

**Kulis, Jerzy, NMENV**

From: Kulis, Jerzy, NMENV
Sent: Wednesday, April 06, 2011 4:54 PM
To: 'Everett, Mark C'; Cobrain, Dave, NMENV; Dale, Michael, NMENV
Cc: Ball, Theodore T; Shen, Hai; Woodworth, Lance A; Lynnes, Kathryn D
Subject: RE: R-61 proposed well design

Mark,

This e-mail serves as NMED approval for installation of regional aquifer well R-61 as proposed in the document attached to the original e-mail received by NMED on April 6, 2011 at 2:48 PM. This approval is based on the information available to NMED at the time of the approval. NMED understands that LANL will provide the results of preliminary water-quality sampling, any modifications to the proposed well design, and any additional information related to the installation of well R-61 as soon as such information becomes available. **LANL must notify NMED of well development and aquifer testing at R-61 at least three business days prior to commencing these activities.** LANL shall give notice of this installation to the New Mexico Office of the State Engineer as soon as possible.

Thanks,

Jerzy Kulis
Environmental Scientist
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505-6303
Phone: 505-476-6039
Fax: 505-476-6030

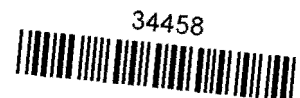
From: Everett, Mark C [mailto:meverett@lanl.gov]
Sent: Wednesday, April 06, 2011 2:48 PM
To: Kulis, Jerzy, NMENV; Cobrain, Dave, NMENV; Dale, Michael, NMENV
Cc: Ball, Theodore T; Shen, Hai; Woodworth, Lance A; Lynnes, Kathryn D
Subject: R-61 proposed well design

Jerzy,

Attached, please find our proposed design for well R-61. Well R-61 is on the mesa to the south of Mortandad canyon near existing well R-50. Please contact me with any questions or concerns. If the proposed design is acceptable, please respond to this e-mail with your concurrence.

Thanks,

Mark Everett, PG
ADEP ET-EI
Los Alamos National Laboratory
(505) 667-5931



Kulis, Jerzy, NMENV

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Subject: R-61 proposed well design
Attachments: R-61 Well Design justification_SW_edits.docx

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R-61 Well Objectives

The R-61 well is intended to further define the southern extent of chromium contamination in the regional aquifer. R-61 is located to intersect potential pathways for chromium migration from the chromium source in the vicinity of R-42 and R-28 that may be more southerly than those sampled at R-44, R-45, and R-50 (Figure 1). Secondary objectives were to sample potential perched groundwater zones, if present, and refine the map of the water table in this area.

The drilling workplan for R-61 called for completion of a monitoring well with two screens in the regional aquifer. The R-61 borehole reached a total depth (TD) of 1266 ft with 12-in. casing. Repeated depth-to-water measurements of 1101 ft have been obtained within the casing.

R-61 Recommended Well Design

It is recommended that R-61 be installed as a two-screen well with a 10-ft stainless-steel, 20 slot, wire-wrapped well screen extending from 1125 ft to 1135 ft bgs and a 20-ft stainless-steel, 20 slot, wire-wrapped well screen extending from 1220 ft to 1240 ft bgs. The depth to top of regional saturation is ~1101 feet (see discussion below). The primary filter packs for each screen will consist of 10/20 sand extending 5 ft above and 5 ft below the screen openings. A 2-ft secondary filter pack will be placed above each primary filter pack. The proposed well design is shown in Figure 2.

This well design is based on the objectives stated above and on the information summarized below.

R-61 Well Design Considerations

Preliminary lithologic logs indicate that the geologic units encountered while drilling the R-61 borehole include the Tshirege Member of the Bandelier Tuff (surface to 270 ft), Otowi Member of the Bandelier Tuff (270-585 ft), Guaje Pumice Bed (580-605 ft), an upper interval of Puye Formation (605-615 ft), Cerros del Rio volcanic series (615-915 ft), a lower interval of Puye Formation (915-1155 ft), and Miocene pumiceous deposits (1155-1265 ft TD). The top of regional saturation is within the Puye Formation.

Perched water was not expected and there were no indications of perched water at R-61. When open borehole drilling was terminated at 896 ft bgs and before 12-inch casing was installed, water was observed standing in the borehole to 830 ft bgs. However, when this water was blown out and the borehole was interrogated over a period of ~6 hours it was observed to be completely dry, indicating that the water observed had been added during drilling. Over the next 40 ft of drilling with casing-advance methods, the borehole was repeatedly circulated and blown dry with no indication of formation water. Perched water does not occur at R-61, consistent with observations in surrounding boreholes (e.g., MCOI-10, MCOBT-8.5, R-50).

Examination of cuttings from the lower interval of the Puye Formation at R-61 indicates typical Tschicoma-derived intermediate volcanic lithologies. The lower 54 ft of the Puye formation is within the zone of regional saturation. There is no indication of clay-rich intervals within the Puye Formation. The upper screen is located at 1125-1135 ft to provide sufficient submergence beneath the top of regional saturation for well development. This places the upper screen at an elevation of ~5810-5820 ft, comparable to screen 1 at R-50 (5817-5827 ft elevation) and to the screen at R-42 (5806-5827 ft elevation).

