



## Department of Energy

Washington, DC 20585

September 23, 2011

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Deputy Director  
Mail Stop T8F5  
Washington, DC 20555-0001

Subject: Response to Comments on, Department of Energy Position Paper Entitled "Temporary Shutdown of the Groundwater Remediation System" for the Tuba City, Arizona Disposal Site

To Whom It May Concern:

In response to your comments received by the U.S. Department of Energy (DOE) on June 20, 2011, we offer the following responses:

**U. S. Nuclear Regulatory Commission (NRC) comments (in May 17, 2011, letter from D. Orlando to R. Bush)**

1. It is not clear from the report how long the U.S. Department of Energy (DOE) intends to suspend remediation activities. It appears that DOE intends to suspend activities for up to five years. It would be helpful if a more definitive suspension period were defined and a list of planned activities during remediation suspension was included.
2. DOE appears to have based their conclusion that limited migration of contaminants of concern will occur on a numeric model, without having the specifics of the model reported to DOE at the time of the report. In addition, the title for Figure 6 "Model-Predicted Particle Travel Distances at Five Years..." is misleading. The figure appears to depict iso-concentrations at five years. However, comparison to Figure 2 existing ISO- concentration map is difficult as Figure 6 does not include topography, while figure 2 does.
3. While we agree that the suspension of drawdown of groundwater may allow the water table to re-saturate areas that have become unsaturated, it is not clear if DOE's model takes into account that re-saturation of groundwater may increase concentrations of contaminants of concern.

Based on the above we suggest that DOE increase the monitoring frequency during the suspension of remediation activities.



*ASUEAD*

**DOE Response to Comment 1**

At the time of the initial notification to NRC it was undetermined how long the Tuba City treatment plant would be shut down. An independent assessment of the operability of the treatment plant was performed by Arcadis, which resulted in a number of specific recommendations to improve or reconfigure the plant to increase reliability, control, and safety in operating the plant. In addition, a brief consideration of alternative treatment technologies was produced for possible future use in the event that it was determined the plant was no longer viable.

In order to better manage the many changes to the plant and to procedures that were necessary to get the plant back in operation, an Integrated Project Team was formed by the contractor to manage this as a project with many specific items to complete. Without going in to great detail, this systematic approach will culminate with an integrated restart scheduled to occur on September 22, 2011. A number of intermediate steps have been taken, including operator training, rewriting of procedures, physical changes to plant equipment, and individual component testing with water. The integrated test will introduce acid back into the system, apply vacuum and heat, and result in a restart of normal operations; assuming no problems are encountered during the process.

While it is not required by regulation to do so, LM decided to apply a graded approach to adopting the DOE orders associated with the operation of a nuclear facility in order to address the lack of management awareness and involvement and culture of safety that led to the incident of October 2010. The contractor, and eventually DOE, will be trained and apply the requirements of the DOE orders related to Conduct of Operations, which also emphasizes and requires more management oversight of activities than has historically been applied at the non-nuclear LM sites.

The position paper enclosed with the DOE letter dated December 8, 2010, did not address the question of how long DOE may suspend remediation activities. As stated in the opening sentence of the report, the analysis instead assumes an indefinite suspension of remediation activities. This approach is conservative because potential contaminant migration during a short term shut down is likely to be less than for a protracted shut down.

The report did not identify contingency actions during the plant shut down because the analysis concluded that none were necessary. The report identified that operating a selected group of distal wells would likely have no effect on plume containment. The interim operating water level in the evaporation pond is maintained by periodic groundwater withdrawal from extraction wells located in the main region of groundwater contamination. This practice maintains some degree of plume containment (and treatment by solar evaporation) during the temporary shut down.

**DOE Response to Comment 2**

DOE developed and maintains a numerical model of groundwater flow and solute transport at the Tuba City site using conventional modeling software that simulates site subsurface conditions. The model is a working tool used to interpret various site hydrogeologic data; to refine the site conceptual model of groundwater flow and solute transport; and, as in the present case, to evaluate effects of a flow system perturbation. DOE likely will provide the model specifics as public information during the upcoming revision of the Groundwater Compliance Action Plan for the site (in preparation).

Regarding Figure 6, NRC is correct in identifying uranium concentration isopleths in the figure. Site topography was not included in Figure 6 so as not to obscure the iso-concentration contours. Concentration contours plotted in Figures 2 and 6 are identical (contoured from February 2010 monitoring results), representing uranium distribution in groundwater before plant shutdown.

DOE apologizes that the five-year travel distances plotted in Figure 6 are not more evident (the travel distance depiction in Figure 6 is described in the final text section of the report "Figures"). The presentation was intended to be very brief but would have benefitted from an expanded view for greater resolution of the model-predicted particle traces.

DOE emphasizes that the particle tracking analysis predicts no substantive change in plume configuration in five years following plant shut down. Particle tracking is applied to illustrate the advective component of groundwater flow (average linear flow velocity [direction and magnitude]) predicted by the flow model. Reactive or dispersive processes affecting solute transport are not represented.

**DOE Response to Comment 3**

DOE is in full agreement with NRC that re-saturating portions of the aquifer could lead to an increase in contaminant concentration to approach pre-pumping levels at monitoring locations in those regions. Such an increase is not necessarily indicative of a continued or new source of contamination, but instead are likely geochemical or matrix mass transfer effects not unique to the Tuba City site. DOE concluded in a previous study the concentration rebound to be relatively rapid (within days) and the duration of the high concentrations to be brief (hours to days) after resumed pumping.

The particle tracking analysis employed in this analysis does not account for any solute in the model such as conventional transport codes require. For example, there is no representation of contaminant sources, sinks, or initial conditions in the particle tracking analysis.

**DOE Response to Monitoring Frequency Comment**

DOE is uncertain of the rationale by which NRC advocates an increased monitoring frequency — specific data gaps and data use objectives for such activity are not defined by NRC. DOE maintains that the relatively slow rates of groundwater and contaminant movement at the site do not warrant an increase in the frequency of water quality monitoring during the suspension of remediation activities.

**DOE Concluding Remarks**

DOE has since refined the site numerical model to include simulated transport of uranium. During the upcoming revision of the Groundwater Compliance Action Plan for the site (in preparation), DOE will likely provide the model specifics and results as public information.

DOE suggests that NRC consider factors other than model results to assess possible effects of a temporary plant shut down on plume movement, such as (1) uranium transport is retarded relative to the average rate of groundwater flow, (2) the water table has not yet fully recovered since plant shut down, suggesting a degree of continued groundwater capture as aquifer storage is replenished, (3) the contaminant plume formed over a much longer period than the plant shut down and under hydraulic conditions much more conducive to plume formation and migration than at present, and (4) aggressive groundwater withdrawal over nine-years did not significantly reconfigure the groundwater uranium plume, suggesting that a brief suspension of remediation activity is also unlikely to effect much change.

Please contact me at 970-248-6073 if you have any further concerns or questions. Please send any correspondence to:

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Sincerely,



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Site Manager

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