contains listed constituents from residual radioactive material." NUREG-1724 (page 1-8) states that the extent and magnitude of contamination involves determining whether the water quality at a location meets background water quality.

Comment No. 1M. Section 5.4.6 (page 5-109) indicates that an expansion of gravel pits up gradient of the Naturita site will increase ground water loss through evaporation and could significantly decrease the rate that uranium flushes naturally from the alluvial aquifer at the site. If this were to occur, it would impact the accuracy of the ground water contaminant transport predictions. Please provide information on the criteria and method that will be used to determine whether future ground water quality data is in agreement with model predictions and the proposed contingencies when the data and model no longer show a positive correlation.

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 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. 1N. With respect to proposed implementation of measures, Section 8.4.1 (page 8-15) states that "IC(s) will remain in effect for perpetuity or until concentrations of contaminants at the site fall below acceptable levels." Please quantify "acceptable levels" with a list of the constituents, concentrations levels, and all supporting analysis used to derive the levels. Also, please provide the proposed method (e.g., statistical) and criteria for determining when concentrations have reached these levels.

Basis: 40 CFR 192.02 (c)(2) requires that ground water not exceed concentration limits established under 40 CFR 192.02 (c)(3) in the uppermost aquifer underlying the site beyond the point of compliance as defined in 40 CFR 192.02 (c)(4). NUREG-1724 states that a concentration limit should be specified for each of the hazardous constituents.

Comment No. 1O. Please provide more detail for the cost computation in Section 8.3.3. (page 8-14). The cost of $2,100 per sample round multiplied by 15 sample rounds (once a year for 5 years and every 3 years for the following 30) does not equal $105,000. Also, please provide the rationale behind using a 35-year sampling period. The 35-year assumption appears to be contradicted in Section 7.7 (page 7-18), where it is acknowledged that total duration of monitoring may be up to 100 years. Appendix F (page F-43) states that "At 100 years there is still a 49 percent probability that the (uranium) standard will be exceeded." Moreover, the Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project at Naturita Fact Sheet (DOE, March 2003) indicates that it will take more than 1,000 years for vanadium to drop below the 0.330 mg/L human health-based risk concentration. Based on the use of a perpetual environmental covenant as an institutional control to eliminate the use of alluvial ground water (i.e., no ground water point of exposure within the area of institutional controls), it would appear that monitoring far beyond 35 years may be necessary to determine when contaminant concentrations allow lifting of the institutional controls.

Basis: 40 CFR 192.02(c)(3)(ii)(A) requires that alternate concentration limits may be established after considering remedial or corrective actions to achieve the levels specified in paragraphs (c)(3)(i)(A) and (B) of 40 CFR 192.02. NUREG-1724 acceptance criteria (page 3-8) states that the cost and benefits of each of the corrective action alternatives should be considered.

2. DRAFT Ground Water Compliance Action Plan for the Naturita, Colorado, UMTRA Project Site, September 2002

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 during future monitoring.

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 be provided.

Comment No. 2B. As discussed in Section 2.3, page 2-1, supplemental standards for surface cleanup were applied to significant areas both on-site (11 acres) and off-site (11 acres). In addition, seeps and pond water containing elevated levels of site related contaminants have been identified north of the site on the Maupin property. Please indicate what site access control measures will be provided for the Naturita site, with particular emphasis on the areas discussed above. Additionally, please provide an inspection schedule for access controls at the Naturita site.

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

Comment No. 2C. Please provide more detail concerning evaluation and reporting of data during the proposed 35-year sampling period (Section 3.7, page 3-7). The information should include the proposed method (e.g., statistical), criteria for determining whether the conditions are consistent 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 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 a signed copy of any environmental covenants for institutional control areas not owned by a government agency (e.g., a covenant with the Maupin family). Also, information compiled during a recent site visit by NCR personnel indicated that a domestic drinking water well had recently been installed at the Maupin residence. Please provide all available documentation (e.g., well permit number, well installation date, well construction log, etc.) for the newly installed Maupin well.

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 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. Section 6.1.3, Table 6-2 (pages 6-8 and 6-9) of the Site Observational Work Plan (May 2002) indicated a hazard quotient (HQ) for noncarcinogenic exposures to arsenic of 2.1 and 1.5 for child and adult residential ground water ingestion, respectively. In

addition, Table 6-2 indicated that the carcinogenic risk from residential ground water ingestion for arsenic was 2.99 x 10^{-04}. All these risk levels were higher than the criteria discussed in Section 6.1.2.1 (i.e., an HQ of 1.0 for non-carcinogenic exposures and 10^{-06} for carcinogenic risk). As a result, arsenic was designated a contaminant of potential concern and the SOWP contained a proposal for natural flushing with institutional controls as a compliance strategy. In contrast, Section 2.6.2.2 of the GWCAP indicates that average arsenic concentrations are at or below the former MCL for arsenic (0.05 mg/L) and arsenic has been removed from the list of contaminants of concern because modeling indicates that its concentration levels in ground water will continue to decrease

Although the UMTRCA standard for arsenic was formerly 0.05 mg/L, the NRC must consider the recently revised National Primary Drinking Water Regulation MCL of 0.01 mg/L for arsenic. Based on the average arsenic concentrations in the alluvial aquifer depicted in Figure 5-23 (page 5-33), nine wells exhibited arsenic above the current MCL. Given the reduction in the MCL for arsenic and the results of the risk analyses discussed above, please provide a more detailed rationale for eliminating arsenic from the compliance strategy as originally proposed in the SOWP, including the method (e.g., statistical) and criteria (e.g., number of consecutive sample results below the target level) used in removing arsenic from the list of contaminants of concern. In addition, please discuss the impact of the reduced MCL on contaminant transport simulations of future arsenic concentrations in the alluvial aquifer (Section 5.3.5.1, page 5-69).

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.”