

NUCLEAR WASTE REPOSITORY PROJECT OFFICE P.O. BOX 1767 • TONOPAH, NEVADA 89049 (702) 482-8183 • FAX (702) 482-9289

December 1, 1997

Mr. Russell L. Patterson U.S. Department of Energy Yucca Mountain Site Characterization Office Post Office Box 30307

North Las Vegas, Nevada 89036-0307

Nye County Early Warning Drilling Program

Dear Mr. Patterson:

I am submitting to the DOE/YMP for review a description and detailed cost estimate of an expanded Nye County drilling program. These new wells will be located down gradient of Yucca Mountain and are designed to investigate the saturated zone hydrology in the Amargosa Valley area. This program will establish a Nye County 'Early Warning Monitoring Network' and create a comprehensive baseline of critical aquifer parameters that will be available to all interested parties. Nye County believes that this network will be critical for assuring the down-gradient public that changes in the system will be observed in time for mitigating measures to be implemented. This program is a three-year program beginning in FY98 and will extend through FY2000.

As you are well aware, Phase I of the Nye County program was initiated in December 1994 with the drilling of well ONC#1 and the subsequent instrumenting of this hole along with DOE hole NRG-4. This data has been used by Nye County technical staff and scientists from the NRC, NWTRB and DOE. The project also demonstrated an alternative drilling system and down hole monitoring equipment. Although limited in scope, these two wells have provided valuable information on the character of the unsaturated and shallow saturated zone along the Bow Ridge fault off the southeast edge of Yucca Mountain. It has become apparent, however, based on recent data and results of DOE's own that additional information is urgently needed in the shallow and deep saturated zones down gradient of the Yucca Mountain repository site. This program will assist in obtaining this data in a timely and cost effective manner.

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Nye County is requesting DOE consider funding this program under a new grant or an addendum to the existing Grant#DE-FG08-96-12027 since it is anticipating substantial fewer resources being available for oversight in FY98. The cost of the Phase I holes were bore solely by Nye County Oversight funds. This program therefore must necessarily be funded by some other means.

If you have any questions regarding details of this program, please call me at (702) 794-5547 or 727-7727. Thank you for your prompt consideration of this important proposal.

Sincerely,

Nick Stellavato On-Site Geotechnical Representative

cc: Les W. Bradshaw, Nye County Manager Phil Niedzielski-Eichner, Nye County Mal Murphy, Nye County

NYE COUNTY PROPOSAL FOR A PHASED DRILLING AND TESTING PROGRAM FOR A SERIES OF EARLY WARNING WELLS DOWN GRADIENT OF THE YUCCA MOUNTAIN SITE

INTRODUCTION

Nye County's Technical Grant is currently limited in focus and is addressing the key issue of pneumatic response of the unsaturated zone at Yucca Mountain. This work is exclusively focused on pressure, temperature, and relative humidity data derived from the unsaturated zone in wells ONC#1 and NRG-4 and in the ESF. Little data is currently being acquired from the shallow aquifer and no data from the deeper aquifer.

Nye County's program also evaluates DOE's general scientific program and identifies areas that the County feels are not being adequately investigated. One of these areas is the sparse data set from the saturated zone in and down gradient of Yucca Mountain. DOE's saturated zone program was reduced or delayed in favor of other budget priorities at a time when the unsaturated zone was believed to offer a tight barrier from radionuclide migration to the accessible environment.

To the contrary, the latest information coming from testing in the ESF and from pneumatic response data from various wells at Yucca Mountain, 'potential fast flow paths' apparently exist through out the unsaturated zone. The existence of 'fast paths' to the saturated zone greatly increases the importance of understanding the saturated zone flow and transport properties. These properties will become increasingly important for Total System Performance Assessment/Viability Assessment calculations that will be performed in FY98. Other recent data from the NTS concerning plutonium migration on colloids in the saturated zone on Pahute Mesa have raised another warning flag.

EARLY WARNING AND DATA BASE DEVELOPMENT

More data and a long-term baseline are critical to understanding any changes in the natural system from future development at Yucca Mountain. Unfortunately, a meaningful database on the saturated zone in the area of Yucca Mountain *does not* exist. Out of concern for this deficiency, Nye County proposes to develop these critical databases by drilling a series of shallow and deep wells to obtain aquifer parameters, followed by pump testing and long-term monitoring of water chemistry and water levels in each well.

