



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

January 23, 1995

MEMORANDUM TO: Keith McConnell, Section Leader  
Geosciences/Geotechnical Engineering Section  
ENGB/DWM/NMSS

FROM: Stephen McDuffie, Geologist *SMD 1/23/95*  
Geosciences/Geotechnical Engineering Section  
ENGB/DWM/NMSS

SUBJECT: TRIP REPORT FOR THE DECEMBER 27-30, 1994, SITE VISIT TO  
OBSERVE YUCCA MOUNTAIN ESF TUNNELING ACTIVITIES

During the week of December 27-30, 1994, I was temporarily assigned to the U.S. Nuclear Regulatory Commission's On-Site Representative Office in Las Vegas, NV. This assignment was for the purpose of observing the U.S. Department of Energy's (DOE's) tunneling activities at the Exploratory Studies Facility (ESF). My role during this site visit was primarily to observe the tunnel boring machine (TBM) operation and gather information on plans for its future operation. I also served as a point of contact for NRC and CNWRA staff inquiring about TBM activities, as well as an NRC contact for DOE and its contractors in case any urgent communication with NRC was necessary.

ESF portal activities resumed at 8:00 am on December 27 after being shut down for 3 days over the Christmas holiday. Prior to the long weekend, the TBM had progressed to station 0+93.7 meters. DOE's stated plan for the week of December 27-30 was to operate the TBM during swing and graveyard shifts. The day shift was to be used for maintenance, including ongoing electrical work in connecting the mapping platform to the TBM. The bulk of TBM operation took place during swing and graveyard shifts the night of December 27 and morning of December 28; progress was made to station 1+00 meters. Routine maintenance, including moving the laser used for directional control (normally done after each 10-20 m of advancement), was performed during the morning of December 28. Operation resumed for several hours during the afternoon of December 28, progressing to station 1+01.4 meters. This was the last operation of the TBM until after the 3-day hiatus for the New Year's holiday. Work from the December 28 swing shift through graveyard the morning of December 31 involved placing a concrete invert, preparing a steel set for emplacement, and electrical hookup of the mapping platform. Restart of the TBM was planned for the morning of January 3, 1995.

Upon arrival at the Field Operations Center (FOC) on December 27, I met with Ralph Schneider (FOC manager), Jade Woodruff, Craig Matthews, and Jim Niggemeyer, all of SAIC. No DOE representative (e.g., Winn Wilson, Bob Waters) was present at the FOC this week. Normally there is a site manager's meeting at the FOC on Wednesday mornings, but there was none during this week

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due to the number of staff on leave. This was unfortunate, as such meetings often provide a wealth of current information on a variety of projects at the site. SAIC staff did provide me with some useful information about the project. I learned that the shortage of steel sets which plagued the project in November has been resolved. I asked Schneider his opinion on the possibility of shifting to a 24-hour day, 7-day workweek for TBM operations, and he expressed some reservations about such a schedule. Finally, SAIC staff stated the opinion that the Nye County drilling program at the site is well coordinated with DOE. Apparently both Nye County and DOE are pleased with the relationship.

Prior to visiting the ESF pad, Jim Niggemeyer provided me with the safety briefing necessary to enter the ESF. This briefing allows one to enter the tunnel with an escort, and the training is valid for 3 days. The General Underground Training course was not offered during the week, so I was unable to obtain indefinite tunnel access. Future NRC representatives on these assignments should receive this training during their visit, if possible.

In the afternoon, I visited the ESF pad to meet with George Veatch of the Management & Operations contractor (M&O). He served as the day shift ESF construction supervisor during the week. Mr. Veatch said the TBM operated for approximately 45 minutes early Tuesday afternoon, progressing about 45 inches. A muck car then derailed, hampering progress. Efforts to return the car to the track were apparently ongoing as we spoke. Mr. Veatch mentioned that the condition of the ground showed improvement over these 45 inches, which could help speed progress. During the machine downtime, staff also worked to synchronize the third conveyor in the TBM assembly (which empties into the muck cars) with the other two. The use of muck cars will eventually be a limiting step in the rate of mining progress. May 1995 is the expected date of operation of the full conveyor system, which will deliver muck from the cutter head to the muck pile. Mr. Veatch stated that heavy rain in the days before my arrival eroded some of the fill over the water line above and outside the portal. Repairs to this should be forthcoming.

In the morning of December 28, I again visited Mr. Veatch at the ESF pad. He escorted me into the tunnel along most of the length of the TBM. A portion of the mapping gantry still extends outside the tunnel portal. It is my understanding that Phase 3 of TBM operations (limited operations) cannot begin until the tunnel is long enough to cover the entire gantry. I asked a number of questions about the project and its management. The following is some of the information gleaned from this conversation: A given crew of workers has the ability to both operate the TBM and perform the necessary machine maintenance. Maintenance is scheduled for the day shift at this time, since more of the electrical specialists work during the day. As for immediate oversight, apparently those working in the tunnel (Kiewit and REECO staff) simply work as they see fit, seeking guidance from the shift supervisor (M&O) if they encounter an irregularity. Decisions on when to operate the machine and when to shut it down seem to be made by DOE staff located in Las Vegas, based on input provided to them by M&O. Mr. Veatch shares the opinion of

Ralph Schneider that a 7-day workweek would be a great burden on project personnel. The dryhouse was removed from the TBM because of concern that low clearance between the dryhouse and underlying conveyor could lead to large muck pieces striking the dryhouse. The steel sets must undergo testing to be properly qualified for this project, even though they are standard for the tunneling industry. Arrangements are being made to have the sets tested on site at the ESF pad.

