



Community Advisory Board for Nevada Test Site Programs

February 10, 2006

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Mr. Stephen A. Mellington
Assistant Manager for Environmental Management
U.S. Department of Energy – Nevada Site Office
PO Box 98518
Las Vegas, NV 89193-8518

RE: Community Advisory Board for Nevada Test Site Programs (CAB)
Recommendation for Future Nevada Test Site Well Locations

Dear Mr. Mellington:

As you are aware, over the last four years the CAB's Underground Test Area (UGTA) Committee has conducted an in-depth review and study of the UGTA project with the ultimate goal of providing a recommendation for future well locations at the Nevada Test Site. We have worked closely with programmatic technical staff, U.S. Geological Survey experts, and Nye County representatives; conferred with the Nevada Division of Environmental Protection; and met with stakeholders to ensure that they were both aware of our work and could also participate in the process with their feedback and concerns.

Although our work is not completely finished at this point, we are submitting the attached recommendation which details proposed sites for two additional wells at the Nevada Test Site. We believe, however, that a network of at least three wells in the western Pahute Mesa region should be considered; therefore, we are continuing to evaluate the geophysical conditions and will provide you with specific coordinates for a third well in a follow-up recommendation. In addition, DOE has invited us to continue our work and provide additional recommendations for well locations that we believe may further enhance data collection or may provide opportunities to serve as early sentinel monitoring wells. Therefore, we will continue to work with your representatives and share our thoughts as we move through our investigative process.

We sincerely appreciate the opportunity to work with you to address stakeholder concerns related to groundwater. Both your federal and contractor technical staff members have met with us on numerous occasions to pore over maps and technical reports, share their scientific expertise, address our questions, and provide whatever resources we needed to accomplish our work.

Stephen A. Mellington
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This has been a tremendously valuable learning experience for all of us, and has provided an opportunity for a true partnership between the community and DOE. Thank you once again for this opportunity, and we look forward to our ongoing work with you on the UGTA project.

Sincerely,



Kathleen Peterson, Chairperson
Community Advisory Board for Nevada Test Site Programs

Enclosures:
CAB UGTA Well Location Recommendations

/mkp

cc: U.S. Senator John Ensign
U.S. Senator Harry Reid
U.S. Congresswoman Shelly Berkley
U.S. Congressman Jim Gibbons
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CAB Members

CAB UGTA WELL LOCATION RECOMMENDATIONS

INTRODUCTION

Established in 1994, the Community Advisory Board for Nevada Test Site Programs (CAB) is a formal group of volunteer citizens organized to provide stakeholder feedback to the U.S. Department of Energy's (DOE's) Nevada Site Office Environmental Management Program.

From 1951 to 1992, the United States government conducted 828 underground nuclear tests at the Nevada Test Site (NTS) at depths ranging from ~90 to 4,800 feet beneath the desert's surface. About one-third of those tests occurred near or below the water table, which resulted in some radioactive contamination of the groundwater at the NTS. Therefore, shortly after its formation, the CAB organized the Underground Test Area (UGTA) Committee to focus on issues related to groundwater. Committee members kicked off their work with an intensive multi-year learning process. Members pored over lengthy technical documents, listened to numerous briefings by DOE scientists, conferred with expert hydrologists, geologists, academia, and regulators, and reviewed and provided feedback to an independent peer review of the project. Throughout the years, the CAB also scheduled regular public meetings to discuss its findings and invite feedback from stakeholders.

Because of the clearly defined recommendations of the CAB and related stakeholder concerns, in August 2002 Carl Gertz (DOE's Assistant Manager for Environmental Management at that time) invited the CAB to further research the issue and provide specific recommendations for a future well location.

As a result of its ensuing in-depth study, combined with feedback from potentially affected stakeholders and the Peer Review Report findings, the CAB is focusing its efforts on western Pahute Mesa. This region sits

relatively close to the NTS boundary and is directly upgradient of the residents of Oasis Valley, Beatty, and Amargosa Valley. Because the groundwater flows west and south from the NTS, contaminated groundwater could migrate beyond the NTS boundary in this region.

Ultimately the CAB concluded that, given the lack of data in the critical focus area, a network consisting of a minimum of three wells would provide a more comprehensive approach. Therefore, the CAB recommends that a series of at least three (3) wells be drilled to determine the depth to groundwater, provide a clearer understanding of groundwater geochemistry, identify rock units, and provide results from single well pump tests. The primary objectives for each of the wells are as follows:

1. Intersect a contaminant plume which can be tied to the source test
2. Sample geochemistry, measure elevation of the water, and test for potential contamination
3. Improve the understanding of the effect of the structure known as the Thirsty Canyon Lineament on groundwater flow

The CAB further believes that these three strategically placed wells will decrease computer model uncertainties in the region of concern and will likely improve overall understanding of contaminant transport.

RECOMMENDATIONS

CAB WELL #1

Objective

The objective of CAB Well #1 is to intersect a contaminant plume. Therefore, the CAB selected a site downgradient from the Benham Test and Well #ER-20-5#1, which intersected Benham contamination in 1996. It would be beneficial to detect radionuclides other than tritium so that contaminants may be linked to a specific historical test.

