CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

- SUBJECT:Application of Ground Magnetic Surveys in Fortymile Wash, Nevada, and Visual
Inspection of Drill Cuttings from Several Nye County Early Warning Detection
Program Wells (20.01402.861)
- DATE/PLACE: May 4–8, 2000 Fortymile Wash, Nye County, Nevada
- AUTHORS: David Farrell and Peter La Femina

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PERSONS PRESENT:	David Farrell, Peter La Femina, Michael Smith, Walter Illman	

BACKGROUND AND PURPOSE OF TRIP:

As part of their site characterization and performance assessment activities the DOE has developed hydrologic models of the Fortymile Wash and Amargosa Desert region. These models contain numerous uncertainties, and the importance of these uncertainties to the performance of the proposed repository is unknown. CNWRA activities reported here were carried out as part of an ongoing effort to evaluate aspects of the DOE models for this region. Specifically, this trip served two purposes: (i) collection of geomagnetic data in the vicinity of Fortymile Wash, Nye County, Nevada and (ii) visual inspection of drill cuttings from several of the Nye County-Early Warning Drilling Program (NC-EWDP) wells.

SUMMARY OF ACTIVITIES:

Geomagnetic Survey

Ground magnetic surveys were performed in the vicinity of Fortymile Wash, located southeast of Yucca Mountain to (i) gain insights into the geologic and hydrologic structure of Fortymile Wash and northern Amargosa Desert; (ii) better define the transition from Miocene tuff deposits to valley fill in the vicinity of Fortymile Wash; and (iii) constrain structural and hydrogeologic models of the area, which were constructed from Transient Electromagnetic (TEM), Time-Domain Induced Polarization, and Schlumberger resistivity data collected by CNWRA staff and contractors in January, 1999.

The location of the contact between the Miocene tuff units and valley fill is of considerable importance for repository performance, because increased retardation of radionuclides is expected to occur within the valley fill relative to the tuffaceous units. This aspect of the survey builds on earlier work performed on the eastern edge of Fortymile Wash in May, 1999, which aimed at identifying the tuff/valley fill contact. A geologic model of this earlier data set located the contact between NC-EWDP well Washburn 1X (south) and well JF-3 (north). The new ground magnetic data extend the previous data set on the eastern edge of Fortymile Wash and complete earlier, uninterpreted surveys performed west of the wash.

Several megabytes of magnetic data were collected during this survey, along approximately 40 km of survey lines. The surveyed lines included (i) a north-south line, parallelling Hwy 373 and extending north from Amargosa Farms to the 510 gate of the Nevada Test Site (NTS) (this line augments an earlier north-trending line extending from north of J-13 to the 510 gate, and will be constrained by future data from the Felderhoff Federal 25-1 and NC-EWDP-4D wells); (ii) an east-west line extending from Lathrop Wells Cinder Cone (Cind-R-lite location) in the west, eastward to a location south of NC-EWDP-5S and north of Amargosa Valley (this line coincides with TEM line A-A' from the January, 1999 survey and is constrained by NC-EWDP-15D, NC-EWDP-2D, NC-EWDP-Washburn 1X, and NC-EWDP-4D); (iii) a series of lines that extend the previously surveyed north-south line west of Fortymile Wash (May, 1999), as far north as J-13 and as far south as NC-EWDP-2D (apart from J-13 and NC-EWDP-2D, this line, which crosses the tuff/valley-fill contact, eventually will be constrained by additional data from NC-ECWDP-20 and NC-EWDP-19D); and (iv) several shorter east-west lines located on the west side of Fortymile Wash, south of Busted Butte, that are coincident with TEM data collected during the January, 1999 CNWRA survey.

The data collected during this survey is currently being processed. However, the combined interpretation from the ground magnetic, TEM and well logging data sets are expected to better constrain geologic and hydrogeologic models of the Fortymile Wash/Amargosa Desert region. These data will also be of considerable value in the review of DOE models for the region.

Visual Inspection of Drill Cuttings from Several Nye County Early Warning Drilling Program Wells

Staff examined drill cuttings from four of the NC-EWDP wells; NC-EWDP-2D, NC-EWDP-19D, NC-EWDP-15D, and NC-EWDP-4PA, at the Yucca Mountain Project - Sample Management Facility. These wells are of interest because of their proximity to geophysical surveys conducted by CNWRA staff and Fortymile Wash. To date, reports of detailed analyses on cutting have only been provided for NC-EWDP-2D (see Nye County, Early Warning Drilling Program, Phase 1–FY 1999, Data Package). NC-EWDP-2D is located approximately 100 m north of Highway 95 in Fortymile Wash and consists primarily of varying sequences of valley fill, lake sediments, and volcaniclastics.

NC-EWDP-19D is located at the southwestern corner of the NTS. The drill cuttings of NC-EWDP-19D extend down to a depth of 1438.3 ft. Polylithologic sedimentary deposits (ranging from gravels to silts) occur in this well between 355 ft (start of sample collection) and 820 ft. At a depth of 820 ft, the well encountered a zeolitized ash flow tuff. This deposit extends to a depth of 1245 ft, becoming less altered with depth. According to Chris Lewis (Yucca Mountain Project–Sample Management Facility staff), this tuff unit has been hypothesized to be part of the Crater Flat Group. Between 1245 ft and 1430 ft the well encountered polylithologic sediments. Between 1430 ft and 1438.3 ft the well encountered white volcaniclastic deposits that are similar in appearance to volcaniclastic deposits within the Oligocene-Miocene Rocks of the Pavitts Spring and Horse Springs units located north of Mercury, Nevada.

NC-EWDP-4PA is located south of gate 510 on the Lathrop Wells road. This well extends to a depth of approximately 500 ft. Cuttings collected along the length of this borehole show varying thicknesses of valley fill, ranging in size from gravel to fine sand. No tuffaceous or volcaniclastic units appear to be present within the zones sampled.

NC-EWDP-15D is located approximately 100 m north of Highway 95 and southeast of the Lathrop Wells cinder cone. This well extends down to a depth of approximately 600 ft and consists primarily of white to mottled tuffaceous and volcaniclastic units.

CONCLUSIONS:

Ground geomagnetic data were collected in the southern portion of Fortymile Wash. The collection of the data appears to have been successful. Interpretation of the data (in conjunction with previously collected geomagnetic data, electrical resistivity data, gravity data, and well bore data) should help constrain the location of the tuff-alluvium contact in Fortymile Wash. The data should also better constrain models of the geology and hydrogeology beneath Fortymile Wash, and prove useful for reviewing current and future DOE models for the region.

Examination of wellbore cuttings at the Sample Management Facility for selected Nye County wells located in southern Fortymile Wash indicates the presence of near-surface tuffaceous units in the southwest portion of Fortymile Wash. In depth analyses have not yet been performed on these cuttings to determine their source unit. This borehole data should prove useful for constraining geologic and hydrologic model of the region.

PROBLEMS ENCOUNTERED:

No significant problems were encountered during the survey. The only problem of note was that limited basestation data were collected on May 6 due to logistic problems. This data will be augmented with geomagnetic data recorded at nearby geomagnetic observatories located in Boulder, Fresno, and Tucson.

PENDING ACTIONS:

There are no pending actions with respect to the field work performed during the field visit to YM. However, with respect the overall project, the next steps are magnetic data reduction, magnetic data processing, and data interpretation.

REFERENCES:

Farrell, D.A., Investigation of Subsurface Structure Beneath Fortymile Wash and the Amargosa Desert Region Using Electromagnetic and Resistivity Methods. Trip Report. San Antonio, TX: Center for Nuclear Waste Regulatory Analyses. 1999.

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