

D. DeMarco

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
TRIP REPORT

SUBJECT: Trip Report for Observation and Sampling of Nye County Early Warning
Drilling Program Wells
(20.06002.01.141.018)

DATE/PLACE: May 9–13, 2004
Nye County, Nevada

AUTHOR: Miriam Juckett

DISTRIBUTION:

CNWRA

W. Patrick
CNWRA Directors
CNWRA Element Mgrs
M. Juckett
L. Gutierrez

NRC

W. Reamer
B. Meehan
E. Whitt
W. Ford
T. McCartin
L. Kokajko
E. Collins
F. Brown
K. Stablein
M. Bailey
A. Campbell
L. Campbell
B. Leslie
H. Art
J. Bradbury
D. Brooks
L. Hamdan
P. Justus
J. Pohle
J. Trapp

SwRI

Record Copy B, IQS

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Trip Report for Observation and Sampling of Nye County Early Warning Drilling Program Wells

DATE/PLACE: May 9–13, 2004
Nye County, Nevada

AUTHORS: Miriam Juckett

PERSONS PRESENT:

M. Juckett and J. Brown from the Center for Nuclear Waste Regulatory Analyses (CNWRA) and S. Blanco and B. Strye from Raba Kistner, traveled to Las Vegas and Nye County, Nevada to participate in a Nye County Early Warning Drilling Program sampling event. Representatives of Nye County invited several organizations to participate and collect water samples from wells in the Early Warning Drilling Program. The number of organizations and individuals participating in the sampling event varied from day to day. Participants included representatives of Nye County and its subcontractors, BSC company [U.S. Department of Energy (DOE) contractor], Lawrence Livermore National Laboratory, United States Geological Survey, and the University of Nevada at Las Vegas.

BACKGROUND AND PURPOSE OF TRIP:

Nye County, with funding from the DOE, established the Early Warning Drilling Program in fiscal year 1999. The Early Warning Drilling Program is designed to protect residents of Nye County against potential radionuclide contamination and to produce data regarding the geology, chemistry, and hydrology of strata located along the potential flow path of groundwater emanating from Yucca Mountain and vicinity. CNWRA personnel participated in the recent sampling event to observe practices and procedures used to collect water samples and to obtain water samples for independent chemical analyses.

The May sampling event involved NC–EWDP–19PB (Phase IV) and NC–EWDP–3S (Phase I) Early Warning Drilling Program wells. See Figure 1 for approximate location of the Early Warning Drilling Program boreholes. Nye County provides detailed descriptions of each borehole, including summary lithologic logs, water level data, and well completion information at their web site (www.nyecounty.com) under the Early Warning Drilling Program section.

In general, the depth and nature of construction for the Early Warning Drilling Program wells can be discerned from the well designation. Those designated as “P” wells are piezometers and are completed with one or multiple separate PVC pipes (2 inches in diameter) that are screened at discrete depths. “S” wells are completed with larger diameter casing and are typically screened at multiple intervals.