Background

The existing Well #ER-20-5#1 is located ~4,290 feet south/southwest of the Benham test, which was conducted in 1968. Since groundwater migration is controlled by a variety of subsurface factors, it is not possible to know precisely how much farther contamination may have traveled since that time. However, the distance could be in excess of 1,000 feet. To increase the chance of encountering radionuclides, the CAB recommends a more conservative distance for the well site. Furthermore, the potential for detecting a greater array of radionuclides may be increased by focusing on a location behind the leading edge of the plume. If contamination is found at this well site, the information may aid in determining rate of migration.

Plotting a straight line from Benham through ER-20-5#1 provides a general direction of migration, even though it may not be the primary direction of groundwater flow. This alignment does, however, parallel faults mapped at surface to the west of the Benham and Tybo shots, so the CAB believes that this is a reasonable direction to use for well site selection.

Specific Location / Rationale

Siting CAB Well #1 downgradient of ER-20-5#1 seems to be a reasonable approach to intercept contamination. Therefore, the CAB recommends that the well be drilled 800 ft. south of ER-20-5#1 along a line from Benham through well ER-20-5#1, and deep enough to penetrate the Calico Hills Confining Unit, at or near the following coordinates:

N 4, 118,950 / E546,310 / UTM

Recognizing the limitation of siting a well location solely from a topographic map, the CAB believes an arc of five degrees on either side of the reference line, and apexed on ER-20-5#1 should provide sufficient area to locate an acceptable drill site along the ridge. Since containment ponds already exist within this area, well site elevation may make reuse of these ponds possible; however, this cannot be determined from the topographic maps used by the CAB for siting. As long as the adjustment of the well location does not compromise the objective of the well, the CAB is fully supportive of any cost-saving measures, which can be implemented. In the event that no contamination is found at this site, this well would make an effective monitoring well for contamination and would still provide important data; e.g., some indication of rate of flow in the area of concern.

CAB WELL #2

Objective:

The objective of CAB Well #2 is to sample geochemistry and elevation of water and test for potential contamination. This well location is targeted to be downgradient of, and in an approximate line with, ER-20-5#1 and CAB Well #1 within the transition zone between the caldera and the Timber Mountain Bench (Tannenbaum Hills Area).

Background

This well site is problematic due to its proximity to the topographic edge of Pahute Mesa. To identify the initial location, a line was extended from Benham through ER-20-5#1 down to the bench area. The most favorable site to avoid intersecting the Timber Mountain bench is within the blue zone of the attached gravity inversion map (red zones are shallower, progressing to purple which are the deepest zones to bedrock); however, much of this area lies in cliffs and drainages. Two possible locations were identified where topography may allow access to the blue zone, labeled site B and site C. Site C is targeted at N4,116,850 and E545,785 and is the furthest south (7874' from Well ER-20-5#1), but it runs the highest risk that it might still be above the bench since it is close to the green zone. Well ER-EC-1 was drilled in the green zone, and lithology indicates it was above the bench. Site B is targeted at N4,117,345 and E545,910 which may be a better location (6,233' from well ER-20-5#1) according to the geophysics. However, it is located in the bottom of a wash, which may not be topographically accessible. On the other hand, Site A is within the purple zone at N4,118,110 and E546,100, which will definitely still be in the caldera (3,609' from well ER-20-5#1) — but may be north of the transition zone. However, this location could still provide valuable information about water level changes between CAB Well #1 to the north and ER-EC-6 to the south on the bench, which may provide some information on water flow direction. Furthermore, when considering the possible rate of groundwater migration, this location would be favorable for a sentinel well, since contamination could reach this area by 2020.

Specific Location / Rationale

In light of all considerations - particularly the sentinel well characteristics of this site, the CAB recommends that CAB Well #2 be drilled at site A, ~3,600 feet south of the ER-20-5 well cluster, in line with CAB Well #1, at the following coordinates:

N 4,118,110 m / E 546,100 m / UTM

In order to allow optimization of the drill site, the five-degree arc extending from either side of the reference line and apexed on ER-20-5#1 will also apply at this site. However, due to the greater distance from the apex well, the CAB recommends that preference be given to the eastern side of the reference line as this is more in line with the probable direction of groundwater flow, given the orientation of mapped faults and the surface cracks mapped in USGS Open File Report 01-272: *GIS Surface Effects Archive of Underground Nuclear Detonations Conducted at Yucca Flat and Pahute Mesa, Nevada Test Site, Nevada*, 2001, Dennis N Grasso.

CAB Well #2 should also be drilled to a target depth to intersect at least the Calico Hills Confining Unit, which underlies all tests in the Tybo and Benham fault-bounded block. An additional 1,000 - 2,000 feet of depth could provide valuable information for unit correlation if CAB Wells #1 and #2 were drilled to the underlying Bullfrog Confining Unit. However, the sampling integrity of the well and protection of the deeper aquifers (if contaminants are discovered in CAB Wells #1 or #2) could be placed at risk. The CAB believes that such a risk is unwarranted, considering the information gained, and that the first two CAB wells should not be advanced below the Calico Hills Confining Unit.