This new drilling and testing program is referred to by Nye County as the Early Warning Drilling Program (EWDP) and will be a phased program of planned drilling, testing, well completion, longterm monitoring, and data collection taking place over a three year period. This monitoring network is critically important and must be installed well in advance of any development. Advanced installation will make it possible to observe and mitigate, if needed, any impacts from development of a repository on the natural groundwater system down gradient of Yucca Mountain. This program would begin in early 1998 and be completed in 2000.

SHALLOW MONITORING WELLS

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The purpose of the shallow monitoring system is to acquire aquifer parameters of the alluvial and upper tuff aquifers. This series of wells will allow detection of any potentially contaminated groundwater that may bypass the deep monitoring system. Narrow contamination plumes could potentially bypass the deep monitoring system due to 1) the uncertainty in the dispersivity of the fractured system and 2) the proposed distance between the deep monitoring system wells. The relative uniformity of the dispersivity of the alluvial aquifer, however, may permit any plume to bypass the deep monitoring system without being detected. If this were to happen, the radioactivity would be sufficiently dispersed in the alluvial aquifers that it would be detected by the shallow system.

The distance between the shallow wells can be designed with more certainty once the hydraulic and dispersive properties of the shallow aquifers are better understood. Because the depth to the water table varies significantly in the Amargosa Desert, these shallow wells may vary in depth from a few hundred feet to as much as 1000 feet. These wells will partially penetrate the bedrock if possible.

Phase I of the EWDP will consist of five wells to be drilled in FY98 down gradient of Yucca Mountain. The exact location of the wells depends on 1) land accessibility, 2) the potential value of the information to be obtained, and 3) the potential for maximizing confidence in the system, after consultation with YMP technical staff. These wells will be completed with multiport piezometers (preferably Westbay Corporation equipment) so samples and aquifer characteristics of specific zones can be obtained. By isolating specific aquifer zones, head and water chemistry differences can be determined.

Phase II will consist of five additional wells drilled in FY99. These wells will also be down gradient of Yucca Mountain and will be located after results of FY98 drilling are known. Again, testing will be performed similar to FY98 testing. The final Phase will be completed in FY2000 with the drilling of five additional holes. These holes will again be located based on results of FY98 and FY99 drilling. As is always the case with Nye County data, posting of data sets will be on the Nye County web page, <u>www.nyecounty.com</u>. A map of the proposed locations has been attached to this request along with costs of drilling, testing, logging, completions, and program supervision.

DEEP MONITORING WELLS

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The purpose for installing deep monitoring wells will be to:

- develop a comprehensive database of aquifer parameters in the deep carbonate aquifer down gradient of Yucca Mountain:
- help define the inter-relationships of the deep carbonate aquifer and the upper tuff aquifers down gradient of Yucca Mountain;
- help define the relationship of the carbonate aquifer to the Death Valley and Franklin Lake Playa discharge sites;
- help define flow paths down gradient of Yucca Mountain; and
- build the capacity to detect any contaminant plume that might travel vertically from the Yucca Mountain repository site into the deep volcanic or carbonate aquifer systems.

Two wells will be drilled in the FY98 Phase I program that will penetrate the deep carbonate aquifer system down gradient of Yucca Mountain. The first well will be drilled near Forty-Mile Wash and the other at the mouth of Crater Flat. The carbonate aquifer lies at a depth of 2000 to 4000 feet. At least the upper 200 feet of this aquifer should be penetrated and completed. A multiport Westbay sampling and monitoring system will be installed to help obtain aquifer parameters of the deep system.

Once the hydrologic and hyrochemical system in these two wells is understood, additional wells can be drilled at various depths for monitoring purposes. After the initial wells have been monitored for a period of one year, a second set of wells will be installed based on the information obtained in the initial wells.

This stepwise drilling program will continue until a high confidence is achieved that the system will detect any potential migration of radionuclides from the Yucca Mountain site. A map is attached that shows the proposed locations of the deep well network along with costs of the three-year program. All drilling will be conducted under the Nye County Quality Assurance plan thus ensuring that the data can be used in the licensing process.

