

UNITED STATES

WASHINGTON, D.C. 20555-0001

February 13, 1995

MEMORANDUM TO: Mysore Nataraja, Acting Section Leader $C_{h} = \frac{2}{3}/35$ Geosciences/Geotechnical Engineering Section ENGB/DWM/NMSS

FROM: Stephen McDuffie, Geologist SM(の 02/10/95 Geosciences/Geotechnical Engineering Section ENGB/DWM/NMSS

SUBJECT: TRIP REPORT FOR THE JANUARY 30-FEBRUARY 3, 1995, SITE VISIT TO OBSERVE YUCCA MOUNTAIN EXPLORATORY STUDIES FACILITY TUNNELING ACTIVITIES

During the week of January 30, 1995, 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 as it began to transgress the Bow Ridge fault zone. In addition, I worked in coordination with the On-Site Representatives (ORs) to gather information on various aspects of the tunnel design and data gathering programs. I also served as a point of contact with DOE's construction contractors, which enabled me to quickly relay information on tunneling activities to the ORs and the staff at Headquarters.

In the morning of January 30, I visited the ORs' office in Las Vegas to discuss my activities for the week. Bill Belke provided me with an assortment of documents which together compose design package 2C. He suggested that if time allowed, I could gain a better understanding of some technical issues by perusing the package. Unfortunately, my free time at the Field Operations Center (FOC) during the week allowed only a cursory look at the package.

I arrived at the FOC around noon Monday. I viewed a safety video which enabled me to enter the ESF with an escort. I spoke by phone with George Veatch of the Construction Management Operator (CMO), who served as the day shift supervisor during the week, and he informed me that the TBM was operating. Mr. Veatch said activity was unusually heavy on the ESF pad that shift, and it would be more convenient for the constructors if I could delay a visit to the pad until the swing shift. I obliged, and later met with Rick Davis (CMO) on the swing shift.

Mr. Davis escorted me into the tunnel for about 2 hours. During this time I observed the complete process of installing a steel set, lagging, and a concrete invert. The steel sets are erected inside the area of the TBM shield, then expanded with a hydraulic jack after the shield is moved forward.

9502170251 950213 PDR WASTE WM-11 PDR

102.8 -11 WM 11/16

M. Nataraja

Steel set erection appears to be the limiting step in the tunneling process; the TBM operated about 15 minutes of the 2 hours I was inside the tunnel. The machine must also shut down while the muck cars are emptied. With the present distance from the TBM to the dumping site, a train of three muck cars can be emptied in approximately 8 minutes. This is about the same amount of time required to fill three cars while the TBM is operating. Short breaks in TBM operation for steel installation, muck dumping, and shift changes are not expected to be problematic if soft ground is encountered. DOE plans 24-hour operation while crossing the Bow Ridge fault, since extended hiatuses give the ground a chance to relax around the machine, which can hinder extension of the machine's wall grippers.

In the morning of Tuesday, January 31, a phone call to Mr. Veatch revealed that the TBM encountered soft ground and was shut down at about 3:00 am. The soft ground was accompanied by a cavity in the rock, which could be observed by construction workers looking through the TBM cutter head. Preparations were underway to line the void with shotcrete, thus, stabilizing its walls. Mr. Veatch escorted me into the tunnel that afternoon to observe the early stages of shotcrete application. The shotcrete is mixed with minimal water, then pumped through a hose and applied by a worker through an opening in the TBM cutter head. While observing in the tunnel, I learned more about the tunneling industry by talking with Jerry Shelton (CMO).

Early on Wednesday, February 1, I spoke by telephone with Nelson O'Connor (CMO), graveyard shift supervisor. He informed me that 4 cubic yards of shotcrete were applied to the cavity during the swing shift the evening of the January 31, and 3 cubic yards during the graveyard shift that morning. Mr. O'Connor expected TBM operation to resume soon but perhaps not until Thursday. I spent most of Wednesday with the ORs as they escorted Charlie Haughney (NRC) on a site tour. We visited the Sample Management Facility, the ESF, the exposure of the Ghost Dance fault at UZ-7a, the Large Block Test, Yucca summit, and Trench 14.

Later that afternoon I spoke with Winn Wilson (DOE), the FOC site manager, about camera passes for NRC staff visiting the site. In the future, camera passes can be obtained by contacting Ranch Control at (702) 295-5915, providing them with information on the nature of the camera to be used, and the reason for taking pictures. This should be done at least one week prior to arrival at the test site. The pass can then be picked up at the badging office upon arrival in Mercury. For such requests, initial contact with Ranch Control should be made by the ORs.