The deeper screen is located at 1220-1240 ft depth to capture a stratigraphic position in the Miocene pumiceous strata at a depth where driller and site geologist observations suggested an increase in

the rate of water produced from ~10 gpm to 20-30 gpm. The location of this deeper screen is at an elevation of 5705-5725 ft, comparable to screen 2 at R-50 (5698-5719 ft elevation).

At completion of drilling at R-61 the 12-inch casing extended to a TD of 1266 ft bgs. Water production from the regional aquifer was first detected in the range of 1108 to 1128 ft bgs. Initial water level measured on removal of tools from the borehole was 1101 ft bgs. Subsequent measurements of depth to water over a period of two days consistently reproduced this depth to water. The predicted top of regional saturation at this locality was 1103 ft bgs, consistent with observation. A natural gamma log collected after tools were removed from the borehole showed a decrease at 1102 ft bgs consistent with saturation below that depth. Constraints on the top of regional saturation fall within a range of 1101-1102 ft bgs, very consistent with the predicted depth of 1103 ft bgs.

Alternative Design Considerations

Alternatives to the design presented above include screen placements and screen lengths. The upper screen could be moved a few feet higher but the placement shown in Figure 2 allows 17 ft of submergence to the top of the transition sand; raising the screen would decrease the submergence needed for adequate well development. This depth to the upper screen slots also insures full screen submergence as supply wells PM-4 and PM-5 are pumped. Moving the screen down would bring it closer to the transition between Puye Formation fanglomerates and Miocene pumiceous sediments. A 10 ft length for the upper screen allows discrete sampling near the top of the regional aquifer. The upper screen placement as proposed also puts it at an elevation comparable to the upper screen at R-50 (Figure 2).

The lower screen could also be adjusted several feet either up or down in elevation. The placement as shown here puts the screen slots at the top of this screen at the depth (1220 ft bgs) where significant increase in water production was first observed during drilling. The lower screen placement and length as shown also provide a sampling elevation comparable to that of the lower screen at R-50 (Figure 2).