COSTS

The costs in the attached table are based on information obtained from selected vendors, contractors, and past experience. If funds were approved for this program, official Nye County bid requests would be obtained for all phases of the program. All samples will be split 50-50 with DOE and its contractors. Well locations will be finalized based on DOE contractor and Nye/Inyo County input. All drilling will be under the supervision of Nye County with Inyo County providing technical input. DOE can work with Nye and Inyo in developing the testing and sampling program and may take samples for their program requirements.

The EWDP is planned as a three-year drilling and testing program with reduced sampling of the monitoring network in the years following. The program is broken into three Phases; Phase 1 in FY98. Phase II in FY99, and Phase III in FY2C00. The program will consist of drilling and testing

five shallow wells and two deep wells, along with completion of previously drilled oil and gas test well Felderhoff 25-1 in FY98. The cost of this first Phase is \$3,046,350 and will be initiated in the first quarter 1998. Drilling will commence as soon as all environmental requirements and land access issues are resolved. Phase II will begin in early FY99 with the drilling of five additional shallow and two additional deep monitoring wells. The testing program will be basically the same as FY98 but may be adjusted based on results obtained in the FY98 program. Costs of the FY99 program are \$3,279,485 based on a 10 percent inflation factor. The FY2000 program will again be adjusted based on input from Nye/Inyo County technical staff and DOE hydrologists. The FY2000 program tentatively consists of five additional shallow wells and two more deep wells with a cost estimate of \$3,607,433. The total estimated cost for the three-year program is just under \$10 million. The Yucca Mountain data set for the shallow and deep aquifer units will be increased by 15 new shallow long-term monitoring wells and six new deep carbonate aquifer wells added to an all but nonexistent saturated zone dataset.

Well ID	Depth	Site Prep	Mob/Dem	Dritting ⁴	Logging ²	Logging'	Testing*	Completio 83	Permitting ^s	Mbc ⁴	Total
EWDP-015	500-1000	4,000	10,000'	48,600	25,000	15,000	45,250	146,000	5,000	36,550	\$335,400
EWDP-025	500-1000	4,000	2,800	48,600	25,000	15,000	45,250	146,000	5,000	36,550	\$328,200
EWDP-035	500-1000	4,000	2,800	48,600	25,000	15,000	45,250	146,000	5,000	36,550	\$328,200
EWDP-045	500-1000*	4,000	2,800	48,600	25,000	15,000	45,250	146,000	5,000	36,550	\$328,200
EWDP-055	500-1000*	4,000	2,800	48,600	25,000	15,000	45,250	146,000	5,000	36,550	\$328,200
EWDP-01D	2000-6000*	5,000	10,000	200,000	25,000	20,000	60,500	350,000	5,000	36,550	\$712,050
EWDP-02D	4000-6000*	5,000	3,500	200,000	25,000	20,000	60,500	350,000	5,000	36,550	\$705,550
Feldmoff 25-1	4000-6000*	NA	NA	NA	NA	NA	NA	65,000ª	ΝΛ	NA	NA
Total FY98	N۸	30,000	34,700	643,000	175,000	115,000	347,250	1,495,000	35,000	255,850	\$3,130,80G
Total FY99	NΛ	30,000	34,700	643,000	175,000	115,000	347,250	1,430,000	35,000	255,800	\$3,287,340*
Total FY2000	NA	30,000	34,700	643,00	175,000	115,000	347,250	1,430,000	35,000	255,850	\$3,451,707*
TOTAL	NA	90,000	104,100	1,929,000	525,000	345,000	1,041,750	4,355,000	105,000	767,550	\$9,869,847

¹ Drilling includes rig crew travel time and per diem
² Wellsite geologic logging of cuttings and water sample handling
³ Geophysical logging of each hole; Schlumberger, etc.
⁴ Testing includes all pumps, pipe, and sample analysis
⁵ All costs of obtaining required environmental permits, QA oversight, surveying, archeological clearances etc.
⁶ Includes water purchase for drilling, supervision, data analysis, report printing, technical support, trailer rental
⁷ Mobilization for first hole; other moves on a per hour rate
⁶ Completion costs based on estimate of J. Czarnecki of the USGS for previously drilled oil and gas test well Felderhoff 25-1
⁶ Includes 10 percent inflation factor for FY99 and FY2000







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