Thursday morning, February 2, Mr. O'Connor informed me by telephone of the developments overnight. A decision was made Wednesday to fill the cavity around the cutter head with concrete, so a slick line to pump concrete was laid overnight. A fiberboard membrane to protect the cutter head from concrete was expected to be delivered that morning, and the first of two concrete batches emplaced thereafter. The constructors believed, at this time, that the concrete filling would solve the problem; the void would not grow as the TBM progressed onward.

M. Nataraja

Later Thursday morning, I attended a meeting in Las Vegas with the two ORs and Alden Segrest and Jim Salchek of the Management and Operating contractor (M&O). Salchek discussed, in some detail, M&O's new design control process. M&O believes this new process, which includes a core group of 5 reviewers known as the product checking group, will eliminate mistakes in the ESF design. NRC has expressed concern with the ESF design control process in the past. Design package 8A, which covers the main drift at repository level in the Topopah Springs, will be the first design package created under this new process. Thursday afternoon I accompanied Bill Belke as he met with various DOE and contractor staff in his OR duties.

Thursday evening, while dining in the Mercury cafeteria, I spoke with Arthur Watkins of DOE's Architect and Engineering (A&E) contractor. He said the membrane over the TBM cutter head was in place, and the first batch of cement would likely be emplaced that evening. He stated a belief that the cavity around the cutter head is largely a natural cavity associated with the Bow Ridge fault zone, rather than a cavity created entirely by running ground (unconsolidated materials sloughing off the tunnel walls). Mr. Watkins was optimistic that the TBM would progress smoothly after this cavity was filled.

Friday morning I spoke with Mr. O'Connor near the end of the graveyard shift, and he informed me that the concrete pump had plugged on the swing shift Thursday night. A new pump was installed during the graveyard shift, and the first batch of concrete was expected to be emplaced Friday morning.

I spent much of Friday morning talking with Brad Augustine and Steve Beason of the U. S. Bureau of Reclamation (USBR), the group responsible for mapping and sampling the ESF walls. The mappers had been concerned about the liberal use of steel lagging in tunnel support, since the lagging hinders their ability to map and sample the tunnel wall. They informed me that a meeting on Thursday involving both the constructors and scientists had resolved their concerns. A decision was made to remove individual pieces of lagging, at the mappers' request, to facilitate mapping. Mappers were also concerned about their restricted access to the front of the TBM when situations such as cavities arise, but they were assured Thursday that USBR staff would be able to take photos of such cavities in the future. Beason was the only USBR representative who did observe the cavity before shotcrete application, and he shares the opinion that the cavity is largely natural. However, some scientists within DOE and its contractors feel that the cavity is a result of running ground.

Mr. Beason escorted me into the tunnel, and we discussed procedures followed in mapping and sampling. The procedures are the same as those used in mapping and sampling the ESF starter tunnel (with minor modifications), for example, Job Packages 92-20A and 92-20C, and Test Planning Package 92-10. I have high confidence in the mapping program after discussing it with Messrs. Beason and Augustine.

M. Nataraja

I later spoke by telephone with Dick Kovach of Los Alamos National Laboratory. Following up on a request from Mike Bell, I inquired about the use of water in the tunnel. Mr. Kovach said that he and the mapping principal investigator personally instructed the constructors on tunnel wall cleaning. Minimizing use of water in the tunnel was emphasized in this training. Water is mixed with air in a blowpipe to create a mist for cleaning the walls. Very little free water runs to the bottom of the tunnel during this cleaning. I did not observe the process, but from the description I have no concerns with it. All ESF water usage is metered, and it contains lithium bromide as a tracer. Metered water is also used in mixing the shotcrete in the tunnel, although cement is mixed with water outside the tunnel.

Friday afternoon I returned to Las Vegas to meet with Chad Glenn. We discussed the events of the week, and we decided that Chad should follow up on the issue of whether DOE has in place contingency plans for dealing with bad rock conditions, such as those encountered on Tuesday.

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

D.T	07D	701			
DT	218	IRU	111	UN	: /

Central File	DWM r/f	NMSS r/f	ENGB r/f	MBell
	JHolonich	MDelligatti	JThoma	RWeller
BJagannath LSS	On-Site Rep	CNWRA	PUBLIC	ACNW

DOCUMENT NAME: S:\DWM\ENGB\SMM\YMTRIP2

OFC	ENGB	Ē	ENGB >> `	
NAME	SMcDuffie/e SMc	eb D	MNataraja) _{for} KMcConnell	
DATE	2/10/95		2/13/95	
			SECTORAL DEGADO	

OFFICIAL RECORD COPY