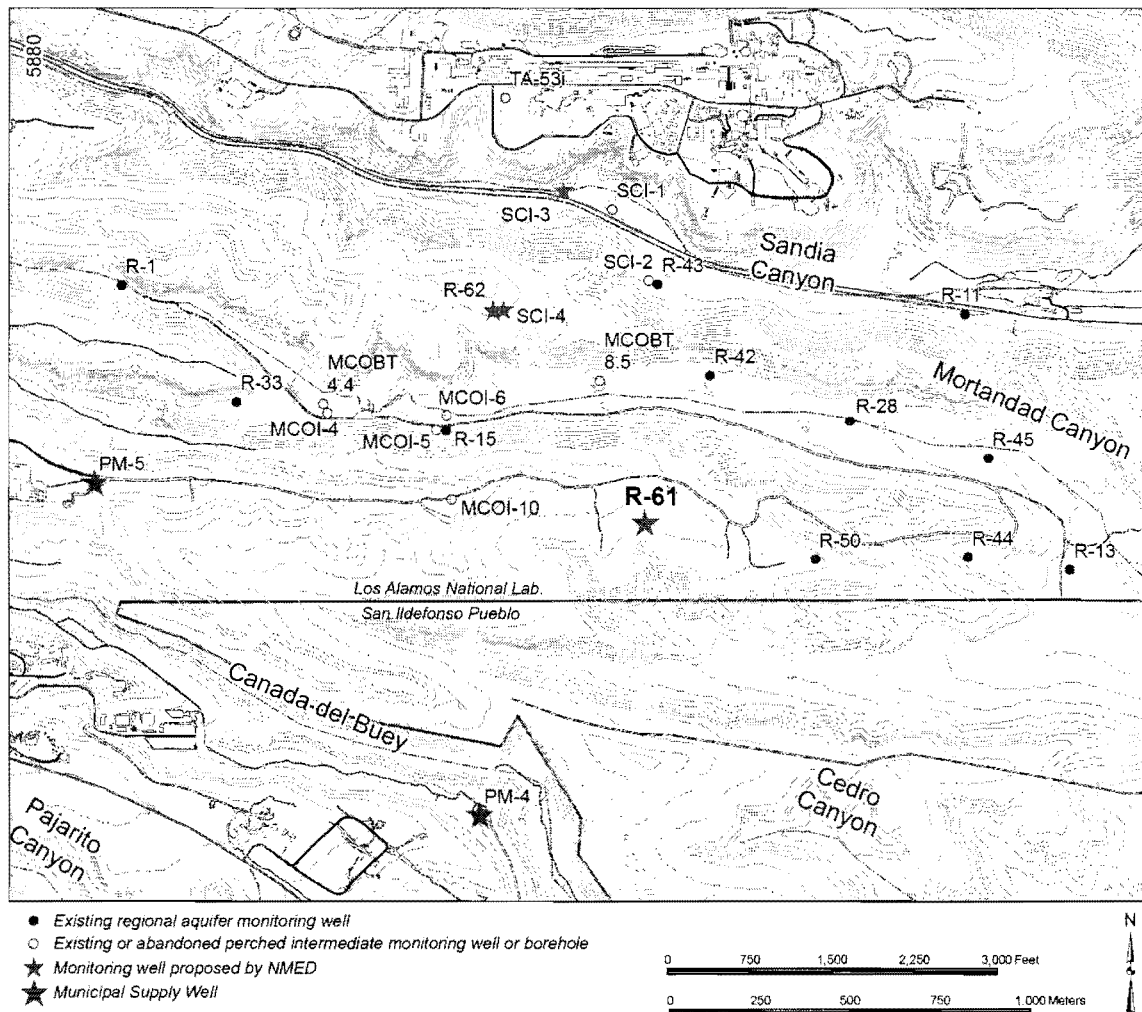


Figure 1: Location map for R-61 relative to nearby regional and intermediate wells and boreholes.

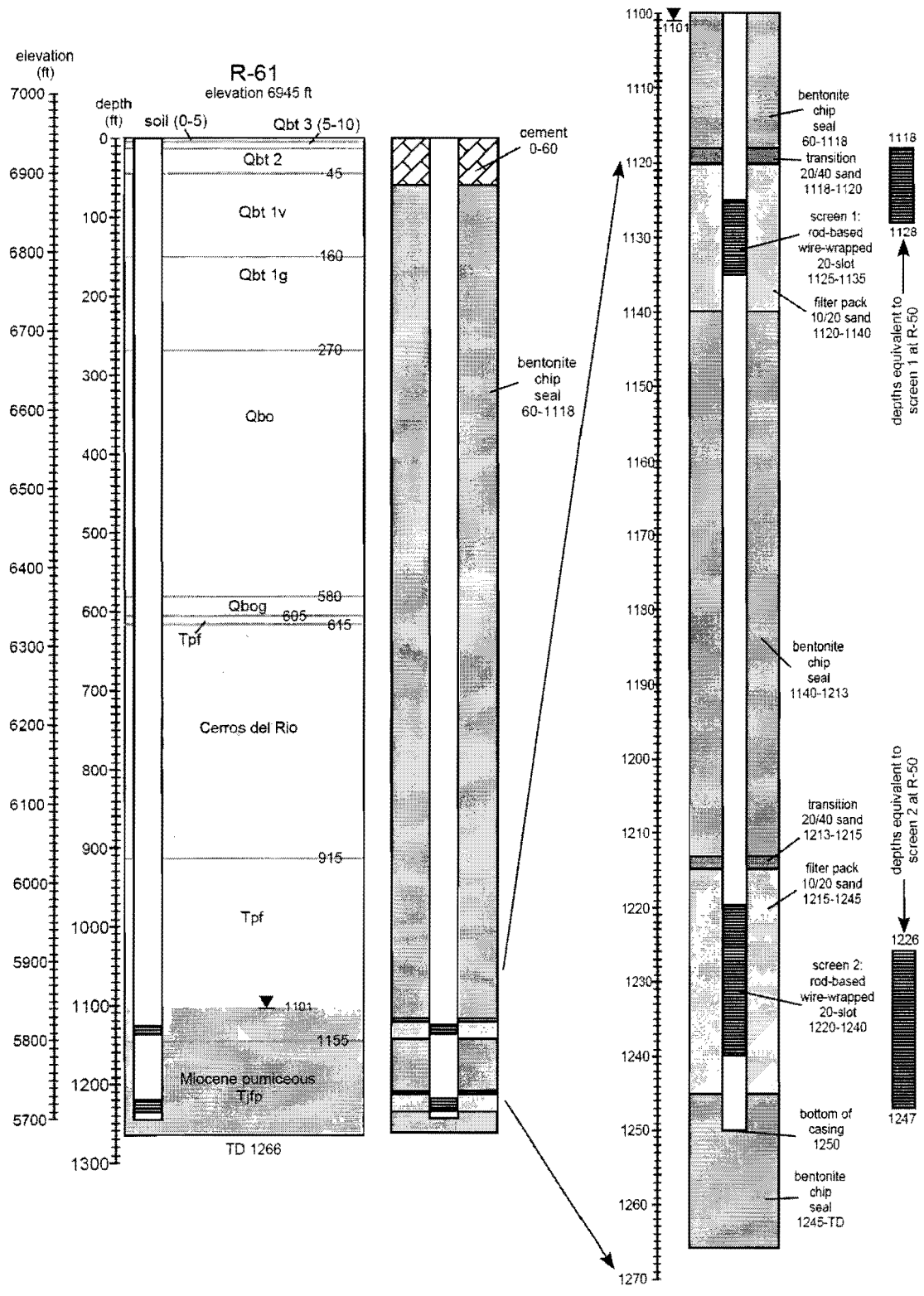


Figure 2. Proposed well design, R-61 (Qbt 3, 2, 1v, 1g = subunits of the Tshirege Member of the Bandelier Tuff; Qbo = Otowi Member of Bandelier Tuff; Qbog = Guaje Pumice Bed, Tpf = Puye Formation; Tjfb = Miocene pumiceous unit beneath the Puye Formation).