

## **U.S. NUCLEAR REGULATORY COMMISSION WORK ACTIVITY PLAN DURING A QUARTERLY TUNNEL ENTRY**

### **1. INTRODUCTION**

The staff of the U.S. Nuclear Regulatory Commission (NRC) proposes to undertake several activities during a scheduled U.S. Department of Energy (DOE) quarterly tunnel inspection on September 20, 2007. This preliminary draft of the proposed NRC staff activities was generated, based on early discussions with DOE and Yucca Mountain Project staff members, to assist DOE's planning for the quarterly inspection.

During the last discussion, on August 6, 2007, Yucca Mountain Project staff's questions about scope creep and occupational safety emerged as issues restricting initiation of the NRC staff's proposed activities. The duration of time spent in the tunnel, and the ventilation capability behind the bulkhead of Alcove 5, were both issues of concern. The NRC staff remain flexible to enable DOE to plan activities in a manner that ensures safety is maintained. If ventilation tests are needed during this next DOE quarterly tunnel inspection to ensure safety, the NRC staff could shift its activities to the planned December 2007 quarterly tunnel entry.

### **2. PROPOSED WORK**

The NRC staff proposes to undertake three activities during the quarterly tunnel entry on September 20, 2007: 1) observations and measurements of streak marks and drift ceiling features in Alcove 5; 2) sampling of secondary mineralization in Alcove 5, dependent on availability of sample splits from a previous DOE entry; and 3) observations and creation of a baseline for spalling fragments at two locations along the Exploratory Studies Facility (ESF).

### **3. PURPOSE**

Activity (1): Observe linkage between ceiling features and iron-stained marks on analog waste packages and trays. This activity will quantify the number and spacing of iron-stained streak marks or splotches. Observations of the iron-stained marks may indicate seepage, though the temperature at which the possible seepage might have occurred is unknown.

Activity (2): Obtain mineral samples of secondary minerals from the drift walls to use for mineralogic and stable isotope (oxygen and deuterium) analyses that could constrain temperature of formation. This sampling only will occur if DOE determines that it does not have enough sample material to send NRC splits of the April 2006 samples collected by Yucca Mountain Project staff.

Activity (3): Observe rock fragments that may have fallen, and create a baseline to monitor fragments that may fall from the drift ceiling. Conversely, this activity may confirm the lack of fragments spalling from the tunnel ceiling in the coming years. This activity would take place in the ESF tunnel, and is in lieu of characterization of thermally driven spallation of fragments in Alcove 5.

#### 4. LOCATION

Alcove 5, behind the bulkhead, is the primary location of planned work. Lesser time is proposed for several locations along the ESF. Four or five sites will be inspected to determine suitability. Two of those sites will be selected for the proposed activity along the ESF.

#### 5. DESCRIPTION OF ACTIVITIES

##### 5.1 Alcove 5 Measurements and Observations

Observations and basic measurements will be made in the bulkheaded portion of Alcove 5, to assess possible relations between locations of iron-stained marks and streaks on analog waste packages, invert, and trays and features on the alcove ceiling. Spacing of features on the ceiling and iron-stained marks will be determined by tape measure. A simple laser level will be used to establish vertical relationships. Photographs may also be taken during the observations. The area of the concrete liner at the far end of the alcove will not be included.

##### 5.2 Alcove 5 Sampling

This activity will only occur if DOE is not able to provide adequate amounts of splits of previously collected samples. At least one week before the entry, DOE will ascertain the amount of scraped samples from various locations, that could be made available to the NRC staff, for mineralogic and stable isotope analyses. These analyses are intended to estimate the temperature of formation. The temperature range at which the seepage could have occurred is currently constrained from approximately 45 to 200°C [113 to 392°F]. If sufficient material is available, the NRC staff prefers to obtain splits of the DOE-collected samples from April 2006, rather than collect its own samples during the September 20, 2007 tunnel entry. If DOE can provide sample splits, the NRC staff will need locations where samples were collected.

The NRC will provide the apparatus, if needed, to sample secondary minerals on the alcove wall. It is envisioned that an extendable pole with a collection apparatus attached will be used, in conjunction with a ladder, to scrape or dislodge samples from the alcove wall or ceiling.

##### 5.3 ESF Fragment Baseline Activity

Four or five sites will be selected before the proposed entry, based on known lithology, fracture mapping, rock-quality index mapping, and extent of ground support (i.e., areas with ribs with slats will be avoided). From these sites, two will be selected during the entry for baseline activities, based on observations of the quantity and size of fragments currently on the invert. The quantity of fragments on the side of the invert and loosely resting in any wire mesh support will be taken as an indication of spalled fragments, though it is acknowledged that some fragments on the invert may have sporadically fallen from the conveyor belts. Mine safety inspections during the operation period of the ESF have included shifting of fragments from the tracks and dislodgement of loose fragments from the wire mesh. The NRC staff would appreciate receiving any records the mine safety staff may have retained that includes number or location of detached rock fragments found in the ESF over the years during their safety inspections.

Because the history of the existing fragments, or fraction thereof, is not explicitly known, it is proposed that a baseline be established during the next tunnel entry. Future quarterly

inspections will then be able to identify freshly fallen fragments with certainty. It is anticipated that approximately 10-m [33-ft] lengths along the tunnel will be photographed, marked, and existing fragments cataloged. Photographs taken of the invert and rock support system, including the mesh, will be used as a baseline to help identify future fragments that may detach from the drift ceiling.

## 6. PROPOSED SCHEDULE

The NRC staff has proposed that all activities take place during one quarterly tunnel entry, with the next scheduled entry on September 20, 2007. If DOE needs to test ventilation capabilities beyond the bulkhead during the September 20, 2007, tunnel entry, then the NRC staff understands that Alcove 5 activities may need to occur during the next tunnel entry, scheduled for December 2007.

The proposed Alcove 5 activities will require 3 to 4 hours in the alcove. The tunnel fragment observations and baselining will require 10 minutes at each of two selected sites. An additional 10 minutes may be needed, if the initial possible sites are rejected after quick observations. Sites will be visited once, as the tunnel entry team progresses from the north ramp to the south ramp.

## 7. PERSONNEL

Two to four NRC staff or contractor are projected for the work activity. Four staff is the optimal number of participants, but the work could be accomplished with less staff if more time is allowed. The NRC staff remains flexible regarding the number of NRC participants. The NRC staff realizes that DOE may focus on the speed of completion of activities, or on restrictions in the number of staff entering the alcove because of ventilation capabilities.

## 8. EQUIPMENT

Provided by DOE (in addition to tunnel-entry safety equipment):

- Ladder

Provided by NRC:

- Laser level and tape measure
- Scraper and collection bag, if needed for additional sampling
- Standard personal safety equipment (e.g., hard hat, safety glasses, steel-toed boots)

## 9. TRAINING AND SAFETY

To be completed prior to travel to Las Vegas:

- Medical certification by NRC doctor, or Southwest Research Institute doctor
- First Aid Training

To be completed on-site/Las Vegas, week of September 17, before entry:

- Site Access Training
- General Underground Training
- Respirator Training and Respirator Fit Test
- Ladder Training (1.8-m [6-ft] maximum)
- Hearing Conservation Training