The remainder of December 28 was spent in the FOC office and visiting other sites at Yucca Mountain. I learned that evening from the acting swing shift supervisor, Paul Glader (M&O) that the TBM began excavating at 1:15 pm on December 28 and progressed about 1.4 meters during the day shift. I was unaware of this excavation until after the fact, despite being at the pad less than 3 hours before it began. I doubt that Mr. Veatch knew during our conversation that operation would commence shortly. He was aware of my interest in observing TBM operation, but did not mention any impending activity. This is symptomatic of the communication difficulties surrounding the project. It is unclear who makes operational decisions, when they are made, and what the reasoning is behind them.

The daily ESF status report dated December 28 (received at FOC 8:00 am on December 29, standard procedure) stated that the availability of material to support TBM operations was becoming critical due to holiday schedules. About 1:30 pm on December 29, I met with Paul Glader to discuss activities of the previous evening and general TBM operation. Mr. Glader informed me that the material in critical supply is steel lagging, which is used with steel sets in ground support. He expected some lagging might arrive by air freight sometime Thursday, December 27, but as of 8:00 am Friday, December 30, it had not arrived. Mr. Glader was quite helpful in explaining some basics of how the TBM operates. He also attempted to explain the management structure overseeing ESF activities. This structure is quite complex, with seemingly overlapping areas of authority, and was not easily grasped during our conversation.

At the beginning of the swing shift on December 29, I spoke with Nelson O'Connor (M&O) at the ESF pad. He returned from vacation to relieve Mr. Glader as swing shift construction supervisor. No tunneling was planned for the swing or graveyard shifts for December 29-30, as the lagging had not arrived. Electrical work continued. In our discussion about the project, he cited logistical difficulties in bringing the necessary staff into the project as one cause of slowdowns. The travel distance hinders bringing all the desired personnel to the site exactly when they are needed. Moreover, new employees require upwards of 2 weeks of training before they can be productive. Mr. O'Connor seems optimistic about future TBM activities. He estimates that in mid-January the TBM will be ready for limited operation of Phase 3: 1) electrical connections will be complete; 2) material supply problems will be solved; and 3) mappers and miners will be able to work harmoniously. Moreover, the quality of the rock is expected to improve,

requiring less ground support and allowing for faster progress. Mr. O'Connor does not believe tunneling through the Bow Ridge Fault will be problematic; the fault gouge may be consolidated just enough to hold together during tunneling. In response to my question, who determines which category of ground support to use, he said, any changes in category require signatures from those involved with tunnel design. Regarding the possibility of 7-day workweeks, Mr. O'Connor also expressed concern with such a schedule.

At 7:30 am on December 30, I received the ESF daily status report dated December 29. This report stated that TBM activities would be suspended until after the New Year's holiday weekend; electrical work would continue through 8:00 am on December 31. At 8:00 am on December 30, I spoke with Rick Davis (M&O) and Mr. Veatch. Electrical work was slowed on December 29 due to rainy conditions at the site. Mr. Davis knew that M&O and Kiewit staff asked DOE on December 29 to allow uninterrupted electrical work through 8:00 am on December 31, rather than proceed with tunneling. Mr. Davis felt that mapping gantry electrical connections could be completed by 1/3/95 with several shifts devoted just to electrical work. Mr. Davis was unsure whether the shutdown request would be granted by DOE. I informed him that the December 29 status report stated that TBM operation was halted through the weekend. He said the status report is the official word, as it is produced by DOE, therefore, TBM operation would be suspended until January 3, 1995. I found it odd that I had access to information on TBM operation before a member of the M&O staff did--another example of the complex lines of communication and management in this project. DOE called for TBM operation to resume with the first shift after the holiday beginning 8:00 am on January 3. Lubricants in the machine take several hours to heat up before operation, so tunneling was unlikely before noon on January 3. Also scheduled for the week of January 3 is training for the mapping staff. The mappers must be fully trained on the use of the mapping gantry before Phase 3 operations can begin.

The construction work schedule did not require my continuous presence at the pad or at the FOC, so I observed several sites of geological importance around Yucca Mountain. I visited the new pad where borehole UZ-7a will be drilled with the LM-300 beginning about March 1995. Construction of this pad provided an exposure of the Ghost Dance Fault. I walked up the slope above the pad to look at an apparent scarp related to the Ghost Dance Fault. Plenty of well-cemented fault breccia occurs along this 1-meter-high offset. This contrasts with the fault breccia in the face of the cut, which has a much less indurated calcite matrix. I attempted to trace the scarp over the hillside of Broken Limb Ridge, but it is indistinguishable beyond several tens of meters above the pad. I later visited the Antler Ridge exposure of the Ghost Dance Fault and the site of the Large Block Test, which have been observed by several NRC staff in the past.

If there are any questions regarding this report, I can be reached at 415-6684.

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**Distribution for Memorandum to K. McConnell dated January 23, 1995**

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ETC., BY S. MCDUFFIE**

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