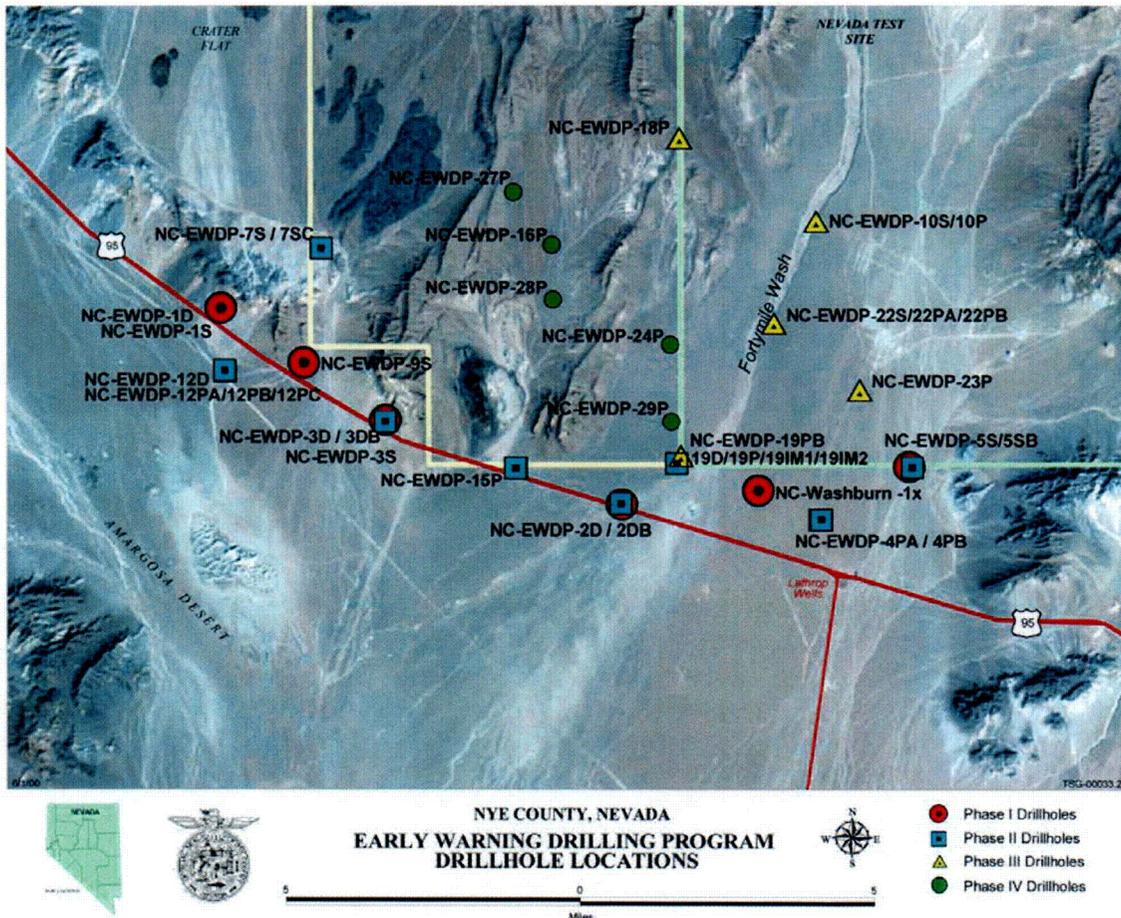


Figure 1. Approximate Locations of Early Warning Drilling Program Wells. Image Courtesy of Nye County (www.nyecounty.com)

SUMMARY OF ACTIVITIES:

Nye County's plans for the May event called for sampling to take place over five consecutive days from May 10–14, 2004. CNWRA staff participated during the first three days of sampling. Sampling for the deep zone of 19PB took place on Monday, May 10, 2004. Weather conditions were extremely adverse, with sustained winds of 30 mph and gusts at 60 mph, causing sandstorms which greatly complicated sampling. Field analyses were conducted in the back of an SUV to avoid as much disruption by the wind and sand as possible. Containers were sheltered as much as possible while being filled at the wellhead, and filtering of samples was completed in the hotel to avoid contamination. Sampling of the shallow zone of 19PB took place on Tuesday, May 11, 2004, with much more amiable weather conditions. The sampling was uneventful, with no pump or well problems.

For both zones of well 19PB, CNWRA staff conducted field analyses and collected samples for subsequent laboratory analyses. For each zone, approximately 16 liters of water were collected and were split and/or processed into subsamples for subsequent laboratory analyses. Sample type and quantities are listed in Table 1. CNWRA field analyses included measurement of temperature, pH, oxidation-reduction potential, conductivity, dissolved oxygen, and alkalinity.

Table 1. Sample Types and Volumes Collected for Each Groundwater Zone at Well 19PB During the May 2004 Early Warning Drilling Program Sampling Event. A total of 2 Zones Were Sampled.