CAB WELL #3

Objective

The objective of CAB Well #3 is to improve the understanding of the effect of the Thirsty Canyon structure on groundwater flow along the west end of the Timber Mountain Bench.

Background

Early hydrologic work in the western Pahute Mesa area delineated a subsurface structure, but its effect on groundwater flow could not be determined. However, groundwater levels seemed to indicate that it could be a flow path from Pahute Mesa to Oasis Valley. Similarity of groundwater geochemistry suggests that the water beneath Pahute Mesa flows into the Oasis Valley area. During the drilling of the UGTA wells downgradient of Pahute Mesa, three pairs of wells [ER-EC-4 and 2A, ER-EC-6 and 8, and ER-EC-1 and PM-3] were drilled on either side of the structure. However, no attempt was made to actually intersect it. The CAB recognizes that it is extremely difficult to construct a well in a structure of this type. However, the CAB does not believe that the hydrologic character of this structure has been adequately identified and believes that more work should be done in this area.

Well site #3 was selected based on the inverse gravity map created for the Pahute Mesa area. In general, the CAB recommends targeting the blue spot on the gravity inversion map (within the green trough), which lies along the alignment of the Thirsty Canyon structure at the west end of the Timber Mountain Bench. If the bench forms a barrier to southward groundwater flow, this location could provide information related to the direction in which the diverted water could flow. The Thirsty Canyon structure is very deep; therefore, wherever possible, some geophysical method should be employed to refine the well location to increase the probability of intersecting the structure.

Although the scale of the map referenced for this target area is not very detailed, by making a rough approximation of the location of the blue spot, it appears that the target site is in the cliff-enshrouded East fork of the Thirsty Canyon. Topography makes drilling access problematic and potentially very expensive. There is one plateau located to the east that may provide an accessible drill site, but topography could be problematic for this site as well. The CAB Well #3 site is in an area with minimal subsurface information nearby. To ensure that a well is not sited too close to one of the existing ER-EC wells, the CAB plotted the location of the three closest: 1, 2A, and 4. Proposed CAB Well site #3, when shifted east to place it on the plateau, would be located ~9,000 feet west/

southwest of ER-EC-1, ~19,000 ft north/northeast of ER-EC-2A, and ~27,000 ft north-east of ER-EC-4, which is drilled on the west side of the Thirsty Canyon structure. To relocate the site north of Thirsty Canyon to avoid the topographic difficulties may place it upgradient of potential groundwater flow around the bench area. The CAB concluded that further study was needed to determine a practicable drill site for the objective of this well.

In June 2005, the DOE offered to include air photographs of the potential site for CAB Well #3 during a planned air reconnaissance flight in the area. The CAB reviewed copies of these photos in October 2005 and discovered that the terrain - even on the plateau - was too steep to afford reasonable access for a drilling operation. The preferred target area along the intersection of the bench and the Thirsty Canyon structure is located entirely in the extremely rugged east fork of Thirsty Canyon. In the lower reaches of the canyon where access is feasible, some wells have already been drilled.

Specific Location / Rationale

With these considerations in mind, it was originally recommended that CAB Well #3 be drilled at the west end of the Timber Mountain Bench, aligned with the Thirsty Canyon Lineament, on the plateau east of the topographic canyon, with the following specific coordinates:

N 4, 116, 950 m / E 539,220 m / UTM

This was an idealized target site. As explained in the discussion above, further study and refinement was needed to locate the exact position for this well. Considering the new topographic information provided, the CAB wishes to withdraw this proposed site and will reevaluate whether the Thirsty Canyon structure can be targeted upgradient of the original plan and still answer the questions which remain.

CONCLUSIONS

The process of siting a well for the UGTA Project has been an educational and enlightening experience. Technical experts working on the UGTA project have been extremely helpful in providing detailed programmatic information to the CAB for review and have patiently answered even the most simplistic questions. As an example, in November 2005, CAB members were invited to view graphical representations from the UGTA model with technical experts working on the program to address questions generated during the siting study. The CAB has also received briefings on EarthVision, a sophisticated computer mapping tool, and a wide array of maps generated by that program. The CAB would like to continue working with the UGTA technical working group to "fine tune" final site selection for the proposed wells. It is the CAB's desire to see wells sited where they will provide the best information possible but in a cost-effective manner. A great deal of study went into these recommendations and a complete report on the background, process and sources will be forthcoming as an appendix to this initial transmittal.

In a recent meeting to discuss the current proposed well sites, the CAB was encouraged to include other well sites it believes would be beneficial to the UGTA program. In light of this new request, the CAB will make additional recommendations to include “early warning” of potential contaminant migration upgradient of residential communities down stream of the NTS. However, since Well sites #1 and 2 are the highest priorities, there will be no change in those recommendations. Designating a specific location for CAB Well #3 should be deferred at this time to permit additional investigation of geophysical information and to better determine accessibility to the area of interest for purposes of drilling a cost-effective well. We appreciate the cooperative working relationship between the CAB and the UGTA program staff and we are looking forward to this new challenge of recommending additional well sites.

GRAVITY INVERSION MAP

USGS OFR 99-49, Fig. 8

