



Department of Energy  
Washington, DC 20585

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U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Deputy Director  
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Subject: Proposed Interim Treatment System Evaluation (ITSE) for the Tuba City, Arizona, Disposal Site

To Whom It May Concern:

As you are aware, the Tuba City, Arizona, Disposal Site has been operating under an interim treatment plan since September 2014, when the groundwater treatment plant was put into a safe standby condition. Interim treatment has involved pumping extracted groundwater directly to the evaporation pond. The extraction flow rate (annually averaging 10 gallons per minute) has been adjusted manually, to maintain pond level. Data collection has included extraction well flow rates, total flow, and monthly water-quality analyses from the producing extraction wells.

DOE informed NRC of site operations status after cessation of distillation system (letters dated November 5, 2014 and January 7, 2015). NRC concurred with the conclusion that “shutdown of the ground water treatment system should not pose an immediate threat to public health and safety of the environment” while stating that DOE should monitor and address any such “threat... in a timely manner” (NRC letter dated March 9, 2015). The “*Plan for Interim Treatment During Distillation Shutdown for the Tuba City, Arizona, Disposal Site*” (LMS/TUB/S12431, January 2015) did not specify a timeframe for returning to the water treatment/aquifer restoration strategy as defined in the Groundwater Compliance Action Plan (GCAP, 1999). However, the Interim Treatment System Evaluation, as summarized below, includes a planned duration of one year for collection and evaluation of data related to optimization of evaporative treatment. This evaluation will provide valuable input for GCAP revision – for planning, design and implementation of evaporative treatment as a primary treatment process, or as a secondary treatment process for handling concentrated liquid waste generated by another water treatment process (e.g., distillation or membrane filtration).

A previous study (*Alternatives Analysis of Contaminated Groundwater Treatment Technologies, Tuba City, Arizona, Disposal Site*, LMS/TUB/S12161, February 2015) included evaluation of treatment at a continuous groundwater extraction rate of 40 gallons per minute (gpm). This flow rate was determined by analysis of the extraction well field—identifying the extraction wells that are the steadiest producers and carry the heaviest contaminant loads. It has been estimated that operating selected extraction wells at a total flow rate of 40 gpm will remove up to 90 percent of the contaminant load that was previously treated at 100+ gpm through the distillation treatment process.

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To fully evaluate the extraction/evaporation treatment option at 40 gpm, an optimized evaporative treatment process would be required. Optimization will require expanded data-collection efforts to support the evaluation of evaporative technology options, the development of implementation concepts, and the execution of desktop or pilot studies of enhanced evaporation techniques.

In order to properly evaluate an optimized evaporative treatment approach, an Interim Treatment System Evaluation (ITSE) plan is being developed. In concept, the ITSE will proceed through a stepwise optimization approach including:

- Baselineing the annual nominal evaporative capacity of the existing pond
- Implementation of minor modifications to increase evaporation rate, such as:
  - Utilization of the overflow pond as a part of routine operation
  - Installation of a manifold on the pond berm perimeter to allow inlet flow to run across the liner, increasing evaporative surface area and temperature
  - Piping modifications to allow for the use of the existing solar concentrator to preheat extracted groundwater prior to conveyance to the pond
- Desktop studies, pilot studies, or both of enhanced evaporation techniques such as
  - Spray evaporation
  - Wind-aided intensified evaporation
- Conceptual design of an additional pond, if needed

In addition to optimization efforts directed toward enhanced evaporation efficiency, the U.S. Department of Energy Office of Legacy Management (DOE-LM) recognizes the need to gather information to address outstanding information needs related to plume geometry, and provide an improved basis for assessing the response of the contaminant plume to the groundwater extraction strategy. The current groundwater characterization sampling and analysis plan (monthly in-house analyses for extraction wells and semiannual analyses at an external lab for extraction and monitoring wells) will be augmented in the ITSE. Steps to be taken to improve understanding of groundwater movement and contaminant transport may include:

- Installation of 20 new monitoring wells, to address data needs for refinement of the groundwater flow model
- Continuous real-time automated monitoring of well levels at selected locations
- Collection of samples to support geochemical evaluations of:
  - Long-term contaminant release from the source zone
  - Natural attenuation capacity in the aquifer, ahead of the plume

The ITSE will consider a variety of performance criteria and will provide recommendations for no more than two enhanced evaporation alternative processes for further study (if necessary). Performance criteria will be determined in the planning stage and may include:

- Achievable extraction flow rate and contaminant mass removal
- Response of the contaminant plume to the optimal extraction flow rate

- Extraction/treatment system reliability, availability, and maintainability
- Operational safety
- Operational simplicity
- Stakeholder acceptance
- Capital expense
- Long-term operations and maintenance expense
- Schedule lead time for installation and startup

DOE-LM is considering a one-year duration for ITSE data collection, correlation with site-specific weather data, testing of potential enhanced evaporation methods, and monitoring plume response. The duration is intended to allow for quantification of the effects of seasonal variations in evaporation rates. Conclusions and recommendations from the one-year study will be documented in a report, and could then be used as the basis for revision to the Groundwater Compliance Action Plan.

As previously documented in the DOE-LM position paper *Temporary Shutdown of the Groundwater Remediation System* for the Tuba City, Arizona, Disposal Site (November 2010), plume migration during system shutdown, including no extraction, was estimated at 10 feet per year. Throughout the ITSE duration, plume migration is expected to be less than the previously projected value, due to continuous groundwater extraction flows in a range of 10–40 gpm. The high end of the flow rate range should be reached if enhanced evaporation methods developed during pilot studies are implemented. Furthermore, the *Plan for Interim Treatment During Distillation Shutdown for the Tuba City, Arizona, Disposal Site* (April 2015) documents the strategy for monitoring plume migration and operating additional extraction wells, as needed. Migration of the contaminant plume in the proposed one-year duration of interim treatment evaluation is expected to be minimal and will be controlled. Distal wells on the Middle Terrace and outside the site fence line may be periodically operated to control plume migration.

Please call me at (970) 248-6073 if you have any questions. Please address any correspondence to:

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Sincerely,



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