Sample Volume and Container Type	Filtration	Preservation	Analyses
Four 40 ml, amber glass	filtered, 0.45 μm	none	total and inorganic carbon
Two 250 ml, amber glass	filtered, 0.45 μm	none	stable isotope ratio, (H/D, $^{16}\text{O}/^{18}\text{O}$, and $^{12}\text{C}/^{13}\text{C}$)
Four 1 liter, HDPE*	not filtered	none	various organic analyses
One 500 mL, HDPE	not filtered	none	any necessary analysis
Seven 1 liter, HDPE	filtered, 0.45 μm	none	anions, cations, trace metals, sorption experiments
One liter, HDPE	filtered, 0.45 μm	1+1 HNO_3 (trace metal grade)	cations, trace metals
Three 4oz, HDPE	not filtered	none	various organic analyses

*HDPE—High density polyethylene

For the first time, an inline probe was taken by CNWRA for field measurements and was used for both the shallow and deep zones of 19PB. The inline probe is a multi-probe instrument fitted with a flow-through cell and is calibrated prior to attaching directly to the well-head lines. Conductivity, oxidation-reduction potential, pH, and temperature were measured on the inline probe, which also provided GPS information. Table 2 provides preliminary results of CNWRA field measurements, inline probe readings, and readings collected from the Nye County in-line monitoring probe.

Sampling of zone 3 of well 3S was to take place on Wednesday, May 12, 2004. Upon arrival at the wellhead, the CNWRA crew was informed that the well was producing extremely turbid water and was unsuitable for sampling. A bucket of water collected from the well was murky and a green, slick sediment had settled to the bottom (see Figures 2 and 3). The particles in the water caused occasional line clogging and an erratic flow rate. Nye County decided not to connect their inline probe or collect field measurements. CNWRA staff agreed and did not take field measurements, but collected two liters of unfiltered well-water for potential subsequent lab analyses. Nye County also collected several samples. United States Geological Survey personnel attempted to filter the water at the wellhead, but were largely unsuccessful.

Table 2. Summary of Preliminary Field Chemistry Measurements for the May 2004 Early Warning Drilling Program Sampling Event at Well 19PB. Readings from the In-line Monitoring Probe (YSI 6820 Probe with YSI 650 Monitor) Used by Nye County Personnel Are for Information Only.

Zone or String	Time of Sample	Water Temp. (°C)	pH	Conductivity (S/cm)	Dissolved Oxygen (mg/L)	ORP (mV) (Ag/AgCl)	Alkalinity (mg/L) (as CaCO ₃)	Measurement Source
Deep	0923	26.76	8.39	430	4.81	31.4		NYE
	0957	27.02	8.36	422	4.78	45.0		NYE
	1030	27.08	8.25	422	5.20	73.8		NYE
	0942	27.19	8.15	399.3		43		CNWRA (INLINE)
	1000	27.08	8.16	388.7		61		CNWRA (INLINE)
	0930	25.1	7.97	375	5.71	97.3	190/203	CNWRA (FIELD)
Shal.	0855	23.58	8.20	358	2.49	108.2		NYE
	0915	24.41	8.26	354	2.51	107.8		NYE
	0935	24.72	8.24	351	2.57	108.2		NYE
	0930	25.13	8.31	331.1		48		CNWRA (INLINE)
	0945	25.35	8.29	332.3		51		CNWRA (INLINE)
	0945	25.9	8.38	337	4.30	105.0	111/116	CNWRA (FIELD)

Note: CNWRA inline probe values were originally recorded as NHE values and were converted to Ag/AgCl equivalent by the equation $NHE - 197mV = Ag/AgCl$.

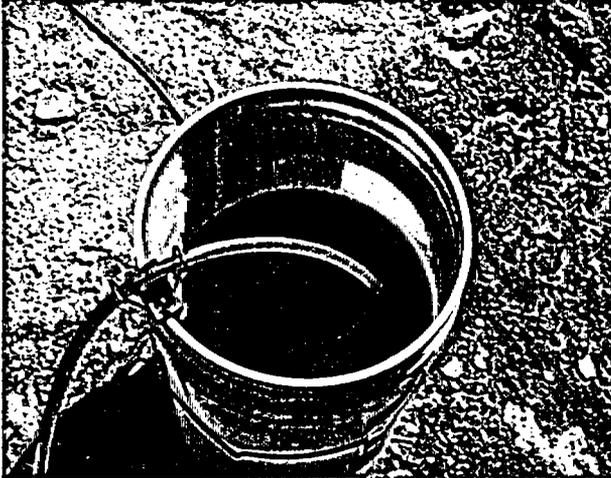


Figure 2. Bucket of Water Obtained From NC-EWDP-3S on May 12, 2004



Figure 3. Comparison of Water Obtained From NC-EWDP-3S on May 11-12, 2004 Respectively

Sampling generally proceeded with Nye County personnel opening the well, measuring and recording static water level, installing the pumping apparatus, and purging the well. Wells are usually pumped to discharge at least three borehole volumes prior to sampling. However, well 19PB was pumped for over a week prior to sampling, and well 3S was pumped for at least two days prior to sampling, exceeding the three borehole volume minimum. Once samples were ready to be taken, each interested group collected water from the same discharge point, which was upstream of the discharge tubing for the in-line probe assemblies. The volume and type of container used for the collection of samples varied depending on the needs and interests of each organization collecting samples.

OTHER PERTINENT ITEMS:

Nye County pumped well 19PB for nearly two weeks prior to the sampling event in preparation for possible upcoming tracer tests.

CONCLUSIONS:

The Early Warning Drilling Program continues to be a source for important site characterization information that will impact the licensing process. Chemical and mineralogical data gained from the wells will help to bound radionuclide transport parameters used in predicting the potential for radionuclide migration and may provide information regarding the fate of water transported away from Yucca Mountain and vicinity.

PROBLEMS ENCOUNTERED:

Weather conditions were adverse on May 10, 2004 at well 19PB and throughout Armagosa Valley.

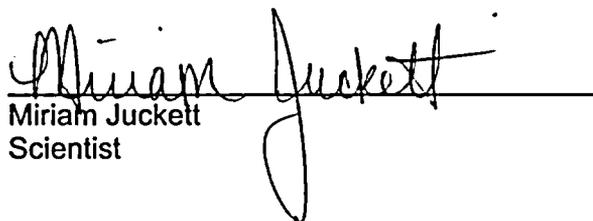
PENDING ACTIONS:

Chemical analysis of the water samples is underway.

RECOMMENDATIONS:

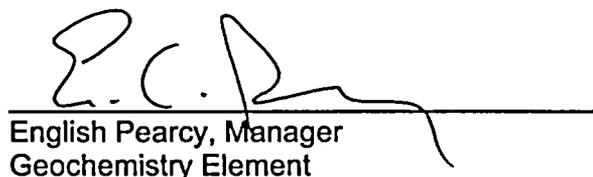
NRC and CNWRA staff should continue involvement in the Early Warning Drilling Program. Through direct participation, NRC and CNWRA staff can (i) improve communication with the public and interested parties, (ii) provide rapid response as necessary to procedural and quality assurance issues through oversight, and (iii) be better prepared to deal with DOE case for licensing through a first-hand knowledge of the collection and limitations of the data generated within the Early Warning Drilling Program characterization process. All of these result in helping to achieve NRC stated goals of increasing public confidence, reducing the regulatory burden, and streamlining the licensing process.

SIGNATURES:

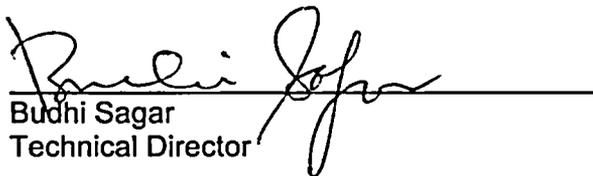

Miriam Juckett
Scientist

5/28/2004
Date

CONCURRENCE:


English Percy, Manager
Geochemistry Element

5/28/2004
Date


Budhi Sagar
Technical Director

6/1/2004
Date